ENERGY SAVINGS PLAN FOR ESIP

Swedesboro Woolwich School District, NJ
August 24, 2022

PREPARED FOR

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Honeywell

HONEYWELL PROPRIETARY

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SECTION A
EXECUTIVE SUMMARY

Section A — Executive Summary

Honeywell is pleased to submit this Energy Savings Plan (ESP) for the Swedesboro Woolwich School District (the District). During the development of the Energy Savings Plan, Honeywell has completed a thorough investment grade energy audit of the Swedesboro Woolwich School District buildings and grounds. Based on the audit findings and Honeywell's extensive experience in working with schools, we can confidently state that we can deliver a financially viable, comprehensive solution to address the District's facility concerns and goals. Our Energy Savings Plan includes projects that achieve energy and operational efficiencies, create a more comfortable and productive environment and are actionable via the New Jersey Energy Savings Improvement Program (NJ ESIP) in accordance with NJ PL2012, c.55.

The Energy Savings Plan is the core of the NJ ESIP process. It describes the energy conservation measures that are planned and the cost calculations that support how the plan will pay for itself through the resulting energy savings. Under the law, the Energy Savings Plan must address the following elements:

- The results of the energy audit.
- A description of the energy conservation measures (ECMs) that will comprise the program.
- An estimate of greenhouse gas reductions resulting from those energy savings.
- Identification of all design and compliance issues and identification of who will provide these services.
- An assessment of risks involved in the successful implementation of the plan.
- Identify the eligibility for, and costs and revenues associated with, the PJM Independent System Operator for demand response and curtail-able service activities.
- Schedules showing calculations of all costs of implementing the proposed energy conservation measures and the projected energy savings.
- Maintenance requirements necessary to ensure continued energy savings, and describe how they will be provided; and
- If developed by an ESCO, a description of, and cost estimates of a proposed energy savings guarantee.

The purpose of this document is to provide all the information required for the Swedesboro Woolwich School District to determine the best path forward in the implementation of a New Jersey Energy Savings Improvement Program (ESIP). It is important to note that the Energy Savings Plan provides a comprehensive evaluation of ALL potential ECMs within the Swedesboro Woolwich School District. This is not meant to infer that all the ECMs identified can be implemented. However, if the ECM is part of this plan, it may be implemented later as additional funding becomes available or technology changes to provide for an improved financial return.

Our Energy Savings Plan is structured to clearly demonstrate compliance with the NJ ESIP law, while also presenting the information in an organized manner which allows for informed decisions to be made. The information is divided into the following sections:

A. **Executive Summary** (This Section)

B. **Preliminary Utility Analysis** – The Preliminary Utility Analysis (PUA) defines the utility baseline for the Swedesboro Woolwich School District buildings included in the Energy Savings Plan. It provides an overview of the current usage and a cost per square foot by building of utility expenses. The report also compares the Swedesboro Woolwich School District utility consumption to that of others in the same region on a per square foot basis.

C. **Energy Conservation Measures** – This section includes a detailed description of the ECMs we have selected and identified for your School. It is specific to your facilities in scope, savings methodology and environmental impact. It is intended to provide a basis of design for each measure in narrative form. It is not intended to be a detailed specification for construction. ALL potential ECMs for the Swedesboro Woolwich School District are identified for the purposes of potential inclusion in the program. Final selected ECMs are to be determined by the Swedesboro Woolwich School District in conjunction with Honeywell during the project development phase of the NJ ESIP process.

D. **Technical and Financial Summary** – This section includes an accounting of all technical and financial outcomes associated with the ECMs as presented on the New Jersey Board of Public Utilities Forms II through V. Information detailed on the forms includes projected implementation hard costs, projected energy savings, projected operational savings and projected environmental impact. Form VI: Annual Cash Flow Analysis provides a "rolled-up" view of the overall project financials, inclusive of financing costs, on an annual basis as well as over the entire 15 or 20-year term of the agreement.

E. **Measurement & Verification and Maintenance Plan** – This section identifies the intended methods of verification and measurement for calculating energy savings. These methods are compliant with the International Measurement and Verification Protocols (IMVP), as well as other protocols previously approved by the Board of Public Utilities (BPU) in New Jersey. This section also includes the recommended maintenance requirements for each type of equipment. Consistent maintenance is essential to achieving the energy savings projected in this plan.

F. **Design Approach** – This section includes a summary of Honeywell's best practices for the successful implementation of a NJ ESIP project. It includes a project specific Safety Management Plan and provides an overview of our project management procedure, construction management and a sample schedule for the overall completion of the project. Within the schedule, we clearly define the tasks directed towards compliance with architectural, engineering and bidding procedures in accordance with New Jersey Public Contracts Law.

G. **Appendices 1 to 4** – Please refer to the Teams room for the following documents:

- Honeywell – Appendix 1 — LOCAL GOVERNMENT ENERGY AUDITS
- Honeywell – Appendix 2 — ECM CALCULATIONS
- Honeywell – Appendix 3 — EQUIPMENT CUT SHEETS
- Honeywell – Appendix 4 — LIGHTING LINE BY LINES

Benefits

The measures investigated in this Energy Savings Plan could result in an annual utility savings of 1,668,369 kWh of electricity and save 9,255 therms of natural gas. Additionally, these energy savings will result in a net reduction of greenhouse gases and will reduce the district's carbon footprint by 545 MTE of CO_2 annually. This is equivalent to removing 115 cars from the road annually and /or 516 forested acres per year. All these savings are achieved while improving the classroom environment and renewing many items that have been in service beyond useful life expectancy.

In accordance with the NJ ESIP process, the next step in the project development phase is for Honeywell to provide our recommendations and for the Swedesboro Woolwich School District to select the desired content of the project based upon the Swedesboro Woolwich School District unique goals and objectives. The selections will consider the projected costs, projected energy and operational savings, available financing options at the time of the agreement, interest rates, length of term and Swedesboro Woolwich School District priorities, which will all play a part in the final selection and cash flow of ECMs. The definitive requirement under NJ PL2012, c.55 is that the project is self-funding within the 15 or 20-year term as outlined in the legislation.

Overall, it is evident that the Swedesboro Woolwich School District is well positioned to implement a program that will upgrade your facilities, while funding itself within the requirements of the law and with zero impact on your taxpayer base. We welcome this opportunity to partner with the Swedesboro Woolwich School District to improve the comfort and efficiency of your facilities through the successful implementation of this Energy Savings Plan.

Sincerely,

Caroline Jackson,

Senior Business Consultant

SECTION B
PRELIMINARY UTILITY ANALYSIS

Section B – Preliminary Utility Analysis

Honeywell

Preliminary Utility Analysis

Swedesboro Woolwich SD
Swedesboro, NJ

Helping customers manage energy resources to improve financial performance

Executive Summary

Honeywell would like to thank you for the opportunity of providing you with this Preliminary Utility Analysis. A one year detailed billing analysis was completed for all utility data provided by your staff. The facility's electric and gas consumption were compared to a benchmark of typical facilities of similar use and location. It should be noted however, that some of Buildings which make up the benchmarking standards are not equipped with mechanical cooling (air conditioning). Therefore, these buildings may unjustly appear to be less efficient in comparison.

Through our Energy Services offerings, Honeywell's goal is to form a long term partnership for the purpose of meeting your current infrastructure needs by focusing to:

- Improve Operational Cost Structures
- Ensure Satisfaction
- Upgrade Infrastructure While Reducing Costs
- Meet Strategic Initiatives
- Leverage Teamwork
- Pursue Mutual Interests
- Provide Financing Options

How does it work?

Under an energy retrofit solution, Honeywell installs new, energy efficient equipment and optimizes your facility, as part of a multi-year service contract. Most of these improvements are cost-justified by energy and operational savings. Some of the energy conservation measures provide for a quick payback, and as such, would help offset other capital intensive energy conservation measures such as, boilers, package rooftop units, domestic hot water heaters, etc. The objective is to provide you with reduced operating costs, increased equipment reliability, optimized equipment use, and improved occupant comfort.

After review of the utility analysis, you can authorize Honeywell to proceed with the development of a detailed engineering report. The report development phase allows Honeywell to prepare an acceptable list of proposed energy conservation measures, which are specific to the selected facility. Some examples of typical Energy Conservation Measures include:

- Lighting
- Control Systems
- Boilers
- AC Units/Condensers
- Building Enevelope
- Package Rooftop Units
- Domestic Hot Water Heaters
- Plug Load Management

Why Honeywell?

- Honeywell is one of the world leaders in providing infrastructure improvements
- With Honeywell as your building partner, you gain the advantage of more than 115 years of leadership in building services
- Honeywell has the infrastructure and manpower in place to manage and successfully implement your project
- Honeywell has over 30 years experience in the energy retrofit marketplace with over $5 Billion in customer energy savings
- Honeywell provides you with "Single Source Responsibility" - from Engineering to Implementation, Servicing and Financing (if desired)

Energy Benchmarking

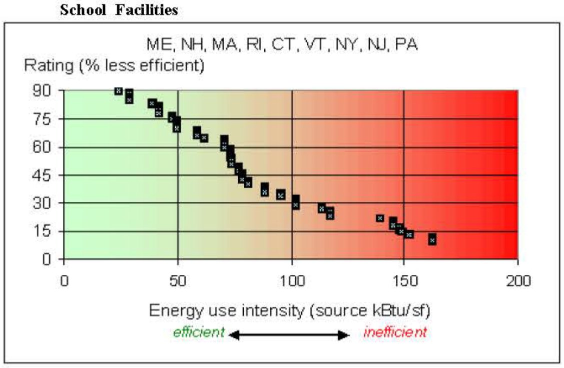
The calculation of EUI (Energy Use Intensity) is shown below. EUI, expressed in kBtu/sf, is normalized for floor area, the most dominant influence on energy use in most buildings. Its use usually provides a good approximation of how your building's energy performance compares to others. Site EUI indicates the rate at which energy is used at your building (the point of use). Source EUI indicates the rate at which energy is used at the generation sources serving your building (the point of source) and indicates the societal energy penalty due to your building The lower the EUI, the higher the rating, indicating that the building is more efficient than other buildings. The greater the EUI, the lower the rating, indicating that there is an opportunity for higher potential benefits from operational improvements.

The Source EUI below has been applied to a Department of Energy statistical model from the Oak Ridge National Laboratory. The Department of Energy has estimated energy use and cost reductions for building source EUI ratings (percentiles) in the table below. Please see the DOE Regional Source EUI Comparison graph below to rate your building in relation to the regional distribution of similar type buildings. (Note: The Source EUI includes the inefficiencies of electrical generation and transmission. A reduction in 'electrical' source EUI includes a benefit in terms of reduction of air pollution emissions and green house gases, and is thus an indicator of societal benefit.)

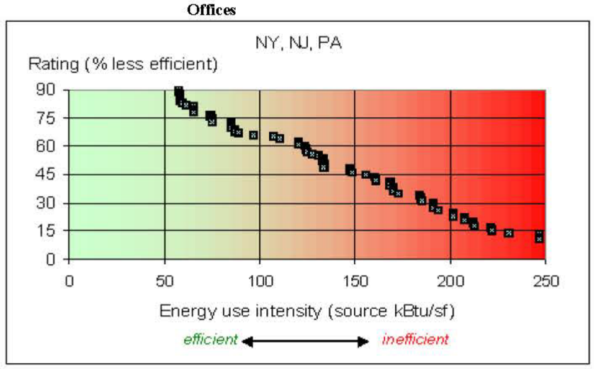
Source EUI Rating for your Building	Energy use and cost reduction potential (%)	Walk-thru energy assessment recommended?
above 60%	below 25%	No
40 to 60%	20 to 35%	Maybe
20 to 40%	35 to 50%	Yes
Below 20%	above 50%	Definitely

Site EUI Rank		Annual Total Electrical Use (kWh)	Annual Total Non-Electrical Fuel Use (Therms)	Building Gross Floor Area (sq-ft)	Site EUI Rating	Source EUI: Annual Total Source Energy Use per Sq-Ft (kBtu/sf)	Rating (Regional Source EUI Comparison)
1	Charles G. Harker School	848,882	29,612	100,748	58	117	25%
2	Gov. Charles C. Stratton School	742,879	16,800	90,274	47	104	28%
3	Margaret C. Clifford School	452,709	9,392	45,424	55	124	20%
4	Walter Hill School	567,786	11,378	71,374	43	98	30%
		2,612,256					

School Facilities



Offices



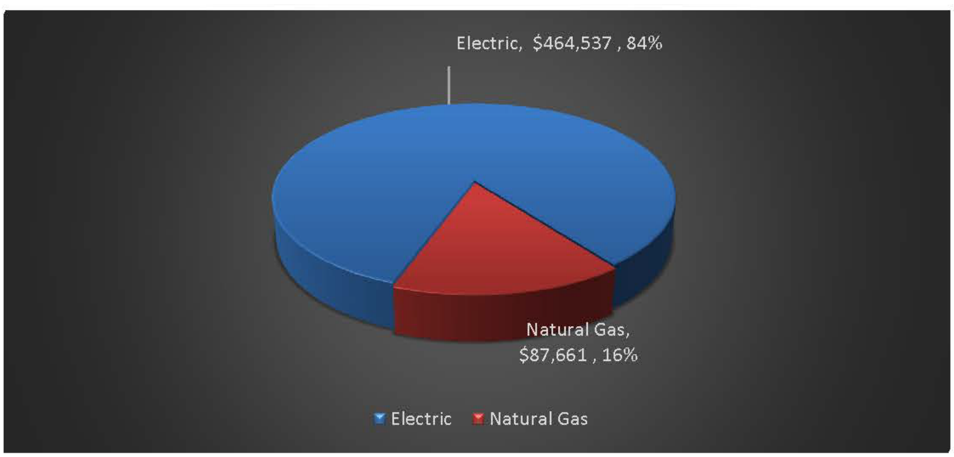
Historical Summary

Utility Analysis Period:
September 2020 - August 2021

	Electric	Natural Gas
Utility Costs*	$464,537	$87,661
Utility Usage (kWh, Therms)	2,612,256	67,182
$ Cost/Unit (kWh, Therms)	$0.17783	$1.305
Annual Electric Demand (kW)	12,181	

* Costs include energy and demand components, as well as taxes, surcharges, etc.

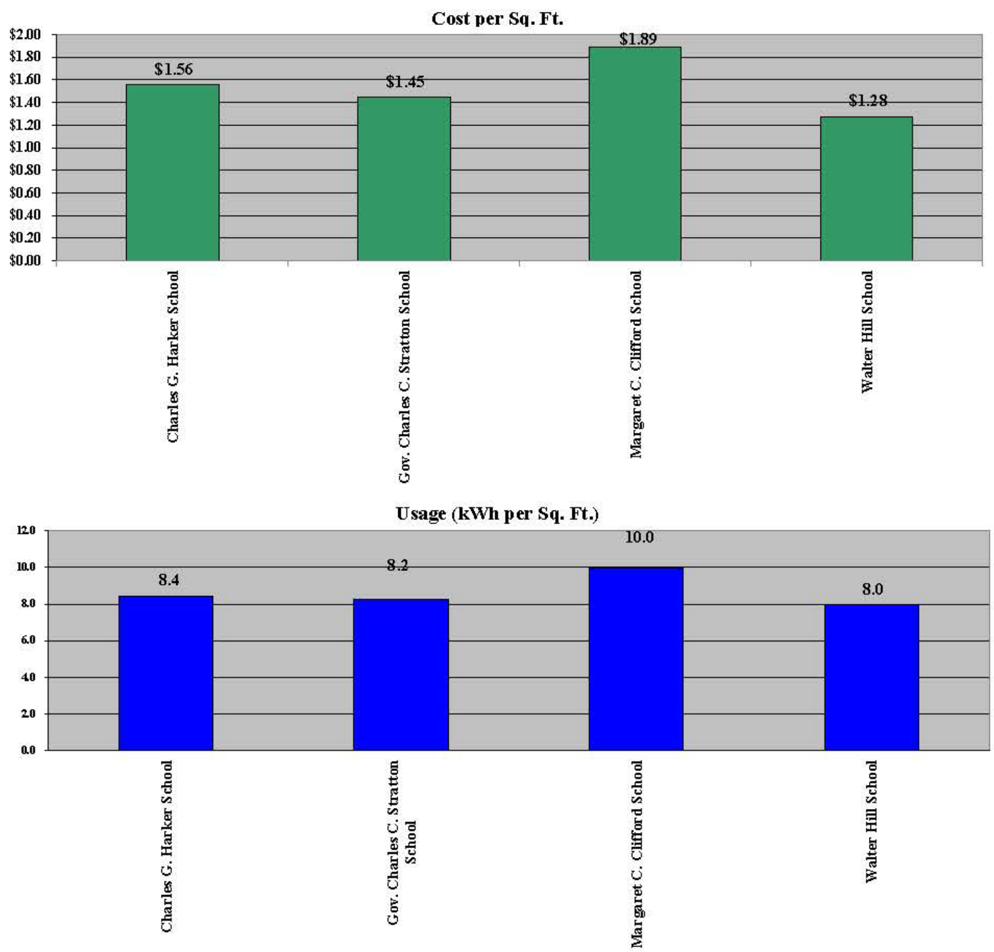
Actual Cost by Utility
September 2020 - August 2021



Total Cost
$552,198

Utility Analysis
Electric

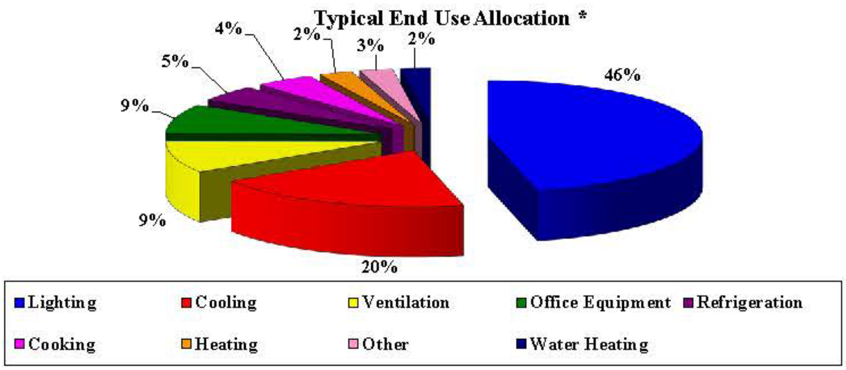
Square Footage Analysis



Note: Average kWh/SF for School buildings in this climate zone is 9.0

Electric

Sources of Electric Consumption

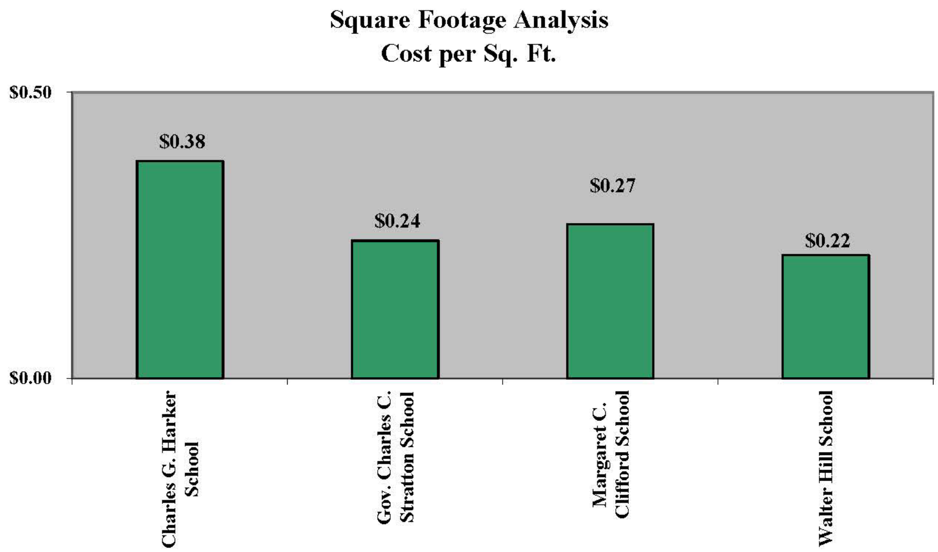


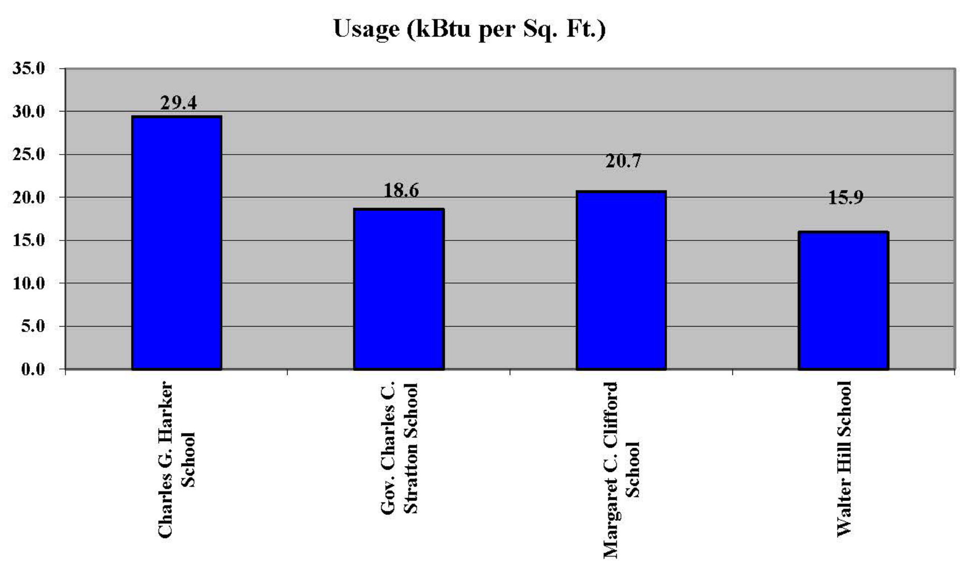
**This allocation is generic and is not a representation of the actual end use in your buildings included in this report.

Typical Allocation Applied to Your Electric Cost**

	Lighting	$215,081
	Cooling	$91,049
	Ventilation	$42,737
	Office Equipment	$39,950
	Refrigeration	$21,833
	Cooking	$20,440
	Heating	$11,613
	Other	$11,613
	Water Heating	$10,220
Your Total Cost	**September 2020 - August 2021**	**$464,537**

Utility Analysis
Natural Gas

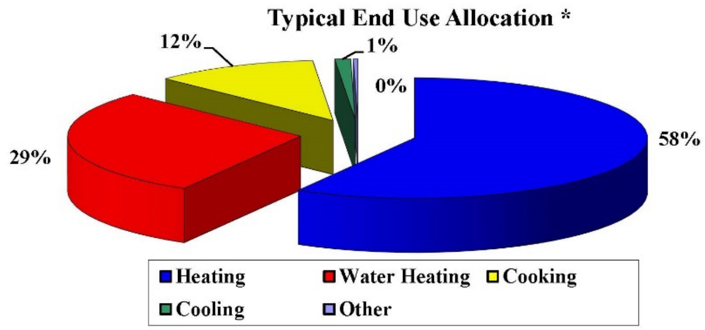




Note: Average kBTU/SF for School buildings in this climate zone is 46.1

Utility Analysis
Natural Gas

**Sources of Usage
Natural Gas**



**This allocation is generic and is not a representation of the actual end use in your buildings included in this rep

Typical Allocation Applied to Your Cost
Natural Gas**

	Heating	$51,106
	Water Heating	$25,334
	Cooking	$9,993
	Cooling	$964
	Other	$263
Your Total Cost	**September 2020 - August 2021**	**$87,661**

Annual Emissions & Environmental Impact

Swedesboro Woolwich SD

September 2020 - August 2021

Based on the US Environmental Protection Agency -
Greenhouse Gas Equivalencies Calculator
http://www.epa.gov/cleanenergy/energy-resources/calculator.html

The following energy usage, cost and pollution have been quantified:

Total Annual Electric usage	2,612,256	kWh
Annual Natural Gas usage	67,182	Therms

Electric Emissions	
0.00070742	MTeCO_2 per kWh saved
Natural Gas Emissions	
0.05302541	MTeCO_2 per MMBtu saved
Equillivent Cars	
0.214132762	Cars/ 1MTeCO2
Forrested Acres	
1.3063142	Forested Acres Factor/ 1MTeCO2

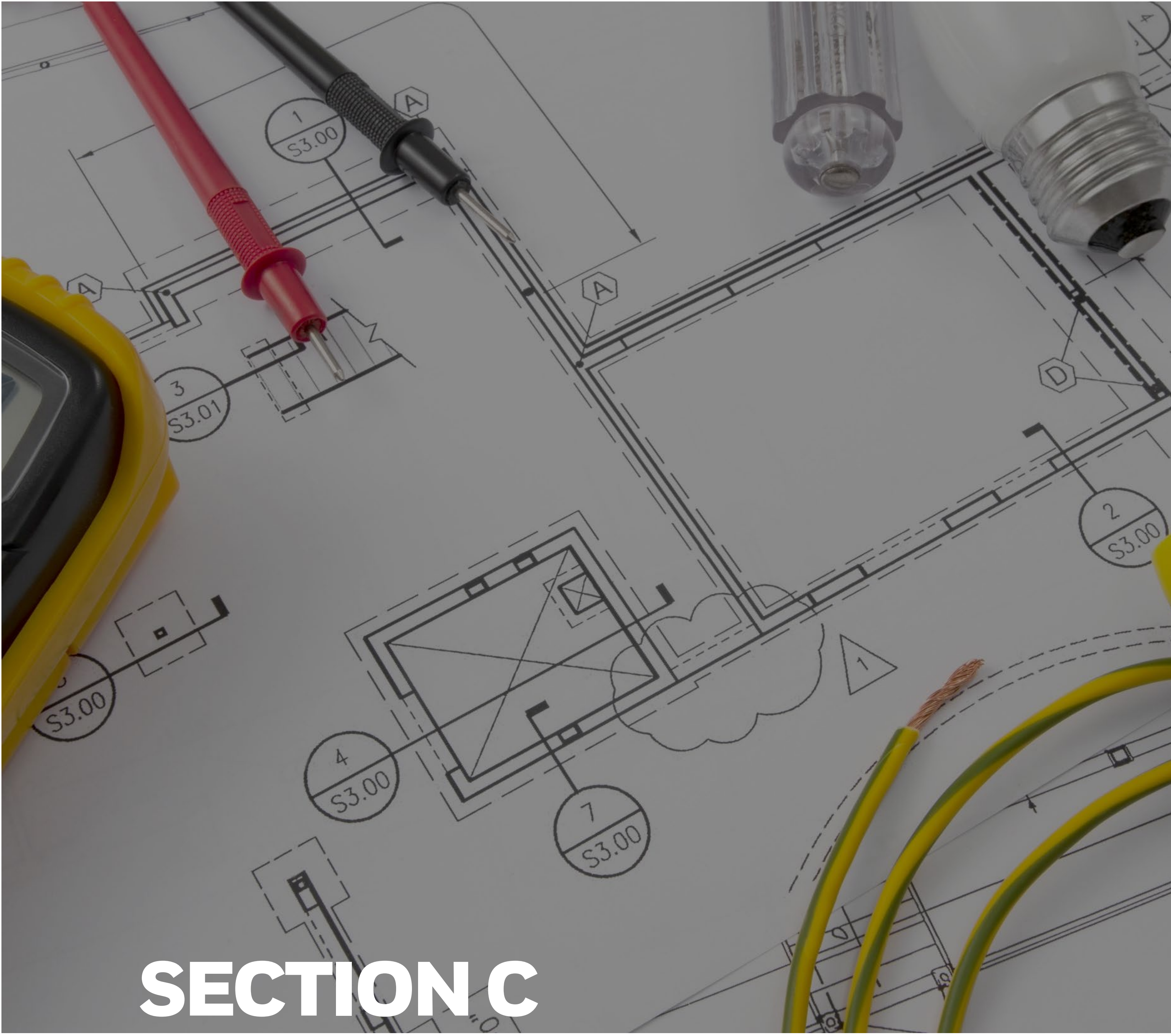
Annual Greenhouse Gas Emissions (Metric tons of equivalent of CO2)		
eCO2 (Electric)	1,848	MT
eCO2 (Gas)	354	MT
Total eCO2	2,202.197	MT

This is equivalent to one of the following:	
475	No. of passenger vehicles - annual greenhouse gas emissions
2877	No. of acres of U.S. forests - carbon sequestered annually

Honeywell

Potential Retrofits

Retrofit Description	Utility/Fuel Type	Common Recommendations for Action
Lighting Retrofit and Motion Sensors	Electric/Natural Gas	Upgrade lighting and lighting controls
De-Stratification Fans	Electric/Natural Gas	Redistribution of Conditioned Air
Boiler Replacement	Natural Gas	Install high efficient, modular, condensing boilers
DHW Boiler/Tank Replacements	Electric/Natural Gas	Higher Efficiency Units
RTU Replacements	Electric/Natural Gas	Higher Efficiency Units
Building Management System Upgrades	Electric/Natural Gas	Reduce equipment run-time and provide better comfort
Building Envelope Improvements	Electric/Natural Gas	Reduce building leakage
Roof Replacements	Electric/Natural Gas	Reduce building leakage
Computer Controllers	Electric	Put computers to sleep when building is unoccupied
Install Premium Efficient Motors/Variable Frequency Drives	Electric	Provide more efficient motors and variable frequency drives
Transformer Replacements	Electric	Provide more efficient transformers with reduced amounts of excess heat to the spaces
Water Thermal Conservation	Natural Gas	Lower water thermal consumption



SECTION C
ENERGY CONSERVATION MEASURES

Section C – Energy Conservation Measures

Introduction

The information used to develop this section was obtained through the independent energy audit building surveys to collect equipment information, interviews with operators and end users, and an understanding of the components to the systems at the sites. The information obtained includes nameplate data, equipment age, condition, the system's design and actual load, operational practices and schedules, and operations and maintenance history. Honeywell has done a review of the Energy Conservation Measures (ECMs) which would provide energy and cost savings the District. This report aims to be an assessment of the feasibility and cost effectiveness of such measures, and an indication of the potential for their implementation. The ECMs listed below have been reviewed throughout your facilities for consideration within a complete Energy Savings Plan. What follows is a general description of the energy auditing process and the detailed descriptions of the ECMs for your facilities.

ECM Description	Charles G. Harker School	Governor Charles C. Stratton School	Margaret C. Clifford School	Walter Hill School
1A LED Lighting Upgrades	■	■	■	■
1B De-Stratification Fans w/ UV Disinfection	■	■	■	■
1C Vending Misers & Plug Loads	■	■	■	■
2A Boiler Replacements		■	■	■
2B Multipurpose Room Floor Replacement		■		■
2C Domestic Hot Water Heater Replacement	■	■		■
2D Rooftop Unit Replacement	■	■		■
2E Cooling Tower Replacements		■		■
2F Heat Pump Replacement		■	■	■
2G Premium Efficiency Motors and VFDs	■	■	■	■
2H Kitchen Hood Efficiency Improvements	■	■	■	■
2I Walk-In Compressor Controls	■	■	■	■
3A Building Management System Upgrades	■	■	■	■
3B BMS Dashboard - Energy Optimization	■	■	■	■
4A Building Envelope Improvements	■	■	■	■
4B Roofing Upgrades	■	■	■	■
5A Permanent Load Reduction	■	■	■	■
6A Transformer Replacement		■	■	■
7A Cogeneration CHP	■			
8A Solar PPA	■	■	■	■
9A Energy Education	■	■	■	■
10A Sustainable Transportation - EV Chargers	■	■	■	■
11A Digital School Kiosks	■	■	■	■

ECM 1A LED Lighting Upgrades

The key benefits of this ECM include:

- **Energy Savings** from reducing total energy consumption with more efficient, state of the art technology. Today's most efficient way of illumination and lighting has an estimated energy efficiency of 80%-90% when compared to traditional lighting and conventional light bulbs. Lighting controls reduce or eliminate reliance on occupants or staff to turn lights off when spaces are unoccupied by automatically turning lighting fixtures off thereby reducing electrical energy consumption.
- **Improved Teacher And Student Performance** from enhanced lighting quality that translates to an enhanced learning working environment.
- **Improved Equipment Longevity** by reducing amount of light usage and extending the useful life of your lighting system. LED bulbs and diodes have an outstanding operational lifetime expectation of up to 100,000 hours. This is 11 years of continuous operation, or 22 years of 50% operation. Operational savings in terms of bulb and ballast replacement are significant based on this technology.
- **Reduced Maintenance And Operational Costs** by modernizing your lighting system, reducing the runtime of lighting system and components, and providing for longer lasting and technologically advanced lights, without the need to address deficient or bad ballasts.
- **Ecologically Friendly** LED lights are free of toxic chemicals. Most conventional fluorescent lighting bulbs contain a multitude of materials like mercury that are dangerous for the environment. LED lights contain no toxic materials and are 100% recyclable and will help to reduce carbon footprint by up to a third. The long operational lifetime span mentioned above means also that one LED light bulb can save material and production of 25 incandescent light bulbs. A big step towards a greener future!

ECM Description	Charles G. Harker School	Governor Charles C. Stratton School	Margaret C. Clifford School	Walter Hill School
1A LED Lighting Upgrades	▪	▪	▪	▪

EXISTING CONDITIONS

Indoor lighting predominantly consists of fluorescent T-8 lamps, with a smaller quantity of other fixtures such as compact fluorescent lamps (CFLs), incandescent bulbs, and high-intensity discharge (HID) lighting.

SCOPE OF WORK

The proposed lighting system is based on the recent investment grade lighting system audit where existing lighting systems were analyzed and inventoried. Honeywell proposes to retrofit all existing fluorescent fixtures with high efficiency Light Emitting Diode (LED) lamps.

The district will receive many benefits from the lighting system upgrade.

Existing Lighting at Walter Hill School

Existing Lighting at Charles G. Harker School

LED OUTDOOR LIGHTING UPGRADES

EXISTING CONDITIONS

The District has various types of High Intensity Discharge (HID) light fixtures and older LED fixtures, which are not as efficient as modern LED types. Parking lot and building exterior lights consist of pole mounted shoe-box type and wall pack HID fixtures.

SCOPE OF WORK

The exterior wall-packs and pole-mounted shoebox fixtures are currently high wattage HID lamps. These will be replaced with lower wattage LED fixtures. The LED technologies offer significant advantages such as extended lamp life, minimal lumen depreciation, "instant on" and very high energy conversion efficiency. These fixtures will provide substantial maintenance savings via the new 100,000-hour LED lamp life versus the 20,000 hours of the existing metal halide lamps.

CHANGES IN INFRASTRUCTURE

New LED lamps and fixtures will be installed as part of this ECM. Existing poles and shoe box fixtures will be utilized where possible.

CUSTOMER SUPPORT AND COORDINATION WITH UTILITIES

Coordination efforts will be needed to reduce or limit impact to building occupants.

ENVIRONMENTAL ISSUES

Resource Use	Energy savings will result from reduced electric energy usage. A slight increase in heating energy is resultant from the reduced heat output of more efficient lamps.
Waste Production	All lamps and ballasts that are removed will be properly disposed.
Environmental Regulations	No environmental impact is expected.

ECM 1B De-Stratification Fans w/ UV Disinfection

The key benefits of this ECM include:

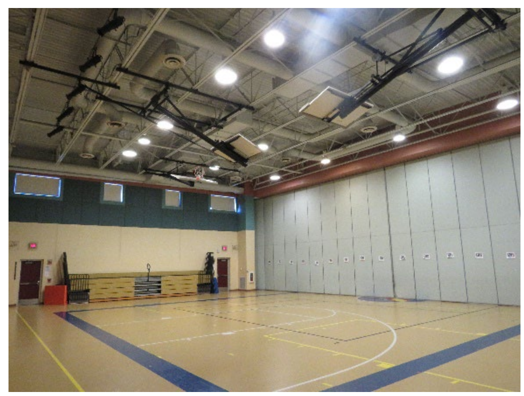
- **Improved Efficiency And Energy Savings** through more equal distribution of conditioned air space.
- **Equipment Longevity** due to lower utilization of equipment to condition air.
- **Increased Comfort** of students and teachers.

ECM Description	Charles G. Harker School	Governor Charles C. Stratton School	Margaret C. Clifford School	Walter Hill School
1B De-Stratification Fans w/ UV Disinfection	▪	▪	▪	▪

EXISTING CONDITIONS

Warm air stratifies close to the ceiling in high ceiling areas such as in a gymnasium or auditorium. Elevated levels of heat transfer through the high walls and roof causes elevated heat loss.

Charles G. Harker School Gym



Governor Charles C. Stratton School Multi-purpose Room

PROPOSED SOLUTION

In areas with 20+ foot ceiling heights, there is approximately a 15°F+ temperature difference between the floor and the ceiling. With higher ceilings, it is even greater. That means to generate the heat necessary to maintain a comfortable 70°F temperature at the floor level, where student activities occur, the ceiling could be 85°F or higher.

De-stratification fans even out the air temperature to a zero to 3°F differential from floor to ceiling and wall to wall. This will allow HVAC systems to run for a shorter duration because of the absence of extreme temperatures to heat or cool, thus allowing the local thermostats to be satisfied for longer periods of time.

Systems Evaluation and Selection

An energy-efficient motor drives a near-silent fan that forces a column of hotter air from the ceiling to the cooler floor below. As this column of warm air nears the floor, it begins to flare out in a circular pattern and rise again creating a torus. While doing so, it warms the cooler air and mixes with air near the floor, increasing the temperature and comfort of occupants. Through a natural law of physics, this torus will continue to re-circulate air, mixing warmer air from the ceiling with cooler air near the floor until the ceiling and air temperatures are nearly equal. As this happens, it will require less and less energy to comfortably heat the work area, allowing thermostats to be lowered and energy savings to be realized. Once started, the entire process of "thermal equalization" will take on average less than 24 hours.

Airius PureAir Series is an air purification and airflow circulation fan system, incorporating the latest in PHI (Photohydroionization) Cell technology to efficiently and effectively neutralize up to 99% of all harmful germs, bacteria, viruses, mold and other contaminants in any internal environment. The PHI Cell emits 'Ionized Hydroperoxides', a naturally occurring cleaning agent, which are circulated throughout spaces via the fan. As the fans continue to circulate internal atmosphere, the PHI circulates its neutralizing Ionized Hydroperoxides, providing 24/7 continuous Air Purification. The PureAir also provides all the features and benefits of the world's most popular destratification and airflow circulation fan, balancing temperatures, improving comfort, reducing heating and cooling costs and reducing carbon emissions.

Based on preliminary site investigation conducted by our staff, we propose to install the de-stratification fans as indicated in the table below.

Table 1. Proposed De-Stratification Fans

Building	Location	Airius Model	Qty Pure Air	Qty Air Pear
Charles G. Harker School	Cafetorium	(3) S-25-SP-SH-120-W & (3) S-25-SP-SH-120-W-PHI	3	3
Governor Charles C. Stratton School	Multipurpose Room	(4) A-25-SP-STD-120-W & (3) A-25-SP-STD-120-W-PHI	3	4
Margaret C. Clifford School	Multipurpose Room	(2) A-45-P4-STD-120-w & (1) A-45-P4-STD-120-W-PHI	1	2
Walter Hill School	Multipurpose Room	(3) A-25-SP-STD-120-W & (3) A-25-SP-STD-120-W-PHI	3	3
Charles G. Harker School	Gym	(4) A-25-SP-STD-120-W & (3) A-25-SP-STD-120-W-PHI	3	4
TOTAL			**13**	**16**

SCOPE OF WORK

Per De-Stratification Fan:

- Shut off the main electric power to the area in which the unit(s) will be installed.
- Install new de-stratification fan and wiring.
- Re-energize.
- Inspect unit operation by performing electrical and harmonics testing.

EQUIPMENT INFORMATION

Manufacturer and Type	Several quality and cost-effective manufacturers are available. The District and Honeywell will determine final selections.
Equipment Identification	As part of the ECM design and approval process, specific product selection will be provided for your review and approval.

CHANGES IN INFRASTRUCTURE

New de-stratification fans will be installed as part of this ECM.

CUSTOMER SUPPORT AND COORDINATION WITH UTILITIES

Coordination efforts will be needed to reduce or limit impact to building occupants.

ENVIRONMENTAL ISSUES

Resource Use	Energy savings will result from reduced thermal energy usage. A slight increase in electrical energy is resultant from the operation of the fan motors.
Waste Production	Proper disposal of any waste generated.
Environmental Regulations	No environmental impact is expected.

ECM 1C Vending Misers & Plug Loads

The key benefits of this ECM include:

- **Energy Savings** by better managing the power consumption of electrical equipment.
- **Longer Equipment Life** thanks to reduced usage.

ECM Description	Charles G. Harker School	Governor Charles C. Stratton School	Margaret C. Clifford School	Walter Hill School
1C Vending Misers & Plug Loads	■	■	■	■

EXISTING CONDITIONS

Multiple vending machines were observed in various buildings. As such, Honeywell has investigated the use of vending machine misers for these areas. Vending machines are located throughout multiple buildings offering soft drinks and snacks to the occupants. A typical cold drink machine consumes over 5,000 kWh annually.

Vending Machines at Charles G. Harker School

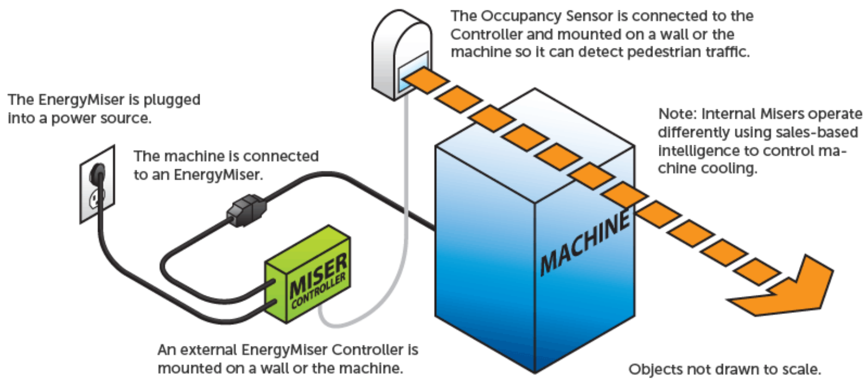
Vending Machines at Walter Hill School

PROPOSED SOLUTION

During the site visit, Honeywell noted vending machines providing an opportunity for energy savings by shutting off non-critical loads during the non-occupied periods.

The Vending Miser Occupancy Control (VMOC) also monitors electrical current used by the vending machine. This ensures that the unit will never power down a vending machine while the compressor is running, so a high head pressure start never occurs. In addition, the current sensor ensures that every time the vending machine is powered up, the cooling cycle is run to completion before again powering down the vending machine. The Coca Cola Company and Pepsi Corporation approve the proposed controller for use on their machines.

Vending Miser Controller



Vending Miser Operation

Table 2. Proposed Vending Machines for Vending Miser Controls

Building	Type	Manufacturer	Qty
Governor Charles C. Stratton School	Break Room	Cold Beverage	1
Governor Charles C. Stratton School	Break Room	Snack	1
Charles G. Harker School	Break Room	Cold Beverage	1
Charles G. Harker School	Break Room	Snack	1
Margaret C. Clifford School	Lounge	Snack	1
Walter Hill School	Lobby	Cold Beverage	1
Walter Hill School	Lobby	Snack	1
TOTAL			**7**

SCOPE OF WORK

Interface with Existing Equipment. All the VMOC devices are easily installed. The vending machine controllers are installed separately from the machine, and implementation will occur during working hours. A period of three (3) weeks will be required to verify proper calibration of the sensors. With respect to the vending machines in the various buildings, Honeywell has estimated the number and types of vending machines based on our site tour. During the implementation phase, Honeywell will check with the vendor about the type and specification of the vending machines as it relates to any internal time clocks which may exist inside the machine. Should this be the case, the savings and cost will be adjusted accordingly.

EQUIPMENT INFORMATION

Manufacturer and Type	Several quality and cost-effective manufacturers are available. The District and Honeywell will determine final selections.
Equipment Identification	As part of the ECM design and approval process, specific product selection will be provided for your review and approval.

CHANGES IN INFRASTRUCTURE

New vending machine controls will be installed as part of this ECM

CUSTOMER SUPPORT AND COORDINATION WITH UTILITIES

Minor support will be required for the interruption of utilities for brief tie-in periods. Continuity of service must be maintained for the customer.

ENVIRONMENTAL ISSUES

Resource Use	Energy savings will result from reduced electric energy usage.
Waste Production	Proper disposal of any waste generated.
Environmental Regulations	No environmental impact is expected.

ECM 2A Boiler Replacements

The key benefits of this ECM include:

- **Reduced Energy Usage** from improved boiler efficiency resulting from replacement of older equipment, and in certain instances, oversized boilers.
- **Lower Operational Costs** through less frequent maintenance and operational issues.

ECM Description	Charles G. Harker School	Governor Charles C. Stratton School	Margaret C. Clifford School	Walter Hill School
2A Boiler Replacements		■	■	■

EXISTING CONDITIONS

Some boilers within the Swedesboro Woolwich School District are near or past the end of their useful life and are less efficient compared to new boilers. Some existing boilers can be replaced with high efficiency condensing boilers.

Governor Charles C. Stratton School - Boiler

Margaret C. Clifford School - Boiler

EXISTING BOILERS TO BE REPLACED

Table 3. Existing Boilers

Building	Type	Manufacturer	Model	Output (MBH)	Fuel	Qty
Governor Charles C. Stratton School	Hot Water	Smith	28A-S/W-10	2,498	NG	2
Margaret C. Clifford School	Hot Water	P-K Thermific	N-1500-2	1,275	NG	2
Walter Hill School	Hot Water	Smith	28A-S/W-07	1,699	NG	2

PROPOSED SOLUTION

It is recommended that the boilers listed in the table above be replaced with boilers operating at higher efficiency as provided in table below. New condensing hot water boilers have thermal efficiencies that range from 88% – 95% depending on the return hot water temperature from the heating loop. With proper design, it is typical to see thermal efficiencies of around 92%. Thermal efficiency is only one part of the equation that makes up the seasonal efficiency of a boiler.

New boiler sizes and quantities will be based on the heat load of the building with redundancy, taking into account the existing system sizing and level of redundancy.

Table 4. Proposed Boilers

Building	Type	Manufacturer	Model	Capacity (MBH)	Fuel	Qty
Governor Charles C. Stratton School	Hot Water	AERCO	BMK-1000	1,000	NG	3
Margaret C. Clifford School	Hot Water	AERCO	BMK-1500	1,500	NG	2
Walter Hill School	Hot Water	AERCO	BMK-1000	1,000	NG	3

SCOPE OF WORK

The following outlines the boiler replacement:

1. Disconnect gas back to shutoff valve and electric back to source panelboard.
2. Remove existing boilers.
3. Install new boilers.
4. Connect gas and heating hot water appurtenances to new boilers.
5. Terminate and power new boiler electric circuiting.
6. Start up, commissioning, and operator training.

ENERGY SAVINGS METHODOLOGY AND RESULTS

In general, Honeywell uses the following approach to determine savings for this specific measure:

Existing Boiler Efficiency	= Existing Heat Production/ Existing Fuel Input
Proposed Boiler Efficiency	= Proposed Heat Production/ Proposed Fuel Input
Energy Savings $	= Heating Production (Proposed Efficiency – Existing Efficiency)

EQUIPMENT INFORMATION

Manufacturer and Type	Several quality and cost-effective manufacturers are available. The District and Honeywell will determine final selections.
Equipment Identification	As part of the ECM design and approval process, specific product selection will be provided for your review and approval.

ECM 2B Multipurpose Room Floor Replacement

The key benefits of this ECM include:

- **Improve Air Quality** by optimizing the amount of fresh air supply to create a healthier building environment.
- **Operational Efficiency** resulting from more precise control and reduced outside air intake.
- **Energy Savings** from reducing total energy consumption with more efficient, state of the art technology.
- **Equipment Longevity** due to more efficient and less wasteful equipment utilization.
- **Occupancy Comfort and Productivity** by way of enhanced temperature and humidity control throughout your buildings.

ECM Description	Charles G. Harker School	Governor Charles C. Stratton School	Margaret C. Clifford School	Walter Hill School
2B Multipurpose Room Floor Replacement		▪		▪

EXISTING CONDITIONS

HVAC equipment serving the multi-purpose rooms at two schools are operated to supply outside air to the spaces continually to minimize the impact on indoor air quality from the flooring materials. Most of the time these spaces are not fully occupied, which increase energy demand for heating and cooling of excessive amount of outside air.

Governor Charles C. Stratton School - Multi-purpose Room

Walter Hill School – Multi-purpose Room

PROPOSED SOLUTION

Honeywell will replace the flooring in these spaces and install CO2 sensors connected to the HVAC equipment. The CO2 sensors will provide the control signal for the HVAC equipment to optimize the quantity of fresh air required, no longer needing to ventilate these spaces 24/7. The installation of CO2 sensors will read the levels of CO2 in the space and ensure that only the required outside air is supplied and heated to meet the minimum outdoor air requirements. This control strategy will reduce the amount of outside air intake and thus reduce the heating energy used by the HVAC units and electric energy used by the motors. Based on this fact, there are reduced requirements for outside air to the spaces.

Table 5. Floor Replacements

Building	Area Served	Floor Area SF
Governor Charles C. Stratton School	Multipurpose Room	7,490
Walter Hill School	Multipurpose Room	6,674

ENERGY SAVINGS METHODOLOGY AND RESULTS

The savings approach is based upon reducing the amount of energy that needs to pre-heat or cool the outside air. The savings are generally calculated as:

Existing Heating BTU & Cost per BTU	*= Metered data from existing meter readings*
Cost of Existing Heating	*= Average site data $/CCF or $/Gallon*
Reduction in Heating/Cooling BTU	*= Reduction in outside air CFM x 1.08 x Delta T x Operating Hours*
Cost of Proposed Heating/Cooling	*= Reduced BTU x Cost per BTU*
Energy Savings $	*= Existing Costs – Proposed Costs*

The baseline adjustment calculations are included with the energy calculations.

CHANGES IN INFRASTRUCTURE

Flooring will be replaced in these spaces.

CUSTOMER SUPPORT AND COORDINATION WITH UTILITIES

Minor support will be required for the interruption of utilities for brief tie-in periods.

ENVIRONMENTAL ISSUES

Resource Use	Energy savings will result from reduced excess outdoor air.
Waste Production	Any removed parts will be disposed of properly.

CHANGES IN INFRASTRUCTURE

New boilers will be installed in itemized locations; in addition, training for maintenance personnel will be required, as well as on-going, annual preventive maintenance.

O&M IMPACT

The new boilers will decrease the O&M cost for maintaining the boilers.

CUSTOMER SUPPORT AND COORDINATION WITH UTILITIES

Minor support will be required for the interruption of utilities for brief tie-in periods. Continuity of service must be maintained for the customer.

ENVIRONMENTAL ISSUES

Resource Use	Annual savings will result from greater combustion efficiency, reduced maintenance costs, and better control and setback.
Waste Production	Existing boilers scheduled for removal will be disposed of properly.
Environmental Regulations	No environmental impact is expected; all regulations will be adhered to in accordance with EPA and local code requirements.

ECM 2C Domestic Water Heater Replacement

The key benefits of this ECM include:

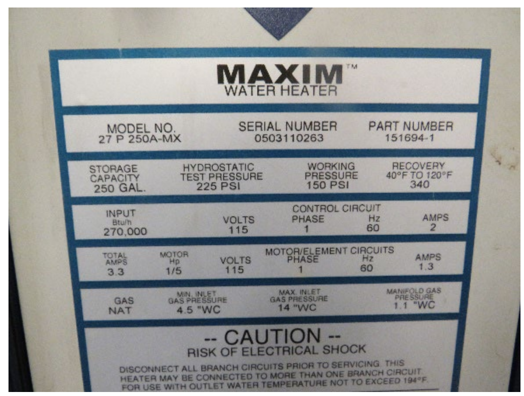
- **Reduced Energy Usage** from improved efficiency resulting from replacement of older equipment.
- **Lower Operational Costs** through less frequent maintenance and operational issues.

ECM Description	Charles G. Harker School	Governor Charles C. Stratton School	Margaret C. Clifford School	Walter Hill School
2C Domestic Hot Water Heater Replacement	■	■		■

EXISTING CONDITIONS

The existing Domestic Hot Water (DHW) heaters are of varying age and condition. Some of the units are not high-efficiency units.

Governor Charles C. Stratton School – Water Heater



Governor Charles C. Stratton School – Water Heater Name Plate

EXISTING WATER HEATERS TO BE REPLACED

Table 6. Existing Water Heaters

Building	Manufacturer	Model	Capacity (MBH)	Storage (Gal)	Fuel	Qty
Governor Charles C. Stratton School	PVI	27 P 250A-MX	216	250	NG	2
Charles G. Harker School	Lochinvar	AWN500	450	-	NG	1
Walter Hill School	Bradford White	D100T1993N	160	98	NG	2

PROPOSED SOLUTION

Honeywell proposes replacing the existing DHW heaters at the above locations with highly efficient condensing DHW heaters. New condensing DHW heaters have efficiencies between 97% - 98%. They provide better control with capabilities as night setback, temperature adjustments and demand control hot water.

Table 7. Proposed Water Heaters

Building	Manufacturer	Model	Capacity (MBH)	Storage (Gal)	Fuel	Qty
Governor Charles C. Stratton School	Bradford White	EF-100T-199E-3N(A)	199	100	NG	2
Charles G. Harker School	Bradford White	EF-120T-400-3N(A)	400	119	NG	1
Walter Hill School	Bradford White	EF-100T-199E-3N(A)	199	100	NG	2

SCOPE OF WORK

The following outlines the boiler replacement:

1. Demolish and remove old water heaters.
2. Furnish and install condensing gas fired domestic hot water heaters as specified in the table above.
3. Install all required piping, controls, and breeching as needed.
4. Install mixing valve.
5. Install circulators where needed for building use and kitchen supply.
6. Test and commission.

ENERGY SAVINGS METHODOLOGY AND RESULTS

The savings are calculated from the domestic hot water heater efficiency differences.

Existing Boiler Efficiency	= Existing Boiler Efficiency + Existing Heat Exchanger Efficiency
Proposed Boiler Efficiency	= Efficiency of the New Domestic Hot Water Heater
Energy Savings $	= DHW Load x (Existing Equipment Efficiency – New Equipment Efficiency)

EQUIPMENT INFORMATION

Manufacturer and Type	Several quality and cost-effective manufacturers are available.
Equipment Identification	As part of the measure design and approval process, specific product selection will be provided for your review and approval.

CHANGES IN INFRASTRUCTURE

A new controller for each DHW heater will be installed and programmed. In addition to the controllers, training for maintenance personnel will be required.

CUSTOMER SUPPORT AND COORDINATION WITH UTILITIES

Minor support will be required for the interruption of utilities for brief tie-in periods.

ENVIRONMENTAL ISSUES

Resource Use	Energy savings will result from improved thermal efficiency.
Waste Production	Proper disposal of any waste generated.
Environmental Regulations	No environmental impact is expected.

ECM 2D Roof Top Unit Replacements

The key benefits of this ECM include:

- **Reduced Energy Usage** from improved efficiency resulting from replacement of older equipment.
- **Lower Operational Costs** through less frequent maintenance and operational issues.

ECM Description	Charles G. Harker School	Governor Charles C. Stratton School	Margaret C. Clifford School	Walter Hill School
2D Rooftop Unit Replacement	■	■		■

EXISTING CONDITIONS

Some Rooftop Units (RTUs) serving the locations photographed below are inefficient or past their useful lives. Replacing these units with new, high efficiency units will save energy costs over the long term while reducing repair costs that would otherwise have been necessary to keep the old RTUs in operation.

Governor Charles C. Stratton School - RTU

Walter Hill School - RTU

EXISTING ROOFTOP UNITS TO BE REPLACED

Table 8. Existing Rooftop Units

Building	Location Served	Manufacturer	Model	Tons	Qty
Governor Charles C. Stratton School	Stage/Storage	AAON	RK-07-3-E0-32M	7.0	1
Governor Charles C. Stratton School	Multi-Purpose Room	AAON	RK-08-3-E0-31M	8.0	1
Governor Charles C. Stratton School	Multi-Purpose Room	AAON	RK-08-3-E0-31M	8.0	1
Governor Charles C. Stratton School	Multi-Purpose Room	AAON	RK-08-3-E0-31M	8.0	1
Governor Charles C. Stratton School	Multi-Purpose Room	AAON	RK-08-3-E0-31M	8.0	1
Governor Charles C. Stratton School	Faculty Dinning	AAON	RK-04-3-E0-32M	4.0	1
Governor Charles C. Stratton School	Kitchen	AAON	RK-10-3-E0-32M	10.0	1

Building	Location Served	Manufacturer	Model	Tons	Qty
Governor Charles C. Stratton School	Heat Pump Ventilation Air Part 1	AAON	RK-26-3-E0-31M	26.0	1
Governor Charles C. Stratton School	Heat Pump Ventilation Air Part 2	AAON	RK-30-3-E0-31M	30.0	1
Governor Charles C. Stratton School	Heat Pump Ventilation Air Part 3	AAON	RK-08-3-E0-31M	8.0	1
Walter Hill School	Multi-Purpose Room	AAON	RK-10-3-E0-31M	10.0	4
Walter Hill School	Stage Storage	AAON	RK-05-3-E0-322	5.0	1
Walter Hill School	Kitchen	AAON	RK-08-3-E0-31M	8.0	1
Walter Hill School	Offices Hallway	AAON	RK-04-3-E0-32M	4.0	1
Charles G. Harker School	Offices	York	DR120N20Q4KZZ30003D	10.0	1

PROPOSED SOLUTION

Honeywell proposes replacing the existing rooftop units in the above table. The new units will be installed in the same location as the existing units. Existing electrical power supply will be reconnected to the new units. The new units will be equipped with factory-installed microprocessor controls that improve unit efficiency. The units will also communicate with the building management system.

Table 9. Proposed Rooftop Units

Building	Location Served	Manufacturer	Model	Tons	Qty
Governor Charles C. Stratton School	Stage/Storage	Trane	YHC092F4RZA	7.5	1
Governor Charles C. Stratton School	Multi-Purpose Room	Trane	YHC102F4RZA	8.5	1
Governor Charles C. Stratton School	Multi-Purpose Room	Trane	YHC102F4RZA	8.5	1
Governor Charles C. Stratton School	Multi-Purpose Room	Trane	YHC102F4RZA	8.5	1
Governor Charles C. Stratton School	Multi-Purpose Room	Trane	YHC102F4RZA	8.5	1
Governor Charles C. Stratton School	Faculty Dinning	Trane	YHC048F4RZA	4.0	1
Governor Charles C. Stratton School	Kitchen	Trane	YHC120F4RZA	10.0	1
Governor Charles C. Stratton School	Heat Pump Ventilation Air Part 1	Trane	OAK/N K360	26.0	1
Governor Charles C. Stratton School	Heat Pump Ventilation Air Part 2	Trane	OAK/N540	30.0	1
Governor Charles C. Stratton School	Heat Pump Ventilation Air Part 3	Trane	OAB/G B108	8.0	1
Walter Hill School	Multi-Purpose Room	Trane	YHC120F4RZA	10.0	4
Walter Hill School	Stage Storage	Trane	YHC092F4RZA	5.0	1
Walter Hill School	Kitchen	Trane	YHC102F4RZA	8.5	1
Walter Hill School	Offices Hallway	Trane	YHC048F4RZA	4.0	1
Charles G. Harker School	Offices	Trane	YHC120F4RZA	10.0	1

SCOPE OF WORK

The following outlines the scope of work to install the rooftop units stated in the above table:

1. Disconnect existing RTU electric connections.
2. Disconnect piping and air ducts from the unit.
3. Remove unit from the base.
4. Modify base for new unit if necessary.
5. Rig and set new unit at the base.
6. Inspect piping and air ducts before reconnecting them to the unit.
7. Reconnect piping and air ducts.
8. Repair duct and piping insulation.
9. Connect electric power.
10. Start up and commissioning of new unit.
11. Maintenance operator(s) training.

ENERGY SAVINGS METHODOLOGY AND RESULTS

The savings approach is based on the energy efficiency between the existing and new units. The savings are generally calculated as:

Electric Energy savings	*= Existing unit energy consumption (kWh) – replacement unit energy consumption (kWh)*

EQUIPMENT INFORMATION

Manufacturer and Type	Several quality and cost-effective manufacturers are available. Honeywell and the customer will determine final selections.
Equipment Identification	As part of the ECM design and approval process, specific product selection will be provided for your review and approval.

CHANGES IN INFRASTRUCTURE

New rooftop units will be installed in itemized locations; in addition, training for maintenance personnel will be required, as well as on-going, annual preventive maintenance.

CUSTOMER SUPPORT AND COORDINATION WITH UTILITIES

Coordination of the electrical tie-in will be required.

ENVIRONMENTAL ISSUES

Resource Use	Energy savings will result from higher efficiency units.
Waste Production	Existing unit scheduled for removal will be disposed of properly.
Environmental Regulations	No environmental impact is expected.

ECM 2E Cooling Tower Replacements

The key benefits of this ECM include:

- **Reduced Energy Usage** from improved efficiency due to replacement of older equipment.
- **Lower Operational Costs** through less frequent maintenance and operational issues.

ECM Description	Charles G. Harker School	Governor Charles C. Stratton School	Margaret C. Clifford School	Walter Hill School
2E Cooling Tower Replacements		▪		▪

EXISTING CONDITIONS

Cooling tower units serving the building has gone beyond its useful life and is inefficient, have exceeded their expected useful service lives, and are costly to maintain. Replacing this with new, high efficiency unit will save energy costs over the long term while reducing repair costs that would otherwise have been necessary to keep the old units in operation.

Governor Charles C. Stratton School – Cooling Tower

Walter Hill School – Cooling Tower

Table 10. Existing Cooling Towers

Building	Make	Model	Qty.	Tons
Governor Charles C. Stratton School	BAC	VFL-072-32N/DHX	2	250
Walter Hill School	BAC	FXV-443-DX	1	150

PROPOSED SOLUTION

Honeywell proposes replacing the existing cooling tower unit in the table above. The new unit will be installed in the same location as the existing units. Existing electrical power supply will be reconnected to the new motors. The units will communicate with the existing or enhanced BMS.

Table 11. Proposed Cooling Towers

Building	Make	Model	Qty.	Tons
Governor Charles C. Stratton School	BAC	VFL-072-32N	2	250
Walter Hill School	BAC	FXV-0812A-20D-L	1	150

SCOPE OF WORK

The following outlines the scope of work to install the cooling tower units listed in the table above.

1. Disconnect existing electric connections.
2. Disconnect piping from the unit.
3. Remove existing unit.
4. Rig and set new unit.
5. Inspect piping before reconnecting them to the unit.
6. Reconnect piping.
7. Repair piping insulation.
8. Connect electric power.
9. Start up and commissioning of new unit.
10. Maintenance operator(s) training.

ENERGY SAVINGS METHODOLOGY AND RESULTS

The savings approach is based on the energy efficiency between the existing and new units. The savings are generally calculated as:

Electric Energy Savings	*Existing unit energy consumption (kW/ton) – replacement unit energy consumption (kW/ton*

EQUIPMENT INFORMATION

Manufacturer and Type	Honeywell and the customer will determine final selections.
Equipment Identification	Product cut sheets and specifications are available upon request. As part of the measure, design, and approval process, specific product selection will be provided for your review and approval.

CUSTOMER SUPPORT AND COORDINATION WITH UTILITIES

Coordination of the electrical tie-in will be required.

ENVIRONMENTAL ISSUES

Resource Use	Energy savings will result from higher efficiency units.
Waste Production	Existing units scheduled for removal will be disposed of properly.
Environmental Regulations	No environmental impact is expected.

ECM 2F Heat Pump Replacement

The key benefits of this ECM include:

- **Reduced Energy Usage** from improved efficiency resulting from replacement of older equipment.
- **Lower Operational Costs** through less frequent maintenance and operational issues.
- **Equipment Longevity Improvement** due to improved efficiency and less wasteful equipment utilization.

ECM Description	Charles G. Harker School	Governor Charles C. Stratton School	Margaret C. Clifford School	Walter Hill School
2F Heat Pump Replacement		▪	▪	▪

EXISTING CONDITIONS

Honeywell identified existing heat pumps as having exceeded their useful service life. Replacing these units with new, high efficiency units will save energy costs over the long term, while reducing repair costs that would otherwise have been necessary to keep the old units in operation.

Margaret C. Clifford School – Heat Pump

Margaret C. Clifford School – Heat Pump

EXISTING HEAT PUMPS TO BE UPGRADED

Table 12. Existing Heat Pumps

Building	Manufacturer	Model	Qty	BTU Heating	BTU Cooling
Governor Charles C. Stratton School	Trane	GEVA006	2	18,200	14,000
Governor Charles C. Stratton School	Trane	GEVA012	5	69,000	59,500
Governor Charles C. Stratton School	Trane	GEVA015	1	17,500	13,600
Governor Charles C. Stratton School	Trane	GEVA018	1	21,900	17,900
Governor Charles C. Stratton School	Trane	GEVA018	4	90,000	73,600
Governor Charles C. Stratton School	Trane	GEVA018	5	112,500	94,000

Building	Manufacturer	Model	Qty	BTU Heating	BTU Cooling
Governor Charles C. Stratton School	Trane	GEVA024	6	186,000	147,600
Governor Charles C. Stratton School	Trane	GEVA024	2	62,000	49,000
Governor Charles C. Stratton School	Trane	GEVA030	26	871,000	720,200
Governor Charles C. Stratton School	Trane	GEVA030	2	67,000	55,400
Governor Charles C. Stratton School	Trane	GEVA036	3	132,000	120,900
Governor Charles C. Stratton School	Trane	GEVA042	1	47,800	37,900
Governor Charles C. Stratton School	Trane	GEVA048	2	114,000	92,000
Governor Charles C. Stratton School	Trane	GEVA060	3	222,300	171,300
Governor Charles C. Stratton School	Trane	GEVA100	1	124,000	104,100
Walter Hill School	Trane	GEVA006	2	18,400	14,000
Walter Hill School	Trane	GEVA009	1	10,650	8,100
Walter Hill School	Trane	GEVA012	3	41,400	35,700
Walter Hill School	Trane	GEVA018	2	33,800	26,200
Walter Hill School	Trane	GEVA024	3	66,600	54,900
Walter Hill School	Trane	GEVA030	9	272,700	214,200
Walter Hill School	Trane	GEVA042	6	192,000	157,200
Walter Hill School	Trane	GEVA006	2	93,200	74,080
Walter Hill School	Trane	GEVA006	10	80,000	70,000
Walter Hill School	Trane	GEVA006	2	16,000	14,480
Walter Hill School	Trane	GEVA006	3	22,200	19,800
Walter Hill School	Trane	GEVA009	3	31,500	24,600
Walter Hill School	Trane	GEVA012	1	13,600	11,900
Walter Hill School	Trane	GEVA015	2	34,000	26,200
Walter Hill School	Trane	GEVA048	1	57,700	47,720
Walter Hill School	Trane	GEVA048	2	116,400	91,400
Walter Hill School	Trane	GEVA060	1	75,600	56,600
Walter Hill School	Trane	GEVA036	1	43,100	34,000
Walter Hill School	HEATEX	RHXC-1A/SP-7500-HP-1-D	1	301,000	272,000
Walter Hill School	HEATEX	RHXC-1A/SP-4200-HP-1-G	1	350,000	298,000
Walter Hill School	HEATEX	RHXC-1A/SP-5000-HP-1-A	1	138,000	123,000
Walter Hill School	HEATEX	RHXC-1A/SP-2900-HP-1-D	1	170,000	175,000

Building	Manufacturer	Model	Qty	BTU Heating	BTU Cooling
Margaret C. Clifford School	Trane	GEVB048	6	54,600	288,000
Margaret C. Clifford School	Trane	GEVB036	3	26,700	108,000
Margaret C. Clifford School	Trane	GEVB036	1	5,100	36,000
Margaret C. Clifford School	Trane	GEVA048	22	149,600	1,056,000

PROPOSED SOLUTION

Honeywell proposes to replace existing heat pumps with new units. New units will be equipped with open protocol factory mounted controls which can be tied into existing BMS system.

Building	Manufacturer	Model	Qty	BTU Heating	BTU Cooling
Governor Charles C. Stratton School	Trane	GEVA006	2	18,200	14,000
Governor Charles C. Stratton School	Trane	GEVG012	5	69,000	59,500
Governor Charles C. Stratton School	Trane	GEVG015	1	17,500	13,600
Governor Charles C. Stratton School	Trane	GEVG018	1	21,900	17,900
Governor Charles C. Stratton School	Trane	GEVG018	4	90,000	73,600
Governor Charles C. Stratton School	Trane	GEVG018	5	112,500	94,000
Governor Charles C. Stratton School	Trane	GEVG024	6	186,000	147,600
Governor Charles C. Stratton School	Trane	GEVG024	2	62,000	49,000
Governor Charles C. Stratton School	Trane	GEVG030	26	871,000	720,200
Governor Charles C. Stratton School	Trane	GEVG030	2	67,000	55,400
Governor Charles C. Stratton School	Trane	GEVG036	3	132,000	120,900
Governor Charles C. Stratton School	Trane	GEVG042	1	47,800	37,900
Governor Charles C. Stratton School	Trane	GEVG048	2	114,000	92,000
Governor Charles C. Stratton School	Trane	GEVG060	3	222,300	171,300
Governor Charles C. Stratton School	Trane	GEVG100	1	124,000	104,100
Walter Hill School	Trane	GEVG006	2	18,400	14,000
Walter Hill School	Trane	GEVG009	1	10,650	8,100
Walter Hill School	Trane	GEVG012	3	41,400	35,700
Walter Hill School	Trane	GEVG018	2	33,800	26,200

Building	Manufacturer	Model	Qty	BTU Heating	BTU Cooling
Walter Hill School	Trane	GEVG024	3	66,600	54,900
Walter Hill School	Trane	GEVG030	9	272,700	214,200
Walter Hill School	Trane	GEVG042	6	192,000	157,200
Walter Hill School	Trane	GEVG006	2	93,200	74,080
Walter Hill School	Trane	GEVG006	10	80,000	70,000
Walter Hill School	Trane	GEVG006	2	16,000	14,480
Walter Hill School	Trane	GEVG006	3	22,200	19,800
Walter Hill School	Trane	GEVG009	3	31,500	24,600
Walter Hill School	Trane	GEVG012	1	13,600	11,900
Walter Hill School	Trane	GEVG015	2	34,000	26,200
Walter Hill School	Trane	GEVG048	1	57,700	47,720
Walter Hill School	Trane	GEVG048	2	116,400	91,400
Walter Hill School	Trane	GEVG060	1	75,600	56,600
Walter Hill School	Trane	GEVG036	1	43,100	34,000
Walter Hill School	HEATEX	RHXC-1A/SP-7500-HP-1-D	1	301,000	272,000
Walter Hill School	HEATEX	RHXC-1A/SP-4200-HP-1-G	1	350,000	298,000
Walter Hill School	HEATEX	RHXC-1A/SP-5000-HP-1-A	1	138,000	123,000
Walter Hill School	HEATEX	RHXC-1A/SP-2900-HP-1-D	1	170,000	175,000
Margaret C. Clifford School	Trane	GEVG048	6	54,600	288,000
Margaret C. Clifford School	Trane	GEVG036	3	26,700	108,000
Margaret C. Clifford School	Trane	GEVG036	1	5,100	36,000
Margaret C. Clifford School	Trane	GEVG048	22	149,600	1,056,000

SCOPE OF WORK

The following outlines the heat pump replacements:

1. Disconnect existing electric connections.
2. Disconnect piping from the unit.
3. Rig and set new unit.
4. Inspect piping and air ducts before reconnecting them to the unit.
5. Reconnect piping and air ducts.
6. Repair duct and piping insulation.
7. Connect electric power.
8. Start up and commissioning of new unit.
9. Maintenance operator(s) training.

ENERGY SAVINGS METHODOLOGY AND RESULTS

In general, Honeywell uses the following approach to determine savings for this specific measure:

Electric Energy savings	*Existing unit energy consumption (kWh) – replacement unit energy consumption (kWh*

EQUIPMENT INFORMATION

Manufacturer and Type	Several quality and cost-effective manufacturers are available. Honeywell and the customer will determine final selections.
Equipment Identification	Product cut sheets and specifications are available upon request. As part of the measure, design, and approval process, specific product selection will be provided for your review and approval.

CUSTOMER SUPPORT AND COORDINATION WITH UTILITIES

Coordination of the electrical tie-in will be required.

ENVIRONMENTAL ISSUES

Resource Use	Energy savings will result from higher efficiency units.
Waste Production	Existing condensing units scheduled for removal will be disposed of properly.
Environmental Regulations	No environmental impact is expected.

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ECM 2G Premium Efficiency Motors and VFDs

The key benefits of this ECM include:

- **Energy Savings** from reduced run hours and reduced motor speeds.
- **Equipment Longevity** due to more efficient and less wasteful equipment utilization and reduced startup wear.

ECM Description	Charles G. Harker School	Governor Charles C. Stratton School	Margaret C. Clifford School	Walter Hill School
2G Premium Efficiency Motors and VFDs	▪	▪	▪	▪

EXISTING CONDITIONS

Honeywell has identified standard efficiency electric motors on several pumps. Energy savings can be obtained by replacing the standard efficiency motors with premium efficiency motors as well as by installing VFDs on systems that have two-way control valves.

Margaret C. Clifford School – Motor

Charles G. Harker School – Motor

EXISTING MOTORS TO BE REPLACED

Table 13. Existing Motors

Building	Equipment Description	Qty.	Motor HP	Existing Efficiency	Replace Motor	Add VFD
Charles G. Harker School	CHW Return	3	15.0	92.0%	Y	Y
Governor Charles C. Stratton School	CT 1-2 Fan	2	25.0	91.0%	Y	Y
Margaret C. Clifford School	Loop Water System Pump	2	15.0	89.5%	Y	Y
Margaret C. Clifford School	CT 1 Fan	1	15.0	91.0%	Y	Y
Margaret C. Clifford School	Tower Pump	2	10.0	89.5%	Y	Y
Margaret C. Clifford School	CHW Pump	2	7.5	91.0%	Y	Y
Margaret C. Clifford School	HW Pump	2	7.5	85.5%	Y	Y
Walter Hill School	CW Pump	2	10.0	91.7%	Y	Y

Building	Equipment Description	Qty.	Motor HP	Existing Efficiency	Replace Motor	Add VFD
Walter Hill School	CT 1 Fan	2	7.5	88.5%	Y	Y

PROPOSED SOLUTION

Honeywell observed that several motors and pumps that are sized to meet peak heating or cooling conditions. However, we've learned that most operating hours occur during conditions that require less than peak loads.

Honeywell proposes replacement of all above-mentioned single speed standard efficiency motors (that do not have VFDs) with new premium efficiency motors and installing new couplings where applicable. In addition, Honeywell recommends installing VFDs on these pumps. Energy used by the motor can be reduced by varying the flow in response to varying loads in the space. Motor speed may be controlled either based on the pressure in the distribution system or based on time of day.

Honeywell recommends fitting unit ventilators with two-way valves (provided that unit ventilators located at end of piping branches are fitted with three-way valves to keep hot water moving through the distribution piping at all times).

Honeywell also recommends installing VFDs on the heating hot water pumps and chilled water pumps to better match pumping output to system requirements and reduce energy waste. Each motor will be equipped with new selector relays that will allow one drive to operate per pump with the VFD drive. Honeywell also recommends installation of new differential pressure sensors and tying them to the control system to allow you to regulate the speed of the pump per load requirements. Lastly, we recommend installation of VFDs on the cooling system pump motors that have higher horsepower. VFDs will maintain temperatures in the unit by adjusting the speed of both the motor and the pump, and can be connected to your BMS.

ENERGY SAVINGS METHODOLOGY AND RESULTS

The energy consumed by electric motors varies inversely with the cube of the motor speed. Variable frequency drives reduce motor speed (in response to load) thus reducing energy consumption exponentially.

CHANGES IN INFRASTRUCTURE

New motors will be installed in place of the old motors. No expansion of the facilities will be necessary.

CUSTOMER SUPPORT AND COORDINATION WITH UTILITIES

Coordination of the electrical tie-in will also be required.

ENVIRONMENTAL ISSUES

Resource Use	Energy savings will result from reducing electrical usage by operating higher efficiency motors for the same horsepower output. The equipment uses no other resources.
Waste Production	This measure will produce waste by-products. Old motors shall be disposed of in accordance with all federal, state, and local codes.
Environmental Regulations	No environmental impact is expected.

ECM 2H Kitchen Hood Efficiency Improvements

The key benefits of this ECM include:

- **Reduced Energy Usage** from improved equipment control and reduced exhaust of conditioned air.
- **Lower Operational Costs** through less frequent maintenance and operational issues.

ECM Description	Charles G. Harker School	Governor Charles C. Stratton School	Margaret C. Clifford School	Walter Hill School
2H Kitchen Hood Efficiency Improvements	▪	▪	▪	▪

EXISTING CONDITIONS

Honeywell observed that the kitchens utilize a constant volume kitchen exhaust hood system. This system operates at full load, even when there is no activity in the kitchen. It also requires operating the exhaust fan at full load. This wastes both fan energy and heating energy. When the hood is not utilized, an opportunity exists to reduce airflow and conserve energy.

Margaret C. Clifford School - Kitchen Hood

Charles G. Harker School - Kitchen Hood

PROPOSED SOLUTION

Honeywell recommends installing a microprocessor-based controls system whose sensors automatically regulate fan speed based on cooking load, time of day and hood temperature while minimizing energy usage. The system includes a temperature sensor installed in the hood exhaust collar, IP sensors on the ends of the hood that detect the presence of smoke or cooking effluent and VFD that control the speed of the fans. This will result in energy and cost savings, noise reduction, longer equipment life and reduction in cleaning costs.

Table 14. Existing Kitchen Hoods to Receive Controls

Building	Kitchen Hood (sq. ft.)	Make	Type	Add VFD	Qty
Charles G. Harker School	65	Melink	Intelli-Hood	Y	1
Governor Charles C. Stratton School	70	Melink	Intelli-Hood	Y	1
Margaret C. Clifford School	96	Melink	Intelli-Hood	Y	1
Walter Hill School	70	Melink	Intelli-Hood	Y	1

SCOPE OF WORK

1. Install a temperature sensor in the hood to monitor temperature of the exhaust gas.
2. Install a set of two photo sensors on the sides to monitor smoke density across the hood.
3. Install a control panel with a small point controller and a set of relays in the kitchen close to the hood.
4. Provide electric wiring from the new panel to the sensors, exhaust fan motor as well as to the closest electric panel for power supply.
5. Provide connection to the BMS system for remote monitoring, control, and alarming. This system could also be stand-alone to save on cost.
6. Commission control components and sequences and calibrate control loops.

Sequence of operation will enable the exhaust fans when either temperature or smoke density in the range hoods is above a pre-set value. Time delays between start and stop will be programmed to prevent motor short cycling. Schedule programming could be implemented as well.

ENERGY SAVINGS METHODOLOGY AND RESULTS

The savings approach is based upon reducing the amount of conditioned air that is being exhausted when there is no cooking taking place.

EQUIPMENT INFORMATION

Manufacturer and Type	Several quality and cost-effective manufacturers are available. The District and Honeywell will determine final selections.
Equipment Identification	As part of the ECM design and approval process, specific product selection will be provided for your review and approval.

CHANGES IN INFRASTRUCTURE

There will be improvements in HVAC equipment and controls for not operating fans continuously.

CUSTOMER SUPPORT AND COORDINATION WITH UTILITIES

Minor support will be required for the interruption of utilities for brief tie-in periods.

ENVIRONMENTAL ISSUES

Resource Use	Energy savings will result from reduced energy.
Waste Production	Any removed parts will be disposed of properly.
Environmental Regulations	No environmental impact is expected.

ECM 2I Walk-In Compressor Controls

The key benefits of this ECM include:

- **Energy Savings** from reducing equipment runtime.
- **Equipment Longevity** due to more efficient and less wasteful equipment utilization.
- **Operational Savings** from less frequent need to repair or replace equipment thanks to less frequent equipment use.

ECM Description	Charles G. Harker School	Governor Charles C. Stratton School	Margaret C. Clifford School	Walter Hill School
2I Walk-In Compressor Controls	■	■	■	■

EXISTING CONDITIONS

In many refrigeration, walk-in freezers and coolers, the compressor is oversized and cycles on/off frequently. This compressor cycling results in higher energy consumption and may reduce the life of the compressor.

Charles G. Harker School – Walk-In Ref./Frz.

Margaret C. Clifford Schooll – Walk-In Ref./Frz.

EXISTING WALK-IN REFRIGERATOR/FREEZERS TO RECEIVE CONTROLS

Table 15. Existing Walk-In Refrigerator/Freezers

Building	Location	Walk-In Refrigerators	Walk-In Freezers	Type
Governor Charles C. Stratton School	Kitchen	1	1	Intellidyne
Charles G. Harker School	Kitchen	1	1	Intellidyne
Margaret C. Clifford School	Kitchen	1	1	Intellidyne
Walter Hill School	Kitchen	1	1	Intellidyne

PROPOSED SOLUTION

Honeywell will install a controller manufactured by Intellidyne at the above-mentioned buildings to reduce the compressor cycles of the kitchen walk-in coolers and freezers. The installation of this ECM will have no negative impact on system operation or freezing of food products. By reducing the cycling, the sensor will improve operating efficiency and reduce the electric consumption by 10% to 20%.

This control enhancement will save energy through the reduced compressor cycling in the kitchen walk-in coolers and freezers and will extend the operating life of the compressor. Consequently, the compressor will not have to be replaced as often.

Intellidyne Sensor Features

- Automatic restart on power failure.
- Surge protection incorporated into circuitry.
- Fully compatible with all energy management systems.
- UL listed.
- Maintenance free.

Intellidyne Sensor Benefits

- Patented process reduces air conditioning electric consumption typically 10% to 20%.
- Increased savings without replacing or upgrading costly system components.
- “State-of-the-art” microcomputer controller – LED indicators show operating modes.
- Protects compressor against momentary power outages and short cycling.
- Simple 15-minute installation by qualified installer.
- No programming or follow-up visits required.
- Maximum year-round efficiency.
- Reduces maintenance and extends compressor life.
- Fail-safe operation.
- Guaranteed to save energy.
- UL listed, “Energy Management Equipment”.

Intellidyne’s patented process determines the cooling demand and thermal characteristics of the entire air conditioning system by analyzing the compressor’s cycle pattern, and dynamically modifies that cycle pattern to provide the required amount of cooling in the most efficient manner. This is accomplished in real-time by delaying the start of the next compressor “on” cycle, by an amount determined by the cooling demand analysis. These new patterns also result in less frequent and more efficient compressor cycles.

ENERGY SAVINGS METHODOLOGY AND RESULTS

The energy savings for this ECM is realized by the reduction in run time of the compressors and fan motors in the freezers/refrigerators.

CHANGES IN INFRASTRUCTURE

None.

CUSTOMER SUPPORT AND COORDINATION WITH UTILITIES

Minor support will be required for the interruption of utilities for brief tie-in periods.

ENVIRONMENTAL ISSUES

Resource Use	Energy savings will result from the reduced electrical consumption of the compressor.
Waste Production	Any removed parts will be disposed of properly
Environmental Regulations	No environmental impact is expected.

ECM 3A Building Management System Upgrades

The key benefits of this ECM include:

- **Improve Air Quality** by more precise control of air filtration, air composition and ultra-violet cleaning to create a healthier school building environment.
- **Operational Efficiency** resulting from better control and system wide visibility.
- **Remote Operation** of HVAC systems via mobile phone or off-site computer.
- **Energy Savings** from reducing total energy consumption with more efficient, state of the art technology.
- **Occupancy Comfort and Productivity** resulting from enhanced temperature and humidity control throughout your buildings.
- **Deliver a Comprehensive Open Protocol Building Management System**. Verify design is customized for each building yet uniform throughout the district. Assure longevity of control system with proper commissioning and training.

ECM Description	Charles G. Harker School	Governor Charles C. Stratton School	Margaret C. Clifford School	Walter Hill School
3A Building Management System Upgrades	■	■	■	■

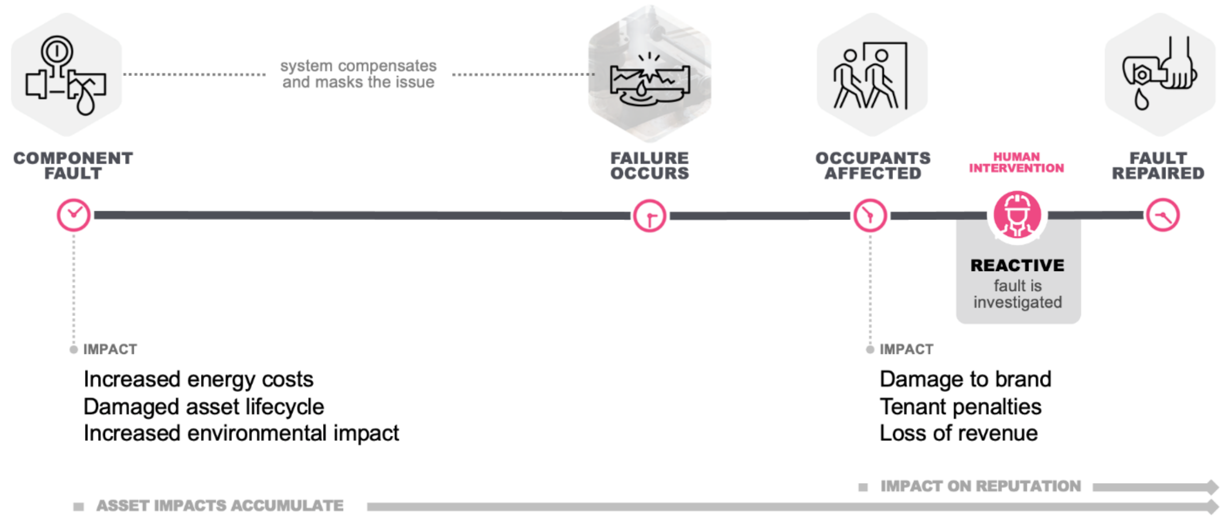
Swedesboro Woolwich School District Building Management System Overview

The Swedesboro Woolwich School District currently used three different Building Management Systems (BMS) to control the various HVAC equipment. A Johnson Controls Metasys BMS is used to control the General Charles G. Harker Elementary School equipment. A Trane Tracer Summit BMS is used to control the equipment at Governor Charles C. Stratton School and the Walter Hill School. A new Trane Tracer Synchrony BMS is used to control the equipment at the Margaret C. Clifford School. Each of these systems can be accessed at front end terminals at each school but require separate login credentials. As a result of having three separate BMS solutions, there is significant variation in everyday operation, including different graphical interfaces, setpoint adjustment and overrides, occupancy scheduling, etc.

The current facility maintenance and control service teams utilizes a traditional scheduled preventative and reactive maintenance approach which is not an effective way to deliver the kind of resiliency that a manufacturing facility requires to maintain competitive advantage and ensure productivity due to the following challenges:

- Inefficient Planned Maintenance – Scheduled and routine maintenance plans spend too much time inspecting and maintaining assets that are not broken.
- Poor Asset Performance Visibility - Break fix and scheduled maintenance make it difficult to track and validate asset optimization and vendors costs.
- Low Vendor Accountability - Lack of transparency makes it difficult to measure vendor compliance and ROI.
- Aging, Shrinking Workforce - Large groups of maintenance staff are approaching retirement age, with a smaller, less skilled workforce to replace them.
- Complex Vendor Management - Building operators have to maintain several contracts with multiple vendors, making it difficult and costly to manage.

Deferred, or Reactive Maintenance



EXISTING CONDITIONS

Table 16. Existing Building Management Controls

Building	Existing Building Management System
Governor Charles C. Stratton School	Trane
Charles G. Harker School	JCI
Margaret C. Clifford School	Trane
Walter Hill School	Trane

Margaret C. Clifford School

The Clifford School's Trane Tracer Synchrony BMS is the most up-to-date controls installation in the District. In order to bring the building into the new BMS solution, a new Trane SC+ building network controller has been installed as an overlay to the existing Trane Tracer Summit BCU and field controllers. This has provided the facility personnel with a web-based graphical interface, while retaining the existing equipment-level control infrastructure. Facility maintenance personnel have indicated that the Trane BCU network controllers are in need of replacement.

This system provides Direct Digital Control (DDC) for two boilers, the cooling tower, the dual temp plant, AHU-1, MAU-1, 34 heat pumps, five supply fans, one exhaust fan, and miscellaneous hallway cabinet unit heaters. The equipment is running on various occupancy schedules and setpoints that are not standardized. Weekday occupied start times range from 5AM to 7:15AM and end times range from 1:30PM to 9PM. The space temperatures range from 69 to 75 degrees, with active setpoint varying greatly from 65 to 85 degrees. Many of the equipment graphic screens appear to be remnants of the previous BMS and are not intuitive to navigate or adjust control parameters.

Governor Charles C. Stratton School

The Stratton School control system is part of the legacy Trane Tracer Summit BMS. A single Trane BCU network controller is connected to the various Trane Tracer Summit field controllers so that they can be displayed on the Tracer Summit BMS software installed on the operator workstation PC. This system provides DDC for the boiler plant, cooling tower, dual temp plant, seven rooftop AC units, three rooftop makeup air units, 12 exhaust fans, and 68 heat pumps. The equipment is running on various occupancy schedules and setpoints that are not standardized. Weekday occupied start times range from 4AM to 6:30AM and end times range from 4PM to 7PM. The gym equipment is currently set to run 24/7 in order to reduce mercury content in the air. The space temperatures range from 69 to 74 degrees, with active setpoint varying greatly from 65 to 80 degrees. Several of the equipment graphic screens are showing points that are not reading properly. This indicates that the field controllers are not communicating properly and are in need of repair or replacement.

Walter Hill School

The Walter Hill School control system is part of the legacy Trane Tracer Summit BMS. A single Trane BCU network controller is connected to the various Trane Tracer Summit field controllers so that they can be displayed on the Tracer Summit BMS software installed on the operator workstation PC. This system provides DDC for the boiler plant, cooling tower, dual temp plant, seven rooftop AC units, one VAV box, four rooftop makeup air units, 12 exhaust fans, and 64 heat pumps. The equipment is running on various occupancy schedules and setpoints that are not standardized. Weekday occupied start times range from 4AM to 8AM and end times range from 1:30PM to 6PM. The space temperatures range from 66 to 78 degrees, with active setpoint varying greatly from 60 to 74 degrees. Several of the equipment graphic screens are showing points that are not reading properly. This indicates that the field controllers are not communicating properly and are in need of repair or replacement.

General Charles G. Harker School

The Harker School control system is part of the Johnson Metasys BMS. Two NAE network controllers are used to connect the various Metasys controllers so that they can be displayed on the Metasys Site Management Portal (SMP) software that is installed on the operator workstation PC. This system provides DDC for the hot water boiler plant, the chilled water plant, two McQuay Chillers, five air handling units, eight packaged rooftop units, one makeup air unit, five reheat coils, 16 VAV units, 40 unit ventilators, three fan coil units, 11 cabinet heaters, two electric unit heaters, three ductless split systems, and 15 exhaust fans. The equipment is running on various occupancy schedules and setpoints that are not standardized. Weekday occupied start times range from 5:30AM to 6:30AM and end times range from 2:30PM to 6PM. The space temperatures range from 67 to 76 degrees. Several of the equipment graphic screens are showing points that are not reading properly. This indicates that the field controllers are not communicating properly and are in need of repair or replacement.

PROPOSED CONDITIONS

Overview

- The Swedesboro Woolwich School District will be responsible to provide and terminate all new LAN connections in each building, as required, which will be used to connect a new or existing supervisory controller to the Customer LAN.
- Existing panels, transformers, power supplies, relays, conduit, wiring, and sensors will be reused if found to be functional. Warranty components as new.
- All control wiring will be run in conduit in mechanical rooms. Wire mold is acceptable in exposed areas. Plenum rated wiring can be run above drop ceilings.

- All newly installed field controllers will be open source BACnet or Lon Direct Digital Controls. The preferred communication protocol shall be BACnet. All new DDC field controllers shall be BACnet unless there is an existing LON communication trunk nearby in the same MER, or existing LON controllers are replaced with new controllers. The existing LON trunk can be reused if it is tested for integrity.
- OPEN NIC STATEMENTS - All Niagara 4 software licenses shall have the following NiCS: "accept.station.in=*"; "accept.station.out=*"and "accept.wb.in=*"and "accept.wb.out=*". All open NIC statements shall follow Niagara Open NIC specifications.
- All control devices furnished within this scope of work shall be programmable directly from the Niagara 4 Workbench embedded toolset upon completion of this project. The use of configurable or programmable controllers that require additional software tools or tools that require a specific Niagara 4 license brand to operate for post-installation maintenance shall not be acceptable.

District-Wide Tridium Niagara 4 Supervisor

Provide and install a new Tridium N4 supervisor on a customer provided virtual server and connect new and existing controls for each building listed herein. Provide new graphics for each piece of equipment, new floor plan graphics, alarms, and trending. Graphics, alarming, and trending for all buildings will reside in the new district wide BMS supervisor.

Additional Scope Details:

- Provide on-site training for facility personnel.
- Provide updated occupied schedules and occupied/unoccupied setpoint changes in the existing BMS to reflect the values in Exhibit D1-D2 of the Agreement.

Margaret C. Clifford School

Install New Supervisory Controller

Furnish and install one new Niagara N4 JACE-8000 network controller. Integrate all existing Trane DDC control points into the District-Wide N4 Supervisor.

Additional Details:

- Provide graphics, trending and alarms, scheduling, and M&V summary screens.
- Provide onsite training for facility personnel.

Integration of Existing DDC Controllers

Integrate existing Trane DDC field controllers into the BMS and provide new graphics, trending, scheduling, occ/unocc setpoints, etc. The existing DDC field controllers include the following but are not limited to:

- 2 boilers
- 1 cooling tower
- Dual temp plant
- AHU-1
- MAU-1
- 34 heat pumps
- 5 supply fans
- 1 exhaust fan

Retro-Commission Existing DDC Controls

Provide point-to-point checkout and functional testing for existing DDC equipment as per the existing sequence of operation. Provide modifications to control sequences as needed to accomplish energy strategies listed herein. Repair defective control components as needed to provide a complete functioning system. Add any issues to the mechanical equipment deficiency list. Repairing or replacing mechanical equipment on the deficiency list is not Honeywell's responsibility.

- 2 Boilers
- 1 Cooling Tower
- Dual Temp Plant
- AHU-1
- MAU-1
- 34 Heat Pumps
- 5 Supply Fans
- 1 Exhaust Fan

Additional Scope Details:

- Provide and install new outside air relative humidity sensor.
- Resolve communication issues for HP-10 and HP-16
- Provide programming to implement the following sequence of operation strategies:
  - Dual Temperature Plant
    - Updated HW/CHW OAT Reset Parameters
    - Unoccupied Offset of HW/CHW Setpoint
    - Unoccupied OAT Lockout
    - Morning Warmup / Cooldown
  - Air Handling Units - AHU-1
    - Demand Control Ventilation – Furnish and install new CO2 sensor
    - Discharge Air Temperature Reset

Governor Charles C. Stratton School

Install New Supervisory Controller

Furnish and install one new Niagara N4 JACE-8000 network controller. Integrate all existing Trane DDC control points into the District-Wide N4 Supervisor.

Additional Details:

- Provide graphics, trending and alarms, scheduling, and M&V summary screens.
- Provide onsite training for facility personnel.

Integration of Existing DDC Controllers

Integrate existing Trane DDC field controllers into the BMS and provide new graphics, trending, scheduling, occ/unocc setpoints, etc. The existing DDC field controllers include the following but are not limited to:

- 2 Boilers
- 1 Cooling Tower

- Dual Temp Plant
- 7 RTUs
- 3 MAUs
- 68 Heat Pumps
- 12 Exhaust Fans

Retro-Commission Existing DDC Controls

Provide point-to-point checkout and functional testing for existing DDC equipment as per the existing sequence of operation. Provide modifications to control sequences as needed to accomplish energy strategies listed herein. Repair defective control components as needed to provide a complete functioning system. Add any issues to the mechanical equipment deficiency list. Repairing or replacing mechanical equipment on the deficiency list is not Honeywell's responsibility.

- 2 Boilers
- 1 Cooling Tower
- Dual Temp Plant
- 7 RTUs
- 3 MAUs
- 68 Heat Pumps
- 12 Exhaust Fans

Additional Scope Details:

- Resolve communication issues for Rooms 2129 and 2213, Gym AC-5, and MUA-2
- Provide programming to implement the following sequence of operation strategies:
  - Dual Temperature Plant
    - Updated HW/CHW OAT Reset Parameters
    - Unoccupied Offset of HW/CHW Setpoint
    - Unoccupied OAT Lockout
    - Morning Warmup / Cooldown
  - Air Handling Units – AC-1-7
    - Demand Control Ventilation – Furnish and install new CO2 sensor
    - Discharge Air Temperature Reset
    - Standardize economizer sequence and parameters

Walter Hill School

Install New Supervisory Controller

Furnish and install one new Niagara N4 JACE-8000 network controller. Integrate all existing Trane DDC control points into the District-Wide N4 Supervisor.

Additional Details:

- Provide graphics, trending and alarms, scheduling, and M&V summary screens.
- Provide onsite training for facility personnel.

Integration of Existing DDC Controllers

Integrate existing Trane DDC field controllers into the BMS and provide new graphics, trending, scheduling, occ/unocc setpoints, etc. The existing DDC field controllers include the following but are not limited to:

- 2 Boilers
- 1 Cooling Tower
- Dual Temp Plant
- 7 RTUs
- 4 MAUs
- 1 VAV Box
- 64 Heat Pumps
- 12 Exhaust Fans

Retro-Commission Existing DDC Controls

Provide point-to-point checkout and functional testing for existing DDC equipment as per the existing sequence of operation. Provide modifications to control sequences as needed to accomplish energy strategies listed herein. Repair defective control components as needed to provide a complete functioning system. Add any issues to the mechanical equipment deficiency list. Repairing or replacing mechanical equipment on the deficiency list is not Honeywell's responsibility.

- 2 Boilers
- 1 Cooling Tower
- Dual Temp Plant
- 7 RTUs
- 4 MAUs
- 1 VAV Box
- 64 Heat Pumps
- 12 Exhaust Fans

<u>Additional Scope Details</u>:

- Resolve communication issues for Hallway unit 201
- Provide programming to implement the following sequence of operation strategies:
  - Dual Temperature Plant
    - Updated HW/CHW OAT Reset Parameters
    - Unoccupied Offset of HW/CHW Setpoint
    - Unoccupied OAT Lockout
    - Morning Warmup / Cooldown
  - Air Handling Units – RTU-1-7
    - Demand Control Ventilation – Furnish and install new CO2 sensor
    - Discharge Air Temperature Reset
    - Standardize economizer sequence and parameters

General Charles G. Harker School

Install New Supervisory Controller

Furnish and install one new Niagara N4 JACE-8000 network controller. Integrate all existing Trane DDC control points into the District-Wide N4 Supervisor.

Additional Details:

- Provide graphics, trending and alarms, scheduling, and M&V summary screens.
- Provide onsite training for facility personnel.

Integration of Existing DDC Controllers

Integrate existing Trane DDC field controllers into the BMS and provide new graphics, trending, scheduling, occ/unocc setpoints, etc. The existing DDC field controllers include the following but are not limited to:

- Hot Water Plant
- Chilled Water Plant
- 5 AHUs
- 8 RTUs
- 1 MAU
- 5 Reheat Coils
- 16 VAV Boxes
- 40 Unit Ventilators
- 3 Fan Coil Units
- 11 Cabinet Unit Heaters
- 2 Electric Unit Heaters
- 3 Ductless Split Systems
- 15 Exhaust Fans

Retro-Commission Existing DDC Controls

Provide point-to-point checkout and functional testing for existing DDC equipment as per the existing sequence of operation. Provide modifications to control sequences as needed to accomplish energy strategies listed herein. Repair defective control components as needed to provide a complete functioning system. Add any issues to the mechanical equipment deficiency list. Repairing or replacing mechanical equipment on the deficiency list is not Honeywell's responsibility.

- Hot Water Plant
- Chilled Water Plant
- 5 AHUs
- 8 RTUs
- 1 MAU
- 5 Reheat Coils
- 16 VAV Boxes
- 40 Unit Ventilators
- 3 Fan Coil Units

- 11 Cabinet Unit Heaters
- 2 Electric Unit Heaters
- 3 Ductless Split Systems
- 15 Exhaust Fans

Additional Scope Details:

- Resolve communication issues for HC-05
- Provide programming to implement the following sequence of operation strategies:
  - Hot Water Plant
    - Updated HW OAT Reset Parameters
    - Unoccupied Offset of HW Setpoint
    - Unoccupied OAT Lockout
    - Morning Warmup
  - Chilled Water Plant
    - Updated CHW OAT Reset Parameters
    - Unoccupied Offset of CHW Setpoint
    - Unoccupied OAT Lockout
    - Morning / Cooldown
  - Air Handling Units – AHU 1-5 and RTU 1-7
    - Demand Control Ventilation – Furnish and install new CO_2 sensor
    - Discharge Air Temperature Reset
    - Standardize economizer sequence and parameters

ENERGY SAVINGS METHODOLOGY AND RESULTS

The savings approach is based upon reducing the amount of energy that needs to pre-heat or cool the outside air. The savings are generally calculated as:

Existing Heating BTU & Cost per BTU	*= Metered data from existing meter readings*
Cost of Existing Heating	*= Average site data $/CCF or $/Gallon*
Reduction in Heating/Cooling BTU	*= Reduction in outside air CFM x 1.08 x Delta T x Operating Hours*
Cost of Proposed Heating/Cooling	*= Reduced BTU x Cost per BTU*
Energy Savings $	*= Existing Costs – Proposed Costs*

The baseline adjustment calculations are included with the energy calculations.

CHANGES IN INFRASTRUCTURE

None.

CUSTOMER SUPPORT AND COORDINATION WITH UTILITIES

Minor support will be required for the interruption of utilities for brief tie-in periods.

ENVIRONMENTAL ISSUES

Resource Use	Energy savings will result from reduced energy.
Waste Production	Any removed parts will be disposed of properly.
Environmental Regulations	No environmental impact is expected.

ECM 3B BMS Dashboard - Energy Optimization

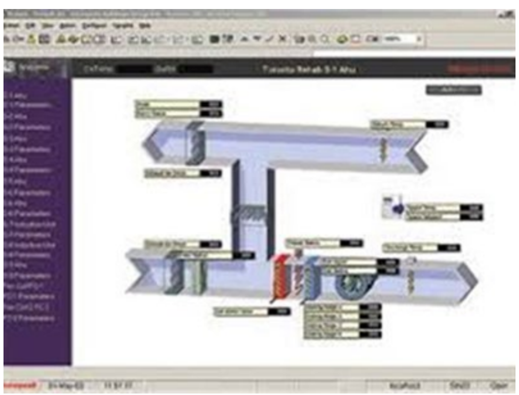
The key benefits of this ECM include:

- **Energy Savings** from reducing total energy consumption with more efficient, state of the art technology.
- **Cloud-Based Solution** that connects to a building's existing systems - without the need for capital investment - and optimizes energy consumption to drive up savings.
- **Monitor Energy Consumption** savings and zone comfort levels for any duration of time.
- **Reduced Maintenance and Operational Costs** by reducing the runtime of HVAC systems.

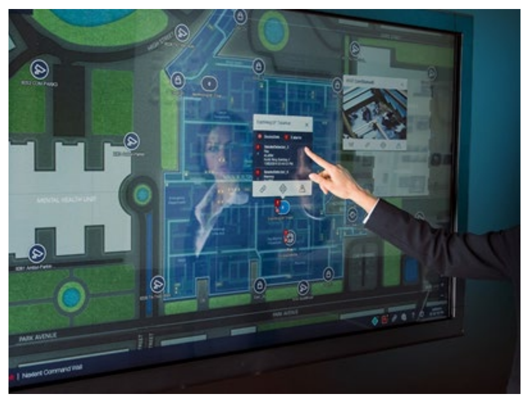
ECM Description	Charles G. Harker School	Governor Charles C. Stratton School	Margaret C. Clifford School	Walter Hill School
3B BMS Dashboard - Energy Optimization	■	■	■	■

EXISTING CONDITIONS

HVAC Systems are the biggest consumer of energy in commercial facilities, and most rely on conservative and inefficient control strategies. Manual or scheduled set-point adjustment strategies simply can't account for the complexity of a building's dynamic occupancy and weather conditions – while maintaining comfort levels.



HVAC Equipment Control

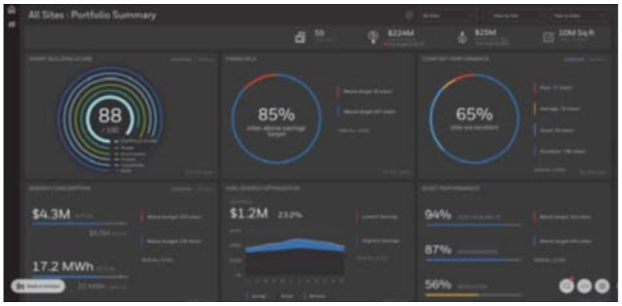


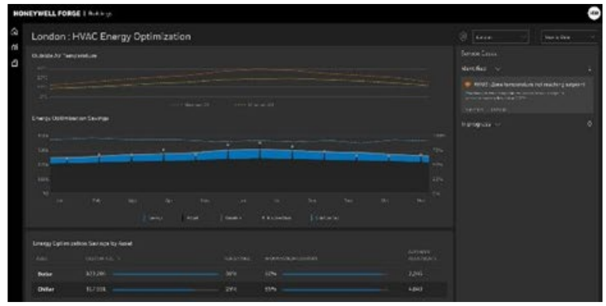
HVAC Equipment Control

PROPOSED SOLUTION

BUILDING ANALYTICS closed-loop solution operates without the need for customer intervention by regularly analyzing real-time conditions data – weather and occupancy - with predictive, machine learning models that compute and adjust set points automatically over a facility's entire HVAC distribution system. These machine learning models work best with hot water, chilled water, and variable air volume HVAC systems, constantly performing adjustments that District staff already completes on a manual basis.

The solution performs these calculations and adjustments in continuous, 15-minute intervals to ensure peak efficiency around the clock, and customers are able to monitor energy consumption, energy savings and zone comfort levels for any duration of time.





District-Wide Honeywell Forge Predictive Maintenance Solution

We propose to deploy Honeywell Forge Predictive Maintenance, an application that automates the detection of faults and anomalies in the operation of building heating, ventilation, and air conditioning (HVAC) systems which impact building comfort, energy consumption or the life cycle of the assets. Faults are raised in the way of service cases containing actionable recommendations about how to address the fault and are presented to the building operator via the enterprise dashboards. By adopting a Predictive Maintenance program, building operators can transition from costly preventative and reactive maintenance programs to a pro-active or just-in-time maintenance program. The benefits of a Predictive Maintenance program include:

- Reduced labor/subcontract cost associated with performing preventative maintenance activities.
- Reduced labor/subcontract cost by identification of Service Case root cause with recommended actions to resolve the fault.
- Reduced energy cost by immediately identifying and addressing anomalies which impact energy consumption.
- Increased occupant productivity by immediately identifying and addressing anomalies which impact occupant comfort.
- Reduced capital and operational expenses by identifying and addressing anomalies which impact the life cycle of equipment and components.
- Boost operational continuity by reducing equipment failures and reactive activity.

SCOPE OF WORK

System Agnostic

Works with the existing BMS system using the open integration power of Niagara ®.

Safe & Secured

Built-in safety features ensure HVAC systems are always controlled – even during unexpected disturbances.

Autonomous Control

No need for customer intervention or expertise through this closed loop, continuously monitored solution.

Real-Time Intelligence

Advanced machine learning calculates occupancy and weather data to optimize set-points every 15-minutes.

Domain Expertise

A solution built on over one-hundred years of experience in building technologies.

Smart Visualization
Solution identifies pre-existing faults and delivers real-time energy, savings and comfort metrics.

Energy needs fluctuate based on seasons, weather, occupancy and usage. With Energy Optimization we have demonstrated that we can use the latest self-learning algorithms to optimize building operation.

CHANGES IN INFRASTRUCTURE

None.

CUSTOMER SUPPORT AND COORDINATION WITH UTILITIES

None.

ENVIRONMENTAL ISSUES

Resource Use	Energy savings will result from optimized building operation.
Waste Production	No waste will be generated as a result of this ECM.
Environmental Regulations	No environmental impact is expected.

ECM 4A Building Envelope Improvements

The key benefits of this ECM include:

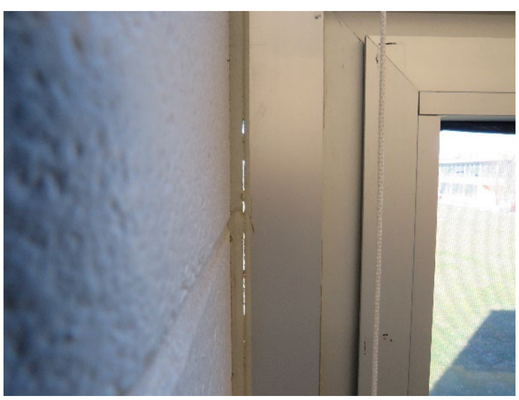
- **Energy Savings** from reducing unwanted outside air infiltration.
- **Equipment Longevity** due to more efficient and less wasteful equipment utilization.
- **Occupancy Comfort and Productivity** by way of enhanced temperature and humidity control throughout your buildings.
- **Improved Building Envelope** from addressing building gaps that allow unconditioned air penetration.

ECM Description	Charles G. Harker School	Governor Charles C. Stratton School	Margaret C. Clifford School	Walter Hill School
4A Building Envelope Improvements	▪	▪	▪	▪

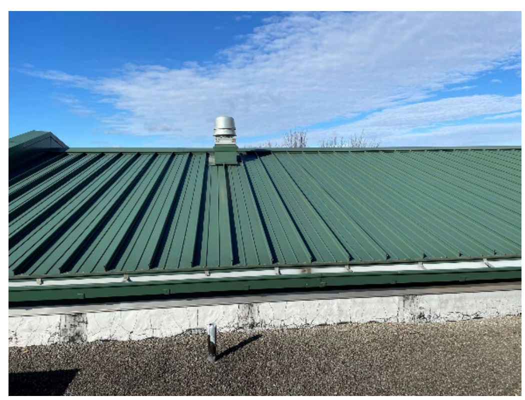
EXISTING CONDITIONS

Heat loss due to infiltration is a common problem, particularly in places with long and cold winter seasons such as NJ. This problem has been shown to represent the single largest source of heat loss or gain through the building envelopes of nearly all types of buildings. Our work has found 30% to 50% of heat loss attributable to air leaks in buildings.

Honeywell uncovered several leaks that allow for heat loss to occur during the winter season and unwanted heat gains during the summer season. These problems include door gaps, exhaust fans in poor condition, open windows or windows in poor condition, lack of air sealing, and insulation.



Typical Building Envelope



Governor Charles C. Stratton School - Building Envelope

Honeywell has helped customers like you to address these problems with a comprehensive and thorough building envelope solution that seals up your buildings to improve occupancy comfort and help eliminate unwanted energy waste. We propose to conduct a comprehensive weatherization job to weatherproof doors and windows, caulk and seal leaks, and install spray foam and rigid foam boards to stop unwanted air movement and provide a thermal barrier between spaces. Part of this process may include decoupling floor-to-floor and compartmentalizing of components of the building to equalize pressure differences.

PROPOSED SOLUTION

Building	Door - Install Jamb Spacer (Units)	Door Weather Striping - Doubles (Units)	Door Weather Stripping - Singles (Units)	Overhang Air Sealing (LF)	Roof-Wall Intersection Air Sealing (LF)
Governor Charles C. Stratton School	10	9	6		974
Charles G. Harker School	26	18	8	109	1943
Margaret C. Clifford School	3	6	7		
Walter Hill School	2	5	16	60	359
Total Quantity	**41**	**38**	**37**	**169**	**3276**

Roof-Wall Joints

- **Existing** – Buildings throughout Swedesboro Schools were found to require roof-wall joint air sealing.
- **Proposed** – Honeywell recommends using a high-performance sealant. In some buildings, two-component foam will be used. Any cantilevers off the buildings will be sealed with backer rod and sealant. Finally, the inside vestibule corners should be sealed with backer rod and sealant.

Roof Overhangs

- **Existing** – We found that roof overhangs at exterior doors are open to the drop ceilings, providing a pathway allowing heated and cooled air to escape between the interior and exterior of the building.
- **Proposed** – Honeywell proposes to install rigid foam boards and seal the perimeter and any penetrations with spray foam to prevent air leak and provide a sufficient thermal barrier between the spaces.

Doors

- **Existing** – Doors in this facility need full weather-stripping replacement and/or door sweeps.
- **Proposed** – Honeywell recommends new weather stripping and door sweeps to be installed where needed.

Benefits

This work will allow for more efficient operation of your buildings by reducing heating and cooling losses throughout the year. In addition, the draftiness of the buildings and hot and cold spots will be significantly reduced. A reduction in air infiltration will also minimize potential concerns for dirt infiltration or indoor air quality concerns including allergies.

ENERGY SAVINGS METHODOLOGY AND RESULTS

The energy savings for this ECM are realized at the buildings' HVAC equipment. The improved building envelope will limit conditioned air infiltration through openings in the building air barrier. Less infiltration means less heating required by the heating system.

EQUIPMENT INFORMATION

Manufacturer and Type	Several quality and cost-effective manufacturers are available. The District and Honeywell will determine final selections.
Equipment Identification	As part of the ECM design and approval process, specific product selection will be provided for your review and approval.

CHANGES IN INFRASTRUCTURE

Building envelope will be improved with little or no noticeable changes.

CUSTOMER SUPPORT AND COORDINATION WITH UTILITIES

Minimal coordination efforts will be needed to reduce or limit impact to building occupants.

ENVIRONMENTAL ISSUES

Resource Use	Energy savings will result from reduced HVAC energy usage and better occupant comfort.
Waste Production	Some existing caulking and weather-stripping will be removed and disposed of properly.
Environmental Regulations	No environmental impact is expected.

ECM 4B Roofing Upgrades

The key benefits of this ECM include:

- **Energy Savings** from reducing unwanted outside air infiltration.
- **Equipment Longevity** due to more efficient and less wasteful equipment utilization.
- **Occupancy Comfort and Productivity** thanks to a tighter and more efficient building envelope.

ECM Description	Charles G. Harker School	Governor Charles C. Stratton School	Margaret C. Clifford School	Walter Hill School
4B Roofing Upgrades	▪	▪	▪	▪

EXISTING CONDITIONS

The existing roof warranties are due to expire in the near future. The heat loss and heat gains occurring due to low R-value of the existing roof insulation can be improved through sealing. Additionally, roofs in poor condition can lead to water migration and future building envelope problems. Potential problematic leakage areas can be around perimeters and equipment curbing. The following building roofs will be sealed to the extent needed to meet the maximum permissible solar installation.

Walter Hill School – Roof Replacement

Governor Charles C. Stratton School – Roof Replacement

PROPOSED SOLUTION

Honeywell proposes the installation of a new silicone coating or spray foam for the existing roofs in order to extend the roof warranty, provide resistance to water intrusion, UV exposure and natural weathering. The new sealing will allow for less infiltration through the roof and air conditioning units to work less.

EPDM vs Spray Foam

EPDM Single-ply roof with an initial R-Value of 18 will have a 15%+ loss in thermal resistance due to thermal shorts of steel fasteners. It will also have 10% increase in thermal transmittance when using single layer of insulation board. Finally, R-value and Air permeability of a deck, insulation and membrane has a major impact on System R-value. This will equate to a final overall System R-value equal to approximately 2.42.

An SPF roof has an R Value of approximately 6 per one (1) inch foam (R –Value 6) If three inches of SPF Foam where applied one monolithic, self-flashing system with air barrier – no loss of effective R-value would have an overall System R-value: 18

Durability

Single-ply EPDM roof will have a 45 mil water proofing layer, but will also have major fail points such as flashing, seams, fasteners and single-ply punctures. In contrast the SPF roof will not only have a top coat plus SPF insulation which is all water proofing, meaning even damaging top coat will not create leak.

Sustainability

Commercial buildings can have a maximum of 2 roofs in place. In traditional roofing, when a "third" roof is required, a partial or full tear-off is also required. This adds increased cost for tear-off, increased cost for disposal and a negative impact on the environment

With SPF roofing, the top coat is the only part that needs to be re-applied after the warranty period. There is no "tear-off" required or disposal concerns. A quality applied SPF roof should last the life of the building

Table 17. Existing Roof Area to replace

Building	Approximate Roof Square Footage
Charles G. Harker School	44,800
Governor Charles C. Stratton School	18,500
Margaret C. Clifford School	98,000
Walter Hill School	7,400

ENERGY SAVINGS METHODOLOGY AND RESULTS

The energy savings for this ECM are realized at the buildings' HVAC equipment. The improved roof will limit conditioned air infiltration through openings in the building air barrier. Less infiltration means less heating and cooling required by HVAC systems.

Following approach is used to determine savings for this specific measure:

Existing Roof Efficiency	*= Existing U + Existing Infiltration Rate*
Proposed Roof Efficiency	*= Proposed U + Proposed Infiltration Rate*
Energy Savings $	*= UAdTproposed – UAdTexisting*
Winter Savings (Therms)	*= Energy Savings/Boiler Eff./100,000*
Summer Savings (Tons Cooling)	*= Energy Savings/12,000 Btu/Ton*

INTERFACE WITH BUILDING

The new roof sealing will be constructed to match existing, maintaining contours of the existing building.

CHANGES IN INFRASTRUCTURE

The existing roofing will be sealed at the above referenced roof locations.

SUPPORT AND COORDINATION WITH UTILITIES

Coordination efforts will be needed to reduce or limit impact to building occupants.

ENVIRONMENTAL ISSUES

Resource Use	Energy savings will result from reduced HVAC energy usage and better occupant comfort.
Waste Production	Existing roof material will be removed and disposed of properly.
Environmental Regulations	No environmental impact is expected.

ECM 5A Permanent Load Reduction

The key benefits of this ECM include:

- **Reduced utility costs**.
- **Reduced energy usage** from improved efficiency resulting from replacement of older equipment.
- **Lower Operational Costs** through less frequent maintenance and operational issues.

ECM Description	Charles G. Harker School	Governor Charles C. Stratton School	Margaret C. Clifford School	Walter Hill School
5A Permanent Load Reduction	▪	▪	▪	▪

ECM OVERVIEW

This measure evaluates the savings from the decrease in power (KW) usage and the rebates associated with that reduction through the PJM Permanent Reduction Program. Honeywell proposes to continue to utilize a registered Demand Response Curtailment Service Provider (CSP) to provide energy response services to the School District. Through the CSP, the School District will participate in the PJM Capacity Market Program and PJM Energy Efficiency Program. These programs are offered through the PJM Regional Transmission Organization (RTO), and Independent System Operator (ISO). The Capacity Market Program allows PJM customers the ability to respond to capacity emergencies when called upon by PJM, and the energy efficiency program pays PJM customers for implementing Energy Conservation measures (ECMs) that result in permanent load reductions during defined hours.

Margaret C. Clifford School - Electric Meter

Governor Charles C. Stratton School – Switchboard

PJM CAPACITY MARKET PROGRAM

Capacity represents the need to have adequate resources to ensure that the demand for electricity can be met at all times. For PJM, that means that a utility or other electricity supplier, load serving entity, is required to have the resources to meet its consumers' demand plus a reserve amount. Electricity suppliers, load serving entities, can meet that requirement by owning and operating generation capacity, by purchasing capacity from others or by obtaining capacity through PJM's capacity market auctions.

Table 18. Permanent Load Reduction KW per Building

Building	Permanent Load Reduction (KW)
Charles G. Harker School	68
Governor Charles C. Stratton School	45
Margaret C. Clifford School	25
Walter Hill School	37
TOTAL	**175**

PJM operates a capacity market, called the Reliability Pricing Model (RPM). It is designed to ensure that adequate resources are available to meet the demand for electricity at all times. In the RPM, those resources include not only generating stations, but also demand response actions and energy efficiency measures by consumers to reduce their demand for electricity.

PJM must keep the electric grid operating in balance by ensuring there is adequate generation of electricity to satisfy the demand for electricity at every location in the region both now and in the future. PJM's markets for energy and ancillary services help maintain the balance now while the PJM market for capacity aims to keep the system in balance in the future. Resources, even if they operate infrequently, must receive enough revenue to cover their costs. Payments for capacity provide a revenue stream to maintain and keep current resources operating and to develop new resources. Investors need sufficient long-term price signals to encourage the maintenance and development of generation, transmission and demand-side resources. The RPM, based on making capacity commitments in advance of the energy need, creates a long-term price signal to attract needed investments for reliability in the PJM region.

PROPOSED SOLUTION

Honeywell proposes to work with a PJM Regional Transmission Organization (RTO), CSR to implement a Demand Response energy curtailment program which will generate revenue streams for the School District. Honeywell's Demand Response agent acting as the CSP will notify the district prior to potential events in order to advise and coordinate load curtailment participation in accordance with RTO program requirements and will work with the School District to benefit from energy efficiency improvements.

The PJM Markets are further described below.

The PJM Energy Efficiency Program

Energy efficiency measures consist of installing more efficient devices or implementing more efficient processes/systems that exceed then-current building codes or other relevant standards. An energy efficiency resource must achieve a permanent, continuous reduction in demand for electricity. Energy efficiency measures are fully implemented throughout the delivery year without any requirement of notice, dispatch, or operator intervention. A demand response resource can reduce its demand for electricity when instructed; this means PJM considers it a "dispatchable resource". A demand response resource can participate in the RPM market for as long as its ability to reduce its demand continues. A demand response resource must be willing to reduce demand for electricity up to 10 times each year when called for a reduction. In a year without any reduction calls, the demand response resource is required to demonstrate the ability to reduce demand for electricity during a test of reduction capability.

Data will be submitted by the demand response resource to prove compliance with reductions from actual calls or reductions from capability tests. An energy efficiency resource is one that reduced their demand for electricity through an energy efficiency measure that does not require any additional action by the consumer.

ENERGY SAVINGS METHODOLOGY AND RESULTS

Revenue is generated through participation in the PJM DR program.

CHANGES IN INFRASTRUCTURE

None

CUSTOMER SUPPORT AND COORDINATION WITH UTILITIES

Initiation of demand response curtailment will be required.

ENVIRONMENTAL ISSUES

Resource Use	None.
Waste Production	This measure will produce no waste by-products.
Environmental Regulations	None.

ECM 6A Transformer Replacements

The key benefits of this ECM include:

- **Guaranteed Energy Savings** from reducing total energy consumption with more efficient, state of the art technology.
- **Equipment Longevity** due to more efficient and less wasteful equipment utilization.

ECM Description	Charles G. Harker School	Governor Charles C. Stratton School	Margaret C. Clifford School	Walter Hill School
6A Transformer Replacement		▪	▪	▪

EXISTING CONDITIONS

The transformers in locations within the electrical distribution systems in the City consist of 480 Volts. Distribution transformers are installed in the boiler rooms and in various electrical and utility closets to step down the voltage to 120-208 Volts. Typically, an electrical distribution system has some losses associated with the electrical system and a considerable portion of these losses are associated with distribution transformers.

Margaret C. Clifford School - Transformer

Governor Charles C. Stratton School - Transformer

Systems Evaluation and Selection

Typical transformers are not designed to handle harmonic loads of today's modern facilities, and suffer significant losses, even if the transformer is relatively new. Typically, conventional transformer losses, which are non-linear, increase by 2.7 times when feeding computer loads. The nonlinear load loss multiplier reflects this increase in heat loss, which decreases the net transformer efficiency. Also, unlike most substation transformers that are vented to the exterior, building transformers are ventilated within the building they are located, and their heat losses therefore add to the cooling load.

Based on site investigation conducted by our staff, we identified the following transformers that we propose to replace with energy efficient replacements at a size matching the existing loads as indicated in the table below.

EXISTING TRANSFORMERS TO BE REPLACED

Table 19. Existing Transformers to replace

Building	Location	kVA	Qty
Margaret C. Clifford School	Boiler Room	75	1
Margaret C. Clifford School	Mechanical Room (Orange Hall)	45	1
Margaret C. Clifford School	Storage Room (Yellow)	45	1
Walter Hill School	Main Electrical Room	150	1
Governor Charles C. Stratton School	1347 Mechanical Room	225	1
Governor Charles C. Stratton School	Boiler Room	300	1
Governor Charles C. Stratton School	Old Learning Cottage	225	1

PROPOSED SOLUTION

The proposed transformers will be Power Smiths High Efficiency K-Star Harmonic Mitigating units. They are Energy-Star rated and meet the new TP1 Law requiring replacement of transformers of 600 volts or under.

SCOPE OF WORK

Remove and install new E-saver transformers.

Per Transformer Unit:

- Shut off the main electric power to the transformer to be replaced.
- Disconnect the existing transformer and install replacement unit.
- Turn power back on.
- Inspect unit operation by performing electrical and harmonics testing.
- Dispose of old transformers properly.

ENERGY SAVINGS METHODOLOGY AND RESULTS

The energy savings for this ECM are realized by reduction in electric energy lost in the existing transformers as a result of the higher efficiency of the new transformers.

CHANGES IN INFRASTRUCTURE

New transformers where indicated.

CUSTOMER SUPPORT AND COORDINATION WITH UTILITIES

Minor support will be required for the interruption of services for the affected areas.

ENVIRONMENTAL ISSUES

Resource Use	Energy savings will result from increased voltage conversion efficiency.
Waste Production	Any removed parts will be disposed of properly.
Environmental Regulations	No environmental impact is expected.

ECM 7A CHP (Cogeneration)

The key benefits of this ECM include:

- **Energy Savings** from utilizing a Combined Heat and Power (CHP) system to supplement the existing heating system.
- **Operational Savings** resulting from improved operational efficiencies unique to CHP technology.

ECM Description	Charles G. Harker School	Governor Charles C. Stratton School	Margaret C. Clifford School	Walter Hill School
7A Cogeneration CHP	▪			

EXISTING CONDITIONS

No Combined Heat and Power (i.e. cogeneration) units are currently located within the Swedesboro Woolwich School District.

Cogeneration Configuration

Ecopower CHP

PROPOSED SOLUTION

Honeywell recommends the installation of the ecopower micro-cogeneration system provides heat and electrical power in a cost effective and environmentally friendly manner. Using a natural gas or propane fueled Marathon Engine, the system captures thermal energy for space heating or domestic hot water. The mCHP uses heat generated by an internal combustion engine to produce between 13,000 - 47,000 BTU of heat per hour while simultaneously co-generating 1.2 - 4.4kW of electricity per hour. The system is thermally driven. The ecopower will anticipate the heat demand from sensors located in the house, buffer tank or outside and varies its output to satisfy the demand. It will modulate (slow down or speed up) to run at a level to maintain a constant heat requirement in order to keep the engine running as long as possible, ensuring maximum electrical generation.

SCOPE OF WORK

Table 20. Proposed Cogeneration Units

Building	Type	Manufacturer	KW	Model
Charles G. Harker School	Axiom	Ecopower	4.4	1

ENERGY SAVINGS METHODOLOGY AND RESULTS

Savings are based on energy conversion of natural gas to thermal and electrical energy.

EQUIPMENT INFORMATION

Manufacturer and Type	Axiom Ecopower, Electrical Output 1.2-4.4 kW, Thermal Output 13,000 -47,000 Btu/hr., Overall efficiency 93%
Equipment Identification	Product cut sheets and specifications for generally used are available upon request. As part of the measure design and approval process, specific product selection will be provided for your review and approval.

CHANGES IN INFRASTRUCTURE

The proposed micro-generator unit would reside in or near the boiler room.

CUSTOMER SUPPORT AND COORDINATION WITH UTILITIES

Minor support will be required for the interruption of utilities for brief tie-in periods. The customer and Honeywell will decide upon the exact location of the CHP installation.

ENVIRONMENTAL ISSUES

Resource Use	Energy will be generated to supplement energy purchased from the electrical utility.
Waste Production	Any removed parts will be disposed of properly.
Environmental Regulations	Aside from the environmental benefits from on-site energy generation, no other environmental impact is expected.

ECM 8A Solar PPA

The key benefits of this ECM include:

- **Reduced Utility cost**s.
- **Guaranteed Utility Rates** for 15 years to provide a valuable hedge against future price volatility and deliver greater budgetary certainty utilizing clean electricity.
- **Additional Savings** from solar can provide the Swedesboro Woolwich with more potential ESIP funding to expand the overall project scope and include additional projects.
- **Educational Asset** to provide additional tools for teachers to engage students on sustainability and the environment.
- **Low Risk** given that maintenance is provided by the 3rd party system owner.
- **No Upfront Costs**.

ECM Description	Charles G. Harker School	Governor Charles C. Stratton School	Margaret C. Clifford School	Walter Hill School
8A Solar PPA	▪	▪	▪	▪

ECM OVERVIEW

Honeywell recommends that the District further assess the feasibility of a solar photovoltaic system on District owned roofs to generate on-site renewable electricity. This could be provided at no upfront cost via a Power Purchase Agreement (PPA). A PPA is a public-private partnership financial arrangement in which a third-party solar company owns, operates, and maintains your photovoltaic system, while the host customer agrees to provide the site for the system on its property. The solar system's power production is purchased by you for a predetermined price ($/kWh) and for a predetermined period. This stable price for electricity will be lower than the utilities and third-party suppliers, thereby allowing you to benefit from lower electricity prices, on-site renewable energy generation, a reduction in greenhouse gas emissions and a powerful educational tool for your teachers and students. Meanwhile, the system will not add any additional maintenance costs since it is owned by the third-party solar company. One of the more significant benefits of this potential ECM is that it will provide for a rate change, helping to deliver greater savings within your ESIP project to help fund other measures

Typical Rooftop Solar Array

Typical Parking Lot Solar Array

Honeywell will oversee the design and construction of the system. We will assist in the feasibility study during your IGA, in conjunction with your technical consultant and legal team, to provide RFP development, solicitation, and oversight of the installation of a solar photovoltaic system.

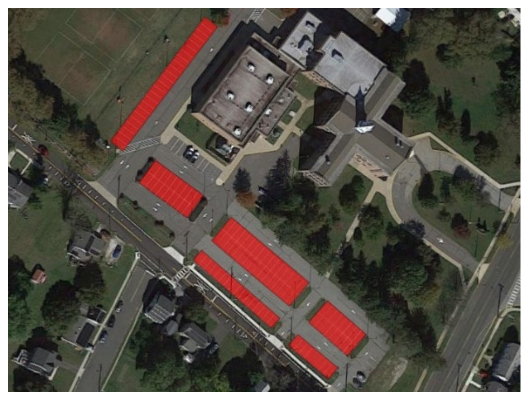
PROPOSED SOLUTION

Honeywell proposes to install the solar PPA system at the potential buildings listed in the chart below.

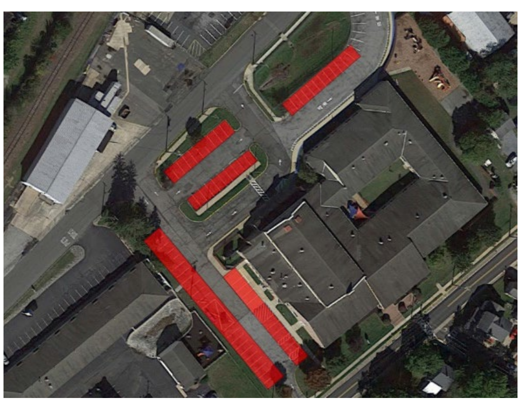
Table 21. Proposed Solar PPA System

Building	Type	KW DC	kWh AC Generated
Charles G. Harker School	PPA	290.7	420,181
Governor Charles C. Stratton School	PPA	290.7	420,181
Margaret C. Clifford School	PPA	239.8	346,612
Walter Hill School	PPA	243.0	351,237
Total		**1064.2**	**1,538,211**

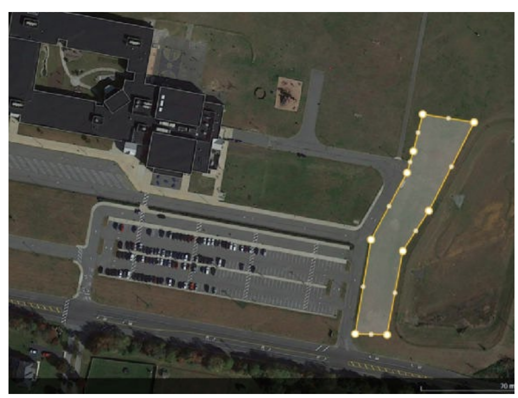
Potential Solar Arrays – Governor Charles C. Stratton School



Potential Solar Arrays - Walter Hill School



Potential Solar Arrays - Margaret C. Clifford School



Potential Solar Arrays - Charles G. Harker School

ENERGY SAVINGS METHODOLOGY AND RESULTS

Savings are based on the difference in kWh price between the PPA and the District's current electrical supplier.

CHANGES IN INFRASTRUCTURE

The proposed solar array would be roof-mounted only.

CUSTOMER SUPPORT AND COORDINATION WITH UTILITIES

Minor support will be required for the interruption of utilities for brief tie-in periods.

ENVIRONMENTAL ISSUES

Resource Use	None.
Waste Production	None.
Environmental Regulations	Aside from the environmental benefits of increasing energy awareness no other environmental impact is expected.

ECM 9A Energy Education

The key benefits of this ECM include:

- **Energy Education** through instructional opportunities during the Energy Savings Plan development and after ESIP project implementation.
- **Energy Conservation** by encouraging energy efficiency among teachers, students, and staff.

ECM Description	Charles G. Harker School	Governor Charles C. Stratton School	Margaret C. Clifford School	Walter Hill School
9A Energy Education	▪	▪	▪	▪

ECM OVERVIEW

Putting Energy into Education and the Community

Honeywell offers to enhance the District's capability to provide comprehensive energy education to a select portion of its students. The goal of this ECM is to enable a realistic student understanding of the scientific, economic and environmental impacts of energy through the National Energy Education Development (NEED) Project, a 501(c)(3) nonprofit education association.

The NEED Project includes innovative educational materials, teacher and resident training programs, evaluation, and recognition. NEED materials and training conferences are designed to provide objective comprehensive information about energy sources, production, and consumption in addition to their impact on the environment, economy, and society. The program emphasizes the development of critical thinking and problem-solving skills using inquiry activities that encourage students to consider the trade-offs inherent in energy decisions.

Existing NEED curriculum materials are reviewed annually by energy advisors and teachers alike. NEED's Teacher Advisory Board and state NEED Teacher Advisory Boards review the materials for objectivity, applicability and content. NEED materials are currently divided into four levels: Primary K-2, Elementary 3-5, Intermediate 6-8, and Secondary 9-12. NEED encourages teachers to review the materials to be certain the materials they request are at the appropriate reading level for their residents. All materials are easily reproducible and carry waivers for reproduction for classroom use. All materials are updated for data each year – always providing educators the most recently available data collected by the Energy Information Administration.

NEED has over 130 teacher and resident guides for teaching the science of energy, sources of energy, electricity and transportation, and efficiency and conservation. The proposed program will include NEED's hands-on kits including:

Curriculum

Curriculum Packet – Each workshop attended will receive a NEED curriculum packet, estimated forty (40) workshop attendees. The NEED basic curriculum packet is provided to educators attending one day training events. This packet contains a planning guide, copies of the Energy Info books and select curriculum pieces for teachers to implement in their classroom. For the 2021-2022 school year, the packet includes new lessons on energy storage and energy careers as well as a sampling of creative arts connections. Feedback from workshop attendees consistently identifies this packet as their "go to" for energy lessons when returning to the classroom.

Energy Efficiency & Conservation Kits (Elementary, Intermediate, Secondary) – Energy Efficiency & Conservation twenty (20) kits will be provided to each teacher/school that attends the workshop. After reviewing the materials, teachers will be able to choose the level of kit that best suits their residents' needs. These kits include tools for measuring school energy use at the appropriate grade levels – residents perform school energy audits and monitoring activities to assist in the reduction of school energy use and preparation of a school energy management plan. The kits come with one (1) Teacher Guide and a class-set of thirty (30) Resident Guides and the materials necessary to conduct the activities with multiple classes.

Science of Energy – One (1) Science of Energy kits will be provided to each District school that participates in the workshop. This curriculum assists teachers to teach specific energy standards in the science education standards and make the connection between those standards and the energy we use today. The unit provides background information and hands-on experiments to explore the different forms of energy and how energy is transformed from one form to another. The Science of Energy kit includes teacher guides written at three levels – Elementary, Intermediate, and Secondary as well as the materials necessary to conduct the activities.

Training

All training programs will include certification of professional development hours for teachers to use for professional development requirements where allowed by the state. It should be noted that each of the training programs include evaluation.

Energy Efficiency Teacher Workshops –This one-day workshop for forty (40) District educators provides background information and the opportunity to walk-through classroom activities with an experienced facilitator. The workshop will cover curriculum materials and resources focused on energy efficiency and electricity. NEED recommends scheduling training on previously planned professional development days to minimize training costs. Workshops will be held at District facilities. If space/time is unavailable during professional development days, workshops can also be held on Saturdays, providing stipends to attending teachers. Continental breakfast and lunch are included as well.

NEED will fully implement the workshops. NEED staff will work with the District and Honeywell to establish a workshop date, engage with District personnel on workshop location and logistics, secure catering, run online registration, and provide recruitment materials. A NEED trainer will facilitate the workshops and NEED will provide Honeywell with evaluation data.

ECM 10A Sustainable Transportation – EV Chargers

The key benefits of this ECM include:

- **Increased Sustainability** from encouraging the use of pollution-free transportation.
- **Tangible Learning Experience** by integrating educational materials with on-site student experience

ECM Description	Charles G. Harker School	Governor Charles C. Stratton School	Margaret C. Clifford School	Walter Hill School
10A Sustainable Transportation - EV Chargers	▪	▪	▪	▪

ECM OVERVIEW

Honeywell will seek to increase the availability of eco-friendly transportation options for staff and parents by providing Electric Vehicle charging stations at each of your schools.

EXISTING CONDITIONS

There are currently no EV Charging Stations located at the District facilities.

Sample Level 2 EV Chargers

Sample Level 2 EV Chargers

PROPOSED SOLUTION

Honeywell proposes to install multiple Level 2 EV Chargers at the locations outlined below. These chargers are capable of increasing the battery charge of electric vehicles by up to 25 miles (of range) per hour. With a five-year prepaid ChargePoint cloud plan, the District can operate and customize charging stations to meet specific requirements. Some of the most widely used features include:

1. Set the price that drivers pay to use charging stations based on energy cost, duration, time of use, session length, or driver group. Funds collected from drivers are electronically transferred to a designated bank account. For example, staff who work for the District may be allowed to use the chargers for free, while visitors may be charged for a certain price per kWh. This can help generate revenue for the District.
2. Advanced access controls manage which drivers can access stations and when. The chargers may be set available for staff and students only during school hours, and open for public after school hours.

3. Waitlist makes charging more convenient by notifying drivers when a charging spot becomes available for them and holding it until they can plug in their vehicle.

With new state-wide incentives available towards the installation of up to six chargers per site, this can be a cost-effective way to integrate the future of transportation into your District's buildings.

Table 22. Proposed EV Charging Stations

Location	Make	Model	Qty	# of Ports
Charles G. Harker School	ChargePointe	CT4021	1	2
Governor Charles C. Stratton School	ChargePointe	CT4021	1	2
Margaret C. Clifford School	ChargePointe	CT4021	1	2
Walter Hill School	ChargePointe	CT4021	1	2
Total			**4**	**8**

CHANGES IN INFRASTRUCTURE

New EV Chargers will be installed as part of this measure.

CUSTOMER SUPPORT AND COORDINATION WITH UTILITIES

Minor support will be required for the interruption of utilities for brief tie-in periods.

ENVIRONMENTAL ISSUES

Resource Use	An increase in electrical use may occur due to this ECM, offset by revenue generated from charging stations.
Waste Production	Any discarded components will be disposed of properly.
Environmental Regulations	Reduced pollution from staff and parent vehicles is expected.

ECM 11A Digital School Kiosks

The key benefits of this ECM include:

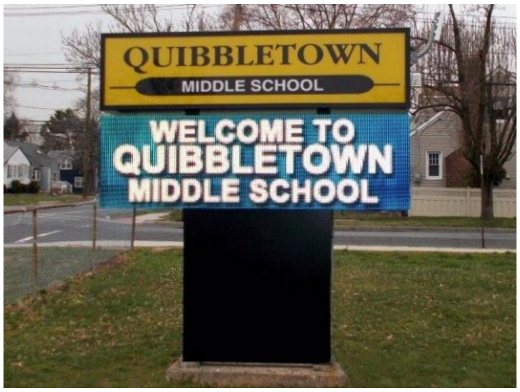
- **Improved Awareness** from replacing existing signage for better communication.
- **Increased School Spirit** by utilizing new technology during school events.

ECM Description	Charles G. Harker School	Governor Charles C. Stratton School	Margaret C. Clifford School	Walter Hill School
11A Digital School Kiosks	▪	▪	▪	▪

EXISTING CONDITIONS

Honeywell observed a mix of both lit and unlit traditional, non-digital signs at the various schools in the District. These signs have limited functionality due to their poor visibility and need for manual changes in messaging.

Existing Sign at Clifford



Sample Digital Signage

PROPOSED SOLUTION

Honeywell proposes to install a new digital kiosk at each school to improve functionality, readability, and ease of use over the existing signage. These new digital signs will allow each school to convey encouragement, updates, school spirit, and important news to students, parents, teachers, and the surrounding community. With countless options and variations of signs available, Honeywell will work with the District to determine a selection bet fit for each school.

Table 23. Proposed Digital School Kiosks

Building	Qty
Charles G. Harker School	1
Governor Charles C. Stratton School	1
Margaret C. Clifford School	1
Walter Hill School	1
Totals	**4**

CHANGES IN INFRASTRUCTURE

New digital signs will be installed at each school.

CUSTOMER SUPPORT AND COORDINATION WITH UTILITIES

Minor support will be required for the interruption of utilities for brief tie-in periods.

ENVIRONMENTAL ISSUES

Resource Use	New signs may increase electricity usage, depending on existing conditions.
Waste Production	Old components will be disposed of properly.
Environmental Regulations	No environmental impact is expected.

SECTION D
TECHNICAL & FINANCIAL SUMMARY

Section D — Technical & Financial Summary

1. Recommended ESIP Project

Recommended ESIP Project

Value of Project	$3,055,877
Term of Repayment	15 Years
Projected Savings Over Term	$4,205,411
Projected NJ Rebates & Incentives	$117,745
Projected Interest Rate	3.5%

Honeywell

2. Recommended Project Technical and Financial Summary Documents

Form II: Energy Conservation Measures (ECMs) Summary Form

FORM II-3
ESCO's ENERGY SAVINGS PLAN (ESP):
ENERGY CONSERVATION MEASUREs (ECMs) SUMMARY FORM
SWEDESBORO WOOLWICH SCHOOL DISTRICT
ENERGY SAVING IMPROVEMENT PROGRAM

ESCO Name: Honeywell International

Proposed Preliminary Energy Savings Plan: ECMs (Base Project)	Estimated Installed Hard Costs (1) $	Estimated Annual Savings $	Estimated Simple Payback (years)
1A LED Lighting Upgrades	$ 880,559	$ 128,547	6.85
2A Boiler Replacements	$ 670,877	$ 15,850	42.33
2D Rooftop Unit Replacement	$ 614,297	$ 11,129	55.20
3B BMS Dashboard - Energy Optimization	$ 148,800	$ 19,272	7.72
4A Building Envelope Improvements	$ 190,630	$ 11,923	15.99
5A Permanent Load Reduction	$ -	$ -	-
6A Transformer Replacement	$ 146,261	$ 9,781	14.95
8A Solar PPA	$ 27,498	$ 93,622	0.29
Add additional lines as needed* **Project Summary:**	$ 2,678,922	$ 290,124	9.23

Optional ECMs Considered, but not included with base project at this time	Estimated Installed Hard Costs (1) $	Estimated Annual Savings $	Estimated Simple Payback (years)
1B De-Stratification Fans w/ UV Disinfection	$ 183,813	$ 5,737	32.04
1C Vending Misers & Plug Loads	$ 7,197	$ 386	18.62
2B Multipurpose Room Floor Replacement	$ 925,930	$ 27,252	33.98
2C Domestic Hot Water Heater Replacement	$ 58,741	$ 85	690.60
2E Cooling Tower Replacement	$ 290,329	$ 1,066	272.41
2F Heat Pump Replacement	$ 4,208,073	$ 49,772	84.55
2G Premium Efficiency Motors and VFDs	$ 380,370	$ 21,731	17.50
2H Kitchen Hood Efficiency Improvements	$ 156,116	$ 4,549	34.32
2I Walk In Compressor Controls	$ 47,841	$ 1,095	43.69
3A Building Management System Upgrades	$ 281,773	$ 6,875	40.99
4B Roofing Upgrades	$ 243,256	$ 551	441.41
7A Cogeneration CHP	$ 110,206	$ 847	130.12
9A Energy Education	$ 8,343	$ -	-
10A Sustainable Transportation - EV Chargers	$ 132,839	$ (7,227)	(18.38)

Add additional lines as needed*

(1) The total value of Hard Costs is defined in accordance with standard AIA definitions that include: Labor Costs, Subcontractor Costs, Cost of Materials & Equipment, Temporary Facilities and Related Items, and Miscellaneous Costs such as Permits, Bonds Taxes, Insurance, Mark-ups, Overhead, Profit, etc.

Form III: Projected Annual Energy Savings Data Form

FORM III-3

ESCO's ENERGY SAVINGS PLAN (ESP)
PROJECTED ANNUAL ENERGY SAVINGS DATA FORM
SWEDESBORO WOOLWICH SCHOOL DISTRICT
ENERGY SAVING IMPROVEMENT PROGRAM

ESCO Name: **Honeywell International**

The projected annual savings for each fuel type MUST be completed using the following format. Data should be given in the form of fuel units that appear in the utility bills.

Energy/Water	ESCO Developed Baseline (Units)	ESCO Developed Baseline (Costs $)	Proposed Annual Savings (Units)	Proposed Annual Savings (Costs $)
Electric Demand (KW)	12,181	$182,983	2,437	$36,676
Electric Energy (KWH)	2,612,256	$464,537	1,768,468	$191,600
Natural Gas (therms)	67,182	$87,661	9,107	$11,955
Fuel Oil (Gal)	0	$0	0	$0
Steam (Pounds)				
Water (gallons)				
Other (Specify Units)				
Other (Specify Units)				
Avoided Emissions (1)	Provide in Pounds (Lbs)			
NOX	1,552			
SO2	1,185			
CO2	1,265,604			

(1) ESCOs are to use the rates provided as part of this RFP to calculate Avoided Emissions. Calculation for all project energy savings and greenhouse gas reductions will be conducted in accordance with adopted NJBPU protocols

(2) "ESCOs Developed Baseline": Board's current annual usages and costs as determined by the proposing ESCO; based off Board's utility information as provided to proposing ESCO.

(3) "Proposed Annual Savings": ESCOs proposed annual savings resulting from the Board's implementation of the proposed ESP, as based upon "ESCOs Developed Baseline".

Honeywell

Form IV: Projected Annual Energy Savings Data Form in MMBTUs

FORM IV

ESCO's ENERGY SAVINGS PLAN (ESP):
PROJECTED ANNUAL ENERGY SAVINGS DATA FORM IN MMBTUs
SWEDESBORO WOOLWICH SCHOOL DISTRICT
ENERGY SAVING IMPROVEMENT PROGRAM

ESCO Name: **Honeywell International**

The projected annual energy savings for each fuel type MUST be completed using the following format. Data should be given in equivalent MMBTUs.

ENERGY	ESCO Developed Baseline	ESCO Proposed Savings Annual	Comments
Electric Energy (MMBTUs)	8,913	6,034	
Natural Gas (MMBTUs)	6,718	911	
Fuel Oil (MMBTUs)	0	0	
Steam (MMBTUs)			
Other (Specify) (MMBTUs)			
Other (Specify)			

NOTE: MMBTU Defined: A standard unit of measurement used to denote both the amount of heat energy in fuels and the ability of appliances and air conditioning systems to produce heating or cooling.

Honeywell

Form V: ESCOs Proposed Final Project Cost Form

FORM V

ESCO's ENERGY SAVINGS PLAN (ESP):
ESCOs PROPOSED FINAL PROJECT COST FORM FOR BASE CASE PROJECT
SWEDESBORO WOOLWICH SCHOOL DISTRICT
ENERGY SAVING IMPROVEMENT PROGRAM

ESCO Name: **HONEYWELL INTERNATIONAL**

PROPOSED CONSTRUCTION FEES

Fee Category	Fees [1] Dollar ($) Value	Percentage of Hard Costs
Estimated Value of Hard Costs [2]:	$2,678,922	
Project Service Fees		
Investment Grade Energy Audit	$104,478	3.90%
Design Engineering Fees	$80,368	3.00%
Construction Management & Project Administration	$133,946	5.00%
System Commissioning	$13,395	0.50%
Equipment Initial Training Fees	$13,395	0.50%
ESCO Overhead	$241,103	9.00%
ESCO Profit	$80,368	3.00%
Project Service Fees Sub Total	$345,581	12.90%
TOTAL FINANCED PROJECT COSTS:	$3,345,974	24.90%
ESCO Termination Fee (To be paid only if the Board decides not to proceed beyond the ESP)	$0.00	0.00%

PROPOSED ANNUAL SERVICE FEES

First Year Annual Service Fees	Fees [1] Dollar ($) Value	Percentage of Hard Costs
SAVINGS GUARANTEE (OPTION)	$0	0.00%
Measurement and Verification (Associated w/ Savings Guarantee Option)	$12,000	Flat Fee
ENERGY STAR™ Services (optional)	Included	0.00%
Post Construction Services (If applicable)	N/A	-
Performance Monitoring	Included	-
On-going Training Services	N/A	-
Verification Reports	Included	-
TOTAL FIRST YEAR ANNUAL SERVICES	$12,000	Flat Fee

NOTES:
(1) Fees should include all mark-ups, overhead, and profit. Figures stated as a range will NOT be accepted.
(2) The total value of Hard Costs is defined in accordance with standard AIA definitions that include:

Labor Costs, Subcontractor Costs, Cost of Materials and Equipment, Temporary Facilities and Related Items, and Miscellaneous Costs such as Permits, Bonds Taxes, Insurance, Mark-ups, Overhead and Profit, etc.
ESCO's proposed interest rate at the time of submission: 5% TO BE USED BY ALLRESPONDING ESCOs FOR

*Annual Service only applies if customer accepts energy guarantee.

FORM VI

ESCO's PRELIMINARY ENERGY SAVINGS PLAN (ESP):
ESCO's PRELIMINARY ANNUAL CASH FLOW ANALYSIS FORM
SWEDESBORO WOOLWICH SCHOOL DISTRICT
ENERGY SAVING IMPROVEMENT PROGRAM

ESCO Name: **Honeywell International**

Note: Proposers must use the following assumptions in all financial calculations:
(a) The cost of all types of energy should be assumed to inflate at: **2.4%** gas, **2.2%** electric per year

1. Term of Agreement: **15** (Years) (Months)
2. Construction Period [2] (months): **12**
3. Cash Flow Analysis Format:

Form V Project Cost [3]:	$ 3,345,974
	$ -
ESIP Contract Value:	$ 3,345,974
Additional Capital	$ -
Professional Fees:	$ 25,000
Lease Issuance Fees:	$ 10,000
Total Project Cost [1]:	**$ 3,380,974**

Interest Rate to Be Used for Proposal Purposes: **3.50%**

Year	Annual Energy Savings	Solar Savings	Annual Operational Savings	Energy Rebates/Incentives [5]	Total Annual Savings	Annual Project Costs	Board Costs	Annual Service Costs [4]	Net Cash-Flow to Client	Cumulative Cash Flow
Installation	$ 43,983				$ 43,983	$ -	$ -	$ -	$ 43,983	$ 43,983
1	$ 146,610	$ 93,622	$ 49,893	$ 119,102	$ 409,226	$ (408,576)	$ (420,576)	$ (12,000)	$ 650	$ 44,633
2	$ 149,859	$ 95,203	$ 49,893	$ 3,503	$ 298,458	$ (297,808)	$ (297,808)	$ -	$ 650	$ 45,283
3	$ 153,180	$ 96,811	$ 20,385	$ 3,503	$ 273,880	$ (273,230)	$ (273,230)	$ -	$ 650	$ 45,933
4	$ 156,575	$ 98,446	$ 20,385	$ 3,503	$ 278,910	$ (278,260)	$ (278,260)	$ -	$ 650	$ 46,583
5	$ 160,046	$ 100,109	$ 20,385		$ 280,540	$ (279,890)	$ (279,890)	$ -	$ 650	$ 47,233
6	$ 163,593	$ 101,800			$ 265,393	$ (264,743)	$ (264,743)	$ -	$ 650	$ 47,883
7	$ 167,219	$ 103,519			$ 270,738	$ (270,088)	$ (270,088)	$ -	$ 650	$ 48,533
8	$ 170,925	$ 105,268			$ 276,193	$ (275,543)	$ (275,543)	$ -	$ 650	$ 49,183
9	$ 174,714	$ 107,046			$ 281,759	$ (281,109)	$ (281,109)	$ -	$ 650	$ 49,833
10	$ 178,586	$ 108,854			$ 287,440	$ (286,790)	$ (286,790)	$ -	$ 650	$ 50,483
11	$ 182,545	$ 110,692			$ 293,237	$ (292,587)	$ (292,587)	$ -	$ 650	$ 51,133
12	$ 186,591	$ 112,562			$ 299,153	$ (298,503)	$ (298,503)	$ -	$ 650	$ 51,783
13	$ 190,727	$ 114,463			$ 305,190	$ (304,540)	$ (304,540)	$ -	$ 650	$ 52,433
14	$ 194,955	$ 116,396			$ 311,351	$ (310,701)	$ (310,701)	$ -	$ 650	$ 53,083
15	$ 199,277	$ 118,362			$ 317,639	$ (316,949)	$ (316,949)	$ -	$ 690	$ 53,773
Totals	$ 2,619,384	$ 1,583,152	$ 160,941	$ 129,612	$ 4,493,090	$ (4,439,317)	$ (4,451,317)	$ (12,000)	$ 53,773	**$ 53,773**

NOTES:
(1) Includes: Hard costs and project service fees defined in ESCO's PROPOSED "FORM V"
(2) No payments are made by SWEDESBORO WOOLWICH SCHOOL DISTRICT during the construction period.
(3) This figure should equal the value indicated on the ESCO's PROPOSED "FORM V". DO NOT include in the Financed Project Costs.
(4) Annual Service only applies if customer accepts energy guarantee.
(5) As of July 1, 2021, all of former NJ Clean Energy Program incentive programs transitioned over to the investor-owned gas and electric utility companies. Subsequently, the BPU is requiring that all ESIP projects consult with the DCA and follow all DCA guidance regarding the procurement of all subcontractors.

Honeywell is not acting as a municipal advisor of fiduciary on your behalf. Any municiapl securities or financial products information provided is for general information and educational purposes only and you should obtain the advice of a licensed and qualified financial advisor regarding such information.

Honeywell

Building-by-Building Simple Payback Summary (Hard Costs Only)

A simple payback summary broken down by building by ECM has been provided for the Swedesboro Woolwich School District use in reviewing available scope combinations and options.

Building & ECM	kWh Savings ($)	kW Savings ($)	Natural Gas Savings ($)	Water Savings ($)	Annual Energy Cost Savings ($)	Annual Operational Savings ($)	Net Cost ($)	Simple Payback
Charles G. Harker School	**$ 62,199**	**$ 13,736**	**$ 3,439**	**$ -**	**$ 88,910**	**$ 9,535**	**$ 400,082**	**4.5**
1A LED Lighting Upgrades	$ 28,089	$ 13,736	$ (1,968)	$ -	$ 46,992	$ 7,135	$ 303,545	6.5
2A Boiler Replacements	$ -	$ -	$ -	$ -	$ -	$ -	$ -	-
2D Rooftop Unit Replacement	$ -	$ -	$ -	$ -	$ -	$ -	$ -	-
5A Permanent Load Reduction	$ -	$ -	$ -	$ -	$ -	$ -	$ -	-
4A Building Envelope Improvements	$ 1,367	$ -	$ 4,134	$ -	$ 5,501	$ -	$ 50,170	9.1
6A Transformer Replacement	$ -	$ -	$ -	$ -	$ -	$ -	$ -	-
8A Solar PPA	$ 30,647	$ -	$ -	$ -	$ 30,647	$ -	$ 9,166	0.3
3B BMS Dashboard - Energy Optimization	$ 2,097	$ -	$ 1,273	$ -	$ 5,770	$ 2,400	$ 37,200	6.4
Governor Charles C. Stratton School	**$ 65,517**	**$ 10,023**	**$ 4,532**	**$ -**	**$ 93,577**	**$ 13,505**	**$ 717,439**	**7.7**
1A LED Lighting Upgrades	$ 22,899	$ 9,060	$ (1,686)	$ -	$ 36,378	$ 6,105	$ 240,906	6.6
2A Boiler Replacements	$ -	$ -	$ 3,365	$ -	$ 8,365	$ 5,000	$ 324,939	38.8
2D Rooftop Unit Replacement	$ -	$ -	$ -	$ -	$ -	$ -	$ -	-
5A Permanent Load Reduction	$ -	$ -	$ -	$ -	$ -	$ -	$ -	-
4A Building Envelope Improvements	$ 768	$ -	$ 2,131	$ -	$ 2,899	$ -	$ 26,842	9.3
6A Transformer Replacement	$ 5,208	$ 963	$ -	$ -	$ 6,172	$ -	$ 78,387	12.7
8A Solar PPA	$ 34,636	$ -	$ -	$ -	$ 34,636	$ -	$ 9,166	0.3
3B BMS Dashboard - Energy Optimization	$ 2,005	$ -	$ 723	$ -	$ 5,128	$ 2,400	$ 37,200	7.3
Margaret C. Clifford School	**$ 44,395**	**$ 5,210**	**$ 34**	**$ -**	**$ 55,074**	**$ 5,435**	**$ 200,532**	**3.6**
1A LED Lighting Upgrades	$ 12,858	$ 4,883	$ (887)	$ -	$ 19,888	$ 3,035	$ 111,353	5.6
2A Boiler Replacements	$ -	$ -	$ -	$ -	$ -	$ -	$ -	-
2D Rooftop Unit Replacement	$ -	$ -	$ -	$ -	$ -	$ -	$ -	-
5A Permanent Load Reduction	$ -	$ -	$ -	$ -	$ -	$ -	$ -	-
4A Building Envelope Improvements	$ 161	$ -	$ 514	$ -	$ 675	$ -	$ 5,883	8.7
6A Transformer Replacement	$ 1,823	$ 328	$ -	$ -	$ 2,151	$ -	$ 36,930	17.2
8A Solar PPA	$ 28,339	$ -	$ -	$ -	$ 28,339	$ -	$ 9,166	0.3
3B BMS Dashboard - Energy Optimization	$ 1,214	$ -	$ 407	$ -	$ 4,021	$ 2,400	$ 37,200	9.3
Walter Hill School	**$ 19,489**	**$ 7,706**	**$ 3,950**	**$ -**	**$ 52,563**	**$ 21,418**	**$ 1,245,270**	**23.7**
1A LED Lighting Upgrades	$ 14,937	$ 7,467	$ (1,226)	$ -	$ 25,289	$ 4,110	$ 160,007	6.3
2A Boiler Replacements	$ -	$ -	$ 2,485	$ -	$ 7,485	$ 5,000	$ 324,939	43.4
2D Rooftop Unit Replacement	$ 1,221	$ -	$ -	$ -	$ 11,129	$ 9,908	$ 611,732	55.0
5A Permanent Load Reduction	$ -	$ -	$ -	$ -	$ -	$ -	$ -	-
4A Building Envelope Improvements	$ 670	$ -	$ 2,179	$ -	$ 2,848	$ -	$ 92,316	32.4
6A Transformer Replacement	$ 1,219	$ 239	$ -	$ -	$ 1,458	$ -	$ 19,077	13.1
8A Solar PPA	$ -	$ -	$ -	$ -	$ -	$ -	$ -	-
3B BMS Dashboard - Energy Optimization	$ 1,441	$ -	$ 512	$ -	$ 4,353	$ 2,400	$ 37,200	8.5
Project Total	$ 191,600	$ 36,676	$ 11,955	$ -	$ 290,124	$ 49,893	$ 2,563,324	8.8

3. Utility and Other Rebates & Incentives

New Jersey Department of Clean Energy

In 2018, Governor Murphy signed into law the landmark legislation known as the Clean Energy Act. The law called for a significant overhaul of New Jersey's clean energy systems by building sustainable infrastructure in order to fight climate change and reduce carbon emissions, which will in turn create well-paying local jobs, grow the state's economy, and improve public health while ensuring a cleaner environment for current and future residents.

As part of this statewide undertaking, the Clean Energy Act required New Jersey's investor-owned gas and electric utility companies to reduce their customers' use of gas and electricity by set percentages over time. To help reach these targets, the New Jersey Board of Public Utilities approved a comprehensive suite of efficiency programs that would transition the state to some of the highest energy savings in the country.

These "next generation" energy efficiency programs feature new ways of managing and delivering programs historically administered by New Jersey's Clean Energy Program™ (NJCEP). While NJCEP will continue to offer some energy efficiency programs, all of the investor-owned gas and electric utility companies will now also offer complementary energy efficiency programs directly to their customers.

Incentives, Rebates and Grants Summary

Honeywell has a great deal of experience in applying for, and successfully securing, all available incentives, rebates and grants for our clients. We have been approved and allocated for over $9M of incentives on behalf of our New Jersey customers alone since the introduction of the Energy Savings Improvement Program legislation in 2009. The New Jersey programs employed included primarily the Office of Clean Energy's Direct Install, Prescriptive Rebate Program and Cogeneration Incentives as applicable. All of these programs are available through your local utility company. Through this ESIP program, Honeywell will coordinate all activities with achieving the highest rebate amount available to support the financials of the overall project

ENERGY STAR Portfolio Manager

Honeywell will also utilize the ENERGY STAR Program with Portfolio Manager, EPA's interactive tool that allows facility managers to track and evaluate energy and water consumption across all their buildings. The tool provides the opportunity to load in the characteristics and energy usage of your buildings and determine an energy performance benchmark score. You can then assess energy management goals over time, identify strategic opportunities for savings, and receive EPA recognition for superior energy performance.

Atlantic Electric Prescriptive and Custom Programs

The Atlantic Electric Prescriptive and Custom Incentive Program provides comprehensive energy efficiency services to municipalities, universities, schools, hospitals and other healthcare facilities, non-profit entities, and multi-family facilities.

By participating in the Programs, your organization can enjoy:

- Reduced energy and maintenance costs
- Project planning assistance
- Increased comfort
- Extended equipment life

Honeywell has determined that the Swedesboro Woolwich School District is eligible for $117,745 in estimated total incentives for the projects included in the Prescriptive Lighting, Prescriptive and Custom Measures (Boilers and Building Envelope) and Permanent Load Reduction Programs Please refer to the tables on below for a breakdown of Swedesboro Woolwich School District incentive levels on a building by building basis for each type of incentive.

Rebates and Incentives

Location	Prescriptive Lighting	Prescriptive Measures	Custom Measures	Permanent Load Reduction
Charles G. Harker School	$25,730		$7,242	$1,366
Governor Charles C. Stratton School	$17,864	$10,500	$11,139	$897
Margaret C. Clifford School	$8,097		$3,471	$500
Walter Hill School	$13,058	$13,065	$5,434	$740
Totals	**$64,748**	**$23,565**	**$27,285**	**$3,503**

Total Rebates and Incentives

Year	Prescriptive Lighting	Prescriptive Rebates	Custom Measures	Permanent Load Reduction	Total Incentives
Installation					
Year 1	$64,748	$23,565	$27,285	$3,503	$119,102
Year 2				$3,503	$3,503
Year 3				$3,503	$3,503
Year 4				$3,503	$3,503
Totals	**$64,748**	**$23,565**	**$27,285**	**$14,014**	**$129,612**

4. Financing the ESIP

In accordance with P.L.2012, c.55 an ESIP can be financed through energy savings obligations. The term refers to the two primary financing tools, debt and lease-purchase instruments. Each of these options is discussed below.

Energy savings obligations shall not be used to finance maintenance, guarantees, or the required third-party verification of energy conservation measures guarantees. Energy saving obligations, however, may include the costs of an energy audit and the cost of verification of energy savings as part of adopting an energy savings plan or upon commissioning. While the audit and verification costs may be financed, they are not to be considered in the energy savings plan as a cost to be offset with savings.

In all cases, maturity schedules of lease-purchase agreements or energy savings obligations shall not exceed the estimated average useful life of the energy conservation measures.

An ESIP can also include installation of renewable energy facilities, such as solar panels. Under an energy savings plan, solar panels can be installed, and the reduced cost of energy reflected as savings.

The law also provides that the cost of energy saving obligations may be treated as an element of the local unit's utility budget, as it replaces energy costs.

Debt Issuance

The law specifically authorizes municipalities, school districts, cities, counties, and fire districts to issue refunding bonds as a general obligation, backed with full faith and credit of the local unit to finance the ESIP. Because an ESIP does not effectively authorize new costs or taxpayer obligations, the refunding bond is appropriate, as it does not affect debt limits, or in the case of a board of education, require voter approval. The routine procedures for refunding bonds found in the Local Bond Law and Public-School Bond Law would be followed for issuance of debt, along with any required Bond Anticipation Notes as authorized pursuant to law.

Regarding bonds for public schools, the Department of Education (DOE) has concluded that debt financed ESIP projects are not covered by State aid for debt service or a "Section 15 EFFCA Grant" as there is no new local debt being authorized.

Tax-Exempt Lease Purchase Financing

The tax-exempt lease is a common form of financing for ESIP projects. Tax-exempt leasing is a tool that meets the basic objectives of debt, spreading the cost of financing over the life of an asset, while avoiding constitutional or statutory limitations on issuing public debt. If structured properly, by including non-appropriation language in the financing documents, the tax-exempt lease will not be considered debt for state law purposes but will be considered debt for federal income tax purposes. Thus, for federal purposes, the interest component of the lease payment is tax-exempt.

Under the New Jersey Energy Savings Improvement Program (ESIP), the Swedesboro Woolwich School District may authorize a lease purchase agreement between the District and a financier. Ownership of the equipment or improved facilities will pass to the Swedesboro Woolwich School District when all the lease payments have been made. There are legal expenses and other minimal closing costs associated with this type of structure. The lease purchase agreement may not exceed 15 years (commencing upon completion of the construction work), or 20 years where a combined heat and power or cogeneration plant is included in the project. The primary benefits of a lease are lower rates and the acquisition of essential use property without creating debt.

Under a lease there is typically a single investor. The lease may have non-appropriation language that allows the District to access low tax-exempt rates. Some previous customers have chosen to remove the non-appropriation language which has resulted in lower competitive rates.

Repayment of the lease payments is tailored to meet the requirements of the Swedesboro Woolwich School District. Payments are typically scheduled to commence after the construction is complete and acceptance of the project has been received by the District. Typically, payment terms are structured so there is no up-front capital expense to the Swedesboro Woolwich School District and payments are aligned within your cash flow and fiscal limits.

Certificates of Participation (COP's)

Certificates of Participation are another form of a lease purchase agreement with the differentiating factor being that there are multiple investors participating in the purchase of the lease. COP's require financial disclosure and are typically utilized on higher value projects where one investor doesn't have the capacity to hold a high value lease for a single customer.

Energy Savings Obligations

Energy Savings Obligations can be issued as refunding bonds in accordance with the requirements of N.J.S.A 40A:11-4.6(c)(3). These bonds may be funded through appropriation for the utility services in the annual budget of the contract unit and may be issued as refunding bonds pursuant to N.J.S.40A:2-52 et seq., including the issuance of bond anticipation notes as may be necessary, provided that all such bonds and notes mature within the periods authorized for such energy savings obligations. Energy savings obligations may be issued either through the contracting unit or another public agency authorized to undertake financing on behalf of the unit but does not require bond referendum.

SECTION E MEASUREMENT & VERIFICATION AND MAINTENANCE PLAN

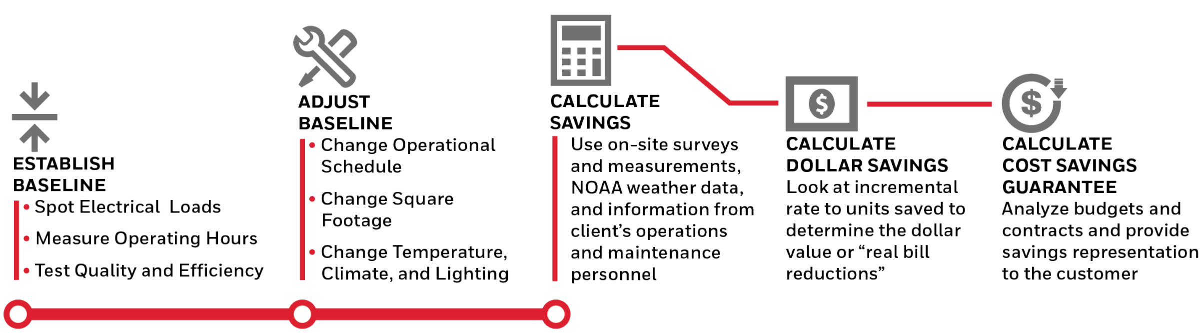
Section E – Measurement & Verification and Maintenance Plan

1. Baseline

The purpose for establishing a baseline for an energy performance project is to accurately predict what the energy consumption and costs would have been as if the energy project was never completed. The baseline can then be used to measure the improvement in efficiency and determine the overall energy savings of the project. Since the energy consumption of all facilities is somewhat affected by variable weather conditions, a baseline for heating and cooling systems is typically dependent on degree-days or outside temperature. A baseline also needs to incorporate changes in facility use, such as a change in hours of operation or increased levels of outside air. Once again, if these changes would have occurred in the absence of the energy project, they should be incorporated into the project's baseline.

Honeywell will calculate the baseline based on the systems and operating conditions as they currently exist. Honeywell finds baseline development most accurate if specific measurements are taken on equipment over a period of time (early in the audit phase) to determine actual kW, kWh, oil and gas consumption, cfm, gpm, hours of use, etc. A summary of some of the methods, which will be used by Honeywell to establish baselines and support, calculated savings are listed below.

1. Spot measurements of electrical loads such as lighting, fan and pump motors, chillers, electric heat, etc.
2. Measurement of equipment operating hours using electric data recorders.
3. Measurement of existing operating conditions using data recorders for space temperature and humidity, air handler temperatures (mixed, return, cooling and heating coil discharges), and space occupancy using lighting loggers.



4. Spot measurement for boiler efficiencies, water use.
5. Running measurements of chiller operation, including simultaneous measurement of input kWh or steam flow, and chilled water supply and return temperatures and flow (gpm).
6. Records of operating conditions from building management systems and utility-grade meters.

The data from the above is used to calculate existing energy use, which is then reconciled with current facility utility bills, and adjusted as required to provide a mutually agreed baseline.

To provide valid savings evaluations, Honeywell's maintains a significant inventory of metering equipment utilized by its auditors and Energy Engineers to ascertain critical data about the operation of the facility.

Typically, Honeywell's auditors use the following equipment for their onsite measurements:

- Recording and instantaneous power and harmonic analyzers.
- Data loggers for pressures, temperatures, flow rates, humidity and CO2.
- Lighting level and recording profile/run-hour and occupancy meters.
- Multimeters, handheld kW meters.
- Combustion analyzers.
- Ultrasonic flow meters.
- Infrared thermometers

The ECMs installed in many projects allow for energy savings to be identified by direct metering or a combination of metering and calculations with accepted assumptions. In the case of lighting, for example, it is relatively easy to meter representative samples of unique fixture types, both before and after a retrofit, to determine the power consumption difference in Watts. When multiplied by the quantity of each fixture type, the total connected load reduction can be derived. In combination with run time assumptions, or meters, the electrical reduction can be accurately determined. Where possible, direct measurement of ECMs during construction (before and after the retrofit) coupled with energy savings calculations is a method the Honeywell finds to be very accurate and cost-effective.

Due to the nature of some ECMs, or when a combination of ECMs is installed, individual (discrete) metering may not be either possible or able to fully document a baseline and calculate savings. Many of these situations can be handled by combining results from metering along with either engineering-based calculations or output from nationally recognized building simulation programs such as DOE II, ASEAM, TRACE or HAP. This method would be used for ECMs such as night setback, and where no other ECMs have significant interaction with the setback measure.

Formulas exercised in energy savings calculations follow the laws of physics, and many are included in the ASHRAE Handbook of Fundamentals. However, such calculations (i.e. equipment operation profiles) must be tempered by experience, past retrofit practice, and expectations of future operating conditions to arrive at achievable values in practice. Honeywell always reviews each and every project, in detail, for the anticipated savings and never hesitates to reduce the anticipated energy calculations where experience dictates necessary. The final result is a coupled project where the final savings are equal to or greater than anticipated.

Calculating the units of energy saved is a critical measure of energy efficiency improvements, but it does not indicate the actual dollars saved. To do this, Honeywell and the Swedesboro Woolwich School District will establish the base rates that will act as "floor" rates in calculating the savings as agreed to by both parties.

2. Adjustment to Baseline Methodology

Honeywell's methodology0F for establishing and adjusting the baseline is determined by the characteristics of the facility, the conservation technology being installed, the technology being replaced, the type of measurement and verification the Swedesboro Woolwich School District requires and the needs of the Swedesboro Woolwich School District for future changes in facility use.

The purpose of this flexible approach is to make the most accurate possible measurement of the changes in energy uses that are specifically attributable to Honeywell installed ECMs. This creates the ability over the life of the contract to continue measuring only savings achieved by Honeywell and leaves the Swedesboro Woolwich School District free to make future changes to the building or systems without affecting the savings agreement. It also necessitates fewer provisions for making adjustments to the baseline.

Modifications to the energy baseline or savings will be made for any of the following:

1. Changes in the number of days in the annual review cycle.
2. Changes in the square footage of the facilities.
3. Changes in the operational schedules of the facilities.
4. Changes in facility indoor temperatures.
5. Significant changes in climate.
6. Significant changes in the amount of equipment or lighting utilized in the facility.

Examples of situations where the baseline needs to be adjusted are: **i)** changes in the amount of space being air conditioned, **ii)** changes in auxiliary systems (towers, pumps, etc.) and **iii)** changes in occupancy or schedule.

If the baseline conditions for these factors are not well documented it becomes difficult, if not impossible, to properly adjust them when they change and require changes to payment calculations. To compensate for any addition and deletion of buildings and impact on the baseline model, Honeywell will use sound technical methodologies to adjust the baseline. An example would be to add or delete building energy impact via the calculated cooling load in tons as a percentage of the existing campus tonnage baseline or use indices like W/ft2 and Btu/ft2 to calculate the energy consumption of the building and then add or subtract the energy usage to or from the baseline energy consumption.

3. Energy Savings Calculations

In calculating energy savings, Honeywell's highly experienced audit staff uses onsite surveys and measurements, National Oceanic and Atmospheric Administration weather data, detailed discussions with the client's operations and maintenance personnel and engineers, utility records, and other sources to ensure accurate energy, water and O&M savings.

Typically, the following data is gathered:

- Local weather data.
- Utility bills and sub-metered consumption trends.
- Utility rate structure.
- Facility use and occupancy data.
- Internal equipment loads.
- Interviews of operations and maintenance staff and management.
- Building construction, age, use and layout.
- Schematics of energy and water distribution systems.
- Identification and inventory of HVAC equipment.
- Identification and inventory of process equipment.
- Design, configuration, and operating characteristics of HVAC systems.
- Design, configuration, and operating characteristics of process systems.

- Control strategies and sequences of operation for HVAC and other process equipment.
- Identification and count of all lighting fixtures and determination of power consumption for each type.
- Identification and inventory of lighting control methods.
- Measurement of foot-candle levels at sample locations.
- Power quality and harmonics, power factor.
- Indoor air quality issues.

Calculating the units of energy saved is a critical measure of energy efficiency improvements, but it does not indicate the actual dollars saved. To do this, Honeywell and the Swedesboro Woolwich School District will establish the base rates that will act as "floor" rates in calculating the savings. These are usually the rates that are in effect at the time of the start of the contract or rates used for audit estimated savings.

Calculating the units of energy saved is a critical measure of energy efficiency improvements, but it does not indicate the actual dollars saved. To do this, Honeywell and the Swedesboro Woolwich School District will establish the base rates that will act as "floor" rates in calculating the savings. These are usually the rates that are in effect at the time of the start of the contract or rates used for audit estimated savings.

The equation below will be used to calculate the annual savings in dollars.

$$\text{Annual Savings (\$)} = \sum_{m=1}^{12} \{ (Rate_{kWH,Base} \times kWH_{saved,m}) + (Rate_{fuel\ oil,\ Base} \times Fuel\ Oil_{saved,\ gal,\ m}) + (Rate_{Steam,\ Base} \times Steam_{Saved,\ klbs,\ m}) + (Rate_{NG} \times NG_{Saved,\ MCF,\ m}) \} + (Agreed\ (\$))$$

Where

Rate$_{kWH,Base}$= defined base rate for kWh consumption
kWh$_{saved,m}$= calculated kWh savings for month *m*

Rate $_{Fuel\ Oil\ Base}$= defined base rate for fuel Oil Savings (XX/gal.)
Fuel Oil$_{saved,m}$= calculated chilled water savings in gal. for month *m*

Rate $_{Steam,\ Base}$= defined base rate for steam consumption ($XX/MMBtu.)
Steam$_{saved,m}$= calculated steam savings in MMBtu. for month *m*

Rate $_{NG,\ Base}$= defined base rate for natural gas consumption ($XX/Therm)
NG$_{saved,m}$= calculated natural gas savings in Therms for month *m*

Agreed($)= Annual savings in dollars (water, sewer, maintenance, etc.)

Honeywell assigns dollar values to the true incremental value of savings for energy and water. In other words, we do not combine for example, demand and consumptions numbers so that there is an average value to savings. Honeywell looks at each incremental rate to units saved to properly determine the value (dollar) to the District or “real bill reductions”. As noted in the RFP energy escalation rates will be established in accordance with New Jersey Board of Public Utility guidelines.

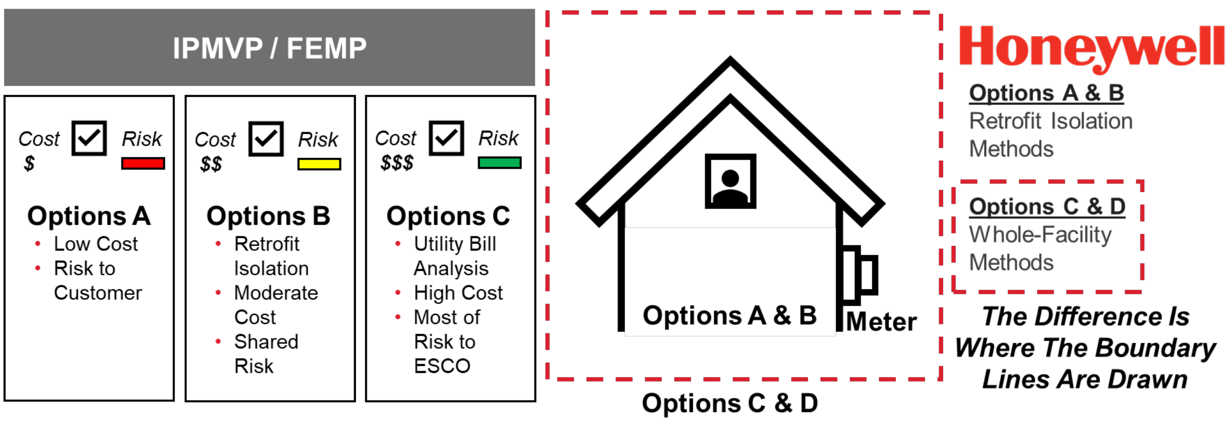
Based on this, Honeywell will review all utility bills (hourly data), tariffs, special contracts and commodity contracts to develop the incremental value (costs) of each utility.

The O&M savings is typically a function of existing the District's budgets (labor & direct costs), maintenance contracts and operations (supplier) contracts. Honeywell will analyze the information to provide a conservative savings representation for the Swedesboro Woolwich School District review and acceptance. The information will include all calculations and assumptions.

4. Measurement & Verification

The purpose of performing any monitoring and verification is to establish an agreed upon process that provides the customer both a level of satisfaction that the improvements have been delivered and ongoing information as to their operation and performance. Additionally, this effort will be used to assess the actual dollars of savings versus the guarantee level.

It is essential for the success of this program that Honeywell and the District agree on a mutually acceptable methodology for measuring and verifying energy savings that are attributable to the energy conservation measures (ECMs) Honeywell installs. This M&V plan provides the procedures to document the energy and cost savings of each of the proposed ECMs.



The plan for monitoring and verifying energy savings for the proposed ECMs is based on the methods described in the ***International Performance Measurement and Verification Protocol (IPMVP)*** [1]. Our approach to M&V is directly consistent with, and in compliance with, the IPMVP. This protocol provides a framework for the most widely accepted and used M&V methods by the industry.

Engineering calculations of energy and cost savings for the project are based on operating parameters (such as weather, temperature settings, run hours, occupancy patterns, and space usage) and equipment performance characteristics. The M&V plan uses the operating parameters established in the baseline for all savings calculations during the term of the project. The intent of the M&V plan is to verify that the ECMs installed by Honeywell will provide the expected energy savings. Therefore, Honeywell will collect data and relative information during the post-retrofit period to demonstrate that the installed equipment is performing at expected levels. It is assumed that the Swedesboro Woolwich School District will continue to be a dynamic institution adding or renovating buildings and desiring to retain the right to set comfort and operating characteristics. To accommodate this, Honeywell will develop its M&V plan in a way that

[1] www.ipmvp.org.

allows the District to adapt to the demands of future campus growth and changes without the need for Swedesboro Woolwich School District and Honeywell to negotiate energy baseline adjustments.

Our typical M&V plan will utilize broadband Internet access to the appropriate the Swedesboro Woolwich School District control interfaces to both confirm operating status and to download trend data to verify proper equipment maintenance.

One year after the commencement date of the ECMs, Honeywell will submit a report verifying and calculating the energy and cost savings for the first year. This report will be submitted for facility review and approval. For the remaining contract term, Honeywell will provide annual reports. These reports will include results of inspections of the installed equipment/systems, energy and cost savings, and recommendations to provide optimum energy performance.

All permanent measurement equipment will be purchased new with a calibration certificate from the manufacturer. The power multi-meter and the TSI multi-meter will be calibrated annually before using them in the annual inspection.

General Approach to M&V

Energy and water savings are determined by comparing the energy and water use associated with a facility or certain systems within a facility before and after the installation of an ECM or other measure. The “before” case is the baseline. The “after” case is the post-installation or performance period. Baseline and post-installation energy use measurements or estimates can be constructed using the methods associated with M&V options A, B, C, and D, as described in the IPMVP. The challenge of M&V is to balance M&V costs, accuracy, and repeatability with the value of the ECM(s) or systems being evaluated, and to increase the potential for greater savings by careful monitoring and reporting.

M&V Options

The IPMVP guidelines classify the M&V procedures into four categories, Options A, B, C and D. As shown in the table below, these options differ in their approach to the level of complexity of the M&V procedures.

M&V Option	Performance Verification Techniques
Option A Verifying that the measure has the potential to perform and to generate savings.	**Option A** is appropriate for ECMs that have energy use that can be readily quantified, such as the use of high efficiency lighting fixtures, high efficiency constant speed motors, and other standard engineering calculations. Engineering calculations before and after installation spot measurements and use of EMS data points with stipulated values.
Option B Verifying that the measure has the potential to perform and verifying actual performance by end use.	**Option B** is appropriate for ECMs that require periodic or on-going measurements to quantify energy use; such as the use of variable frequency drives on pump or fan motors. Engineering calculations with metering and monitoring strategy throughout term of the contract.
Option C Verifying that the measure has the potential to perform and verifying actual performance (whole building analysis.)	**Option C** is used for ECMs for which the energy use or energy savings cannot be measured directly, such as building envelope modifications. Option C is based on the use of utility meters to quantify building energy use. Utility meter billing analysis-using techniques from simple comparison to multivariable regression analysis.

M&V Option	Performance Verification Techniques
Option D Verifying actual performance and savings through simulation of facility components and/or the whole facility	**Option D** is used for ECMs for which the energy use or energy savings cannot be measured directly, or savings for individual ECMs are heavily interdependent. Calibrated building simulation is used to separate the energy savings attributable to each ECM. Calibrated energy simulation/modeling; calibrated with hourly or monthly utility billing data and/or end-use metering.

In general,

> *ECM Energy Savings = Baseline Energy Use - Post-Installation Energy Use*
>
> And
>
> *Energy Cost savings ($) = Total Energy Savings x Contractual Energy Rates*

Exceptions to this simple equation are as follows:

Projects where an on/off M&V method is used. For example, after a new energy management system is installed, control features are turned off for a set period of time to recreate baseline conditions. Thus, savings are determined after installation by comparing energy use with and without the control features activated.

Since energy use at a facility is rarely, if ever, constant, another way to define M&V is as a comparison of a facility's post-installation energy use with its usage if the ECM or system had not been installed. This takes into account situations in which baseline energy use must be adjusted to account for changing conditions, such as changes in facility operation, occupancy, or use or external factors such as weather.

Post-Retrofit M&V Activities

There are two components associated with M&V of performance contract projects:

- Verifying the potential of the ECM to generate savings also stated as confirming that the proper equipment/systems were installed, are performing to specification and have the potential to generate the predicted savings.
- Determining/verify energy savings achieved by the installed ECM(s).

Verifying the Potential to Generate Savings

Verifying baseline and post-installation conditions involves inspections (or observations), spot measurements, and/or commissioning activities. Commissioning includes the following activities:

- Documentation of ECM or system design assumptions
- Documentation of the ECM or system design intent for use by contractors, agencies and operators
- Functional performance testing and documentation necessary for evaluating the ECM or system for acceptance
- Adjusting the ECM or system to meet actual needs within the capability of the system

Post-Installation Verification

Post-installation M&V verification will be conducted by both Honeywell and the Client to ensure that the proper equipment/systems that were installed are operating correctly and have the potential to generate the predicted savings. Verification methods may include surveys, inspections, and/or spot or short-term metering.

Regular Interval Post-Installation Verification

At least annually, Honeywell will verify that the installed equipment/systems have been properly maintained, continue to operate correctly, and continue to have the potential to generate the predicted savings. Savings report for all the installed ECMs will be submitted each year after the acceptance date of the work performed by Honeywell.

Computation of Energy Savings

After the ECMs are installed, energy and cost savings will be determined annually by Honeywell in accordance with an agreed-upon M&V approach, as defined in a project-specific M&V plan.

Construction/Interim Savings

Construction or Interim savings are usually measured by using the same methodology as described in the detail M&V plan for each ECM. The start and the completion time for each ECM must be agreed to between Honeywell and the Swedesboro Woolwich School District.

Electricity and thermal savings from the ECMs where no detailed long-term data is required to be collected will be stipulated and will be based on the starting and the final completion dates and verification of the operation of the ECMs. For other ECMs where long-term data collection is required by the M&V plan, data will be used to calculate the savings using the same equations as described in the detail plan. For example, to calculate electricity savings for the installation of a VFD, the kW is spot measured at a set speed for selected motors through a sampling plan. The measured kW is subtracted from the baseline kW to calculating the savings. Thermal savings are tied to the electrical savings in the manner described in the detail M&V plan. The results are extrapolated to cover all the VFDs installed by Honeywell.

The savings for each of the monitored VFD is calculated on an interval basis as follows:

> kWSaved = (kWBase – kWSpot Measured)
>
> kWhSaved = Estimated operating hours during the interim period * kWSaved
>
> The total kWh savings is the sum of the kWhSaved for all the installed VFDs.

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5. Site-Specific M&V Plan

ECM # and Name	Summary of ECM	M&V Methodology / Recommendation	Description of M&V – Pre- and Post-Process
1A LED Lighting	▪ Upgrade Lighting systems: – Re-lamp/Re-ballast T8/T12 to LED, – Incandescent to LED – Metal Halide and Sodium Vapor to LED High Bays	**Option A** ▪ Pre and Post measurements ▪ Line by Line scope and engineering calculations	▪ **Pre-M&V**: Measurement of kW for 5% sample fixtures in each category ▪ Data log usage hours ▪ Data Log occupancy schedules ▪ Update Line by Line scope with measured kW and usage hours ▪ **Post M&V**: Measurement of kW for 5% sample fixtures in each category ▪ Usage Hours to remain same ▪ Occupancy schedules to remain same ▪ Energy Savings: Update Line by Line scope with measured kW and usage hours and compare to pre-retrofit calculated savings
1B De-Stratification Fans & Disinfection	▪ Install De-Stratification fans in Gymnasiums to minimize stratification of hot air and maintain hot air flow below the fan level	**Option A** ▪ Electric energy savings - Engineering calculations based on programmed parameters. **Option C** ▪ Fuel Savings - Utility Bill Comparison for all fuel related measures	▪ **Pre-M&V**: Verify existing operating parameters match the baseline calculation assumptions ▪ **Post M&V**: Verify that systems are installed as specified and controls are programmed to match the savings assumptions ▪ Electric Energy: Verify savings based on programmed parameters and engineering calculations ▪ Fuel: Compare post installation M&V fuel cost based on fuel billing data and Metrix tuned to normalize to heating degree days
1C Vending Misers	▪ Install Vending machine energy management devices	**Option A** ▪ Pre and Post measurements ▪ Line by Line scope and engineering calculations	▪ **Pre-M&V**: Measurement of kW for 5% sample machines in each category ▪ Data log usage hours ▪ Data Log occupancy schedules ▪ Update Line by Line scope with measured kW and usage hours ▪ **Post M&V**: Measurement of kW for 5% sample machines in each category ▪ Usage Hours to remain same ▪ Energy Savings scope with measured kW and usage hours and compare to pre-retrofit calculated savings

ECM # and Name	Summary of ECM	M&V Methodology / Recommendation	Description of M&V – Pre- and Post-Process
2A Boiler Replacements	▪ Replace boilers in select locations to handle base load	**Option C** ▪ Utility Bill Comparison for all fuel related measures	▪ **Pre-M&V**: Baseline annual fuel cost based on fuel billing data and Metrix tuned to normalize to heating degree days ▪ Perform combustion efficiency test on boilers ▪ **Post M&V**: Compare post installation M&V fuel cost based on fuel billing data and Metrix tuned to normalize to heating degree days ▪ Perform efficiency test on replaced boilers to ensure operating conditions are maintained
2B Multipurpose Room Floor Replacement	▪ Replace selected flooring at Governor Charles C. Stratton School and Walter Hill School	**Option A** ▪ Electric energy savings - Engineering calculations based on programmed parameters **Option C** ▪ Fuel Savings - Utility Bill Comparison for all fuel related measures	▪ **Pre-M&V**: Verify existing operating parameters match the baseline calculation assumptions ▪ **Post M&V**: Verify that systems are installed as specified and controls are programmed to match the savings assumptions ▪ Electric Energy: Verify savings based on programmed parameters and engineering calculations ▪ Fuel: Compare post installation M&V fuel cost based on fuel billing data and Metrix tuned to normalize to heating degree days
2C Domestic Hot Water Heater Replacement	▪ Replace heater in select locations to handle base load	**Option C** ▪ Utility Bill Comparison for all fuel related measures	▪ **Pre-M&V**: Baseline annual fuel cost based on fuel billing data and Metrix tuned to normalize to heating degree days ▪ Perform combustion efficiency test on boilers ▪ **Post M&V**: Compare post installation M&V fuel cost based on fuel billing data and Metrix tuned to normalize to heating degree days ▪ Perform efficiency test on replaced boilers to ensure operating conditions are maintained
2D Rooftop Unit Replacement	▪ Replace antiquated Roof Top Units with new high efficiency Rooftop Units	**Option A** ▪ Engineering calculations based on nameplate and manufacturer supplied data for the existing and replacement units	▪ **Pre-M&V**: Verify manufacturer provided data for existing unit efficiency (EER) ▪ **Post M&V**: Verify manufacturer provided data for new rooftop unit (EER) – verify the new equipment and controls are installed and commissioned as recommended by manufacturer
2E Cooling Tower Replacement	▪ Replace existing Cooling Towers with new higher efficiency units	**Option A** ▪ Electric energy savings - Engineering calculations based on material specifications.	▪ **Pre-M&V**: Verify manufacturer provided data for existing unit efficiency (kW/ton) ▪ **Post M&V**: Verify manufacturer provided data for new unit (kW/ton) – verify the new equipment and controls are installed and commissioned as recommended by manufacturer

ECM # and Name	Summary of ECM	M&V Methodology / Recommendation	Description of M&V – Pre- and Post-Process
2F Heat Pump Replacement	▪ Replace existing Heat Pumps with new high efficiency units	**Option A** ▪ Engineering calculations based on nameplate and manufacturer supplied data for the existing and replacement units	▪ **Pre-M&V**: Verify manufacturer provided data for existing unit efficiency (EER) ▪ **Post M&V**: Verify manufacturer provided data for new rooftop unit (EER) – verify the new equipment and controls are installed and commissioned as recommended by manufacturer
2G Premium Efficiency Motors and VFDs	▪ Install VFDs on select pumps to operate the pump motors in response to the system load. Replace motors with new premium efficiency motors	**Option A** ▪ Engineering calculations for VFDs following pump affinity laws. ▪ Engineering calculations based on nameplate and manufacturer supplied data for the existing and replacement motors	▪ **Pre-M&V**: Verify manufacturer provided data for the pump performance data and motor efficiencies. ▪ **Post M&V**: Obtain trend data for VFD operation from the BMS system to verify baseline calculation assumptions on system loads ▪ Verify efficiency of new motors ▪ Verify manufacturer provided data for new VFDs – verify the new equipment and controls are installed and commissioned as recommended by manufacturer
2H Kitchen Hood Efficiency Improvements	▪ Install control devices on the Kitchen hoods to control exhaust air in response to the cooking load. Replace fan motors with new premium efficiency motors and VFD drives	**Option A** ▪ Energy savings - Engineering calculations based on programmed parameters.	▪ **Pre-M&V**: Verify existing operating parameters match the baseline calculation assumptions ▪ **Post M&V**: Verify that systems are installed as specified and controls are programmed to match the savings assumptions
2I Walk-In Compressor Controls	▪ Install control device on walk-in freezer and refrigerator evaporators to shut down the fan motor when the compressor is off on duty cycle	**Option A** ▪ Stipulated Engineering calculations based on case studies for the Intellidyne control	▪ **Pre-M&V**: None ▪ **Post M&V**: Savings stipulated based on engineering calculations for the term of contract

ECM # and Name	Summary of ECM	M&V Methodology / Recommendation	Description of M&V – Pre- and Post-Process
3A Building Management Controls	▪ Upgrade Building Management Systems to DDC and integrate all systems to a central platform	**Option A** ▪ Electric energy savings - Engineering calculations based on programmed parameters. **Option C** ▪ Fuel Savings - Utility Bill Comparison for all fuel related measures	▪ **Pre-M&V**: Verify existing operating parameters match the baseline calculation assumptions ▪ **Post M&V**: Verify that systems are installed as specified and controls are programmed to match the savings assumptions ▪ **Electric Energy**: Verify savings based on programmed parameters and engineering calculations ▪ **Fuel**: Compare post installation M&V fuel cost based on fuel billing data and Metrix tuned to normalize to heating degree days
3B BMS Dashboard - Energy Optimization	▪ Install Forge Energy Optimization system	**Option A** ▪ Electric energy savings - Engineering calculations based on programmed parameters. **Option C** ▪ Fuel Savings - Utility Bill Comparison for all fuel related measures	▪ **Pre-M&V**: Verify existing operating parameters match the baseline calculation assumptions ▪ **Post M&V**: Verify that systems are installed as specified and controls are programmed to match the savings assumptions ▪ **Electric Energy**: Verify savings based on programmed parameters and engineering calculations ▪ **Fuel**: Compare post installation M&V fuel cost based on fuel billing data and Metrix tuned to normalize to heating degree days
4A Building Envelope Improvements	▪ Install weather stripping on doors, seal roof wall joints and roof penetrations	**Option A** ▪ Electric energy savings - Engineering calculations based on nameplate and manufacturer supplied data **Option C:** ▪ Fuel Savings - Utility Bill Comparison for all fuel related measures	▪ **Pre-M&V:** Verify parameters used in engineering calculations with site conditions ▪ **Post M&V:** ▪ **Fuel:** Compare post installation M&V fuel cost based on fuel billing data and Metrix tuned to normalize to heating degree days
4B Roofing Upgrades	▪ Install new high efficiency roofs on select areas/buildings	**Option A** ▪ Electric energy savings - Engineering calculations based on programmed parameters. **Option C** ▪ Fuel Savings - Utility Bill Comparison for fuel related measures	▪ **Pre-M&V**: Verify existing operating parameters match the baseline calculation assumptions ▪ **Post M&V**: Verify that systems are installed as specified and controls are programmed to match the savings assumptions

ECM # and Name	Summary of ECM	M&V Methodology / Recommendation	Description of M&V – Pre- and Post-Process
5A Permanent Load Reduction	▪ Rebates for Load Reduction (KW)	N/A	N/A
6A Transformer Replacement	▪ Replace existing secondary transformers with high efficiency equivalents	**Option A** ▪ Engineering calculations based on increase in transformer efficiency	▪ **Pre-M&V**: Measure typical existing transformer (typical one for each size) input and output kW to establish transformer losses
7A Cogeneration CHP	▪ Install Cogeneration units	**Option A** ▪ Engineering calculations based on nameplate and manufacturer supplied data for the existing and replacement Units	▪ **Pre-M&V**: Verify manufacturer provided data for existing units efficiency ▪ **Post M&V**: Verify manufacturer provided data for new units verify the new equipment and controls are installed and commissioned as recommended by manufacturer
8A Solar PPA	▪ Install Solar Power using Power Purchase Agreement	N/A	▪ **Pre-M&V**: N/A ▪ **Post M&V**: N/A
9A Energy Education	▪ Institute an Energy Awareness and Saving program to Educate Students, Faculty and Staff	N/A	▪ **Pre-M&V**: N/A ▪ **Post M&V**: N/A
10A Sustainable Transportation - EV Chargers	▪ Install EV charging stations on select areas/buildings	**Option A** ▪ Engineering calculations based on nameplate and manufacturer supplied data	▪ **Pre-M&V**: Verify existing conditions ▪ **Post M&V**: Visual inspection per scope of work
11A Digital School Kiosks	▪ Install new digital kiosks at each school	**Option A** ▪ Engineering calculations based on nameplate and manufacturer supplied data	▪ **Pre-M&V:** Verify existing conditions ▪ **Post M&V**: Visual inspection per scope of work

SECTION F
DESIGN APPROACH

Honeywell

Section F – Design Approach

In accordance with the ESIP PL 2012, c.55 as part of the implementation process, an agreement between the Swedesboro Woolwich School District and Honeywell will determine the energy conservation measures (ECM's) to be implemented. The services of a NJ Licensed Engineering firm and / or Architectural firm shall then be secured to properly comply with local building codes, compliance issues and NJ Public contracts law. Specifications will be designed and developed to exact standards as recommended by Honeywell to achieve all savings outlined in this Energy Savings Plan (ESP). Once specifications are completed, Honeywell will publicly solicit contractors capable of meeting the requirements of the specification for each trade. However, even before the completion of the bidding process, Honeywell project management will be engaged to maintain the overall project schedule and ensure the District's expectations are met. An overview of these activities and functions are detailed below.

1. Safety Management Plan

All of Honeywell's Project Management Plans begin with safety. By integrating health, safety and environmental considerations into all aspects of our business, we protect our customers, our people and the environment, achieve sustainable growth and accelerated productivity, drive compliance with all applicable regulations and develop the technologies that expand the sustainable capacity of our world. Our health, safety and environment management systems reflect our values and help us meet our customer's needs and our business objectives.

Honeywell's Safety Management Plan will be provided at the start of construction.

2. Project Management Process

Honeywell approaches any ESIP project with a systematic, tested and proven delivery process based upon industry best practices including strong project management, open and collaborative communication, superior technical design and state of the art technologies. We go above and beyond, with multiple NJ delivery teams to ensure sufficient resources, meticulous and thorough training and commissioning, and robust maintenance planning that goes the extra mile for the long term. Honeywell excels at project delivery because of our experience in New Jersey delivering ESIP projects with results that meet or exceed expectations.

Honeywell will demonstrate our partnership-based commitment to Swedesboro Woolwich School District throughout the development and delivery of your ESIP project, as we have done for dozens of other public entities throughout New Jersey under the ESIP Law. Our approach is backed by our references and track record and highly experienced engineering resources, which will be fully utilized to help you achieve your unique project goals and requirements.

Honeywell prescribes four phases in the ESIP Process that constitutes your project, including:

- **Phase 1**: Investment Grade Energy Audit (IGEA)
- **Phase 2**: Project Implementation
- **Phase 3**: Commissioning and Training
- **Phase 4**: Energy Savings Guarantee Period

The IGEA will commence with a kickoff meeting between key project stakeholders of the Swedesboro Woolwich School District and Honeywell to review the ESIP Process, including the expectations of both parties during the IGEA, audit parameters, reporting methods, building access protocols, availability of utility and building data, et cetera. Phase 2 will commence after our kickoff meeting has concluded with agreed upon next steps.

Honeywell takes a holistic approach in development of a comprehensive solution that is customized to meet your operational and facility needs and project goals. Our integrated project delivery approach supports continuous and collaborative communication between key stakeholders throughout the process. Our IGEA development process includes the following steps:

IGA Development Process

Step 1 - Discovery

- Ascertain your goals and expectations to define project requirements
- Involve key decision makers to prioritize
- Aggregate utility and building data to benchmark energy consumption
- Ensure site access for energy audits and site measurements to complete survey work
- Inventory of equipment

Step 2 – Identify and Develop Project

- Complete ECM list focused on your requirements
- Coordinated development effort to refine project scope
- Conceptual scopes of work to further define project
- Determine modeling approach and M&V methodology

Step 3 – Cost and Savings Forecasting

- Calculate energy and cost savings
- Identify utility rebates
- Detailed scopes of work
- Operating strategies and equipment performance data

Step 4 – Deliver Solution

- Deliver final IGA Report and contract
- Finalize scope of work
- Secure financing
- Deliver positive cash flow
- Finalize savings guarantee
- Commissioning, M&V and training program

A. Honeywell Performance Contracting

Honeywell is the undisputed performance contracting market leader in the Northeast. Honeywell's Guaranteed Performance Contracting, which we pioneered in the early 1980's, has surpassed the $2 billion mark in cumulative sales. Our performance contracting business features specialized and dedicated resources, including people with expertise specifically to address the needs of our customers. Our portfolio of business experience in the region is over 400 projects and over $500 million in project investment.

B. Honeywell's Commitment to Health, Safety, the Environment and School

All of Honeywell's Project Management Plans begin with safety. By integrating health, safety and environmental considerations into all aspects of our business, we protect our customers, our people and the environment, achieve sustainable growth and accelerated productivity, drive compliance with all applicable regulations and develop the technologies that expand the sustainable capacity of our world. Our health, safety and environment management systems reflect our values and help us meet our customer's needs and our business objectives.

Our Safety Commitment to the Swedesboro Woolwich School District

In today's world, nothing is more important than safeguarding our families at home, at work and at school. Through Honeywell's safety awareness process, we commit to our customers to protect and safeguard our construction sites, our employees, sub-contractors, and your staff.

Our projects all begin with the following steps:

- Safety Training for Employee's and Sub-contractors
- Detailed Work Schedules around the day
- Detailed Background Checks of Personnel
- Detail Logs of Sub Contractor Personnel
- On-Site Logs of Time Sheets, Contact Information for All Personnel
- Clearly Displayed Identification Badges of All Construction Personnel
- On-Site Daily Supervision of All Sub-contractors
- Detailed and Weekly Reviews of Accident Reports and Remediation Strategy

We protect the safety and health of our customers and employees through prevention of illness, injury and pollution.

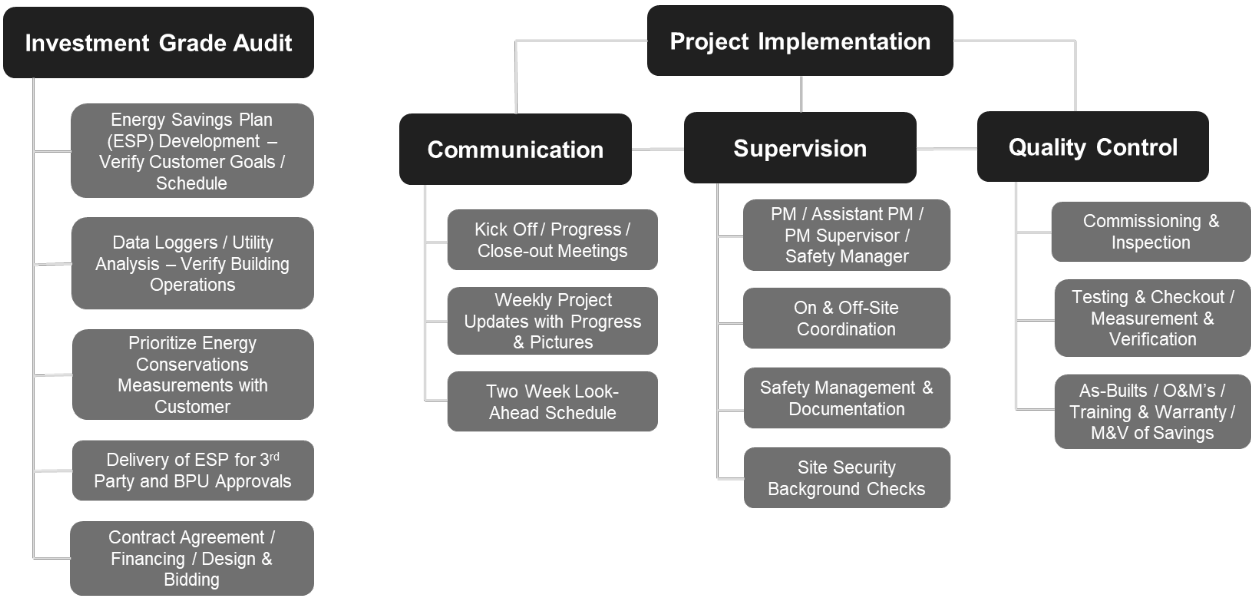
- We actively promote and develop opportunities for expanding sustainable capacity by increasing fuel efficiency, improving security and safety, and reducing emissions of harmful pollutants.
- We are committed to compliance with all of our health, safety, environmental and legal requirements everywhere we operate
- Our commitment to health, safety and the environment is an integral aspect of our design of products, processes and services, and of the lifecycle management of our products.
- Our management systems apply a global standard that provides protection of both human health and the environment during normal and emergency situations
- We identify, control and endeavor to reduce emissions, waste and inefficient use of resources and energy.
- We abide by the company's own strict standards in cases where local laws are less stringent.
- Our senior leadership and individual employees are accountable for their role in meeting our commitments.
- We measure and periodically review our progress and strive for continuous improvement.
- These are our commitments to health, safety, and the environment, and to creating a safe, clean environment everywhere we operate.

C. Project Management Process

The project management process applies technical knowledge, people and communication skills, and management talent in an on-site, pro-active manner to ensure that our contract commitments are met on time, within budget, and at the quality you expect.

A Honeywell Project Management Plan defines plans and controls the tasks that must be completed for your project. But more than task administration, our project management process oversees the efficient allocation of resources to complete those tasks.

Each project and each customer's requirements are unique. At Honeywell, we address customer needs through a formal communication process. This begins by designating one of our project managers to be responsible for keeping the customer abreast of the status of the project.



As the facilities improvements portion of the partnership begins, the Project Manager serves as a single focal point of responsibility for all aspects of the partnership. The Project Manager monitors labor, material, and project modifications related to the Swedesboro Woolwich School District/Honeywell partnership and makes changes to ensure achievement of performance requirements in the facilities modernization component. The Project Manager regularly reviews the on-going process of the project with the customers.

The Project Manager will develop and maintain effective on-going contact with the District and all other project participants to resolve issues and update project status.

There are several challenges in this position. The Project Manager must staff the project and create a work force capable of handling the technologies associated with the project (pneumatic or electric/electronic controls, mechanical systems, etc.), and plan for and use these personnel to achieve optimum results focused on occupant comfort and guarantee requirements.

3. Construction Management

Prior to any work in the buildings, our Project Manager will sit down with your administrative and building staff to outline the energy conservation upgrades that we will be installing in their building. We will discuss proper contractor protocol of checking in and out of the buildings on a daily basis, wearing identifiable shirts, identification badges, and checking in with your facilities staff. We will coordinate certain projects for different times of the day, so we do not interrupt the building and learning environments. Our staff will work a combination of first and second shifts to accomplish the pre-set implementation schedule.

Communication is the key success factor in any construction management plan, and our project manager will be the key focal point during the installation process.

Our team will prevent schedule slippages by continuously tracking the location of all equipment and components required for the project. We make sure all equipment and components will be delivered on time prior to the scheduled date of delivery. Our thorough survey, evaluation and analysis of existing conditions, performed prior to the commencement of construction, will also prevent schedule slippages.

Honeywell is required to subcontract various portions of our projects to contractors. Within the Swedesboro Woolwich School District project, all subcontractors will be selected in accordance with New Jersey public contracts law. Typical areas that are subcontracted are as follows:

- Electrical Installation
- Lighting Retrofits
- HVAC Installation (depends upon the project size and scope)
- Associated General Contracting specialty items to support the project etc., (ceilings, windows, concrete, structural steel, roofing, demolition and removal of equipment, painting and rigging)

Where possible under New Jersey public contracts law, Honeywell uses the following guidelines in hiring subcontractors to perform work on our projects.

- Local Presence in the Community (Customer Recommendations)
- Firm's Qualifications and WBE/MBE Status
- Firm's Financial Stability
- Ability to perform the work within the project timeline
- Price
- Ability to provide service on the equipment or materials installed over a long period of time.

Approval of subcontractors that Honeywell proposes to use lies with the Swedesboro Woolwich School District.

4. Commissioning

Honeywell provides full commissioning of energy conservation measures (ECM's) as part of our responsibility on this project. We will customize this process based on the complexity of ECMs. Specifically, Honeywell will be responsible for start-up and commissioning of the new equipment and systems to be installed during the project. This will include verifying that the installed equipment meets specifications, is installed and started up in accordance with manufacturer's recommendations and operates as intended. A commissioning plan will be prepared that describes the functional tests to be performed on the equipment and the acceptance criteria.

Prior to customer acceptance of the project, Honeywell submits the final commissioning report containing signed acceptance sheets for each ECM. Signed acceptance sheets are obtained upon demonstrating the functionality of each ECM to Swedesboro Woolwich School District appointed representative.

Additionally, Honeywell provides training for facility operators and personnel as needed when each ECM is completed and placed into service. All training is documented in the final commissioning report.

After the completion of the Honeywell commissioning effort, in accordance with New Jersey ESIP legislation, the District will be required to secure the services of a 3rd party independent firm to verify that the new equipment and systems meet the standards set forth in the Energy Savings Plan. To maintain the independence of this review, these costs must be born directly by the Swedesboro Woolwich School District. However, at the option of the Swedesboro Woolwich School District, these services can be financed as a portion of the total project cost.

5. Installation Standards

When Honeywell designs a solution, we consider current and future operations. For any upgrades, we install, we follow building codes/standards, which dictate certain standards for energy or building improvements. Listed in tables following this section are standards for building design. During the life of the agreement, there is a partnership approach to maintaining these standards for reasons of comfort and reliability. For lighting our standard is to meet or exceed Illuminating Engineering Society (IES) light level requirements, achieving the relevant standards wherever possible.

In the case of fluorescent lighting upgrades, we recommend that a group re-lamping of lamps be done approximately five years after the initial installation depending upon run times. Your building facility staff, on an as needed basis, can complete normal routine maintenance of lamps and ballasts. This maintains the quality of the lighting levels, and color rendering qualities of the lamps.

Space temperatures will be set by the energy management system and local building controls and will be maintained on an annual basis. Flexibility will be maintained to regulate space temperatures as required to accommodate building occupant needs.

Your facility staff and building personnel will operate the energy management system with ongoing training and support from Honeywell. Therefore, the District and Honeywell will maintain the standards of comfort. The comfort standards will be maintained throughout the life of the agreement through sound maintenance planning and services recommended as part of this ESP.

Regarding ventilation, Honeywell will upgrade ventilation to meet current standards in those areas where our scope of work involves upgrades to or replacement of systems providing building ventilation. We generally will not upgrade ventilation in those areas where our work doesn’t involve the upgrade or replacement of systems or equipment providing ventilation to a building or facility.

Heating and Cooling Standards

Heating Temperatures	Cooling Temperatures	Unoccupied Temperatures
70-72° F	72-74° F	58-62° F

Honeywell uses a variety of in-house labor as well as subcontractors to install the energy conservation measures. We have on staff trained professionals in fire, security, energy management systems, all temperature control systems, and HVAC. However, per the ESIP law, all trades will be publicly bid except for specific controls applications. Listed below is a sampling of some of the disciplines that would apply to the Swedesboro Woolwich School District:

Improvements	Honeywell	Subcontractor
Engineering Design/Analysis	■	
Technical Audit	■	
Construction Administration/Management	■	
On-Site Construction Supervision	■	
Installation of Energy Management System	■	■
Manufacturer of Energy Management Equipment	■	■
Installation of HVAC/Mechanical Equipment		■
Installation of Renewable Technology		■
Installation of Building Envelope		■
Energy Supply Management Analysis/Implementation	■	
Installation of Boilers		■
Maintenance of Energy Management Equipment	■	■
Manufacturer/Installation of Temperature Controls	■	■
Monitoring/Verification Guarantee	■	
Training of Owner Staff	■	
Financial Responsibility for Energy Guarantees	■	

Hazardous Waste Disposal or Recycling

Honeywell disposes of all PCB ballasts or mercury containing materials removed as part of the project per EPA guidelines. Honeywell will complete all the required paperwork on behalf of the Swedesboro Woolwich School District. Honeywell will work with the District to review your hazardous material reports and will identify the areas where work will be completed so that the District can contract to have any necessary material abatement completed.

Honeywell can help schedule or coordinate waste removal, but does not contract for, or assume responsibility for, the abatement work. Honeywell also has the capabilities to assist the Swedesboro Woolwich School District in working with the EPA under compliance management issues. We also develop and manufacture automated systems to track and report a wide variety of environmental factors.

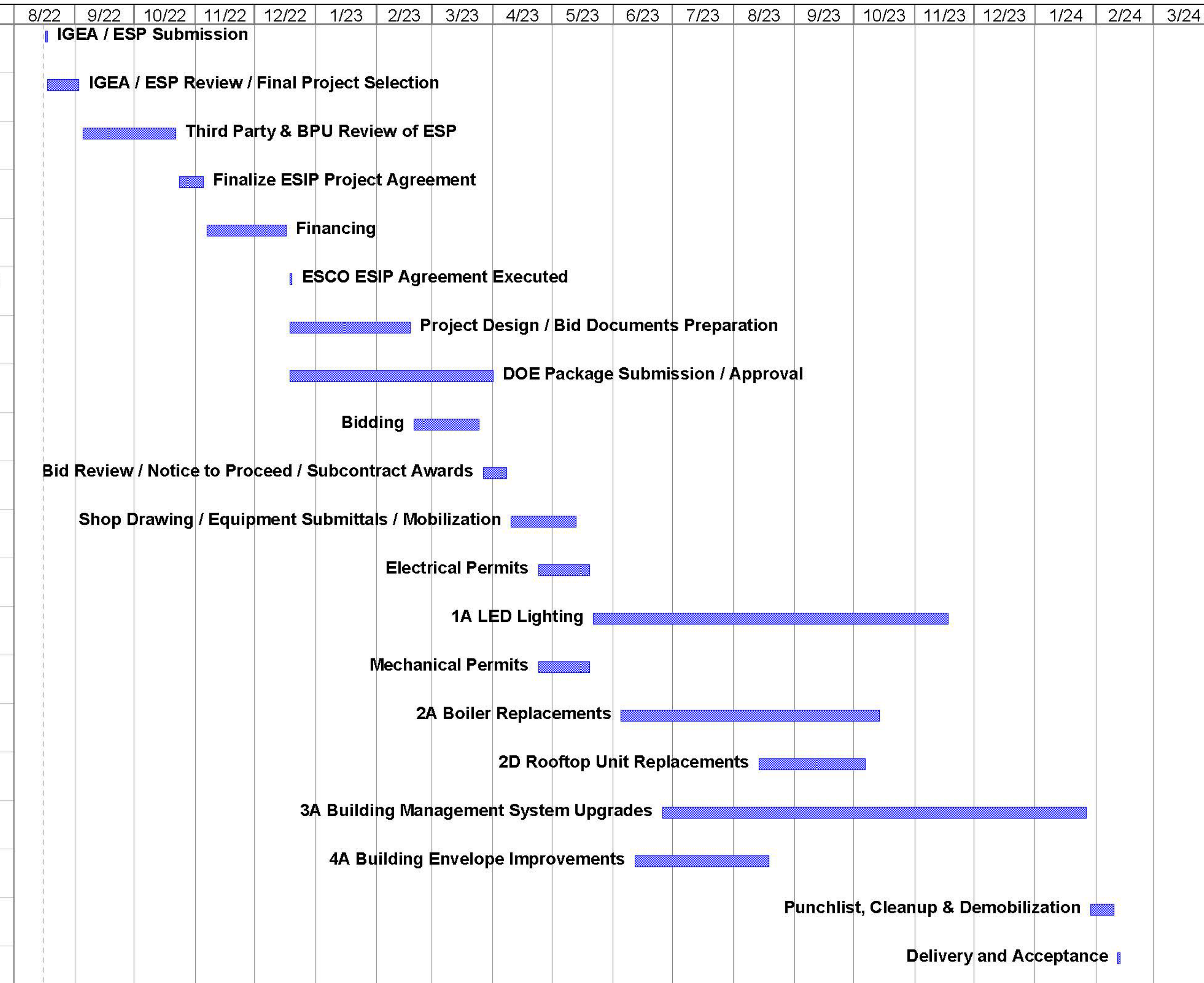
6. Implementation Schedule

Below is a sample schedule for construction and completion of the Project.

Swedesboro-Woolwich School District
Energy Savings Plan
Estimated Construction Schedule

Honeywell

ID	Task Name	Start	Finish
1	IGEA / ESP Submission	Wed 8/17/22	Wed 8/17/22
2	IGEA / ESP Review / Final Project Selection	Thu 8/18/22	Fri 9/2/22
3	Third Party & BPU Review of ESP	Mon 9/5/22	Fri 10/21/22
4	Finalize ESIP Project Agreement	Mon 10/24/22	Fri 11/4/22
5	Financing	Mon 11/7/22	Fri 12/16/22
6	ESCO ESIP Agreement Executed	Mon 12/19/22	Mon 12/19/22
7	Project Design / Bid Documents Preparation	Mon 12/19/22	Fri 2/17/23
8	DOE Package Submission / Approval	Mon 12/19/22	Fri 3/31/23
9	Bidding	Mon 2/20/23	Fri 3/24/23
10	Bid Review / Notice to Proceed / Subcontract Awards	Mon 3/27/23	Fri 4/7/23
11	Shop Drawing / Equipment Submittals / Mobilization	Mon 4/10/23	Fri 5/12/23
12	Electrical Permits	Mon 4/24/23	Fri 5/19/23
13	1A LED Lighting	Mon 5/22/23	Fri 11/17/23
14	Mechanical Permits	Mon 4/24/23	Fri 5/19/23
15	2A Boiler Replacements	Mon 6/5/23	Fri 10/13/23
16	2D Rooftop Unit Replacements	Mon 8/14/23	Fri 10/6/23
17	3A Building Management System Upgrades	Mon 6/26/23	Fri 1/26/24
18	4A Building Envelope Improvements	Mon 6/12/23	Fri 8/18/23
19	Punchlist, Cleanup & Demobilization	Mon 1/29/24	Fri 2/9/24
20	Delivery and Acceptance	Mon 2/12/24	Mon 2/12/24



APPENDICES

Section G — Appendices

Please see appropriate folders in Teams room provided as follows:

- Honeywell – Appendix 1 — LOCAL GOVERNMENT ENERGY AUDITS
- Honeywell – Appendix 2 — ECM CALCULATIONS
- Honeywell – Appendix 3 — EQUIPMENT CUT SHEETS
- Honeywell – Appendix 4 — LIGHTING LINE BY LINES

APPENDIX 1

Local Government Energy Audit Report

Margaret C. Clifford School

March 11, 2019

Prepared for:

Swedesboro-Woolwich School District

601 Auburn Avenue

Swedesboro, NJ 08085

Prepared by:

TRC Energy Services

900 Route 9 North

Woodbridge, NJ 07095

Disclaimer

The goal of this audit report is to identify potential energy efficiency opportunities, help prioritize specific measures for implementation, and provide information about financial incentives that may be available. Most energy conservation measures have received preliminary analysis of feasibility that identifies expected ranges of savings and costs. This level of analysis is usually considered sufficient to establish a basis for further discussion and to help prioritize energy measures.

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

TRC bases estimated installation costs on our experience at similar facilities, pricing from local contractors and vendors, and/or cost estimates from RS Means. We encourage the owner of the facility is encouraged to independently confirm these cost estimates and to obtain multiple estimates when considering measure installations. Actual installation costs can vary widely based on individual 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.

The New Jersey 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. Please review all available program incentives and eligibility requirements prior to selecting and installing any energy conservation measures.

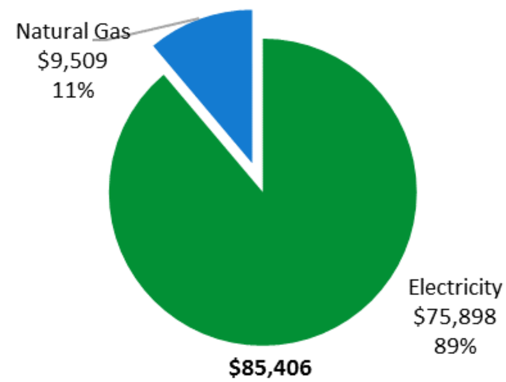
The customer and their respective contractor(s) are responsible to implement energy conservation measures in complete conformance with all applicable local, state and federal requirements.

Table of Contents

1 EXECUTIVE SUMMARY

The New Jersey Board of Public Utilities (NJBPU) has sponsored this Local Government Energy Audit (LGEA) report for Margaret C. Clifford School. This report provides you with information about your facility's energy use, identifies energy conservation measures (ECMs) that can reduce your energy use, and provides information and assistance to help make changes in your facility. TRC Energy Services (TRC) conducted this study as part of a comprehensive effort to assist New Jersey school districts and local governments in controlling their energy costs and help protect our environment by reducing statewide energy consumption.

BUILDING PERFORMANCE REPORT

Annual Utilities	Costs: $85,406 Electricity: 480,302 kWh Natural Gas: 8,261 Therms	
ENERGY STAR® Benchmarking Score	51	A standard energy use benchmark is not available for this facility type. This report contains suggestions about how to improve building performance and reduce energy costs.

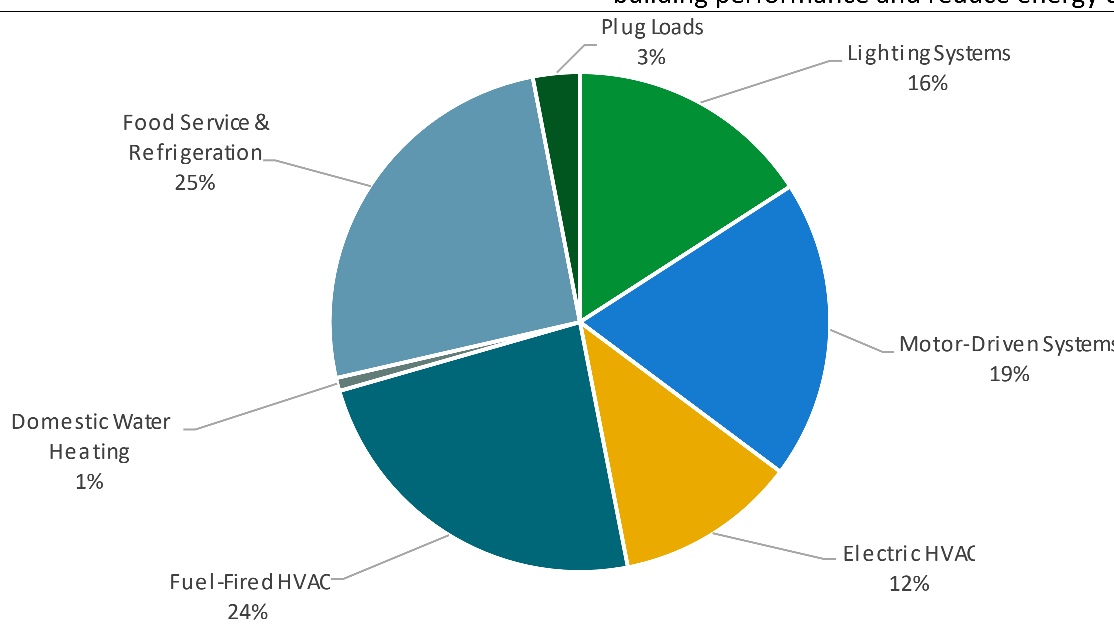


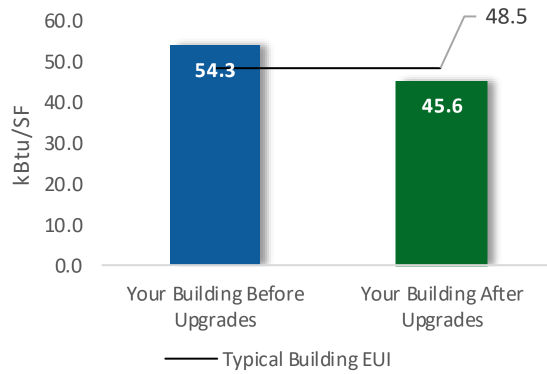
Figure 1 - Energy Use by System

POTENTIAL IMPROVEMENTS

This energy audit considered a range of potential energy improvements in your building. Costs and savings will vary between improvements. Presented below are two potential scopes of work for your consideration.

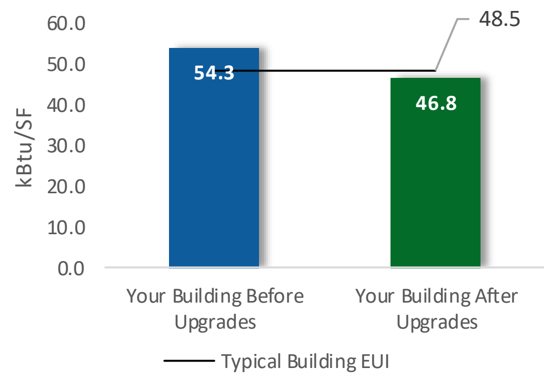
Scenario 1: Full Package (all evaluated measures)

Installation Cost	$161,674
Potential Rebates & Incentives[1]	$17,855
Annual Cost Savings	$16,849
Annual Energy Savings	Electricity: 103,545 kWh Natural Gas: 423 Therms
Greenhouse Gas Emission Savings	55 Tons
Simple Payback	8.5 Years
Site Energy Savings (all utilities)	16%



Scenario 2: Cost Effective Package[2]

Installation Cost	$80,943
Potential Rebates & Incentives	$12,120
Annual Cost Savings	$15,566
Annual Energy Savings	Electricity: 98,238 kWh Natural Gas: 37 Therms
Greenhouse Gas Emission Savings	50 Tons
Simple Payback	4.4 Years
Site Energy Savings (all utilities)	14%



On-site Generation Potential

Photovoltaic	High
Combined Heat and Power	None

[1] Incentives are based on current SmartStart Prescriptive incentives. Other program incentives may apply.

[2] A cost-effective measure is defined as one where the simple payback does not exceed two-thirds of the expected proposed equipment useful life. Simple payback is based on the net measure cost after potential incentives.

#	Energy Conservation Measure	Annual Electric Savings (kWh)	Peak Demand Savings (kW)	Annual Fuel Savings (MMBtu)	Annual Energy Cost Savings ($)	Lifetime Energy Cost Savings ($)	Estimated Install Cost ($)	Estimated Incentive ($)*	Estimated Net Cost ($)	Simple Payback Period (yrs)**	CO_2e Emissions Reduction (lbs)
Lighting Upgrades		**68,192**	**17.6**	**-11**	**$10,647**	**$159,705**	**$47,061**	**$8,800**	**$38,261**	**3.6**	**67,359**
ECM 1	Install LED Fixtures	13,666	1.6	0	$2,159	$32,392	$20,285	$2,100	$18,185	8.4	13,761
ECM 2	Retrofit Fixtures with LED Lamps	54,526	16.0	-11	$8,488	$127,313	$26,775	$6,700	$20,075	2.4	53,598
Lighting Control Measures		**14,269**	**4.2**	**-3**	**$2,220**	**$17,763**	**$19,456**	**$2,345**	**$17,111**	**7.7**	**14,019**
ECM 3	Install Occupancy Sensor Lighting Controls	12,169	3.6	-3	$1,894	$15,150	$19,056	$2,345	$16,711	8.8	11,957
ECM 4	Install High/Low Lighting Controls	2,099	0.6	0	$327	$2,614	$400	$0	$400	1.2	2,063
Motor Upgrades		**2,892**	**1.2**	**0**	**$457**	**$6,855**	**$14,171**	**$0**	**$14,171**	**31.0**	**2,912**
	Premium Efficiency Motors	2,892	1.2	0	$457	$6,855	$14,171	$0	$14,171	31.0	2,912
Variable Frequency Drive (VFD) Measures		**13,907**	**1.5**	**0**	**$2,198**	**$32,963**	**$15,041**	**$900**	**$14,141**	**6.4**	**14,004**
	Install VFD on Variable Air Volume (VAV) Fans	1,332	0.4	0	$210	$3,156	$2,632	$0	$2,632	12.5	1,341
ECM 5	Install VFDs on Heating Water Pumps	8,225	1.4	0	$1,300	$19,496	$7,214	$0	$7,214	5.6	8,283
ECM 6	Install VFDs on Cooling Tower Fans	4,350	-0.4	0	$687	$10,311	$5,194	$900	$4,294	6.2	4,380
Gas Heating (HVAC/Process) Replacement		**0**	**0.0**	**39**	**$444**	**$8,879**	**$61,209**	**$5,610**	**$55,599**	**125.2**	**4,516**
	Install High Efficiency Hot Water Boilers	0	0.0	39	$444	$8,879	$61,209	$5,610	$55,599	125.2	4,516
Domestic Water Heating Upgrade		**0**	**0.0**	**18**	**$206**	**$2,056**	**$115**	**$0**	**$115**	**0.6**	**2,091**
ECM 7	Install Low-Flow DHW Devices	0	0.0	18	$206	$2,056	$115	$0	$115	0.6	2,091
Food Service & Refrigeration Measures		**4,285**	**0.2**	**0**	**$677**	**$9,648**	**$4,623**	**$200**	**$4,423**	**6.5**	**4,315**
	Refrigerator/Freezer Case Electrically Commutated Motors	197	0.0	0	$31	$466	$607	$0	$607	19.5	198
ECM 8	Refrigeration Controls	2,860	0.0	0	$452	$7,230	$1,674	$75	$1,599	3.5	2,880
	Replace Refrigeration Equipment	887	0.1	0	$140	$1,681	$2,112	$125	$1,987	14.2	893
ECM 9	Vending Machine Control	343	0.0	0	$54	$271	$230	$0	$230	4.2	345
TOTALS		**103,545**	**24.7**	**42**	**$16,849**	**$237,869**	**$161,674**	**$17,855**	**$143,819**	**8.5**	**109,217**

* - All incentives presented in this table are based on NJ SmartStart 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).

Figure 2 – Evaluated Energy Improvements

1.1 Planning Your Project

Careful planning makes for a successful energy project. When considering this scope of work, you will have some decisions to make, such as:

- How will the project be funded and/or financed?
- Is it best to pursue individual ECMs, groups of ECMs, or use a comprehensive approach where all ECMs are installed together?
- Are there other facility improvements that should happen at the same time?

Pick Your Installation Approach

New Jersey Clean Energy Programs give you the flexibility to do a little or a lot. Rebates, incentives, and financing are available to help reduce both your installation costs and your energy bills. If you are planning to take advantage of these programs, make sure to review incentive program guidelines before proceeding. This is important because in most cases you will need to submit applications for the incentives before purchasing materials or starting installation.

The potential ECMs identified for this building likely qualify for multiple incentive and funding programs. Based on current program rules and requirements, your measures are likely to qualify for the following programs:

Energy Conservation Measure		SmartStart	Direct Install	Pay For Performance
ECM 1	Install LED Fixtures	X	X	X
ECM 2	Retrofit Fixtures with LED Lamps	X	X	X
ECM 3	Install Occupancy Sensor Lighting Controls	X	X	X
ECM 4	Install High/Low Lighting Controls		X	X
ECM 5	Install VFDs on Hot Water Pumps		X	X
ECM 6	Install VFDs on Cooling Tower Fans	X	X	X
ECM 7	Install Low-Flow Domestic Hot Water Devices		X	X
ECM 8	Refrigeration Controls	X	X	X
ECM 9	Vending Machine Control		X	X

Figure 3 – Funding Options

New Jersey Clean Energy Programs At-A-Glance

	SmartStart Flexibility to install at your own pace	**Direct Install** Turnkey installation	**Pay for Performance** Whole building upgrades
Who should use it?	Buildings installing individual measures or small group of measures.	Small to mid-size facilities that can bundle multiple measures together. Peak demand should be below 200 kW. Not suitable for significant building shell issues.	Mid to large size facilities looking to implement as many measures as possible at one time. Peak demand should be over 200 kW.
How does it work?	Use in-house staff or your preferred contractor.	Pre-approved contractors pass savings along to you via reduced material and labor costs.	Whole-building approach to energy upgrades designed to reduce energy use by at least 15%. The more you save, the higher the incentives.
What are the Incentives?	Fixed incentives for specific energy efficiency measures.	Incentives pay up to 70% of eligible costs, up to $125,000 per project. You pay the remaining 30% directly to the contractor.	Up to 25% of installation cost, calculated based on level of energy savings per square foot.
How do I participate?	Submit an application for the specific equipment to be installed.	Contact a participating contractor in your region.	Contact a pre-qualified Partner to develop your Energy Reduction Plan and set your energy savings targets.

Take the next step by visiting **www.njcleanenergy.com** for program details, applications, and to contact a qualified contractor.

Individual Measures with SmartStart

For facilities wishing 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, you can use internal resources or an outside firm or contractor to perform the final design of the ECM(s) and install the equipment. Program pre-approval is required for some SmartStart incentives, so only after receiving pre-approval should you proceed with ECM installation.

Turnkey Installation with Direct Install

The Direct Install program provides 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. Direct Install contractors will assess and verify individual measure eligibility, and, in most cases, they perform the installation work. The Direct Install program is available to sites with an average peak demand of less than 200 kW.

Whole Building Approach with Pay for Performance

Pay for Performance can be a good option for medium to large sized facilities to achieve deep energy savings. Pay for Performance allows you to install as many measures as possible under a single project as well as address measures that may not qualify for other programs. Many facilities pursuing an Energy Savings Improvement Program (ESIP) loan also use this program. Pay for Performance works for larger customers with a peak demand over 200 kW. 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.

More Options from Around the State

Financing and Planning Support with the Energy Savings Improvement Program (ESIP)

For larger facilities with limited capital availability to implement ECMs, project financing may be available through the 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. You have already taken the first step as an LGEA customer, because this report is required to participate in ESIP.

Resiliency with Return on Investment through Combined Heat & Power (CHP)

The CHP program provides incentives for combined heat and power (aka cogeneration) and waste heat to power projects. Combined heat and power systems generate power on-site and recover heat from the generation system to meet on-site thermal loads. Waste heat to power systems use waste heat to generate power. You will work with a qualified developer who will design a system that meets your building's heating and cooling needs.

Ongoing Electric Savings with Demand Response

The Demand Response Energy Aggregator program reduces 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. By enabling commercial facilities to reduce their electric demand 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 demand response (DR) programs. Program participation is voluntary, and facilities receive payments regardless of whether they are called upon to curtail their load during times of peak demand.

2 Existing Conditions

The New Jersey Board of Public Utilities (NJBPU) has sponsored this Local Government Energy Audit (LGEA) Report for Margaret C. Clifford School. This report provides information on how your facility uses energy, identifies energy conservation measures (ECMs) that can reduce your energy use, and provides information and assistance to help you implement the ECMs. This report also contains valuable information on financial incentives from New Jersey's Clean Energy Program (NJCEP) for implementing ECMs.

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

2.1 Site Overview

On August 23, 2018, TRC performed an energy audit at Margaret C. Clifford School located in Swedesboro, NJ. TRC met with Anthony Tobin, Facility Representative to review the facility operations and help focus our investigation on specific energy-using systems.

Margaret C. Clifford School is a one-story, 45,424 square foot building built in 1996. Spaces include: classrooms, multipurpose room, library, computer lab, offices, kitchen, corridors, kitchen and basement mechanical space.

Over the last several years, the facility has undergone a comprehensive interior lighting retrofit project replacing T12 fluorescent fixtures with T8 fluorescent fixtures. The facility is interested in the implementation of new energy conservation measures that can help reduce its overall energy consumption.

2.2 Building Occupancy

The facility is occupied year-round, with higher occupancy during the school year (September through June). Typical weekday occupancy is 40 staff and 192 students. Summer occupancy includes continuing maintenance activities. There are no weekend activities.

Building Name	Weekday/Weekend	Operating Schedule
Margaret C. Clifford School	Weekday	6:00 AM - 4:00 PM
	Weekend	Unoccupied

Figure 4 - Building Occupancy Schedule

2.3 Building Envelope

Building walls are concrete block over structural steel. The walls are made of concrete masonry units (CMUs) with a brick decorative CMU veneer and gypsum drywall interior finish.

The building has asphalt and slate roof shingles that are in good condition. Steel trusses support a pitched roof with a wood deck covered with asphalt shingles. Roof encloses conditioned space. The thermal barrier is between this space and the conditioned space below the roof.

Most of the windows are double glazed with low-e glass and have aluminum frames with a thermal break vinyl frames. The glass-to-frame seals are in good condition. The operable window weather seals are in good condition, showing little evidence of excessive wear. Exterior doors have aluminum frames and are in good condition with undamaged door seals.

Image 1 Building exterior

2.4 Lighting Systems

The primary interior lighting system uses 32-Watt linear fluorescent T8 lamps. Additionally, there are some compact fluorescent lamps (CFL), halogen incandescent and LED general purpose lamps. Typically, T8 fluorescent lamps use electronic ballasts.

Fixture types include 2-, 3-, and 4-lamp, 2-, or 4-foot long troffer-mounted fixtures and 2-foot fixtures with U-bend tube lamps. Most fixtures are in good condition.

Multi-purpose room fixtures have indirect ambient 4 foot LED lamps and are controlled by occupancy sensors. Exit signs are LED. Interior lighting levels were generally sufficient. Most lighting fixtures are controlled manually and the remainder by occupancy sensors.

Exterior fixtures include wall packs with high intensity discharge (HID) and CFL lamps and controlled by photocell.

2.5 Air Handling Systems

Packaged Units

Building areas are served with water source heat pump units controlled by the energy management system (EMS):

- 22 units with a heating capacity of 6.80 MBh and 4-ton cooling capacity with 12.90 EER
- Six heat pumps with a heating capacity of 9.10 MBH and 4-ton cooling capacity with 12.90 EER
- Three heat pumps with heating capacity of 8.90 MBh and cooling capacity of 3-tons with 12.10 EER
- One 12.10 EER unit has heating capacity of 5.10 MBh and 3-ton cooling capacity.
- One 7.5-ton Trane self-contained unit with 1.5 hp supply fan used to provide heating and cooling to kitchen area, has the heating capacity of 82.20 MBh and 11.50 EER.

Refer to Appendix A for detailed information about each unit.

Image 2 AHU-1 Self-contained unit

Image 3 Water source heat pump

Image 4 Heat pump nameplate

2.6 Heating Hot Water Systems

Two P-K Thermific 1275 MBh non-condensing hot water boilers serve the building heating load. The burners are non-modulating with a nominal efficiency of 85%. The boilers are configured in a lead-lag control scheme. Only one boiler is required under high load conditions. Installed in 1996, they are in good condition. There is a service contract in place.

The hydronic distribution system is a heating and cooling system. The cooling tower cools the water with two 7.5 hp cooling pumps and the boilers provide hot water in heating through heat exchangers.

The boilers are configured in a constant flow primary distribution with two 7.5 hp constant speed hot water pumps (PH-1 & 2) and one 0.5 hp hot water circulation pump (PH-3) operating with a lead-lag control scheme. The boilers provide hot water to water source heat pumps, AHU-1, two-unit heaters (CUH-7 & 8) and two outside air fans (SF-1 & 2) throughout the building via heat exchanger (HEX-1).

Hot water is supplied at 86.6°F when the outside air temperature is low, and the setpoint is adjusted linearly to 68°F when the outside air is above 70°F. The hot water return temperature is typically 73.2°F.

Image 5 Boiler plant

Image 6 Boiler plate information

Image 7 Boiler-1

Image 8 Hot water supply pipe

2.7 Condenser Water Systems

The condenser water system consists of one cooling tower (CT1) located outside. The tower has two 10 hp fan motors. Fan motors are staged based on maintaining basin water temperature. Condenser water is supplied to the water source heat pumps by two 15 hp, 400 gallons per minute (gpm) constant flow pumps (PS-1 and PS-2). The condenser water temperature is reset with water supplied at 80°F when the outside air temperature is above 70°F and the setpoint is reset to 65°F when the outside air is below 55°F.

The cooling tower is 12 years old and fill of the cooling tower is noted in be in good condition.

Image 9 Cooling tower

Image 10 Cooling tower nameplate

2.8 Building Energy Management Systems (EMS)

A Trane EMS controls the HVAC equipment, the boilers, cooling tower, AHU-1 and the heat pumps. The EMS provides equipment scheduling, monitors and controls space temperatures, supply air temperatures, humidity, heating water loop temperatures and cooling water loop temperatures.

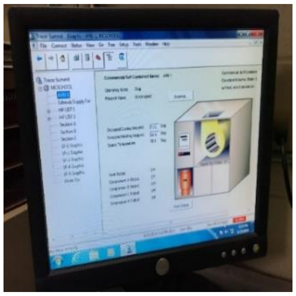


Image 11 Heat pump graphic

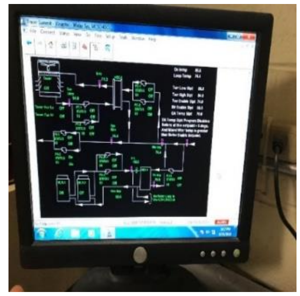


Image 12 HVAC flow diagram

Image 13 Heat pump list

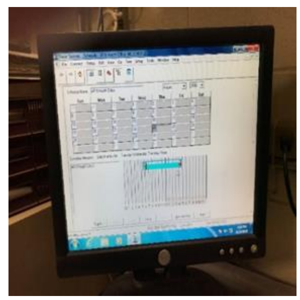


Image 14 Operating schedule

2.9 Domestic Hot Water

Hot water is produced with a 100 gallon, 200 MBh gas-fired storage water heater with an 80% efficiency. At the time of the site visit, the domestic water heaters were set at 120°F. The domestic hot water pipes are insulated, and the insulation is in good condition.

Image 15 DHW heater

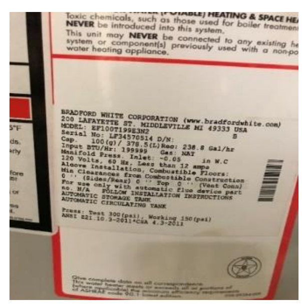


Image 16 Water heater name plate

2.10 Food Service Equipment

The kitchen has mixed gas and electric equipment that is used to prepare lunches for students. Most cooking is done using a combination gas-fired oven, a gas griddle and a gas steamer. Bulk prepared foods are held in three full-size electric holding cabinets. Equipment is high efficiency and is in good condition.

The single tank dishwasher is an ENERGY STAR® high temperature, door type unit with an electric water booster heater.

Our analysis determined that this building's food service equipment accounts for a relatively high proportion of overall energy use. While cost effective opportunities to replace equipment are limited at this time, we recommend that you work with your food service equipment suppliers to maintain equipment in a way that minimizes energy use. This may include cleaning air intakes and exhausts or other methods of keeping your existing equipment operating in top shape. When food service equipment is eventually replaced, consider installing high efficiency or ENERGY STAR® labeled equipment.

Visit https://www.energystar.gov/products/commercial_food_service_equipment for the latest information on high efficiency food service equipment.

Image 17 Gas skillet

Image 18 Gas stove

Image 19 Convection oven

Image 20 Combination oven

2.11 Refrigeration

The kitchen has one stand-up refrigerator with solid doors. There is a freezer chest as well as many refrigerator chests. All equipment is standard efficiency and in good condition.

The walk-in refrigerator has an estimated 7.67-ton compressor located outside and a two-fan evaporator. The cooler has evaporator fan and electric defrost controls.

Visit https://www.energystar.gov/products/commercial_food_service_equipment for the latest information on high efficiency food service equipment.

Image 21 Walk-in cooler

Image 22 Stand up refrigerator

Image 23 Walk-in cooler nameplate

Image 24 Stand up refrigerator

2.12 Plug Load & Vending Machines

The utility bill analysis indicates that plug loads consume approximately 3.03% of total building energy use. This is lower than a typical building.

You seem to already be doing a great job managing your electrical plug loads. This report makes additional suggestions for ECMs in this area as well as energy efficient best practices.

There are 86 computer work stations throughout the facility. Plug loads throughout the building include general kitchen and office equipment. There are classroom typical loads such as printers, projectors, and fans.

There are several residential-style refrigerators throughout the building that are used to store staff lunches and cold beverages. These vary in condition and efficiency.

There is one non-refrigerated vending machine, which is not equipped with occupancy-based controls.

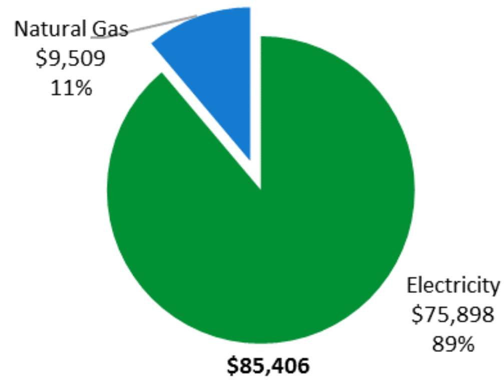
2.13 Water-Using Systems

There are seven restrooms with toilets, urinals, and sinks. Faucet flow rates are at 2.5 gallons per minute (gpm) or higher. Toilets are rated at 2.5 gallons per flush (gpf) and urinals are rated at 2 gpf.

3 ENERGY USE AND COSTS

Twelve months of utility billing data are used to develop annual energy consumption and cost data. This information creates a profile of the annual energy consumption and energy costs.

Utility Summary		
Fuel	**Usage**	**Cost**
Electricity	480,302 kWh	$75,898
Natural Gas	8,261 Therms	$9,509
Total		**$85,406**



An energy balance identifies and quantifies energy use in your various building systems. This can highlight areas with the most potential for improvement. This energy balance was developed using calculated energy use for each of the end uses noted in the figure.

The energy auditor collects information regarding equipment operating hours, capacity, efficiency and other operational parameters from facility staff, drawings, and on-site observations. This information is used as the inputs to calculate the existing conditions energy use for the site. The calculated energy use is then compared to the historical energy use and the initial inputs are revised, as necessary, to balance the calculated energy use to the historical energy use.

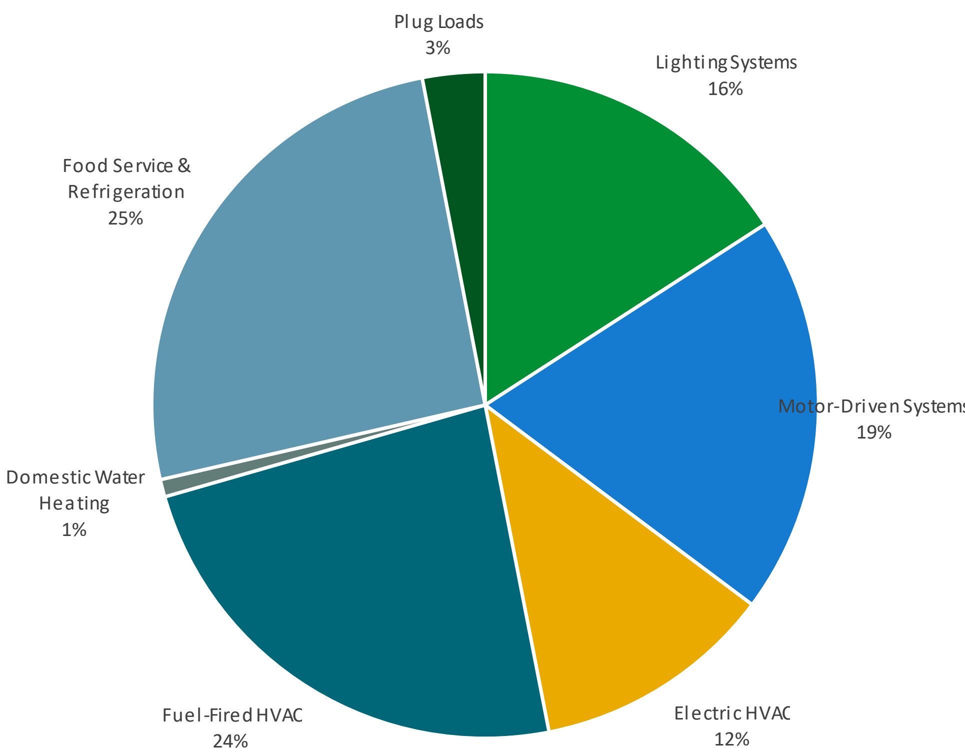
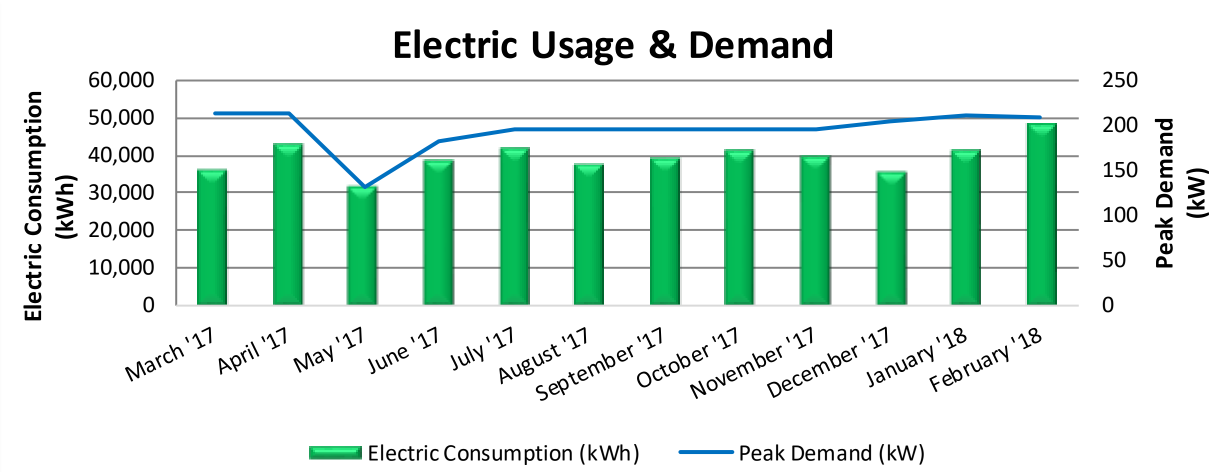


Figure 5 - Energy Balance

3.1 Electricity

Atlantic City Electric delivers electricity under rate class Monthly General Service Secondary.



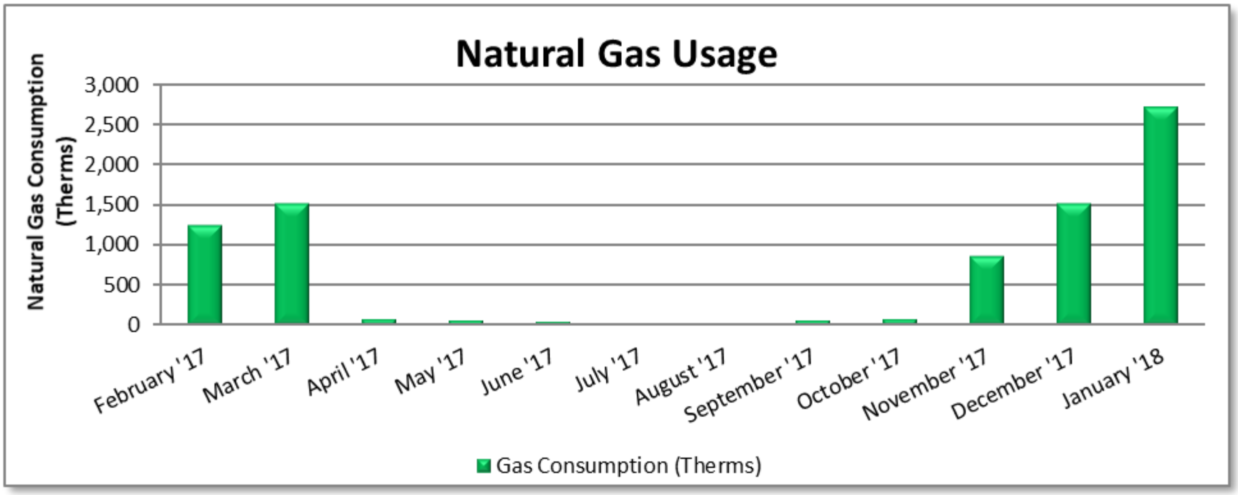
Electric Billing Data					
Period Ending	Days in Period	Electric Usage (kWh)	Demand (kW)	Demand Cost	Total Electric Cost
4/3/17	32	35,718	214	1,758	6,344
5/2/17	28	42,498	215	2,072	7,456
6/1/17	29	31,750	132	1,397	5,526
7/3/17	31	38,642	182	1,602	5,913
8/1/17	28	41,819	195	1,866	6,146
9/5/17	34	37,183	195	1,868	5,831
10/2/17	26	39,047	195	2,000	6,082
11/1/17	29	40,865	196	1,562	5,837
12/2/17	30	39,553	196	1,899	5,972
1/3/18	32	35,171	205	2,126	5,698
2/2/18	29	41,026	211	2,192	6,447
3/5/18	30	47,819	210	2,104	7,191
Totals	**358**	**471,091**	**215**	**$22,446**	**$74,442**
Annual	**365**	**480,302**	**215**	**$22,885**	**$75,898**

Notes:

- Peak demand of 215 kW occurred in February 2018.
- The average electric cost over the past 12 months was $0.158/kWh, which is the blended rate that includes energy supply, distribution, demand, and other charges. This report uses this blended rate to estimate energy cost savings.

3.2 Natural Gas

South Jersey Gas delivers natural gas under rate class General Service, with natural gas supply provided by South Jersey Energy, a third-party supplier.



Gas Billing Data			
Period Ending	**Days in Period**	**Natural Gas Usage (Therms)**	**Natural Gas Cost**
3/2/17	28	1,261	$1,247
4/4/17	33	1,521	$1,525
5/3/17	29	83	$113
6/2/17	30	72	$103
7/5/17	33	52	$86
8/2/17	28	21	$49
9/6/17	35	31	$66
10/3/17	27	73	$101
11/2/17	30	93	$127
12/4/17	32	872	$1,057
1/5/18	32	1,523	$1,862
2/5/18	31	2,727	$3,252
Totals	**368**	**8,329**	**$9,587**
Annual	**365**	**8,261**	**$9,509**

Notes:

- The average gas cost for the past 12 months is $1.151/therm, which is the blended rate used throughout the analysis.

3.3 Benchmarking

Your building was benchmarked using the United States Environmental Protection Agency's (EPA) *Portfolio Manager®* software. Benchmarking compares your building's energy use to that of similar buildings across the county, while neutralizing variations due to location, occupancy and operating hours. Some building types can be scored with a 1-100 ranking of a building's energy performance relative to the national building market. A score of 50 represents the national average and a score of 100 is best.

This ENERGY STAR® benchmarking score provides a comprehensive snapshot of your building's energy performance. It assesses the building's physical assets, operations, and occupant behavior, which is compiled into a quick and easy-to-understand score.

Benchmarking Score	51

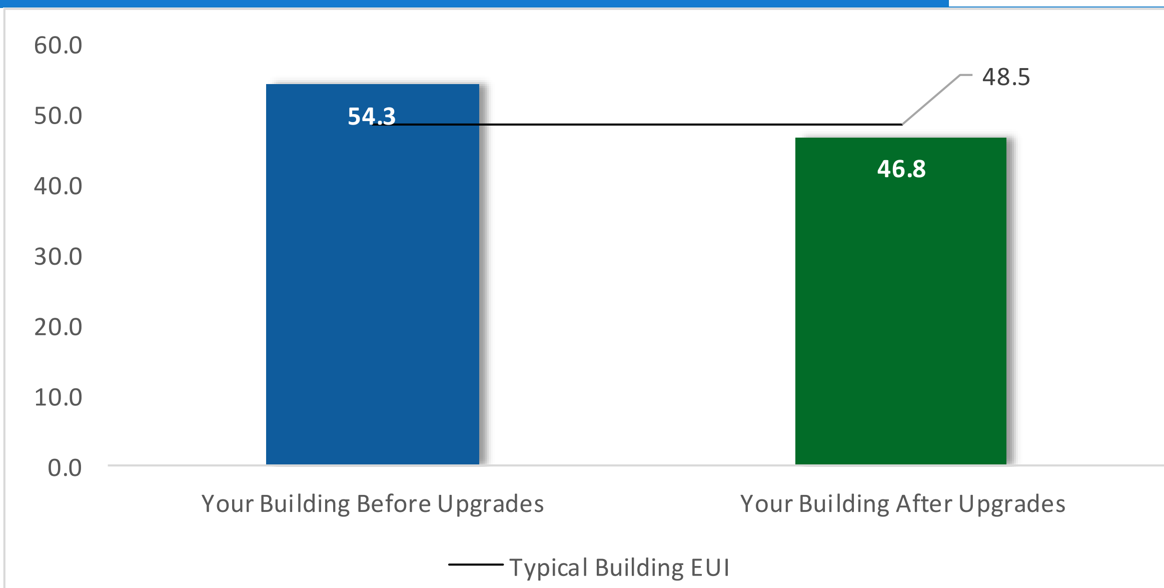


Figure 6 - Energy Use Intensity Comparison

Energy use intensity (EUI) measures energy consumption per square foot and is the standard metric for comparing buildings' energy performance. A lower EUI means better performance and less energy consumed. A number of factors can cause as building to vary from the "typical" energy usage. Local weather conditions, building age and insulation levels, equipment efficiency, daily occupancy hours, changes in occupancy throughout the year, equipment operating hours, and occupant behavior all contribute to a building's energy use and the benchmarking score.

For wastewater treatment plants the energy use intensity is the total source energy use of the property divided by the average influent flow (in gallons per day).

Tracking Your Energy Performance

Keeping track of your energy use on a monthly basis is one of the best ways to keep energy costs in check. Update your utility information in Portfolio Manager® regularly, so that you can keep track of your building's performance.

We have created a Portfolio Manager® account for your facility and we have already entered the monthly utility data shown above for you. Account login information for your account will be sent via email.

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.

For more information on ENERGY STAR® and Portfolio Manager®, visit their website.[3]

[3] https://www.energystar.gov/buildings/facility-owners-and-managers/existing-buildings/earn-recognition/energy-star-certification/how-app-1.

4 Energy Conservation Measures

The goal of this audit report is to identify and evaluate potential energy efficiency improvements, provide information about the cost effectiveness of those improvements, and recognize potential financial incentives from NJBPU. Most energy conservation measures have received preliminary analysis of feasibility which identifies expected ranges of savings and costs. This level of analysis is typically sufficient to demonstrate project cost-effectiveness and help prioritize energy measures.

Calculations of energy use and savings are based on the current version of the *New Jersey Clean Energy Program Protocols to Measure Resource Savings*, which is approved by the NJBPU. Further analysis or investigation may be required to calculate more precise savings based on specific circumstances.

Operation and maintenance costs for the proposed new equipment will generally be lower than the current costs for the existing equipment—especially if the existing equipment is at or past its normal useful life. We have conservatively assumed there to be no impact on overall maintenance costs over the life of the equipment.

Financial incentives are based on the current NJCEP prescriptive SmartStart program. A higher level of investigation may be necessary to support any SmartStart Custom, Pay for Performance, or Direct Install incentive applications. Some measures and proposed upgrades may be eligible for higher incentives than those shown below through other NJCEP programs described in a following section of this report.

Appendix A: Equipment Inventory & Recommendations provides a detailed list of the locations and recommended upgrades for each energy conservation measure.

#	Energy Conservation Measure	Annual Electric Savings (kWh)	Peak Demand Savings (kW)	Annual Fuel Savings (MMBtu)	Annual Energy Cost Savings ($)	Lifetime Energy Cost Savings ($)	Estimated Install Cost ($)	Estimated Incentive ($)*	Estimated Net Cost ($)	Simple Payback Period (yrs)**	CO_2e Emissions Reduction (lbs)
Lighting Upgrades		**68,192**	**17.6**	**-11**	**$10,647**	**$159,705**	**$47,061**	**$8,800**	**$38,261**	**3.6**	**67,359**
ECM 1	Install LED Fixtures	13,666	1.6	0	$2,159	$32,392	$20,285	$2,100	$18,185	8.4	13,761
ECM 2	Retrofit Fixtures with LED Lamps	54,526	16.0	-11	$8,488	$127,313	$26,775	$6,700	$20,075	2.4	53,598
Lighting Control Measures		**14,269**	**4.2**	**-3**	**$2,220**	**$17,763**	**$19,456**	**$2,345**	**$17,111**	**7.7**	**14,019**
ECM 3	Install Occupancy Sensor Lighting Controls	12,169	3.6	-3	$1,894	$15,150	$19,056	$2,345	$16,711	8.8	11,957
ECM 4	Install High/Low Lighting Controls	2,099	0.6	0	$327	$2,614	$400	$0	$400	1.2	2,063
Motor Upgrades		**2,892**	**1.2**	**0**	**$457**	**$6,855**	**$14,171**	**$0**	**$14,171**	**31.0**	**2,912**
	Premium Efficiency Motors	2,892	1.2	0	$457	$6,855	$14,171	$0	$14,171	31.0	2,912
Variable Frequency Drive (VFD) Measures		**13,907**	**1.5**	**0**	**$2,198**	**$32,963**	**$15,041**	**$900**	**$14,141**	**6.4**	**14,004**
	Install VFD on Variable Air Volume (VAV) Fans	1,332	0.4	0	$210	$3,156	$2,632	$0	$2,632	12.5	1,341
ECM 5	Install VFDs on Heating Water Pumps	8,225	1.4	0	$1,300	$19,496	$7,214	$0	$7,214	5.6	8,283
ECM 6	Install VFDs on Cooling Tower Fans	4,350	-0.4	0	$687	$10,311	$5,194	$900	$4,294	6.2	4,380
Gas Heating (HVAC/Process) Replacement		**0**	**0.0**	**39**	**$444**	**$8,879**	**$61,209**	**$5,610**	**$55,599**	**125.2**	**4,516**
	Install High Efficiency Hot Water Boilers	0	0.0	39	$444	$8,879	$61,209	$5,610	$55,599	125.2	4,516
Domestic Water Heating Upgrade		**0**	**0.0**	**18**	**$206**	**$2,056**	**$115**	**$0**	**$115**	**0.6**	**2,091**
ECM 7	Install Low-Flow DHW Devices	0	0.0	18	$206	$2,056	$115	$0	$115	0.6	2,091
Food Service & Refrigeration Measures		**4,285**	**0.2**	**0**	**$677**	**$9,648**	**$4,623**	**$200**	**$4,423**	**6.5**	**4,315**
	Refrigerator/Freezer Case Electrically Commutated Motors	197	0.0	0	$31	$466	$607	$0	$607	19.5	198
ECM 8	Refrigeration Controls	2,860	0.0	0	$452	$7,230	$1,674	$75	$1,599	3.5	2,880
	Replace Refrigeration Equipment	887	0.1	0	$140	$1,681	$2,112	$125	$1,987	14.2	893
ECM 9	Vending Machine Control	343	0.0	0	$54	$271	$230	$0	$230	4.2	345
TOTALS		**103,545**	**24.7**	**42**	**$16,849**	**$237,869**	**$161,674**	**$17,855**	**$143,819**	**8.5**	**109,217**

* - All incentives presented in this table are based on NJ SmartStart 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).

Figure 7 – All Evaluated ECMs

#	Energy Conservation Measure	Annual Electric Savings (kWh)	Peak Demand Savings (kW)	Annual Fuel Savings (MMBtu)	Annual Energy Cost Savings ($)	Lifetime Energy Cost Savings ($)	Estimated Install Cost ($)	Estimated Incentive ($)*	Estimated Net Cost ($)	Simple Payback Period (yrs)**	CO_2e Emissions Reduction (lbs)
Lighting Upgrades		**68,192**	**17.6**	**-11**	**$10,647**	**$159,705**	**$47,061**	**$8,800**	**$38,261**	**3.6**	**67,359**
ECM 1	Install LED Fixtures	13,666	1.6	0	$2,159	$32,392	$20,285	$2,100	$18,185	8.4	13,761
ECM 2	Retrofit Fixtures with LED Lamps	54,526	16.0	-11	$8,488	$127,313	$26,775	$6,700	$20,075	2.4	53,598
Lighting Control Measures		**14,269**	**4.2**	**-3**	**$2,220**	**$17,763**	**$19,456**	**$2,345**	**$17,111**	**7.7**	**14,019**
ECM 3	Install Occupancy Sensor Lighting Controls	12,169	3.6	-3	$1,894	$15,150	$19,056	$2,345	$16,711	8.8	11,957
ECM 4	Install High/Low Lighting Controls	2,099	0.6	0	$327	$2,614	$400	$0	$400	1.2	2,063
Variable Frequency Drive (VFD) Measures		**13,907**	**1.5**	**0**	**$2,198**	**$32,963**	**$15,041**	**$900**	**$14,141**	**6.4**	**14,004**
ECM 5	Install VFDs on Heating Water Pumps	8,225	1.4	0	$1,300	$19,496	$7,214	$0	$7,214	5.6	8,283
ECM 6	Install VFDs on Cooling Tower Fans	4,350	-0.4	0	$687	$10,311	$5,194	$900	$4,294	6.2	4,380
Domestic Water Heating Upgrade		**0**	**0.0**	**18**	**$206**	**$2,056**	**$115**	**$0**	**$115**	**0.6**	**2,091**
ECM 7	Install Low-Flow DHW Devices	0	0.0	18	$206	$2,056	$115	$0	$115	0.6	2,091
Food Service & Refrigeration Measures		**4,285**	**0.2**	**0**	**$677**	**$9,648**	**$4,623**	**$200**	**$4,423**	**6.5**	**4,315**
ECM 8	Refrigeration Controls	2,860	0.0	0	$452	$7,230	$1,674	$75	$1,599	3.5	2,880
ECM 9	Vending Machine Control	343	0.0	0	$54	$271	$230	$0	$230	4.2	345
TOTALS		**103,545**	**24.7**	**42**	**$16,849**	**$237,869**	**$161,674**	**$17,855**	**$143,819**	**8.5**	**109,217**

* - All incentives presented in this table are based on NJ SmartStart 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).

Figure 8 – Cost Effective ECMs

4.1 Lighting

#	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		**68,192**	**17.6**	**-11**	**$10,647**	**$47,061**	**$8,800**	**$38,261**	**3.6**	**67,359**
ECM 1	Install LED Fixtures	13,666	1.6	0	$2,159	$20,285	$2,100	$18,185	8.4	13,761
ECM 2	Retrofit Fixtures with LED Lamps	54,526	16.0	-11	$8,488	$26,775	$6,700	$20,075	2.4	53,598

When considering lighting upgrades, we suggest using a comprehensive design approach that simultaneously upgrades lighting fixtures and controls to maximize energy savings and improve occupant lighting. Comprehensive design will also consider appropriate lighting levels for different space types to make sure that the right amount of light is delivered where needed. If conversion to LED light sources are proposed, we suggest converting all of a specific lighting type (e.g. linear fluorescent) to LED lamps to minimize the number of lamp types in use at the facility, which should help reduce future maintenance costs.

ECM 1: Install LED Fixtures

Replace existing fixtures containing 150-Watt or 250-Watt metal halide lamps with new LED light fixtures. This measure saves energy by installing LEDs which use less power than other technologies with a comparable light output.

In some cases, HID fixtures can be retrofitted with screw-based LED lamps. Replacing an existing HID fixture with a new LED fixture will generally provide better overall lighting optics; however, replacing the HID lamp with a LED screw-in lamp is typically a less expensive retrofit. We recommend you work with your lighting contractor to determine which retrofit solution is best suited to your needs and will be compatible with the existing fixtures.

Maintenance savings may also be achieved since LED lamps last longer than other light sources and therefore do not need to be replaced as often.

Affected building areas: exterior fixtures

ECM 2: Retrofit Fixtures with LED Lamps

Replace fluorescent and incandescent lamps with LED lamps. Many LED tubes are direct replacements for existing fluorescent tubes and can be installed while leaving the fluorescent fixture ballast in place. LED lamps 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. Maintenance savings may also be available, as longer-lasting LEDs lamps will not need to be replaced as often as the existing lamps.

Affected building areas: all areas with fluorescent fixtures with T8 tubes

4.2 Lighting Controls

#	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		**14,269**	**4.2**	**-3**	**$2,220**	**$19,456**	**$2,345**	**$17,111**	**7.7**	**14,019**
ECM 3	Install Occupancy Sensor Lighting Controls	12,169	3.6	-3	$1,894	$19,056	$2,345	$16,711	8.8	11,957
ECM 4	Install High/Low Lighting Controls	2,099	0.6	0	$327	$400	$0	$400	1.2	2,063

Lighting controls reduce energy use by turning off or lowering, lighting fixture power levels when not in use. A comprehensive approach to lighting design should upgrade the lighting fixtures and the controls together for maximum energy savings and improved lighting for occupants.

ECM 3: Install Occupancy Sensor Lighting Controls

Install occupancy sensors to control lighting fixtures in areas that are frequently unoccupied, even for short periods. For most spaces, we recommend lighting controls use dual technology sensors, which reduce the possibility of lights turning off unexpectedly.

Occupancy sensors detect occupancy using ultrasonic and/or infrared sensors. When an occupant enters the space, the lighting fixtures switch to full lighting levels. Most occupancy sensor lighting controls allow users to manually turn fixtures on/off, as needed. Some controls can also provide dimming options.

Occupancy sensors can be mounted on the wall at existing switch locations, mounted on the ceiling, or in remote locations. In general, wall switch replacement sensors are best suited to single occupant offices and other small rooms. Ceiling-mounted or remote mounted sensors are used in large spaces, locations without local switching, and where wall switches are not in the line-of-sight of the main work area.

This measure provides energy savings by reducing the lighting operating hours.

Affected building areas: offices, classrooms, restrooms, library, lounge and storage

ECM 4: Install High/Low Lighting Controls

Install occupancy sensors to provide dual level lighting control for lighting fixtures in spaces that are infrequently occupied but may require some level of continuous lighting for safety or security reasons.

Lighting fixtures with these controls operate at default low levels when the area is unoccupied to provide minimal lighting to meet security or safety requirements. Sensors detect occupancy using ultrasonic and/or infrared sensors. When an occupant enters the space, the lighting fixtures switch to full lighting levels. Fixtures automatically switch back to low level after a predefined period of vacancy. In parking lots and parking garages with significant ambient lighting, this control can sometimes be combined with photocell controls to turn the lights off when there is sufficient daylight.

This measure provides energy savings by reducing the light fixture power draw when reduced light output is appropriate.

Affected building areas: hallways

For this type of measure the occupancy sensors will generally be ceiling or fixture mounted. Sufficient sensor coverage must be provided to ensure that lights turn on in each area as an occupant approaches.

4.3 Motors

#	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)
Motor Upgrades		**2,892**	**1.2**	**0**	**$457**	**$14,171**	**$0**	**$14,171**	**31.0**	**2,912**
	Premium Efficiency Motors	2,892	1.2	0	$457	$14,171	$0	$14,171	31.0	2,912

Premium Efficiency Motors

Replace standard efficiency motors with NEMA Premium® efficiency motors. This evaluation assumes that existing motors will be replaced with motors of equivalent size and type. In some cases, additional savings may be possible by downsizing motors to better meet the motor's current load requirements.

Replacing the motors has a long payback period and may not be justifiable based simply on energy considerations. However, most of the motors at this facility are nearing or have reached the end of their normal useful life. Typically, the marginal cost of purchasing a high efficiency unit can be justified by the marginal savings from the improved efficiency. When the motors are eventually replaced, consider purchasing equipment that exceeds the minimum efficiency required by building codes.

Affected motors:

Location	Area(s)/System(s) Served	Motor Quantity	Motor Application	HP Per Motor	Additional Motor Description
Mech Room	PT-1	1	Other	10.0	Tower Pump
Mech Room	PT-2	1	Other	10.0	Tower Pump
Mech Room	PS-1	1	Other	15.0	Loop Water System Pump
Mech Room	PS-2	1	Other	15.0	Loop Water System Pump
Mech Room	PC-1	1	Other	7.5	Cooling Pump
Mech Room	PC-2	1	Other	7.5	Cooling Pump
Mech Room	PH-1	1	Heating Hot Water Pump	7.5	Heating Pump
Mech Room	PH-2	1	Heating Hot Water Pump	7.5	Heating Pump
Outdoor	CT-1	1	Cooling Tower Fan	15.0	Fan motor
Mech Room	AHU-1	1	Supply Fan	1.5	Fan motor

Savings are based on the difference between baseline and proposed efficiencies and the assumed annual operating hours. The base case motor energy consumption is estimated using the efficiencies found on nameplates or estimated based on the age of the motor and our best estimates of motor run hours. Efficiencies of proposed motor upgrades are obtained from the current *New Jersey's Clean Energy Program Protocols to Measure Resource Savings*.

4.4 Variable Frequency Drives (VFD)

#	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)
Variable Frequency Drive (VFD) Measures		**13,907**	**1.5**	**0**	**$2,198**	**$15,041**	**$900**	**$14,141**	**6.4**	**14,004**
	Install VFD on Variable Air Volume (VAV) Fans	1,332	0.4	0	$210	$2,632	$0	$2,632	12.5	1,341
ECM 5	Install VFDs on Heating Water Pumps	8,225	1.4	0	$1,300	$7,214	$0	$7,214	5.6	8,283
ECM 6	Install VFDs on Cooling Tower Fans	4,350	-0.4	0	$687	$5,194	$900	$4,294	6.2	4,380

Variable frequency drives control motors for fans, pumps, and process equipment based on the actual output required of the driven equipment. Energy savings result from more efficient control of motor energy usage when equipment operates at partial load. The magnitude of energy savings depends on the estimated amount of time that the motor would operate at partial load. For equipment with proposed VFDs, we have included replacing the controlled motor with a new motor —unless the existing motor meets or exceeds IHP 2014 standards—to conservatively account for the cost of an inverter duty rated motor. The savings and cost associated with the new motor are presented with the Premium Efficiency Motor measures. If the proposed VFD measure is not selected for implementation the motor replacement should be reevaluated.

Install VFD on Variable Air Volume (VAV) Fans

Replace existing air volume control devices on variable volume fans, such as inlet vanes and variable pitch fan blades, with VFDs. Inlet guide vanes and variable pitch fan blades are an inefficient means of controlling the air volume compared to VFDs. The existing volume control device will be removed or permanently disabled, and the control signal will be redirected to the VFD to determine proper fan motor speed.

Installing VFD controls on existing AHU-1 will result in energy savings, however, the cost of installation associated with ECM will outweigh the energy saving advantages resulting in a very long payback. This makes the measure financially not viable therefore not recommended based on energy savings alone.

Energy savings result from using a more efficient control device to regulate the air flow provided by the fan. Additional maintenance savings may result from this measure. VFDs are solid state electronic devices, which generally requires less maintenance than mechanical air volume control devices.

Affected air handlers: AHU-1

ECM 5: Install VFDs on Heating Water Pumps

Install variable frequency drives (VFD) to control heating water pumps. Two-way valves must serve the hot water coils and the hot water loop must have a differential pressure sensor installed. If three-way valves or a bypass leg are used in the hot water distribution they will need to be modified when this measure is implemented. As the hot water valves close, the differential pressure increases and the VFD modulates the pump speed to maintain a differential pressure setpoint.

Energy savings result from reducing pump motor speed (and power) as hot water valves close. The magnitude of energy savings is based on the estimated amount of time that the system will operate at reduced load.

Affected pumps: PH-1 & 2

ECM 6: Install VFDs on Cooling Tower Fans

Install a VFD to control the cooling tower fan motor. The VFD will allow the cooling tower fan to operate at the minimum speed necessary to maintain the temperature of the condenser water returning to the chiller.

Energy savings result from reducing fan speed (and power) when there is a reduced load on the chiller and outside air wet bulb temperatures are depressed. The magnitude of energy savings is based on the estimated amount of time that the system will operate at reduced load.

4.5 Gas-Fired Heating

#	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**	**39**	**$444**	**$61,209**	**$5,610**	**$55,599**	**125.2**	**4,516**
	Install High Efficiency Hot Water Boilers	0	0.0	39	$444	$61,209	$5,610	$55,599	125.2	4,516

Install High Efficiency Hot Water Boilers

Replace older inefficient hot water boilers with high efficiency hot water boilers. Energy savings results from improved combustion efficiency and reduced standby losses at low loads.

The most notable efficiency improvement is condensing hydronic boilers which 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 are evaluated when the return water temperature is less than 130°F during most of the operating hours.

For the purposes of this analysis, we evaluated the replacement of boilers on a one-for-one basis with equipment of the same capacity. We recommend that you work with your mechanical design team to select boilers that are sized appropriately for the heating load at this facility. In many cases installing multiple modular boilers rather than one or two large boilers will result in higher overall plant efficiency while providing additional system redundancy.

Replacing the boilers has a long payback and may not be justifiable based simply on energy considerations. However, the boilers are nearing the end of their normal useful life. Typically, the marginal cost of purchasing high efficiency boilers can be justified by the marginal savings from the improved efficiency. When the boiler is eventually replaced, consider purchasing boilers that exceed the minimum efficiency required by building codes. We also recommend working with your mechanical design team to determine whether the heating system can operate with return water temperatures below 130°F, which would allow the use of condensing boilers.

4.6 Domestic Water Heating

#	Energy Conservation Measure	Annual Electric Savings (kWh)	Peak Demand Savings (kW)	Annual Fuel Savings (MMBtu)	Annual Energy Cost Savings ($)	Estimated Install Cost ($)	Estimated Incentive ($)*	Estimated Net Cost ($)	Simple Payback Period (yrs)**	CO_2e Emissions Reduction (lbs)
Domestic Water Heating Upgrade		**0**	**0.0**	**18**	**$206**	**$115**	**$0**	**$115**	**0.6**	**2,091**
ECM 7	Install Low-Flow DHW Devices	0	0.0	18	$206	$115	$0	$115	0.6	2,091

ECM 7: Install Low-Flow DHW Devices

Install low-flow devices to reduce overall hot water demand. The following low flow devices are recommended to reduce hot water usage:

Device	Flow Rate
Faucet aerators (lavatory)	0.5 gpm
Faucet aerator (kitchen)	1.5 gpm
Showerhead	2.0 gpm
Pre-rinse spray valve (kitchen)	1.28 gpm

Low-flow devices reduce the overall water flow from the fixture, while still providing adequate pressure for washing. [Pre-rinse spray valves (PRSVs) — often used in commercial and institutional kitchens — remove food waste from dishes prior to dishwashing.]

Additional cost savings may result from reduced water usage.

4.7 Food Service & Refrigeration Measures

#	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)
Food Service & Refrigeration Measures		**4,285**	**0.2**	**0**	**$677**	**$4,623**	**$200**	**$4,423**	**6.5**	**4,315**
	Refrigerator/Freezer Case Electrically Commutated Motors	197	0.0	0	$31	$607	$0	$607	19.5	198
ECM 8	Refrigeration Controls	2,860	0.0	0	$452	$1,674	$75	$1,599	3.5	2,880
	Replace Refrigeration Equipment	887	0.1	0	$140	$2,112	$125	$1,987	14.2	893
ECM 9	Vending Machine Control	343	0.0	0	$54	$230	$0	$230	4.2	345

ECM 8: Refrigerator/Freezer Case Electrically Commutated Motors

Replace shaded pole or permanent split capacitor (PSC) motors with electronically commutated (EC) motors in walk-in cooler. Fractional horsepower EC re significantly more efficient than mechanically commutated, brushed motors, particularly at low speeds or partial load. By using variable-speed technology, EC motors can optimize fan usage. Because these motors are brushless and use DC power, losses due to friction and phase shifting are eliminated.

Savings for this measure consider both the increased efficiency of the motor as well as the reduction in refrigeration load due to motor heat loss.

ECM 9: Refrigeration Controls

Many walk-in coolers and freezers have evaporator fans that run continuously. The measure adds a control system feature to automatically shut off evaporator fans when not needed.

Energy savings for each of the control measures account for reduction in compressor and fan operating hours as well as reduction in the refrigeration heat load as appropriate.

ECM 10: Replace Refrigeration Equipment

Replace existing commercial refrigerator with new ENERGY STAR® rated equipment. The energy savings associated with this measure come from reduced energy usage, due to more efficient technology, and reduced run times.

ECM 11: Vending Machine Control

Vending machines operate continuously, even during unoccupied hours. Install occupancy sensor controls to reduce energy use. These controls power down vending machines when the vending machine area has been vacant for some time, and, they power up the machines at necessary regular intervals or when the surrounding area is occupied. Energy savings are dependent on the vending machine and activity level in the area surrounding the machines.

5 Energy Efficient Best Practices

A whole building maintenance plan will extend equipment life; improve occupant comfort, health, and safety; and reduce energy and maintenance costs. You may already be doing some of these things—see our list below for potential additions to your maintenance plan. Be sure to consult with qualified equipment specialists for details on proper maintenance and system operation.

Energy Tracking with ENERGY STAR® Portfolio Manager®

You've heard it before–you can't manage what you don't measure. ENERGY STAR® Portfolio Manager® is an online tool that you can use to measure and track energy and water consumption, as well as greenhouse gas emissions.[4] Your account has already been established. Now you can continue to keep tabs on your energy performance every month.

Doors and Windows

Close exterior doors and windows in heated and cooled areas. Leaving doors and windows open leads to a loss of heat during the winter and chilled air during the summer. Reducing air changes per hour (ACH) can lead to increased occupant comfort as well as heating and cooling savings, especially when combined with proper HVAC controls and adequate ventilation.

Window Treatments/Coverings

Use high-reflectivity films or cover windows with shades or shutters to reduce solar heat gain and reduce the load on cooling and heating systems. Older, single pane windows and east or west-facing windows are especially prone to solar heat gain. In addition, use shades or shutters at night during cold weather to reduce heat loss.

Lighting Maintenance

Clean lamps, reflectors and lenses of dirt, dust, oil, and smoke buildup every six to twelve months. Light levels decrease over time due to lamp aging, lamp and ballast failure, and buildup of dirt and dust. Together, this can reduce total light output by up to 60% while still drawing full power.

In addition to routine cleaning, developing a maintenance schedule can ensure that maintenance is performed regularly, and it can reduce the overall cost of fixture re-lamping and re-ballasting. Group re-lamping and re-ballasting maintains lighting levels and minimizes the number of site visits by a lighting technician or contractor, decreasing the overall cost of maintenance.

[4] https://www.energystar.gov/buildings/facility-owners-and-managers/existing-buildings/use-portfolio-manager.

Lighting Controls

As part of a lighting maintenance schedule, test lighting controls to ensure proper functioning. For occupancy sensors, this requires triggering the sensor and verifying that the sensor’s timer settings are correct. For daylight and photocell sensors, maintenance involves cleaning sensor lenses and confirming that setpoints and sensitivity are configured properly.

Motor Maintenance

Motors have many moving parts. As these parts degrade over time, the efficiency of the motor is reduced. Routine maintenance prevents damage to motor components. Routine maintenance should include cleaning surfaces and ventilation openings on motors to prevent overheating, lubricating moving parts to reduce friction, inspecting belts and pulleys for wear and to ensure they are at proper alignment and tension, and cleaning and lubricating bearings. Consult a licensed technician to assess these and other motor maintenance strategies.

Fans to Reduce Cooling Load

Install ceiling fans to supplement your cooling system. Thermostat settings can typically be increased by 4°F with no change in overall occupant comfort due to the wind chill effect of moving air.

AC System Evaporator/Condenser Coil Cleaning

Dirty evaporator and condenser coils restrict air flow and restrict heat transfer. This increases the loads on the evaporator and condenser fan and decreases overall cooling system performance. Keeping the coils clean allows the fans and cooling system to operate more efficiently.

HVAC Filter Cleaning and Replacement

Air filters should be checked regularly (often monthly) and cleaned or replaced when appropriate. Air filters reduce indoor air pollution, increase occupant comfort, and help keep equipment operating efficiently. If the building has a building management system, consider installing a differential pressure switch across filters to send an alarm about premature fouling or overdue filter replacement. Over time, filters become less and less effective as particulate buildup increases. Dirty filters also restrict air flow through the air conditioning or heat pump system, which increases the load on the distribution fans.

Boiler Maintenance

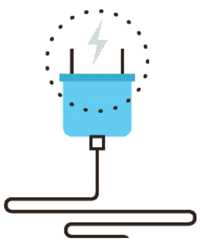
Many boiler problems develop slowly over time, so regular inspection and maintenance is essential to keeping the heating system running efficiently and preventing expensive repairs. Annual tune-ups should include a combustion analysis to analyze the exhaust from the boilers and to ensure the boiler is operating safely. Boilers should be cleaned according to the manufacturer’s instructions to remove soot and scale from the water side or fire side of the boiler.

Water Heater Maintenance

Preventative maintenance can extend the life of the system, maintain energy efficiency, and ensure safe operation. At least once a year, follow manufacturer instructions to drain a few gallons out of the water heater using the drain valve. If there is a lot of sediment or debris, then a full flush is recommended. Turn the temperature down and then completely drain the tank. Annual checks should include checks for:

- Leaks or heavy corrosion on the pipes and valves.
- Corrosion or wear on the gas line and on the piping. If you noticed any black residue, soot, or charred metal, this is a sign you may be having combustion issues and you should have the unit serviced by a professional.
- For electric water heaters, look for signs of leaking such as rust streaks or residue around the upper and lower panels covering the electrical components on the tank.
- For water heaters more than three years old, have a technician inspect the sacrificial anode annually.

Plug Load Controls



Reducing plug loads is a common way to decrease your electrical use. Limiting the energy use of plug loads can include increasing occupant awareness, removing under-used equipment, installing hardware controls, and using software controls. Consider enabling the most aggressive power settings on existing devices or install load sensing or occupancy sensing (advanced) power strips.[5] Your local utility may offer incentives or rebates for this equipment.

Computer Power Management Software

Many computers consume power during nights, weekends, and holidays. Screen savers are commonly confused as a power management strategy. This contributes to avoidable, excessive electrical energy consumption. There are innovative power management software packages available that are designed to deliver significant energy saving and provide ongoing tracking measurements. A central power management platform helps enforce energy savings policies as well as identify and eliminate underutilized devices.

[5] For additional information refer to "Assessing and Reducing Plug and Process Loads in Office Buildings" https://www.nrel.gov/docs/fy13osti/54175.pdf or "Plug Load Best Practices Guide" http://www.advancedbuildings.net/plug-load-best-practices-guide-offices.

Water Conservation

Installing dual flush or low-flow toilets and low-flow/waterless urinals are ways to reduce water use. The EPA WaterSense™ ratings for urinals is 0.5 gallons per flush (gpf) and for flush valve toilets is 1.28 gpf (this is lower than the current 1.6 gpf federal standard).

For more information regarding water conservation go to the EPA's WaterSense™ website[6] or download a copy of EPA's "WaterSense at Work: Best Management Practices for Commercial and Institutional Facilities"[7] to get ideas for creating a water management plan and best practices for a wide range of water using systems.

Water conservation devices that do not reduce hot water consumption will not provide energy savings at the site level, but they may significantly affect your water and sewer usage costs. 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.

If the facility has detached buildings with a master water meter for the entire campus, check for unnatural wet areas in the lawn or water seeping in the foundation at water pipe penetrations through the foundation. Periodically check overnight meter readings when the facility is unoccupied, and there is no other scheduled water usage.

Manage irrigation systems to use water more effectively outside the building. Adjust spray patterns so that water lands on intended lawns and plantings and not on pavement and walls. Consider installing an evapotranspiration irrigation controller that will prevent over-watering.

Procurement Strategies

Purchasing efficient products reduces energy costs without compromising quality. Consider modifying your procurement policies and language to require ENERGY STAR® or WaterSense™ products where available.

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[6] https://www.epa.gov/watersense.

[7] https://www.epa.gov/watersense/watersense-work-0.

6 On-Site Generation

You don't have to look far in New Jersey to see one of the thousands of solar electric systems providing clean power to homes, businesses, schools, and government buildings. On-site generation includes both renewable (e.g., solar, wind) and non-renewable (e.g., fuel cells) technologies that generate power to meet all or a portion of the facility's electric energy needs. Also referred to as distributed generation, these systems contribute to greenhouse gas (GHG) emission reductions, demand reductions and reduced customer electricity purchases reduction, which results in improved electric grid reliability through better use of transmission and distribution systems.

Preliminary screenings were performed to determine if an on-site generation measure could be a cost-effective solution for your facility. Before deciding to install an on-site generation system, we recommend conducting a feasibility study to analyze 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 Solar Photovoltaic

Photovoltaic (PV) panels convert sunlight into electricity. Individual panels are combined into an array that produces direct current (DC) electricity. The DC is converted to alternating current (AC) through an inverter. The inverter is then connected to the building's electrical distribution system.

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

The amount of 22,000 square feet of free area, ease of installation (roof), and the lack of shading elements contribute to the high potential. A PV array located on the roof may be feasible. If you are interested in pursuing the installation of PV, we recommend conducting a full feasibility study.

The graphic below displays the results of the PV potential screening conducted as a part of this audit. The position of each slider indicates the potential (potential increases to the right) that each factor contributes to the overall site potential.

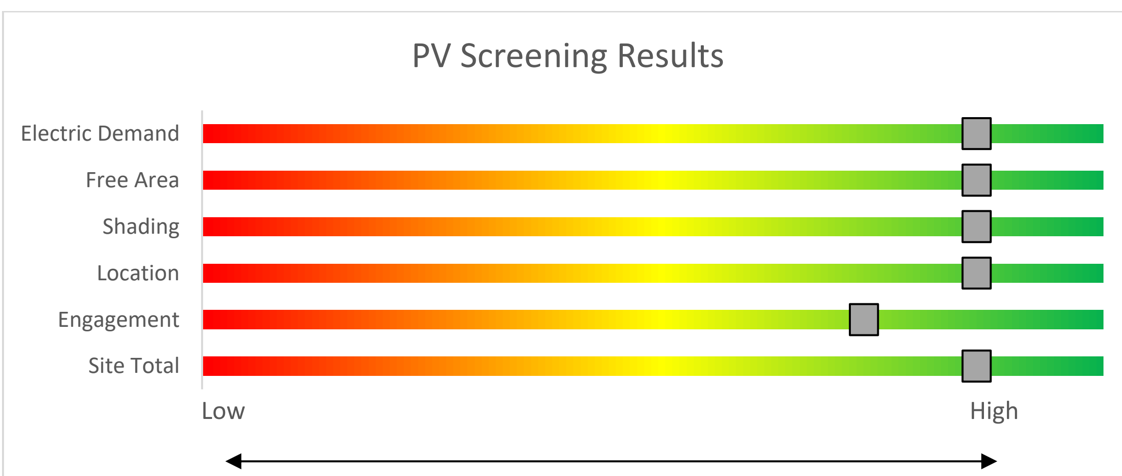

Figure 9 - Photovoltaic Screening

Solar Renewable Energy Certificate (SREC) Registration Program (SRP)

Rebates are not available for solar projects, but owners of solar projects MUST register their projects in the SREC Registration Program before starting construction. Once your PV system is up and running, you periodically earn credits, which can then be sold on the open market for up to 15 years.

If you are considering installing solar photovoltaics on your building, visit www.njcleanenergy.com/srec for more information about the SREC Registration Program.

Get more information about solar power in New Jersey or find a qualified solar installer who can help you decide if solar is right for your building:

- **Basic Info on Solar PV in NJ**: www.njcleanenergy.com/whysolar
- **NJ Solar Market FAQs**: www.njcleanenergy.com/renewable-energy/program-updates-and-background-information/solar-transition/solar-market-faqs
- **Approved Solar Installers in the NJ Market**: 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) generates electricity at the facility and puts waste heat energy to good use. Common types of CHP systems are reciprocating engines, microturbines, fuel cells, backpressure steam turbines, and (at large facilities) gas turbines.

CHP systems typically produce a portion of the electric power used on-site, with the balance of electric power needs supplied by the local utility company. The heat is used to supplement (or replace) existing boilers and provide space heating and/or domestic hot water heating. Waste heat can also be routed through absorption chillers for space cooling.

The key criteria used for screening is the amount of time that the CHP system would operate at full load and the facility's ability to use the recovered heat. Facilities with a continuous need 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 **no** potential for installing a cost-effective CHP system.

Based on a preliminary analysis, the facility does not appear to meet the minimum requirements for a cost-effective CHP installation. The lack of gas service, low or infrequent thermal load, and lack of space for siting the equipment are the most significant factors contributing to the lack of CHP potential.

The graphic below displays the results of the CHP potential screening conducted as a part of this audit. The position of each slider indicates the potential (potential increases to the right) that each factor contributes to the overall site potential.

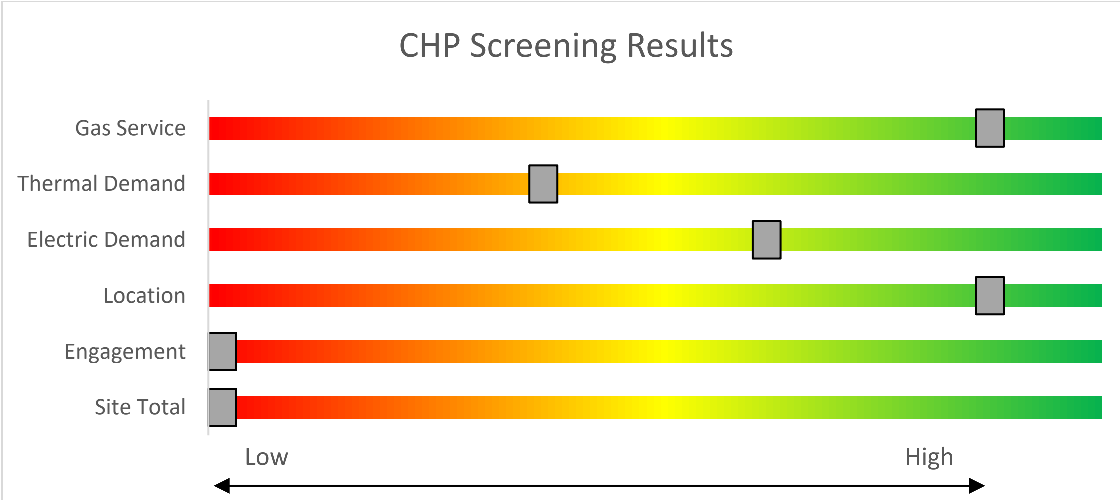

Figure 10 - Combined Heat and Power Screening

Find a qualified firm that specializes in commercial CHP cost assessment and installation: http://www.njcleanenergy.com/commercial-industrial/programs/nj-smartstart-buildings/tools-and-resources/tradeally/approved_vendorsearch/.

7 PROJECT FUNDING AND INCENTIVES

Ready to improve your building's performance? New Jersey Clean Energy Programs can help. Pick the program that works best for you. Incentive programs that may apply to this facility are identified in the Executive Summary. This section provides an overview of currently available in New Jersey Clean Energy Programs.

	SmartStart *Flexibility to install at your own pace*	**Direct Install** *Turnkey installation*	**Pay for Performance** *Whole building upgrades*
Who should use it?	Buildings installing individual measures or small group of measures.	Small to mid-size facilities that can bundle multiple measures together. Average peak demand should be below 200 kW. Not suitable for significant building shell issues.	Mid to large size facilities looking to implement as many measures as possible at one time. Peak demand should be over 200 kW.
How does it work?	Use in-house staff or your preferred contractor.	Pre-approved contractors pass savings along to you via reduced material and labor costs.	Whole-building approach to energy upgrades designed to reduce energy use by at least 15%. The more you save, the higher the incentives.
What are the Incentives?	Fixed incentives for specific energy efficiency measures.	Incentives pay up to 70% of eligible costs, up to $125,000 per project. You pay the remaining 30% directly to the contractor.	Up to 25% of installation cost, calculated based on level of energy savings per square foot.
How do I participate?	Submit an application for the specific equipment to be installed.	Contact a participating contractor in your region.	Contact a pre-qualified Partner to develop your Energy Reduction Plan and set your energy savings targets.

Take the next step by visiting **www.njcleanenergy.com** for program details, applications, and to contact a qualified contractor.

7.1 SmartStart

SmartStart offers incentives for installing prescriptive and custom energy efficiency measures at your facility. This program provides an effective mechanism for securing incentives for energy efficiency measures installed individually or as part of a package of energy upgrades. This program serves most common equipment types and sizes.

SmartStart routinely 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

Incentives

The SmartStart Prescriptive program provides fixed incentives for specific energy efficiency measures. Prescriptive incentives vary by equipment type.

SmartStart Custom provides incentives for more unique or specialized technologies or systems that are not addressed through prescriptive incentives. Custom incentives are calculated at $0.16/kWh and $1.60/therm based on estimated annual savings. Incentives are 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

Submit an application for the specific equipment to be installed. Many applications are designed as rebates, although others require application approval prior to installation. You can work with your preferred contractor or use internal staff to install measures.

Visit www.njcleanenergy.com/SSB for a detailed program description, instructions for applying, and applications.

7.2 Direct Install

Direct Install is a turnkey program available to existing small to medium-sized facilities with an average peak electric demand that does not exceed 200 kW over the recent 12-month period. You 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. Each entity is limited to incentives up to $250,000 per fiscal year.

How to Participate

To participate in Direct Install, you will need to contact the participating contractor assigned to 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.

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

7.3 Pay for Performance - Existing Buildings

Pay for Performance works for larger customers with a peak demand over 200 kW. The minimum installed scope of work must include at least two unique measures that results in at least 15% source energy savings, and 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 to achieve deep energy savings. This program has an added benefit of addressing measures that may not qualify for other programs. Many facilities pursuing an Energy Savings Improvement Program loan also use this program.

Incentives

Incentives are 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

Contact one of the pre-approved consultants and contractors ("Partners"). Under direct contract to you, they will help further evaluate the measures identified in this report through development of the energy reduction plan), assist you in implementing selected measures, and verify actual savings one year after the installation. Your Partner will also help you apply for incentives.

Approval of the final scope of work is required by the program prior to installation. Installation can be done by the contractor of your choice (some P4P Partners are also contractors) or by internal staff, but the Partner remains involved throughout construction to ensure compliance with the program requirements.

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

7.4 Energy Savings Improvement Program

The Energy Savings Improvement Program (ESIP) serves New Jersey's government agencies by financing energy projects. 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. Annual payments are lower than the savings projected from the ECMs, ensuring that ESIP projects are cash flow positive for the life of the contract.

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 described above can also be used to help further reduce the total project cost of eligible measures.

How to Participate

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 used 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. Carefully consider all alternatives to develop an approach that best meets your needs. A detailed program descriptions and application can be found at: www.njcleanenergy.com/ESIP.

ESIP is a program delivered directly by the NJBPU and is not an NJCEP incentive program. As mentioned above, you can use NJCEP incentive programs to help further reduce costs when developing the energy savings plan. Refer to the ESIP guidelines at the link above for further information and guidance on next steps.

7.5 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 prior to the start of construction 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. SRECs 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 SRECs 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 Renewable Portfolio Standard. Purchasing SRECs can help them meet those requirements. As SRECs are traded in a competitive market, the price may vary significantly. The actual price of an SREC during a trading period fluctuates depending on supply and demand.

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

8 ENERGY PURCHASING AND PROCUREMENT STRATEGIES

8.1 Retail Electric Supply Options

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 already buys electricity from a third-party supplier, review and compare prices at the end of each contract year.

A list of licensed third-party electric suppliers is available at the NJBPU website.[8]

8.2 Retail Natural Gas Supply Options

The natural gas market in New Jersey is also deregulated. Most customers that remain with the utility for natural gas service pay rates that are market-based and that fluctuate monthly. 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 typically depends on whether a customer prefers 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 does not already purchase natural gas from a third-party supplier, consider shopping for a reduced rate from third-party natural gas suppliers. If your facility already purchases natural gas from a third-party supplier, review and compare prices at the end of each contract year.

A list of licensed third-party natural gas suppliers is available at the NJBPU website.[9]

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[8] www.state.nj.us/bpu/commercial/shopping.html.

[9] 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	Light Level	Watts per Fixture	Annual Operating Hours	ECM #	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
Restroom	1	U-Bend Fluorescent - T8: U T8 (32W) - 2L	Wall Switch	S	62	2,200	2	Relamp	No	1	LED - Linear Tubes: (2) U-Lamp	Wall Switch	33	2,200	0.0	70	0	$11	$72	$10	5.7
Restroom	1	U-Bend Fluorescent - T8: U T8 (32W) - 2L	Wall Switch	S	62	2,200	2	Relamp	No	1	LED - Linear Tubes: (2) U-Lamp	Wall Switch	33	2,200	0.0	70	0	$11	$72	$10	5.7
135 Bathroom	1	U-Bend Fluorescent - T8: U T8 (32W) - 2L	Wall Switch	S	62	2,200	2	Relamp	No	1	LED - Linear Tubes: (2) U-Lamp	Wall Switch	33	2,200	0.0	70	0	$11	$72	$10	5.7
Women	1	U-Bend Fluorescent - T8: U T8 (32W) - 2L	Wall Switch	S	62	2,200	2	Relamp	No	1	LED - Linear Tubes: (2) U-Lamp	Wall Switch	33	2,200	0.0	70	0	$11	$72	$10	5.7
Men	1	U-Bend Fluorescent - T8: U T8 (32W) - 2L	Wall Switch	S	62	2,200	2	Relamp	No	1	LED - Linear Tubes: (2) U-Lamp	Wall Switch	33	2,200	0.0	70	0	$11	$72	$10	5.7
Room 133	1	U-Bend Fluorescent - T8: U T8 (32W) - 2L	Wall Switch	S	62	2,200	2	Relamp	No	1	LED - Linear Tubes: (2) U-Lamp	Wall Switch	33	2,200	0.0	70	0	$11	$72	$10	5.7
Room 131	1	U-Bend Fluorescent - T8: U T8 (32W) - 2L	Wall Switch	S	62	2,200	2	Relamp	No	1	LED - Linear Tubes: (2) U-Lamp	Wall Switch	33	2,200	0.0	70	0	$11	$72	$10	5.7
Room 119	1	U-Bend Fluorescent - T8: U T8 (32W) - 2L	Wall Switch	S	62	2,200	2	Relamp	No	1	LED - Linear Tubes: (2) U-Lamp	Wall Switch	33	2,200	0.0	70	0	$11	$72	$10	5.7
Room 123	1	U-Bend Fluorescent - T8: U T8 (32W) - 2L	Wall Switch	S	62	2,200	2	Relamp	No	1	LED - Linear Tubes: (2) U-Lamp	Wall Switch	33	2,200	0.0	70	0	$11	$72	$10	5.7
Room 121	1	U-Bend Fluorescent - T8: U T8 (32W) - 2L	Wall Switch	S	62	2,200	2	Relamp	No	1	LED - Linear Tubes: (2) U-Lamp	Wall Switch	33	2,200	0.0	70	0	$11	$72	$10	5.7
Room 125	1	U-Bend Fluorescent - T8: U T8 (32W) - 2L	Wall Switch	S	62	2,200	2	Relamp	No	1	LED - Linear Tubes: (2) U-Lamp	Wall Switch	33	2,200	0.0	70	0	$11	$72	$10	5.7
Kitchen	1	U-Bend Fluorescent - T8: U T8 (32W) - 2L	Wall Switch	S	62	2,200	2	Relamp	No	1	LED - Linear Tubes: (2) U-Lamp	Wall Switch	33	2,200	0.0	70	0	$11	$72	$10	5.7
Room 150	3	U-Bend Fluorescent - T8: U T8 (32W) - 2L	Wall Switch	S	62	2,200	2, 3	Relamp	Yes	3	LED - Linear Tubes: (2) U-Lamp	Occupancy Sensor	33	1,518	0.1	285	0	$44	$487	$65	9.5
Room 151	3	U-Bend Fluorescent - T8: U T8 (32W) - 2L	Wall Switch	S	62	2,200	2, 3	Relamp	Yes	3	LED - Linear Tubes: (2) U-Lamp	Occupancy Sensor	33	1,518	0.1	285	0	$44	$487	$65	9.5
Room 152	3	U-Bend Fluorescent - T8: U T8 (32W) - 2L	Wall Switch	S	62	2,200	2, 3	Relamp	Yes	3	LED - Linear Tubes: (2) U-Lamp	Occupancy Sensor	33	1,518	0.1	285	0	$44	$487	$65	9.5
Room 153	3	U-Bend Fluorescent - T8: U T8 (32W) - 2L	Wall Switch	S	62	2,200	2, 3	Relamp	Yes	3	LED - Linear Tubes: (2) U-Lamp	Occupancy Sensor	33	1,518	0.1	285	0	$44	$487	$65	9.5
Room 154	3	U-Bend Fluorescent - T8: U T8 (32W) - 2L	Wall Switch	S	62	2,200	2, 3	Relamp	Yes	3	LED - Linear Tubes: (2) U-Lamp	Occupancy Sensor	33	1,518	0.1	285	0	$44	$487	$65	9.5
Room 155	3	U-Bend Fluorescent - T8: U T8 (32W) - 2L	Wall Switch	S	62	2,200	2, 3	Relamp	Yes	3	LED - Linear Tubes: (2) U-Lamp	Occupancy Sensor	33	1,518	0.1	285	0	$44	$487	$65	9.5
Room 158	3	U-Bend Fluorescent - T8: U T8 (32W) - 2L	Wall Switch	S	62	2,200	2, 3	Relamp	Yes	3	LED - Linear Tubes: (2) U-Lamp	Occupancy Sensor	33	1,518	0.1	285	0	$44	$487	$65	9.5
Room 156	3	U-Bend Fluorescent - T8: U T8 (32W) - 2L	Wall Switch	S	62	2,200	2, 3	Relamp	Yes	3	LED - Linear Tubes: (2) U-Lamp	Occupancy Sensor	33	1,518	0.1	285	0	$44	$487	$65	9.5
Room 159	3	U-Bend Fluorescent - T8: U T8 (32W) - 2L	Wall Switch	S	62	2,200	2, 3	Relamp	Yes	3	LED - Linear Tubes: (2) U-Lamp	Occupancy Sensor	33	1,518	0.1	285	0	$44	$487	$65	9.5
Room 157	3	U-Bend Fluorescent - T8: U T8 (32W) - 2L	Wall Switch	S	62	2,200	2, 3	Relamp	Yes	3	LED - Linear Tubes: (2) U-Lamp	Occupancy Sensor	33	1,518	0.1	285	0	$44	$487	$65	9.5
Main Office	5	U-Bend Fluorescent - T8: U T8 (32W) - 2L	Wall Switch	S	62	2,200	2, 3	Relamp	Yes	5	LED - Linear Tubes: (2) U-Lamp	Occupancy Sensor	33	1,518	0.1	475	0	$74	$632	$85	7.4
Exterior	1	Metal Halide: (1) 250W Lamp	Photocell	S	295	4,380	1	Fixture Replacement	No	1	LED - Fixtures: Outdoor Wall-Mounted Area Fixture	Photocell	75	4,380	0.1	964	0	$152	$966	$100	5.7
Exterior	20	Metal Halide: (1) 150W Lamp	Photocell	S	190	4,380	1	Fixture Replacement	No	20	LED - Fixtures: Outdoor Wall-Mounted Area Fixture	Photocell	45	4,380	1.5	12,702	0	$2,007	$19,319	$2,000	8.6

	Existing Conditions						Proposed Conditions								Energy Impact & Financial Analysis						
Location	Fixture Quantity	Fixture Description	Control System	Light Level	Watts per Fixture	Annual Operating Hours	ECM #	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	1	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Wall Switch	S	93	2,200	2	Relamp	No	1	LED - Linear Tubes: (3) 4' Lamps	Wall Switch	44	2,200	0.0	120	0	$19	$55	$15	2.1
Custodian	1	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Wall Switch	S	93	2,200	2	Relamp	No	1	LED - Linear Tubes: (3) 4' Lamps	Wall Switch	44	2,200	0.0	120	0	$19	$55	$15	2.1
Office	2	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Wall Switch	S	93	2,200	2, 3	Relamp	Yes	2	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	44	1,518	0.1	305	0	$47	$380	$65	6.6
Office	2	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Wall Switch	S	93	2,200	2, 3	Relamp	Yes	2	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	44	1,518	0.1	305	0	$47	$380	$65	6.6
Receiving Area	2	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Wall Switch	S	93	2,200	2, 3	Relamp	Yes	2	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	44	1,518	0.1	305	0	$47	$380	$65	6.6
Storage	2	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Wall Switch	S	93	2,200	2, 3	Relamp	Yes	2	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	44	1,518	0.1	305	0	$47	$380	$30	7.4
141 Multi Purpose Room	3	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Wall Switch	S	93	2,200	2, 3	Relamp	Yes	3	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	44	1,518	0.1	457	0	$71	$434	$80	5.0
Room 107	4	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Wall Switch	S	93	2,200	2, 3	Relamp	Yes	4	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	44	1,518	0.2	610	0	$95	$489	$95	4.2
107 Health Office	5	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Wall Switch	S	93	2,200	2, 3	Relamp	Yes	5	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	44	1,518	0.2	762	0	$119	$544	$110	3.7
SGI Room	6	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Wall Switch	S	93	2,200	2, 3	Relamp	Yes	6	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	44	1,518	0.3	915	0	$142	$599	$125	3.3
Room 118	6	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Wall Switch	S	93	2,200	2, 3	Relamp	Yes	6	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	44	1,518	0.3	915	0	$142	$599	$125	3.3
137 Lounge	7	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Wall Switch	S	93	2,200	2, 3	Relamp	Yes	7	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	44	1,518	0.3	1,067	0	$166	$653	$140	3.1
Room 150	12	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Wall Switch	S	93	2,200	2, 3	Relamp	Yes	12	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	44	1,518	0.5	1,829	0	$285	$1,197	$250	3.3
Room 151	12	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Wall Switch	S	93	2,200	2, 3	Relamp	Yes	12	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	44	1,518	0.5	1,829	0	$285	$1,197	$250	3.3
Room 152	12	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Wall Switch	S	93	2,200	2, 3	Relamp	Yes	12	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	44	1,518	0.5	1,829	0	$285	$1,197	$250	3.3
Room 153	12	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Wall Switch	S	93	2,200	2, 3	Relamp	Yes	12	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	44	1,518	0.5	1,829	0	$285	$1,197	$250	3.3
Room 154	12	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Wall Switch	S	93	2,200	2, 3	Relamp	Yes	12	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	44	1,518	0.5	1,829	0	$285	$1,197	$250	3.3
Room 155	12	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Wall Switch	S	93	2,200	2, 3	Relamp	Yes	12	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	44	1,518	0.5	1,829	0	$285	$1,197	$250	3.3
Room 158	12	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Wall Switch	S	93	2,200	2, 3	Relamp	Yes	12	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	44	1,518	0.5	1,829	0	$285	$1,197	$250	3.3
Room 156	12	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Wall Switch	S	93	2,200	2, 3	Relamp	Yes	12	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	44	1,518	0.5	1,829	0	$285	$1,197	$250	3.3
Room 159	12	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Wall Switch	S	93	2,200	2, 3	Relamp	Yes	12	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	44	1,518	0.5	1,829	0	$285	$1,197	$250	3.3
Room 157	12	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Wall Switch	S	93	2,200	2, 3	Relamp	Yes	12	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	44	1,518	0.5	1,829	0	$285	$1,197	$250	3.3
Main Office	12	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Wall Switch	S	93	2,200	2, 3	Relamp	Yes	12	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	44	1,518	0.5	1,829	0	$285	$1,197	$250	3.3
Room 135	14	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Wall Switch	S	93	2,200	2, 3	Relamp	Yes	14	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	44	1,518	0.6	2,134	0	$332	$1,307	$280	3.1
Room 133	14	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Wall Switch	S	93	2,200	2, 3	Relamp	Yes	14	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	44	1,518	0.6	2,134	0	$332	$1,307	$280	3.1

	Existing Conditions						Proposed Conditions								Energy Impact & Financial Analysis						
Location	Fixture Quantity	Fixture Description	Control System	Light Level	Watts per Fixture	Annual Operating Hours	ECM #	Fixture Recommendation	Add Controls?	Fixture Quantity	Fixture Description	Control System	Watts per Fixture	Annual Operating Hours	Total Peak kW Savings	Total Annual kWh Savings	Total Annual MMBtu Savings	Total Annual Energy Cost Savings	Total Installation Cost	Total Incentives	Simple Payback w/ Incentives in Years
Room 131	14	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Wall Switch	S	93	2,200	2, 3	Relamp	Yes	14	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	44	1,518	0.6	2,134	0	$332	$1,307	$280	3.1
Room 119	14	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Wall Switch	S	93	2,200	2, 3	Relamp	Yes	14	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	44	1,518	0.6	2,134	0	$332	$1,307	$280	3.1
Room 123	14	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Wall Switch	S	93	2,200	2, 3	Relamp	Yes	14	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	44	1,518	0.6	2,134	0	$332	$1,307	$280	3.1
Room 121	14	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Wall Switch	S	93	2,200	2, 3	Relamp	Yes	14	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	44	1,518	0.6	2,134	0	$332	$1,307	$280	3.1
Room 125	14	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Wall Switch	S	93	2,200	2, 3	Relamp	Yes	14	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	44	1,518	0.6	2,134	0	$332	$1,307	$280	3.1
Kitchen	18	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Wall Switch	S	93	2,200	2, 3	Relamp	Yes	18	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	44	1,518	0.8	2,744	-1	$427	$1,526	$340	2.8
Hallway	59	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Wall Switch	S	93	2,200	2, 4	Relamp	Yes	59	LED - Linear Tubes: (3) 4' Lamps	High/Low Control	44	1,518	2.7	8,993	-2	$1,399	$3,432	$885	1.8
Janitor Closet	1	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	S	62	2,200	2	Relamp	No	1	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	29	2,200	0.0	80	0	$12	$37	$10	2.1
Storage	1	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	S	62	2,200	2	Relamp	No	1	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	29	2,200	0.0	80	0	$12	$37	$10	2.1
Storage	1	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	S	62	2,200	2	Relamp	No	1	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	29	2,200	0.0	80	0	$12	$37	$10	2.1
Storage	1	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	S	62	2,200	2	Relamp	No	1	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	29	2,200	0.0	80	0	$12	$37	$10	2.1
Storage	1	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	S	62	2,200	2	Relamp	No	1	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	29	2,200	0.0	80	0	$12	$37	$10	2.1
Storage	2	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	S	62	2,200	2, 3	Relamp	Yes	2	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,518	0.1	203	0	$32	$189	$20	5.3
Storage	2	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	S	62	2,200	2, 3	Relamp	Yes	2	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,518	0.1	203	0	$32	$189	$20	5.3
Storage	2	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	S	62	2,200	2, 3	Relamp	Yes	2	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,518	0.1	203	0	$32	$189	$20	5.3
Storage	2	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	S	62	2,200	2, 3	Relamp	Yes	2	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,518	0.1	203	0	$32	$189	$20	5.3
Storage	2	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	S	62	2,200	2, 3	Relamp	Yes	2	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,518	0.1	203	0	$32	$189	$20	5.3
105 Conference Room	3	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	S	62	2,200	2, 3	Relamp	Yes	3	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,518	0.1	305	0	$47	$380	$65	6.6
Stage	3	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	S	62	2,200	2, 3	Relamp	Yes	3	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,518	0.1	305	0	$47	$380	$65	6.6
Storage	4	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	S	62	2,200	2, 3	Relamp	Yes	4	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,518	0.1	406	0	$63	$262	$40	3.5
Girls	4	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	S	62	2,200	2, 3	Relamp	Yes	4	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,518	0.1	406	0	$63	$416	$75	5.4
Boys	4	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	S	62	2,200	2, 3	Relamp	Yes	4	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,518	0.1	406	0	$63	$416	$75	5.4
Office	4	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	S	62	2,200	2, 3	Relamp	Yes	4	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,518	0.1	406	0	$63	$416	$75	5.4
Mechanical Room	8	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	S	62	2,200	2, 3	Relamp	Yes	8	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,518	0.2	813	0	$127	$562	$115	3.5
129 Library	24	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	S	62	2,200	2, 3	Relamp	Yes	24	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,518	0.7	2,439	-1	$380	$1,146	$275	2.3

	Existing Conditions						Proposed Conditions								Energy Impact & Financial Analysis						
Location	Fixture Quantity	Fixture Description	Control System	Light Level	Watts per Fixture	Annual Operating Hours	ECM #	Fixture Recommendation	Add Controls?	Fixture Quantity	Fixture Description	Control System	Watts per Fixture	Annual Operating Hours	Total Peak kW Savings	Total Annual kWh Savings	Total Annual MMBtu Savings	Total Annual Energy Cost Savings	Total Installation Cost	Total Incentives	Simple Payback w/ Incentives in Years
Room 127	24	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	S	62	2,200	2, 3	Relamp	Yes	24	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,518	0.7	2,439	-1	$380	$1,146	$275	2.3
Hallway	16	Linear Fluorescent - T8: 4' T8 (32W) - 1L	Wall Switch	S	32	2,200	2, 4	Relamp	Yes	16	LED - Linear Tubes: (1) 4' Lamp	High/Low Control	15	1,518	0.3	852	0	$133	$492	$80	3.1
141 Multi Purpose Room	10	LED - Fixtures: Ambient - 4' - Direct/Indirect Fixture	Occupancy Sensor	S	40	1,518		None	No	10	LED - Fixtures: Ambient - 4' - Direct/Indirect Fixture	Occupancy Sensor	40	1,518	0.0	0	0	$0	$0	$0	0.0
Stage	2	Halogen Incandescent: Bulb (100W) - 1L	Wall Switch	S	100	2,200	2, 3	Relamp	Yes	2	LED - Fixtures: Downlight Solid State Retrofit	Occupancy Sensor	15	1,518	0.1	434	0	$68	$343	$35	4.6
Room 127	1	Exit Signs: LED - 2 W Lamp	None	S	6	8,760		None	No	1	Exit Signs: LED - 2 W Lamp	None	6	8,760	0.0	0	0	$0	$0	$0	0.0
Restroom	2	Exit Signs: LED - 2 W Lamp	None	S	6	8,760		None	No	2	Exit Signs: LED - 2 W Lamp	None	6	8,760	0.0	0	0	$0	$0	$0	0.0
Kitchen	2	Exit Signs: LED - 2 W Lamp	None	S	6	8,760		None	No	2	Exit Signs: LED - 2 W Lamp	None	6	8,760	0.0	0	0	$0	$0	$0	0.0
Stage	4	Exit Signs: LED - 2 W Lamp	None	S	6	8,760		None	No	4	Exit Signs: LED - 2 W Lamp	None	6	8,760	0.0	0	0	$0	$0	$0	0.0
141 Multi Purpose Room	5	Exit Signs: LED - 2 W Lamp	None	S	6	8,760		None	No	5	Exit Signs: LED - 2 W Lamp	None	6	8,760	0.0	0	0	$0	$0	$0	0.0
Hallway	12	Exit Signs: LED - 2 W Lamp	None	S	6	8,760		None	No	12	Exit Signs: LED - 2 W Lamp	None	6	8,760	0.0	0	0	$0	$0	$0	0.0
Exterior	15	Compact Fluorescent: CFL Bulb (26W) - 2L	Photocell	S	52	4,380	2	Relamp	No	15	LED - Fixtures: Downlight Solid State Retrofit	Photocell	36	4,380	0.1	1,025	0	$162	$548	$0	3.4

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?	Remaining Useful Life	Annual Operating Hours	ECM #	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
Mech Room	PT-1	1	Other	10.0	89.5%	No	W	1,696	NR	Yes	91.7%	No		0.1	254	0	$40	$1,567	$0	39.0
Mech Room	PT-2	1	Other	10.0	89.5%	No	W	1,696	NR	Yes	91.7%	No		0.1	254	0	$40	$1,567	$0	39.0
Mech Room	PS-1	1	Other	15.0	89.5%	No	W	1,696	NR	Yes	92.4%	No		0.2	499	0	$79	$1,891	$0	24.0
Mech Room	PS-2	1	Other	15.0	89.5%	No	W	1,696	NR	Yes	92.4%	No		0.2	499	0	$79	$1,891	$0	24.0
Mech Room	PC-1	1	Other	7.5	91.0%	No	W	1,696	NR	Yes	91.7%	No		0.0	60	0	$9	$1,154	$0	122.3
Mech Room	PC-2	1	Other	7.5	91.0%	No	W	1,696	NR	Yes	91.7%	No		0.0	60	0	$9	$1,154	$0	122.3
Mech Room	PH-1	1	Heating Hot Water Pump	7.5	86.5%	No	W	1,696	NR, 5	Yes	91.7%	Yes	1	0.9	4,532	0	$716	$4,761	$0	6.6
Mech Room	PH-2	1	Heating Hot Water Pump	7.5	86.5%	No	W	1,696	NR, 5	Yes	91.7%	Yes	1	0.9	4,532	0	$716	$4,761	$0	6.6
Mech Room	PH-3	1	Heating Hot Water Pump	0.5	78.2%	No	W	2,745		No	78.2%	No		0.0	0	0	$0	$0	$0	0.0
Roof	EF-13	1	Exhaust Fan	0.3	68.0%	No	W	2,745		No	68.0%	No		0.0	0	0	$0	$0	$0	0.0
Roof	EF-14	1	Exhaust Fan	0.2	60.0%	No	W	2,745		No	60.0%	No		0.0	0	0	$0	$0	$0	0.0
Roof	EF-15	1	Exhaust Fan	0.3	60.0%	No	W	2,745		No	60.0%	No		0.0	0	0	$0	$0	$0	0.0
Ceiling Mounted	EF-16	1	Exhaust Fan	0.1	60.0%	No	W	2,745		No	60.0%	No		0.0	0	0	$0	$0	$0	0.0
Roof	PRV-1	1	Exhaust Fan	0.5	68.0%	No	W	2,745		No	68.0%	No		0.0	0	0	$0	$0	$0	0.0
Roof	PRV-2	1	Exhaust Fan	0.5	68.0%	No	W	2,745		No	68.0%	No		0.0	0	0	$0	$0	$0	0.0
Roof	PRV-3	1	Exhaust Fan	0.5	68.0%	No	W	2,745		No	68.0%	No		0.0	0	0	$0	$0	$0	0.0
Roof	PRV-4	1	Exhaust Fan	0.5	68.0%	No	W	2,745		No	68.0%	No		0.0	0	0	$0	$0	$0	0.0
Roof	SF-3	1	Exhaust Fan	2.0	86.5%	No	W	2,745		No	86.5%	No		0.0	0	0	$0	$0	$0	0.0
Roof	SF-4	1	Exhaust Fan	0.5	68.0%	No	W	2,745		No	68.0%	No		0.0	0	0	$0	$0	$0	0.0
Roof	SF-5	1	Exhaust Fan	1.0	83.5%	No	W	2,745		No	83.5%	No		0.0	0	0	$0	$0	$0	0.0

		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?	Remaining Useful Life	Annual Operating Hours	ECM #	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
Outdoor	CT-1	1	Cooling Tower Fan	15.0	91.0%	No	W	3,391	NR, 6	Yes	92.4%	Yes	1	-0.3	4,776	0	$755	$7,086	$900	8.2
Mech Room	AHU-1	1	Supply Fan	1.5	86.5%	No	W	2,745	NR, NR	Yes	86.5%	Yes	1	0.4	1,332	0	$210	$3,380	$0	16.1
Roof	SF-1	1	Exhaust Fan	2.0	86.5%	No	W	2,745		No	86.5%	No		0.0	0	0	$0	$0	$0	0.0
Roof	SF-2	1	Exhaust Fan	2.0	86.5%	No	W	2,745		No	86.5%	No		0.0	0	0	$0	$0	$0	0.0

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 (MBh)	Remaining Useful Life	ECM #	Install High Efficiency System?	System Quantity	System Type	Cooling Capacity per Unit (Tons)	Heating Capacity per Unit (MBh)	Cooling Mode Efficiency (SEER/EER)	Heating Mode Efficiency (COP)	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	Classrooms	1	Electric Resistance Heat		8.53	W		No							0.0	0	0	$0	$0	$0	0.0
Classrooms	Classrooms	1	Electric Resistance Heat		8.53	W		No							0.0	0	0	$0	$0	$0	0.0
Classrooms	HP-21	2	Water Source HP	4.00	6.80	W		No							0.0	0	0	$0	$0	$0	0.0
Classrooms	HP-22	3	Water Source HP	4.00	6.80	W		No							0.0	0	0	$0	$0	$0	0.0
Classrooms	HP-23	3	Water Source HP	4.00	6.80	W		No							0.0	0	0	$0	$0	$0	0.0
Classrooms	HP-24	2	Water Source HP	4.00	6.80	W		No							0.0	0	0	$0	$0	$0	0.0
Classrooms	HP-25	3	Water Source HP	4.00	9.10	W		No							0.0	0	0	$0	$0	$0	0.0
Classrooms	HP-26	3	Water Source HP	4.00	6.80	W		No							0.0	0	0	$0	$0	$0	0.0
Classrooms	HP-27	3	Water Source HP	4.00	6.80	W		No							0.0	0	0	$0	$0	$0	0.0
Classrooms	HP-28	3	Water Source HP	4.00	6.80	W		No							0.0	0	0	$0	$0	$0	0.0
Classrooms	HP-29	3	Water Source HP	4.00	6.80	W		No							0.0	0	0	$0	$0	$0	0.0
Classrooms	HP-30	3	Water Source HP	4.00	9.10	W		No							0.0	0	0	$0	$0	$0	0.0
Classrooms	HP-31	3	Water Source HP	3.00	8.90	W		No							0.0	0	0	$0	$0	$0	0.0
Classrooms	HP-32	1	Water Source HP	3.00	5.10	W		No							0.0	0	0	$0	$0	$0	0.0
Vestibule	CUH-7	1	Electric Forced Air Furnace		24.00	W		No							0.0	0	0	$0	$0	$0	0.0
Vestibule	CUH-8	1	Electric Forced Air Furnace		24.00	W		No							0.0	0	0	$0	$0	$0	0.0
Mech Room	AHU-1	1	Water Source HP	7.50	82.20	W		No							0.0	0	0	$0	$0	$0	0.0

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)	Remaining Useful Life	ECM #	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
Mech Room	B-1	1	Non-Condensing Hot Water Boiler	######	W	NR	Yes	1	Condensing Hot Water Boiler	######	91.00%	Et	0.0	0	19	$222	$30,604	$2,805	125.2
Mech Room	B-2	1	Non-Condensing Hot Water Boiler	######	W	NR	Yes	1	Condensing Hot Water Boiler	######	91.00%	Et	0.0	0	19	$222	$30,604	$2,805	125.2

DHW Inventory & Recommendations

		Existing Conditions			Proposed Conditions							Energy Impact & Financial Analysis						
Location	Area(s)/System(s) Served	System Quantity	System Type	Remaining Useful Life	ECM #	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
Mech Room	Kitchen & lavatory	1	Storage Tank Water Heater (> 50 Gal)	W		No						0.0	0	0	$0	$0	$0	0.0

Low-Flow Device Recommendations

	Recommedation Inputs					Energy Impact & Financial Analysis						
Location	**ECM #**	**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**
Restrooms	7	16	Faucet Aerator (Lavatory)	2.50	0.50	0.0	0	18	$206	$115	$0	0.6

Walk-In Cooler/Freezer Inventory & Recommendations

	Existing Conditions		Proposed Conditions				Energy Impact & Financial Analysis						
Location	Cooler/ Freezer Quantity	Case Type/Temperature	ECM #	Install EC Evaporator Fan Motors?	Install Electric Defrost Control?	Install Evaporator Fan Control?	Total Peak kW Savings	Total Annual kWh Savings	Total Annual MMBtu Savings	Total Annual Energy Cost Savings	Total Installation Cost	Total Incentives	Simple Payback w/ Incentives in Years
Kitchen	1	Cooler (35F to 55F)	NR, 8	Yes	No	Yes	0.0	3,056	0	$483	$2,281	$75	4.6

Commercial Refrigerator/Freezer Inventory & Recommendations

	Existing Conditions			Proposed Conditions		Energy Impact & Financial Analysis						
Location	Quantity	Refrigerator/ Freezer Type	ENERGY STAR Qualified?	ECM #	Install ENERGY STAR Equipment?	Total Peak kW Savings	Total Annual kWh Savings	Total Annual MMBtu Savings	Total Annual Energy Cost Savings	Total Installation Cost	Total Incentives	Simple Payback w/ Incentives in Years
Kitchen	1	Stand-Up Refrigerator, Solid Door (31 - 50 cu. ft.)	No	NR	Yes	0.1	887	0	$140	$2,112	$125	14.2

Cooking Equipment Inventory & Recommendations

	Existing Conditions			Proposed Conditions		Energy Impact & Financial Analysis						
Location	Quantity	Equipment Type	High Efficiency Equipement?	ECM #	Install High Efficiency Equipment?	Total Peak kW Savings	Total Annual kWh Savings	Total Annual MMBtu Savings	Total Annual Energy Cost Savings	Total Installation Cost	Total Incentives	Simple Payback w/ Incentives in Years
Kitchen	1	Insulated Food Holding Cabinet (Full Size)	Yes		No	0.0	0	0	$0	$0	$0	0.0
Kitchen	1	Insulated Food Holding Cabinet (Full Size)	Yes		No	0.0	0	0	$0	$0	$0	0.0
Kitchen	1	Insulated Food Holding Cabinet (Full Size)	Yes		No	0.0	0	0	$0	$0	$0	0.0
Kitchen	1	Gas Steamer	Yes		No	0.0	0	0	$0	$0	$0	0.0
Kitchen	1	Gas Griddle (≤2 Feet Width)	No		No	0.0	0	0	$0	$0	$0	0.0
Kitchen	2	Gas Combination Oven/Steam Cooker (<15 Pans)	Yes		No	0.0	0	0	$0	$0	$0	0.0

Dishwasher Inventory & Recommendations

	Existing Conditions					Proposed Conditions		Energy Impact & Financial Analysis						
Location	Quantity	Dishwasher Type	Water Heater Fuel Type	Booster Heater Fuel Type	ENERGY STAR Qualified?	ECM #	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	Payback w/ Incentives in Years
Kitchen	1	Single Tank Conveyor (High Temp)	Electric	Electric	Yes		No	0.0	0	0	$0	$0	$0	0.0

Plug Load Inventory

	Existing Conditions			
Location	Quantity	Equipment Description	Energy Rate (W)	ENERGY STAR Qualified?
Classrooms	86	Computer	120.0	Yes
Classrooms	2	Laptop	55.0	Yes
Staffrooms	12	Small Printer	46.0	Yes
Classrooms	2	Medium Printer	55.0	Yes
Staffrooms	2	Copy Machine	600.0	Yes
Classrooms	20	Projector	120.0	No
Kitchen	4	Mirowave	800.0	No
Kitchen	1	Medium Refrigerator	145.0	No
Kitchen	1	Large Refrigerator	255.0	Yes
Kitchen	1	Toaster Oven	550.0	No
Classrooms	1	Ceiling Fan	45.0	No
Laundry	1	Clothes washer	2,000.0	No
Laundry	1	Clother Dryer	1,500.0	No
Lounge	13	CRT Tv	244.0	No
Lounge	1	LCD Tv	130.0	Yes
Staffrooms	2	Standing Fan	55.0	No

Vending Machine Inventory & Recommendations

	Existing Conditions		Proposed Conditions		Energy Impact & Financial Analysis						
Location	Quantity	Vending Machine Type	ECM #	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
Lounge	1	Non-Refrigerated	9	Yes	0.0	343	0	$54	$230	$0	4.2

APPENDIX B: ENERGY STAR® STATEMENT OF ENERGY PERFORMANCE

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.

ENERGY STAR® Statement of Energy Performance

LEARN MORE AT energystar.gov

51

ENERGY STAR® Score[1]

Margaret C. Clifford School

Primary Property Type: K-12 School
Gross Floor Area (ft²): 45,424
Built: 1996

For Year Ending: January 31, 2018
Date Generated: January 31, 2019

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
Margaret C. Clifford School 601 Auburn Ave. Swedesboro, New Jersey 08085	SWEDESBORO-WOOLWICH BOARD OF EDUCATION 15 Fredrick Boulevard Woolwich Twp, NJ 08085 856-241-1552	Christopher DeStratis 15 Fredrick Boulevard Woolwich Twp, NJ 08085 856-241-1552 x 1008 cdestratis@swsdk6.com

Property ID: 6571002

Energy Consumption and Energy Use Intensity (EUI)

Site EUI
52.7 kBtu/ft²

Source EUI
116.7 kBtu/ft²

Annual Energy by Fuel

Natural Gas (kBtu)	804,763 (34%)
Electric - Grid (kBtu)	1,591,142 (66%)

National Median Comparison

National Median Site EUI (kBtu/ft²)	53.5
National Median Source EUI (kBtu/ft²)	118.4
% Diff from National Median Source EUI	-2%

Annual Emissions

Greenhouse Gas Emissions (Metric Tons CO2e/year)	204

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

Christopher DeStratis
15 Fredrick Boulevard
Woolwich Twp, NJ 08085
856-241-1552 x 1008
cdestratis@swsdk6.com

Professional Engineer Stamp
(if applicable)

APPENDIX C: GLOSSARY

TERM	DEFINITION
Blended Rate	Used to calculate financial savings. The blended rate is calculated by dividing the amount of your bill by the total energy use. For example, if your bill is $22,217.22, and you used 266,400 kilowatt-hours, your blended rate is 8.3 cents per kilowatt-hour.
BTU	A British thermal unit is the amount of heat required to increase the temperature of one pound water by one-degree Fahrenheit. Commonly used to measure natural gas consumption.
Demand Response	Demand response reduces or shifts electricity usage at or among participating buildings/sites during peak energy use periods in response to time-based rates or other forms of financial incentives.
Energy Efficiency	Reducing the amount of energy necessary to provide comfort and service to a building/area. Achieved through the installation of new equipment and/or optimizing energy management systems.
Generation	The process of generating electric power from sources of primary energy (e.g., natural gas, the sun, oil).
HVAC	Heating, ventilation, and air conditioning.
kW	Kilowatt. Equal to 1,000 Watts.
Load	The total amount of power used by a building system at any given time.
Measure	A single activity, or installation of a single type of equipment, that is implemented in a building system to reduce total energy consumption.
MMBtu	One million British thermal units.
psig	Pounds per square inch.
Plug Load	Refers to the amount of energy used in a space by products that are powered by means of an ordinary AC plug.
Simple Payback	The amount of time needed to recoup the funds expended in an investment, or to reach the break-even point.
Temperature Setpoint	The temperature at which a temperature regulating device (thermostat, for example) has been set.
Turnkey	Provision of a complete product or service that is ready for immediate use
Watt (W)	Unit of power commonly used to measure electricity use.

Local Government Energy Audit Report

Walter Hill School

March 11, 2019

Prepared for:
Swedesboro-Woolwich School District
1815 Kings Highway
Swedesboro, NJ 08085

Prepared by:
TRC Energy Services
900 Route 9 North
Woodbridge, NJ 07095

Disclaimer

The goal of this audit report is to identify potential energy efficiency opportunities, help prioritize specific measures for implementation, and provide information about financial incentives that may be available. Most energy conservation measures have received preliminary analysis of feasibility that identifies expected ranges of savings and costs. This level of analysis is usually considered sufficient to establish a basis for further discussion and to help prioritize energy measures.

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

TRC bases estimated installation costs on our experience at similar facilities, pricing from local contractors and vendors, and/or cost estimates from RS Means. We encourage the owner of the facility is encouraged to independently confirm these cost estimates and to obtain multiple estimates when considering measure installations. Actual installation costs can vary widely based on individual 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.

The New Jersey 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. Please review all available program incentives and eligibility requirements prior to selecting and installing any energy conservation measures.

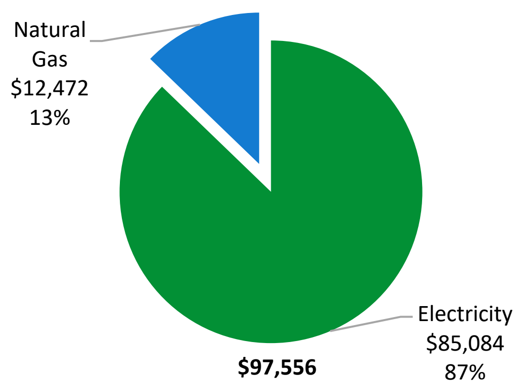
The customer and their respective contractor(s) are responsible to implement energy conservation measures in complete conformance with all applicable local, state and federal requirements.

Table of Contents

1 Executive Summary

The New Jersey Board of Public Utilities (NJBPU) has sponsored this Local Government Energy Audit (LGEA) report for the Walter Hill School. This report provides you with information about your facility's energy use, identifies energy conservation measures (ECMs) that can reduce your energy use, and provides information and assistance to help make changes in your facility. TRC Energy Services (TRC) conducted this study as part of a comprehensive effort to assist New Jersey school districts and local governments in controlling their energy costs and help protect our environment by reducing statewide energy consumption.

BUILDING PERFORMANCE REPORT

Annual Utilities	Costs: $97,556 Electricity: 540,829 kWh Natural Gas: 10,284 Therms	
ENERGY STAR® Benchmarking Score	85 *(1-100 scale)*	Congratulations, your building performs better than the national average. This report has suggestions about how to keep your building running efficiently, further improve performance and lower your energy bills even more.

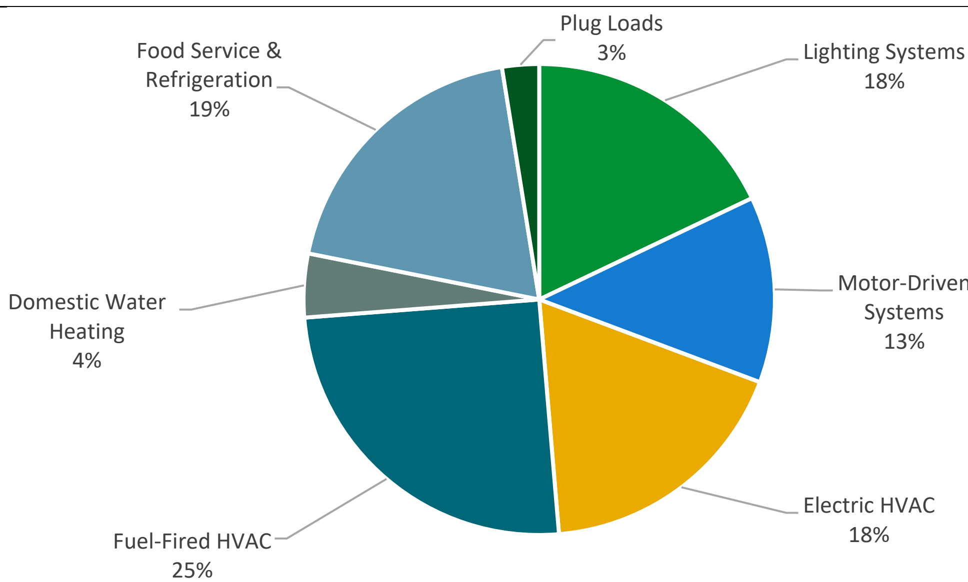


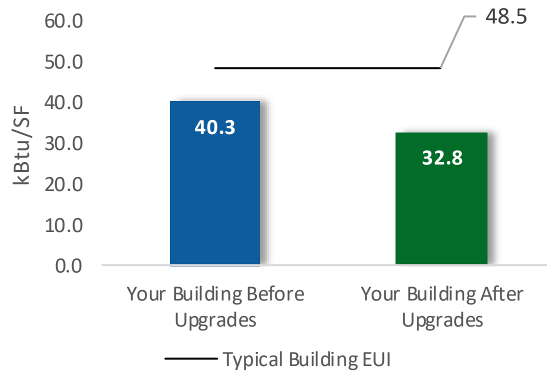
Figure 1 - Energy Use by System

POTENTIAL IMPROVEMENTS

This energy audit considered a range of potential energy improvements in your building. Costs and savings will vary between improvements. Presented below are two potential scopes of work for your consideration.

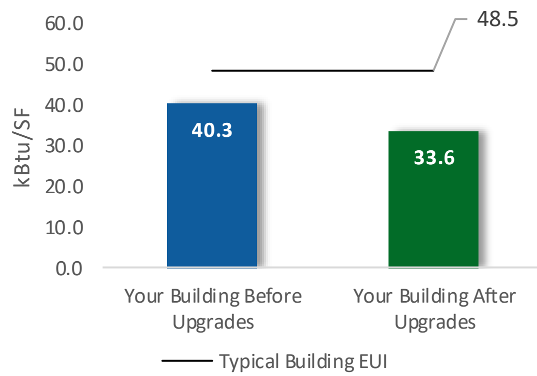
Scenario 1: Full Package (all evaluated measures)

Installation Cost	$124,362
Potential Rebates & Incentives[1]	$13,860
Annual Cost Savings	$20,244
Annual Energy Savings	Electricity: 124,815 kWh Natural Gas: 553 Therms
Greenhouse Gas Emission Savings	66 Tons
Simple Payback	5.4 Years
Site Energy Savings (all utilities)	17%



Scenario 2: Cost Effective Package[2]

Installation Cost	$110,157
Potential Rebates & Incentives	$13,860
Annual Cost Savings	$20,151
Annual Energy Savings	Electricity: 123,825 kWh Natural Gas: 553 Therms
Greenhouse Gas Emission Savings	66 Tons
Simple Payback	4.8 Years
Site Energy Savings (all utilities)	17%



On-site Generation Potential

Photovoltaic	High
Combined Heat and Power	None

[1] Incentives are based on current SmartStart Prescriptive incentives. Other program incentives may apply.

[2] A cost-effective measure is defined as one where the simple payback does not exceed two-thirds of the expected proposed equipment useful life. Simple payback is based on the net measure cost after potential incentives.

#	Energy Conservation Measure	Annual Electric Savings (kWh)	Peak Demand Savings (kW)	Annual Fuel Savings (MMBtu)	Annual Energy Cost Savings ($)	Lifetime Energy Cost Savings ($)	Estimated Install Cost ($)	Estimated Incentive ($)*	Estimated Net Cost ($)	Simple Payback Period (yrs)**	CO_2e Emissions Reduction (lbs)
Lighting Upgrades		**77,403**	**24.1**	**-15**	**$11,999**	**$179,978**	**$39,353**	**$8,875**	**$30,478**	**2.5**	**76,220**
ECM 1	Install LED Fixtures	5,243	0.6	0	$825	$12,372	$1,788	$45	$1,743	2.1	5,280
ECM 2	Retrofit Fixtures with LED Lamps	72,160	23.5	-15	$11,174	$167,606	$37,564	$8,830	$28,734	2.6	70,940
Lighting Control Measures		**23,247**	**7.7**	**-5**	**$3,598**	**$28,786**	**$24,420**	**$2,660**	**$21,760**	**6.0**	**22,840**
ECM 3	Install Occupancy Sensor Lighting Controls	21,560	7.1	-5	$3,337	$26,698	$23,420	$2,660	$20,760	6.2	21,183
ECM 4	Install High/Low Lighting Controls	1,686	0.6	0	$261	$2,088	$1,000	$0	$1,000	3.8	1,657
Motor Upgrades		**990**	**0.5**	**0**	**$156**	**$2,335**	**$14,205**	**$0**	**$14,205**	**91.2**	**996**
	Premium Efficiency Motors	990	0.5	0	$156	$2,335	$14,205	$0	$14,205	91.2	996
Variable Frequency Drive (VFD) Measures		**20,807**	**10.4**	**0**	**$3,273**	**$49,100**	**$45,145**	**$2,325**	**$42,820**	**13.1**	**20,952**
ECM 5	Install VFD on Variable Air Volume (VAV) Fans	16,457	10.8	0	$2,589	$38,835	$37,932	$2,325	$35,607	13.8	16,572
ECM 6	Install VFDs on Cooling Tower Fans	4,350	-0.4	0	$684	$10,265	$7,214	$0	$7,214	10.5	4,380
Domestic Water Heating Upgrade		**0**	**0.0**	**75**	**$908**	**$9,078**	**$172**	**$0**	**$172**	**0.2**	**8,764**
ECM 7	Install Low-Flow DHW Devices	0	0.0	75	$908	$9,078	$172	$0	$172	0.2	8,764
Food Service & Refrigeration Measures		**2,369**	**0.3**	**0**	**$373**	**$2,515**	**$1,067**	**$0**	**$1,067**	**2.9**	**2,385**
ECM 8	Refrigerator/Freezer Case Electrically Commutated Motors	414	0.1	0	$65	$978	$607	$0	$607	9.3	417
ECM 9	Vending Machine Control	1,954	0.2	0	$307	$1,537	$460	$0	$460	1.5	1,968
TOTALS		**124,815**	**43.0**	**55**	**$20,306**	**$271,792**	**$124,362**	**$13,860**	**$110,502**	**5.4**	**132,158**

* - All incentives presented in this table are based on NJ SmartStart equipment incentives and assume proposed equipment meets minimum performance criteria for that pro

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

Figure 2 – Evaluated Energy Improvements

1.1 Planning Your Project

Careful planning makes for a successful energy project. When considering this scope of work, you will have some decisions to make, such as:

- How will the project be funded and/or financed?
- Is it best to pursue individual ECMs, groups of ECMs, or use a comprehensive approach where all ECMs are installed together?
- Are there other facility improvements that should happen at the same time?

Pick Your Installation Approach

New Jersey Clean Energy Programs give you the flexibility to do a little or a lot. Rebates, incentives, and financing are available to help reduce both your installation costs and your energy bills. If you are planning to take advantage of these programs, make sure to review incentive program guidelines before proceeding. This is important because in most cases you will need to submit applications for the incentives before purchasing materials or starting installation.

The potential ECMs identified for this building likely qualify for multiple incentive and funding programs. Based on current program rules and requirements, your measures are likely to qualify for the following programs:

Energy Conservation Measure		SmartStart	Direct Install	Pay For Performance
ECM 1	Install LED Fixtures	X	X	X
ECM 2	Retrofit Fixtures with LED Lamps	X	X	X
ECM 3	Install Occupancy Sensor Lighting Controls	X	X	X
ECM 4	Install High/Low Lighting Controls		X	X
ECM 5	Install VFD on Variable Air Volume (VAV) HVAC	X	X	X
ECM 6	Install VFDs on Cooling Tower Fans		X	X
ECM 7	Install Low-Flow Domestic Hot Water Devices		X	X
ECM 8	Refrigerator/Freezer Case Electrically Commutated Motors		X	X
ECM 9	Vending Machine Control		X	X

Figure 3 – Funding Options

New Jersey Clean Energy Programs At-A-Glance

	SmartStart Flexibility to install at your own pace	**Direct Install** Turnkey installation	**Pay for Performance** Whole building upgrades
Who should use it?	Buildings installing individual measures or small group of measures.	Small to mid-size facilities that can bundle multiple measures together. Peak demand should be below 200 kW. Not suitable for significant building shell issues.	Mid to large size facilities looking to implement as many measures as possible at one time. Peak demand should be over 200 kW.
How does it work?	Use in-house staff or your preferred contractor.	Pre-approved contractors pass savings along to you via reduced material and labor costs.	Whole-building approach to energy upgrades designed to reduce energy use by at least 15%. The more you save, the higher the incentives.
What are the Incentives?	Fixed incentives for specific energy efficiency measures.	Incentives pay up to 70% of eligible costs, up to $125,000 per project. You pay the remaining 30% directly to the contractor.	Up to 25% of installation cost, calculated based on level of energy savings per square foot.
How do I participate?	Submit an application for the specific equipment to be installed.	Contact a participating contractor in your region.	Contact a pre-qualified Partner to develop your Energy Reduction Plan and set your energy savings targets.

Take the next step by visiting **www.njcleanenergy.com** for program details, applications, and to contact a qualified contractor.

Individual Measures with SmartStart

For facilities wishing 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, you can use internal resources or an outside firm or contractor to perform the final design of the ECM(s) and install the equipment. Program pre-approval is required for some SmartStart incentives, so only after receiving pre-approval should you proceed with ECM installation.

Turnkey Installation with Direct Install

The Direct Install program provides 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. Direct Install contractors will assess and verify individual measure eligibility, and, in most cases, they perform the installation work. The Direct Install program is available to sites with an average peak demand of less than 200 kW.

Whole Building Approach with Pay for Performance

Pay for Performance can be a good option for medium to large sized facilities to achieve deep energy savings. Pay for Performance allows you to install as many measures as possible under a single project as well as address measures that may not qualify for other programs. Many facilities pursuing an Energy Savings Improvement Program (ESIP) loan also use this program. Pay for Performance works for larger customers with a peak demand over 200 kW. 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.

More Options from Around the State

Financing and Planning Support with the Energy Savings Improvement Program (ESIP)

For larger facilities with limited capital availability to implement ECMs, project financing may be available through the 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. You have already taken the first step as an LGEA customer, because this report is required to participate in ESIP.

Resiliency with Return on Investment through Combined Heat & Power (CHP)

The CHP program provides incentives for combined heat and power (aka cogeneration) and waste heat to power projects. Combined heat and power systems generate power on-site and recover heat from the generation system to meet on-site thermal loads. Waste heat to power systems use waste heat to generate power. You will work with a qualified developer who will design a system that meets your building's heating and cooling needs.

Ongoing Electric Savings with Demand Response

The Demand Response Energy Aggregator program reduces 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. By enabling commercial facilities to reduce their electric demand 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 demand response (DR) programs. Program participation is voluntary, and facilities receive payments regardless of whether they are called upon to curtail their load during times of peak demand.

2 Existing Conditions

The New Jersey Board of Public Utilities (NJBPU) has sponsored this Local Government Energy Audit (LGEA) Report for Walter Hill School. This report provides information on how your facility uses energy, identifies energy conservation measures (ECMs) that can reduce your energy use, and provides information and assistance to help you implement the ECMs. This report also contains valuable information on financial incentives from New Jersey's Clean Energy Program (NJCEP) for implementing ECMs.

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

2.1 Site Overview

On August 22, 2018, TRC performed an energy audit at the Walter Hill School located in Swedesboro, NJ. TRC met with Anthony Tobin, Facility Representative to review the facility operations and help focus our investigation on specific energy-using systems.

The Walter Hill School is a three-story, 71,374 square foot building built in 1922. Spaces include: classrooms, library, multipurpose room, offices, cafeteria, corridors, stairwells, offices, a commercial kitchen and mechanical space.

The school has water source heat pumps which provides heating and cooling to classrooms and packaged air conditioning (AC) with direct expansion (DX) cooling serves corridors, kitchen and multipurpose room.

Over the last several years the facility has replaced its existing T12 fluorescent fixtures with T8 fluorescent fixtures.

2.2 Building Occupancy

The facility is occupied from September through June. Typical weekday occupancy is 60 staff and 250 students. Summer occupancy includes a summer day camp and continuing maintenance activities. There are no weekend activities.

Building Name	Weekday/Weekend	Operating Schedule
Walter Hill School	Weekday	7:00 AM - 4:00 PM
	Weekend	Unoccupied

Figure 4 - Building Occupancy Schedule

2.3 Building Envelope

Building walls are concrete block and structural steel. The roof is flat as well as pitched with asphalt shingles and covered with asphalt tar, and it is in good condition.

The walls are made of concrete masonry units (CMUs) with a brick veneer and gypsum drywall interior finish.

The flat roof is supported with steel trusses and a reinforced concrete deck and finished with an insulated layer and a covering of modified bitumen.

Steel trusses support a pitched roof with a wood deck covered with asphalt shingles. Roof encloses conditioned space. The thermal barrier is between this space and the conditioned space below.

Site staff report the following issues with the building envelope:

Most of the windows are double glazed with low-e glass and have aluminum frames with a thermal break wood frames. The glass-to-frame seals are in good condition. The operable window weather seals are in good condition, showing little evidence of excessive wear. Exterior doors have aluminum frames and are in good condition with undamaged door seals. Degraded window and door seals increase drafts and outside air infiltration.

Image 1 Building Front

Image 2 Building Roof Shingles

Image 3 Building exterior

Image 4 Building roof

2.4 Lighting Systems

The primary interior lighting system uses 32-Watt linear fluorescent T8 lamps. There are also 40-Watt T12 fixtures in elevators. Additionally, there are some compact fluorescent lamps (CFL) and general-purpose lamps. Typically, T8 fluorescent lamps use electronic ballasts and T12 fluorescent lamps use magnetic ballasts.

Fixture types include 2, 3 and 4-lamp with 4-foot long mounted fixtures and 2-foot fixtures with linear tube lamps. Most fixtures are in good condition. Library fixtures have long U-type CFL and linear fluorescent lamps and are manually controlled.

Library has 50-Watt T5 plug-in CFLs with 32-Watt spiral CFL bulbs and are controlled manually by wall switches. Lighting fixtures in restrooms and hallways are 32-Watt U-bend fluorescent with 2 lamps in each fixture and are controlled by wall switches.

Exterior lighting consists mainly of 4-pin, 32-Watt CFL fixtures with wall-mounted 150-Watt metal halide area fixtures and are controlled by photocells.

All exit signs are LED and interior lighting levels were generally sufficient.

Image 5 Sample T8 lamp

Image 6 Sample U bend lamp

Image 7 Sample 18W 4 pin CFL

Image 8 Sample incandescent bulb

Lighting fixtures in school are controlled by wall switches.

Exterior fixtures include wall packs, wall sconces and canopy lights with high intensity discharge (HID) metal halide and CFL lamps. Exterior fixtures are photocell controlled.

2.5 Air Handling Systems

Packaged Units

Classrooms are served with 64 Trane water source heat pumps controlled by the building energy management system (EMS). These heat pumps have heating capacity ranging from 7.40 MBh to 75.60 MBh and cooling capacity ranging from 0.5 ton to 4.72 ton. The EER for heat pumps ranging from 11.90 to 14.10.

Staffrooms, library, offices, restrooms and multipurpose room are served by four 10-ton, one 5-ton, one 8-ton and one 4-ton Aaon DX packaged roof top units (ACs). These units have gas-fired furnace and output heating capacity ranging from 73 MBh to 146 MBh. These units are equipped with economizers that are in good condition. All AC units provide cooling with variable speed supply fans ranging in size from 1 hp to 3 hp.

Twelve Penn ventilator exhaust fans serve restrooms, mechanical room and dishwasher hood. Kitchen hood exhaust fan has 0.3 hp motor.

There are four Heatex make up air units with supply and return fans. Supply fan motor ranging in size from 1.5 hp to 5 hp and return fan motors are ranging in size from 0.5 hp to 3 hp.

School has a 150-ton BAC cooling tower with two 7.5 hp constant speed supply fans which is part of the water source heat pump arrangement and circulates water through the boiler and the tower loop, which act as a heat source or sink depending on the mode of operation. Two 10 hp condenser water pumps circulate the condensate reverse from the loop of condensate water into the HVAC system. One 3-hp circulating pump circulates water in loop for cooling tower and two 25-hp loop pumps circulates water in terminal units.

Image 9 Aaon packaged unit

Image 10 Supply fan and motor

Image 11 Roof exhaust fan

Image 12 Packaged unit interior

Refer to Appendix A for detailed information about each unit.

2.6 Heating Hot Water Systems

Two Smith cast iron 1,254 MBh steam boilers serve the building heating load needs. The burners are non-modulating with a nominal efficiency of 80%. The boilers are configured in a lead-lag control scheme. Both boilers are required under high load conditions. Installed in 2003, they are in fair condition. There is a service contract in place.

The boilers are configured in a variable flow primary distribution with two 20 hp VFD controlled hot water pumps operating in a lead-lag arrangement. The steam from the boilers is converted to hot water via a heat exchanger and supplied to makeup air units and water source heat pumps throughout the building.

Hot water is supplied at 77.4°F when the outside air temperature is low, and the setpoint is adjusted linearly to 78°F when the outside air is above 81°F. The hot water return temperature is typically 86.4°F.

Image 13 Boiler plant

Image 14 Heat exchanger

Image 15 Heating and condenser water pump

Image 16 Domestic cold-water pump

2.7 Building Energy Management Systems (EMS)

A Trane tracer summit EMS controls the HVAC equipment, cooling tower, boilers, make up units and package units. The EMS provides equipment scheduling monitors and controls space temperatures, supply air temperatures, humidity, heating water loop temperatures, and chilled water loop temperatures.

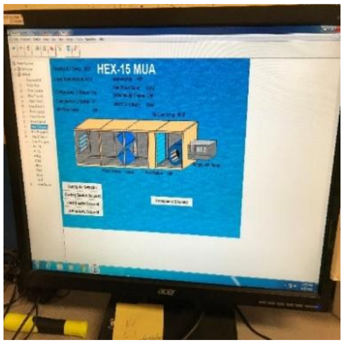


Image 17 Heatex unit graphic

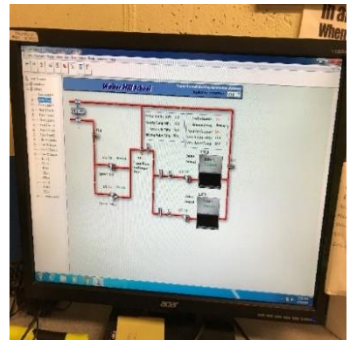


Image 18 Boiler graphic

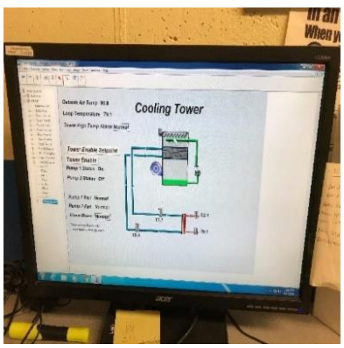


Image 19 Cooling tower graphic

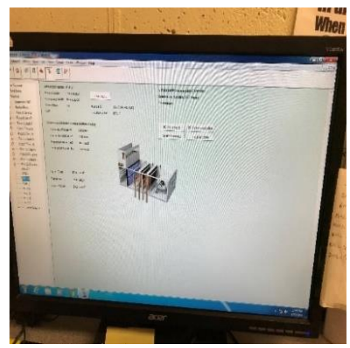


Image 20 EMS layout

2.8 Domestic Hot Water

Hot water is produced with two Bradford White 98 gallon, 200 MBh gas-fired storage water heaters with an 80% efficiency. Two Taco 1/25 hp circulation pumps distribute water to end uses. The circulation pumps operate continuously.

Image 21 Two hot water heaters

Image 22 Taco recirculation pump

2.9 Food Service Equipment

The kitchen has mixed gas and electric equipment that is used to prepare lunches for students. Most cooking is done using a convection electric oven and a gas-fired combination oven/steam cooker. Bulk prepared foods are held in one full size and four half size electric holding cabinets. Equipment is high efficiency and in good condition.

The dishwasher is a Hobart ENERGY STAR® high temperature, single-tank rack type unit. There is an electric booster to provide high temperature water needs of the dishwasher.

Visit https://www.energystar.gov/products/commercial_food_service_equipment for the latest information on high efficiency food service equipment.

Image 23 Gas stove with oven

Image 24 Skillet

Image 25 Cooking equipment

Image 26 Convection oven

2.10 Refrigeration

The kitchen has three stand-up refrigerators with solid doors. All equipment is high efficiency and in good condition. The walk-in refrigerator has an estimated 3.42-ton compressor located on roof and a single fan 1/20 hp evaporator with fan control and electric defrost control. The walk-in low temperature freezer has a 3.42-ton compressor located on roof and a single fan 1/20 hp evaporator with evaporator fan control and electric defrost control.

Visit https://www.energystar.gov/products/commercial_food_service_equipment for the latest information on high efficiency food service equipment.

Image 27 Walk in Cooler

Image 28 Walk in freezer

Image 29 Condensing unit on roof

Image 30 Stand up Refrigerators

2.11 Plug Load & Vending Machines

The utility bill analysis indicates that plug loads consume approximately 2.53% of total building energy use. This is lower than a typical building.

You seem to already be doing a great job managing your electrical plug loads. This report makes additional suggestions for ECMs in this area as well as Energy Efficient Best Practices.

There are 73 computer work stations throughout the facility. Plug loads throughout the building include general cafeteria and office equipment. There are classroom typical loads such as printers, computers, projectors, and fans.

There are several residential-style refrigerators throughout the building that are used to store cold beverage and staff lunches. These vary in condition and efficiency.

There is one refrigerated beverage vending machine and one non-refrigerated vending machines. Vending machines are not equipped with occupancy-based controls.

Image 31 Full size food holding cabinets

Image 32 Half size food holding cabinet

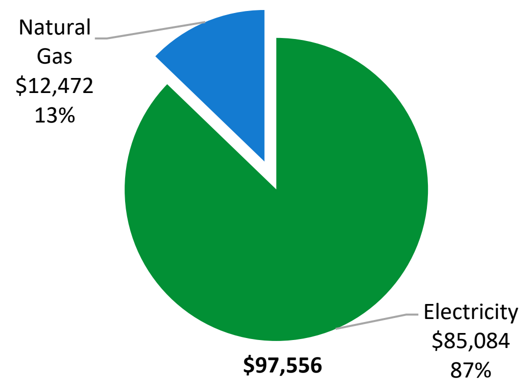
2.12 Water-Using Systems

There are 18 restrooms with toilets, urinals, and sinks. Faucet flow rates are at 2.2 gallons per minute (gpm) or higher. Toilets are rated at 2.5 gallons per flush (gpf) and urinals are rated at 2 gpf.

3 Energy Use and Costs

Twelve months of utility billing data are used to develop annual energy consumption and cost data. This information creates a profile of the annual energy consumption and energy costs.

Utility Summary		
Fuel	**Usage**	**Cost**
Electricity	540,829 kWh	$85,084
Natural Gas	10,284 Therms	$12,472
Total		**$97,556**



An energy balance identifies and quantifies energy use in your various building systems. This can highlight areas with the most potential for improvement. This energy balance was developed using calculated energy use for each of the end uses noted in the figure.

The energy auditor collects information regarding equipment operating hours, capacity, efficiency and other operational parameters from facility staff, drawings, and on-site observations. This information is used as the inputs to calculate the existing conditions energy use for the site. The calculated energy use is then compared to the historical energy use and the initial inputs are revised, as necessary, to balance the calculated energy use to the historical energy use.

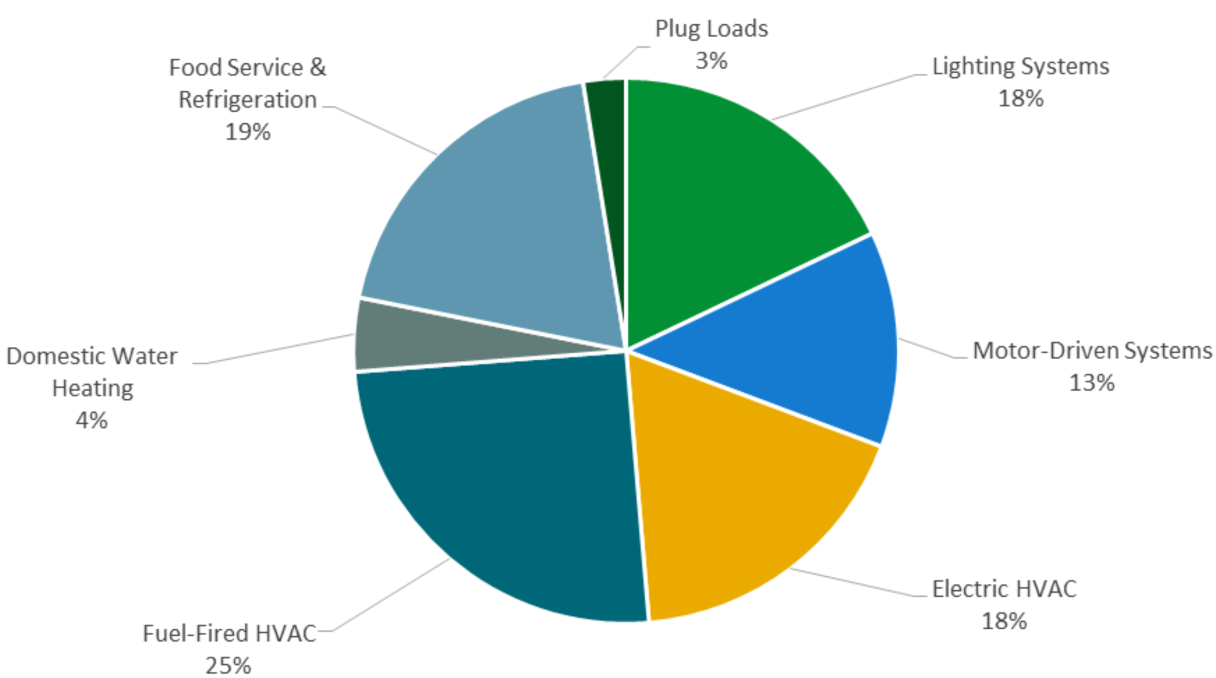
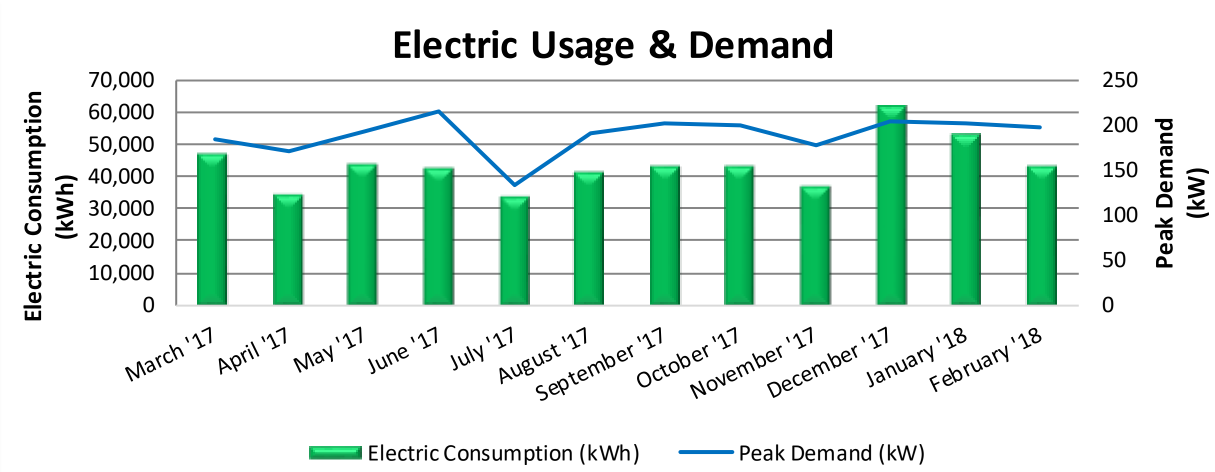


Figure 5 - Energy Balance

3.1 Electricity

Atlantic City Electric delivers electricity under rate class monthly general service secondary.



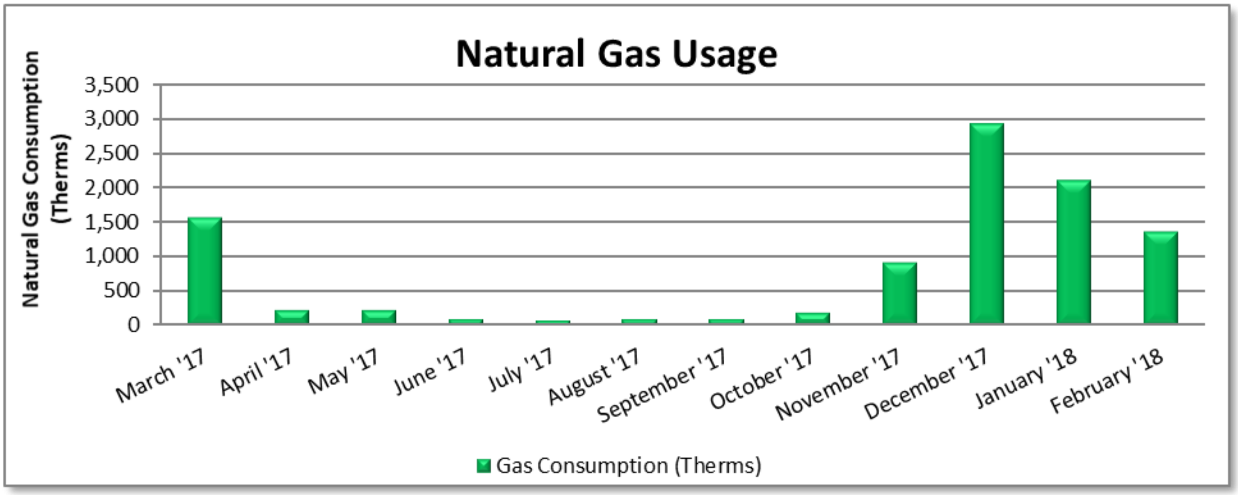
Electric Billing Data					
Period Ending	**Days in Period**	**Electric Usage (kWh)**	**Demand (kW)**	**Demand Cost**	**Total Electric Cost**
4/5/17	29	46,761	186	290	7,958
5/4/17	28	34,327	172	259	5,971
6/6/17	32	43,896	194	74	6,976
7/6/17	29	42,404	215	409	6,683
8/3/17	27	33,533	134	237	5,216
9/7/17	34	41,303	191	424	6,656
10/4/17	26	43,282	202	294	6,799
11/6/17	32	43,142	201	389	6,577
12/5/17	28	36,874	179	299	5,594
1/8/18	33	61,392	205	409	9,173
2/6/18	28	53,023	203	346	8,065
3/6/18	27	43,111	198	326	6,619
Totals	**353**	**523,048**	**215**	**$3,754**	**$82,287**
Annual	**365**	**540,829**	**215**	**$3,882**	**$85,084**

Notes:

- Peak demand of 215 kW occurred in December 2017.
- The average electric cost over the past 12 months was $0.157/kWh, which is the blended rate that includes energy supply, distribution, demand, and other charges. This report uses this blended rate to estimate energy cost savings.

3.2 Natural Gas

South Jersey Gas delivers natural gas under rate class general service, with natural gas supply provided by South Jersey Energy, a third-party supplier.



Gas Billing Data			
Period Ending	Days in Period	Natural Gas Usage (Therms)	Natural Gas Cost
4/5/17	29	1,573	1,608
5/4/17	28	239	303
6/6/17	32	222	294
7/6/17	29	101	165
8/3/17	27	78	137
9/7/17	34	101	172
10/4/17	26	109	166
11/6/17	32	193	271
12/5/17	28	917	1,141
1/8/18	33	2,937	3,542
2/6/18	28	2,113	2,561
3/6/18	27	1,364	1,700
Totals	**353**	**9,946**	**$12,062**
Annual	**365**	**10,284**	**$12,472**

Notes:

- The average gas cost for the past 12 months is $1.213/therm, which is the blended rate used throughout the analysis.
- Due to reduced runtime of boiler plant during summer natural gas usage seems quite low.

3.3 Benchmarking

Your building was benchmarked using the United States Environmental Protection Agency's (EPA) *Portfolio Manager®* software. Benchmarking compares your building's energy use to that of similar buildings across the county, while neutralizing variations due to location, occupancy and operating hours. Some building types can be scored with a 1-100 ranking of a building's energy performance relative to the national building market. A score of 50 represents the national average and a score of 100 is best.

This ENERGY STAR® benchmarking score provides a comprehensive snapshot of your building's energy performance. It assesses the building's physical assets, operations, and occupant behavior, which is compiled into a quick and easy-to-understand score.

Benchmarking Score	85

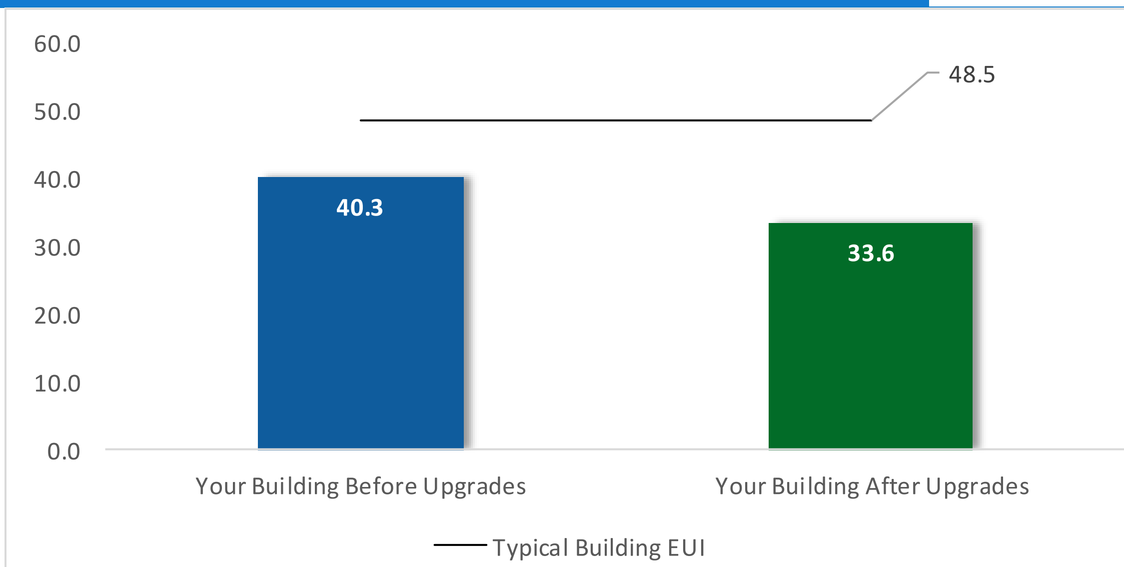


Figure 6 - Energy Use Intensity Comparison

Congratulations, your building performs better than the national average. This report has suggestions about how to keep your building running efficiently, further improve performance, and lower your energy bills even more.

Energy use intensity (EUI) measures energy consumption per square foot and is the standard metric for comparing buildings' energy performance. A lower EUI means better performance and less energy consumed. A number of factors can cause a building to vary from the "typical" energy usage. Local weather conditions, building age and insulation levels, equipment efficiency, daily occupancy hours, changes in occupancy throughout the year, equipment operating hours, and occupant behavior all contribute to a building's energy use and the benchmarking score.

Tracking Your Energy Performance

Keeping track of your energy use on a monthly basis is one of the best ways to keep energy costs in check. Update your utility information in Portfolio Manager® regularly, so that you can keep track of your building's performance.

We have created a Portfolio Manager® account for your facility and we have already entered the monthly utility data shown above for you. Account login information for your account will be sent via email.

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.

For more information on ENERGY STAR® and Portfolio Manager®, visit their website.[3]

[3] https://www.energystar.gov/buildings/facility-owners-and-managers/existing-buildings/earn-recognition/energy-star-certification/how-app-1.

4 Energy Conservation Measures

The goal of this audit report is to identify and evaluate potential energy efficiency improvements, provide information about the cost effectiveness of those improvements, and recognize potential financial incentives from NJBPU. Most energy conservation measures have received preliminary analysis of feasibility which identifies expected ranges of savings and costs. This level of analysis is typically sufficient to demonstrate project cost-effectiveness and help prioritize energy measures.

Calculations of energy use and savings are based on the current version of the *New Jersey Clean Energy Program Protocols to Measure Resource Savings*, which is approved by the NJBPU. Further analysis or investigation may be required to calculate more precise savings based on specific circumstances.

Operation and maintenance costs for the proposed new equipment will generally be lower than the current costs for the existing equipment—especially if the existing equipment is at or past its normal useful life. We have conservatively assumed there to be no impact on overall maintenance costs over the life of the equipment.

Financial incentives are based on the current NJCEP prescriptive SmartStart program. A higher level of investigation may be necessary to support any SmartStart Custom, Pay for Performance, or Direct Install incentive applications. Some measures and proposed upgrades may be eligible for higher incentives than those shown below through other NJCEP programs described in a following section of this report.

Appendix A: Equipment Inventory & Recommendations provides a detailed list of the locations and recommended upgrades for each energy conservation measure.

#	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		**77,403**	**24.1**	**-15**	**$11,999**	**$39,353**	**$8,875**	**$30,478**	**2.5**	**76,220**
ECM 1	Install LED Fixtures	5,243	0.6	0	$825	$1,788	$45	$1,743	2.1	5,280
ECM 2	Retrofit Fixtures with LED Lamps	72,160	23.5	-15	$11,174	$37,564	$8,830	$28,734	2.6	70,940
Lighting Control Measures		**23,247**	**7.7**	**-5**	**$3,598**	**$24,420**	**$2,660**	**$21,760**	**6.0**	**22,840**
ECM 3	Install Occupancy Sensor Lighting Controls	21,560	7.1	-5	$3,337	$23,420	$2,660	$20,760	6.2	21,183
ECM 4	Install High/Low Lighting Controls	1,686	0.6	0	$261	$1,000	$0	$1,000	3.8	1,657
Motor Upgrades		**990**	**0.5**	**0**	**$156**	**$14,205**	**$0**	**$14,205**	**91.2**	**996**
	Premium Efficiency Motors	990	0.5	0	$156	$14,205	$0	$14,205	91.2	996
Variable Frequency Drive (VFD) Measures		**20,807**	**10.4**	**0**	**$3,273**	**$45,145**	**$2,325**	**$42,820**	**13.1**	**20,952**
ECM 5	Install VFD on Variable Air Volume (VAV) Fans	16,457	10.8	0	$2,589	$37,932	$2,325	$35,607	13.8	16,572
ECM 6	Install VFDs on Cooling Tower Fans	4,350	-0.4	0	$684	$7,214	$0	$7,214	10.5	4,380
Domestic Water Heating Upgrade		**0**	**0.0**	**75**	**$908**	**$172**	**$0**	**$172**	**0.2**	**8,764**
ECM 7	Install Low-Flow DHW Devices	0	0.0	75	$908	$172	$0	$172	0.2	8,764
Food Service & Refrigeration Measures		**2,369**	**0.3**	**0**	**$373**	**$1,067**	**$0**	**$1,067**	**2.9**	**2,385**
ECM 8	Refrigerator/Freezer Case Electrically Commutated Motors	414	0.1	0	$65	$607	$0	$607	9.3	417
ECM 9	Vending Machine Control	1,954	0.2	0	$307	$460	$0	$460	1.5	1,968
TOTALS		**124,815**	**43.0**	**55**	**$20,306**	**$124,362**	**$13,860**	**$110,502**	**5.4**	**132,158**

* - All incentives presented in this table are based on NJ SmartStart equipment incentives and assume proposed equipment meets minimum performance criteria

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

Figure 7 – All Evaluated 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		**77,403**	**24.1**	**-15**	**$11,999**	**$39,353**	**$8,875**	**$30,478**	**2.5**	**76,220**
ECM 1	Install LED Fixtures	5,243	0.6	0	$825	$1,788	$45	$1,743	2.1	5,280
ECM 2	Retrofit Fixtures with LED Lamps	72,160	23.5	-15	$11,174	$37,564	$8,830	$28,734	2.6	70,940
Lighting Control Measures		**23,247**	**7.7**	**-5**	**$3,598**	**$24,420**	**$2,660**	**$21,760**	**6.0**	**22,840**
ECM 3	Install Occupancy Sensor Lighting Controls	21,560	7.1	-5	$3,337	$23,420	$2,660	$20,760	6.2	21,183
ECM 4	Install High/Low Lighting Controls	1,686	0.6	0	$261	$1,000	$0	$1,000	3.8	1,657
Variable Frequency Drive (VFD) Measures		**20,807**	**10.4**	**0**	**$3,273**	**$45,145**	**$2,325**	**$42,820**	**13.1**	**20,952**
ECM 5	Install VFD on Variable Air Volume (VAV) Fans	16,457	10.8	0	$2,589	$37,932	$2,325	$35,607	13.8	16,572
ECM 6	Install VFDs on Cooling Tower Fans	4,350	-0.4	0	$684	$7,214	$0	$7,214	10.5	4,380
Domestic Water Heating Upgrade		**0**	**0.0**	**75**	**$908**	**$172**	**$0**	**$172**	**0.2**	**8,764**
ECM 7	Install Low-Flow DHW Devices	0	0.0	75	$908	$172	$0	$172	0.2	8,764
Food Service & Refrigeration Measures		**2,369**	**0.3**	**0**	**$373**	**$1,067**	**$0**	**$1,067**	**2.9**	**2,385**
ECM 8	Refrigerator/Freezer Case Electrically Commutated Motors	414	0.1	0	$65	$607	$0	$607	9.3	417
ECM 9	Vending Machine Control	1,954	0.2	0	$307	$460	$0	$460	1.5	1,968
TOTALS		**123,825**	**42.5**	**55**	**$20,151**	**$110,157**	**$13,860**	**$96,297**	**4.8**	**131,162**

* - All incentives presented in this table are based on NJ SmartStart equipment incentives and assume proposed equipment meets minimum performance criteria

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

Figure 8 – Cost Effective ECMs

4.1 Lighting

#	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		**77,403**	**24.1**	**-15**	**$11,999**	**$39,353**	**$8,875**	**$30,478**	**2.5**	**76,220**
ECM 1	Install LED Fixtures	5,243	0.6	0	$825	$1,788	$45	$1,743	2.1	5,280
ECM 2	Retrofit Fixtures with LED Lamps	72,160	23.5	-15	$11,174	$37,564	$8,830	$28,734	2.6	70,940

When considering lighting upgrades, we suggest using a comprehensive design approach that simultaneously upgrades lighting fixtures and controls to maximize energy savings and improve occupant lighting. Comprehensive design will also consider appropriate lighting levels for different space types to make sure that the right amount of light is delivered where needed. If conversion to LED light sources are proposed, we suggest converting all of a specific lighting type (e.g. linear fluorescent) to LED lamps to minimize the number of lamp types in use at the facility, which should help reduce future maintenance costs.

ECM 1: Install LED Fixtures

Replace existing fixtures containing metal halide lamps with new LED light fixtures. This measure saves energy by installing LEDs which use less power than other technologies with a comparable light output.

In some cases, HID fixtures can be retrofitted with screw-based LED lamps. Replacing an existing HID fixture with a new LED fixture will generally provide better overall lighting optics; however, replacing the HID lamp with a LED screw-in lamp is typically a less expensive retrofit. We recommend you work with your lighting contractor to determine which retrofit solution is best suited to your needs and will be compatible with the existing fixture(s).

Maintenance savings may also be achieved since LED lamps last longer than other light sources and therefore do not need to be replaced as often.

Affected building areas: exterior metal halide fixtures

ECM 2: Retrofit Fixtures with LED Lamps

Replace fluorescent and incandescent lamps with LED lamps. Many LED tubes are direct replacements for existing fluorescent tubes and can be installed while leaving the fluorescent fixture ballast in place. LED lamps 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. Maintenance savings may also be available, as longer-lasting LEDs lamps will not need to be replaced as often as the existing lamps.

Affected building areas: library, multipurpose room, classrooms, restrooms and all other areas with fluorescent fixtures with T8 tubes

4.2 Lighting Controls

#	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		**23,247**	**7.7**	**-5**	**$3,598**	**$24,420**	**$2,660**	**$21,760**	**6.0**	**22,840**
ECM 3	Install Occupancy Sensor Lighting Controls	21,560	7.1	-5	$3,337	$23,420	$2,660	$20,760	6.2	21,183
ECM 4	Install High/Low Lighting Controls	1,686	0.6	0	$261	$1,000	$0	$1,000	3.8	1,657

Lighting controls reduce energy use by turning off or lowering, lighting fixture power levels when not in use. A comprehensive approach to lighting design should upgrade the lighting fixtures and the controls together for maximum energy savings and improved lighting for occupants.

ECM 3: Install Occupancy Sensor Lighting Controls

Install occupancy sensors to control lighting fixtures in areas that are frequently unoccupied, even for short periods. For most spaces, we recommend lighting controls use dual technology sensors, which reduce the possibility of lights turning off unexpectedly.

Occupancy sensors detect occupancy using ultrasonic and/or infrared sensors. When an occupant enters the space, the lighting fixtures switch to full lighting levels. Most occupancy sensor lighting controls allow users to manually turn fixtures on/off, as needed. Some controls can also provide dimming options.

Occupancy sensors can be mounted on the wall at existing switch locations, mounted on the ceiling, or in remote locations. In general, wall switch replacement sensors are best suited to single occupant offices and other small rooms. Ceiling-mounted or remote mounted sensors are used in large spaces, locations without local switching, and where wall switches are not in the line-of-sight of the main work area.

This measure provides energy savings by reducing the lighting operating hours.

Affected building areas: offices, multipurpose rooms, classrooms, library, restrooms, and storage rooms

ECM 4: Install High/Low Lighting Controls

Install occupancy sensors to provide dual level lighting control for lighting fixtures in spaces that are infrequently occupied but may require some level of continuous lighting for safety or security reasons.

Lighting fixtures with these controls operate at default low levels when the area is unoccupied to provide minimal lighting to meet security or safety requirements. Sensors detect occupancy using ultrasonic and/or infrared sensors. When an occupant enters the space, the lighting fixtures switch to full lighting levels. Fixtures automatically switch back to low level after a predefined period of vacancy. In parking lots and parking garages with significant ambient lighting, this control can sometimes be combined with photocell controls to turn the lights off when there is sufficient daylight.

This measure provides energy savings by reducing the light fixture power draw when reduced light output is appropriate.

Affected building areas: hallways on all three floors

For this type of measure the occupancy sensors will generally be ceiling or fixture mounted. Sufficient sensor coverage must be provided to ensure that lights turn on in each area as an occupant approaches.

4.3 Motors

#	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)
Motor Upgrades		**990**	**0.5**	**0**	**$156**	**$14,205**	**$0**	**$14,205**	**91.2**	**996**
	Premium Efficiency Motors	990	0.5	0	$156	$14,205	$0	$14,205	91.2	996

Premium Efficiency Motors

Replace standard efficiency motors with IHP 2014 efficiency motors. This evaluation assumes that existing motors will be replaced with motors of equivalent size and type. In some cases, additional savings may be possible by downsizing motors to better meet the motor's current load requirements.

Affected motors:

Location	Area(s)/System(s) Served	Motor Quantity	Motor Application	HP Per Motor	Additional Motor Description
Outdoor	Cooling Tower	2	Cooling Tower Fan	7.5	Supply Fan
Roof	Multi Purpose Room	1	Supply Fan	3.0	AC-1
Roof	Multi Purpose Room	1	Supply Fan	3.0	AC-2
Roof	Multi Purpose Room	1	Supply Fan	3.0	AC-3
Roof	Multi Purpose Room	1	Supply Fan	3.0	AC-4
Roof	Stage storage	1	Supply Fan	2.0	AC-5
1st & 2nd Floors	Make Up Air Unit	1	Supply Fan	5.0	MUA-15
1st,2nd & 3rd Floors	Make Up Air Unit	1	Supply Fan	5.0	MUA-16
Music room 138	Make Up Air Unit	1	Supply Fan	1.5	MUA-17
Third Floor	Make Up Air Unit	1	Supply Fan	5.0	MUA-22
1st & 2nd Floors	Make Up Air Unit	1	Return Fan	2.0	MUA-15
1st,2nd & 3rd Floors	Make Up Air Unit	1	Return Fan	3.0	MUA-16
Music room 138	Make Up Air Unit	1	Return Fan	0.5	MUA-17
Third Floor	Make Up Air Unit	1	Return Fan	1.5	MUA-22

Savings are based on the difference between baseline and proposed efficiencies and the assumed annual operating hours. The base case motor energy consumption is estimated using the efficiencies found on nameplates or estimated based on the age of the motor and our best estimates of motor run hours. Efficiencies of proposed motor upgrades are obtained from the current *New Jersey's Clean Energy Program Protocols to Measure Resource Savings*.

4.4 Variable Frequency Drives (VFD)

#	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)
Variable Frequency Drive (VFD) Measures		**20,807**	**10.4**	**0**	**$3,273**	**$45,145**	**$2,325**	**$42,820**	**13.1**	**20,952**
ECM 5	Install VFD on Variable Air Volume (VAV) Fans	16,457	10.8	0	$2,589	$37,932	$2,325	$35,607	13.8	16,572
ECM 6	Install VFDs on Cooling Tower Fans	4,350	-0.4	0	$684	$7,214	$0	$7,214	10.5	4,380

Variable frequency drives control motors for fans, pumps, and process equipment based on the actual output required of the driven equipment. Energy savings result from more efficient control of motor energy usage when equipment operates at partial load. The magnitude of energy savings depends on the estimated amount of time that the motor would operate at partial load. For equipment with proposed VFDs, we have included replacing the controlled motor with a new motor —unless the existing motor meets or exceeds IHP 2014 standards—to conservatively account for the cost of an inverter duty rated motor. The savings and cost associated with the new motor are presented with the Premium Efficiency Motor measures. If the proposed VFD measure is not selected for implementation the motor replacement should be reevaluated.

ECM 5: Install VFD on Variable Air Volume (VAV) Fans

Replace existing air volume control devices on variable volume fans, such as inlet vanes and variable pitch fan blades, with VFDs. Inlet guide vanes and variable pitch fan blades are an inefficient means of controlling the air volume compared to VFDs. The existing volume control device will be removed or permanently disabled, and the control signal will be redirected to the VFD to determine proper fan motor speed.

Energy savings result from using a more efficient control device to regulate the air flow provided by the fan. Additional maintenance savings may result from this measure. VFDs are solid state electronic devices, which generally requires less maintenance than mechanical air volume control devices.

Affected air handlers: AC-1 to 5 and MUA-15, 16, 17, 22

ECM 6: Install VFDs on Cooling Tower Fans

Install a VFD to control the cooling tower fan motor. The VFD will allow the cooling tower fan to operate at the minimum speed necessary to maintain the temperature of the condenser water returning to the chiller.

Energy savings result from reducing fan speed (and power) when there is a reduced load on the chiller and outside air wet bulb temperatures are depressed. The magnitude of energy savings is based on the estimated amount of time that the system will operate at reduced load.

4.5 Domestic Water Heating

#	Energy Conservation Measure	Annual Electric Savings (kWh)	Peak Demand Savings (kW)	Annual Fuel Savings (MMBtu)	Annual Energy Cost Savings ($)	Estimated Install Cost ($)	Estimated Incentive ($)*	Estimated Net Cost ($)	Simple Payback Period (yrs)**	CO_2e Emissions Reduction (lbs)
Domestic Water Heating Upgrade		**0**	**0.0**	**75**	**$908**	**$172**	**$0**	**$172**	**0.2**	**8,764**
ECM 7	Install Low-Flow DHW Devices	0	0.0	75	$908	$172	$0	$172	0.2	8,764

ECM 7: Install Low-Flow DHW Devices

Install low-flow devices to reduce overall hot water demand. The following low flow devices are recommended to reduce hot water usage:

Device	Flow Rate
Faucet aerators (lavatory)	0.5 gpm
Faucet aerator (kitchen)	1.5 gpm
Showerhead	2.0 gpm
Pre-rinse spray valve (kitchen)	1.28 gpm

Low-flow devices reduce the overall water flow from the fixture, while still providing adequate pressure for washing. [Pre-rinse spray valves (PRSVs)—often used in commercial and institutional kitchens—remove food waste from dishes prior to dishwashing.]

Additional cost savings may result from reduced water usage.

4.6 Food Service & Refrigeration Measures

#	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)
Food Service & Refrigeration Measures		**2,369**	**0.3**	**0**	**$373**	**$1,067**	**$0**	**$1,067**	**2.9**	**2,385**
ECM 8	Refrigerator/Freezer Case Electrically Commutated Motors	414	0.1	0	$65	$607	$0	$607	9.3	417
ECM 9	Vending Machine Control	1,954	0.2	0	$307	$460	$0	$460	1.5	1,968

ECM 8: Refrigerator/Freezer Case Electrically Commutated Motors

Replace shaded pole or permanent split capacitor (PSC) motors with electronically commutated (EC) motors in walk-in coolers and freezers. Fractional horsepower EC motors are significantly more efficient than mechanically commutated, brushed motors, particularly at low speeds or partial load. By using variable-speed technology, EC motors can optimize fan usage. Because these motors are brushless and use DC power, losses due to friction and phase shifting are eliminated.

Savings for this measure consider both the increased efficiency of the motor as well as the reduction in refrigeration load due to motor heat loss.

ECM 9: Vending Machine Control

Vending machines operate continuously, even during unoccupied hours. Install occupancy sensor controls to reduce energy use. These controls power down vending machines when the vending machine area has been vacant for some time, and, they power up the machines at necessary regular intervals or when the surrounding area is occupied. Energy savings are dependent on the vending machine and activity level in the area surrounding the machines.

5 Energy Efficient Best Practices

A whole building maintenance plan will extend equipment life; improve occupant comfort, health, and safety; and reduce energy and maintenance costs. You may already be doing some of these things— see our list below for potential additions to your maintenance plan. Be sure to consult with qualified equipment specialists for details on proper maintenance and system operation.

Energy Tracking with ENERGY STAR® Portfolio Manager®

You've heard it before - you can't manage what you don't measure. ENERGY STAR® Portfolio Manager® is an online tool that you can use to measure and track energy and water consumption, as well as greenhouse gas emissions.[4] Your account has already been established. Now you can continue to keep tabs on your energy performance every month.

Doors and Windows

Close exterior doors and windows in heated and cooled areas. Leaving doors and windows open leads to a loss of heat during the winter and chilled air during the summer. Reducing air changes per hour (ACH) can lead to increased occupant comfort as well as heating and cooling savings, especially when combined with proper HVAC controls and adequate ventilation.

Lighting Maintenance

Clean lamps, reflectors and lenses of dirt, dust, oil, and smoke buildup every six to twelve months. Light levels decrease over time due to lamp aging, lamp and ballast failure, and buildup of dirt and dust. Together, this can reduce total light output by up to 60% while still drawing full power.

In addition to routine cleaning, developing a maintenance schedule can ensure that maintenance is performed regularly, and it can reduce the overall cost of fixture re-lamping and re-ballasting. Group re-lamping and re-ballasting maintains lighting levels and minimizes the number of site visits by a lighting technician or contractor, decreasing the overall cost of maintenance.

Lighting Controls

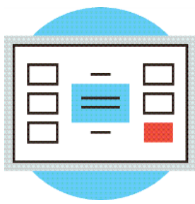
As part of a lighting maintenance schedule, test lighting controls to ensure proper functioning. For occupancy sensors, this requires triggering the sensor and verifying that the sensor's timer settings are correct. For daylight and photocell sensors, maintenance involves cleaning sensor lenses and confirming that setpoints and sensitivity are configured properly.

[4] https://www.energystar.gov/buildings/facility-owners-and-managers/existing-buildings/use-portfolio-manager.

Motor Maintenance

Motors have many moving parts. As these parts degrade over time, the efficiency of the motor is reduced. Routine maintenance prevents damage to motor components. Routine maintenance should include cleaning surfaces and ventilation openings on motors to prevent overheating, lubricating moving parts to reduce friction, inspecting belts and pulleys for wear and to ensure they are at proper alignment and tension, and cleaning and lubricating bearings. Consult a licensed technician to assess these and other motor maintenance strategies.

Thermostat Schedules and Temperature Resets



Use thermostat setback temperatures and schedules to reduce heating and cooling energy use during periods of low or no occupancy. Thermostats should be programmed for a setback of 5°F-10°F during low occupancy hours (reduce heating setpoints and increase cooling setpoints). Cooling load can be reduced 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.

AC System Evaporator/Condenser Coil Cleaning

Dirty evaporator and condenser coils restrict air flow and restrict heat transfer. This increases the loads on the evaporator and condenser fan and decreases overall cooling system performance. Keeping the coils clean allows the fans and cooling system to operate more efficiently.

HVAC Filter Cleaning and Replacement

Air filters should be checked regularly (often monthly) and cleaned or replaced when appropriate. Air filters reduce indoor air pollution, increase occupant comfort, and help keep equipment operating efficiently. If the building has a building management system, consider installing a differential pressure switch across filters to send an alarm about premature fouling or overdue filter replacement. Over time, filters become less, and less effective as particulate buildup increases. Dirty filters also restrict air flow through the air conditioning or heat pump system, which increases the load on the distribution fans.

Boiler Maintenance

Many boiler problems develop slowly over time, so regular inspection and maintenance is essential to keeping the heating system running efficiently and preventing expensive repairs. Annual tune-ups should include a combustion analysis to analyze the exhaust from the boilers and to ensure the boiler is operating safely. Boilers should be cleaned according to the manufacturer's instructions to remove soot and scale from the water side or fire side of the boiler.

Furnace Maintenance

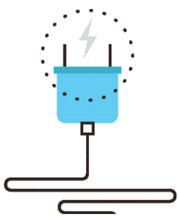
Preventative maintenance can extend the life of the system, maintain energy efficiency, and ensure safe operation. Following the manufacturer's instructions, a yearly tune-up should: check for gas/carbon monoxide leaks; change the air and fuel filters; check components for cracks, corrosion, dirt, or debris build-up; ensure the ignition system is working properly; test and adjust operation and safety controls; inspect electrical connections; and lubricate motors and bearings.

Water Heater Maintenance

Preventative maintenance can extend the life of the system, maintain energy efficiency, and ensure safe operation. At least once a year, follow manufacturer instructions to drain a few gallons out of the water heater using the drain valve. If there is a lot of sediment or debris, then a full flush is recommended. Turn the temperature down and then completely drain the tank. Annual checks should include checks for:

- Leaks or heavy corrosion on the pipes and valves.
- Corrosion or wear on the gas line and on the piping. If you noticed any black residue, soot, or charred metal, this is a sign you may be having combustion issues and you should have the unit serviced by a professional.
- For electric water heaters, look for signs of leaking such as rust streaks or residue around the upper and lower panels covering the electrical components on the tank.
- For water heaters more than three years old, have a technician inspect the sacrificial anode annually.

Plug Load Controls



Reducing plug loads is a common way to decrease your electrical use. Limiting the energy use of plug loads can include increasing occupant awareness, removing under-used equipment, installing hardware controls, and using software controls. Consider enabling the most aggressive power settings on existing devices or install load sensing or occupancy sensing (advanced) power strips.[5] Your local utility may offer incentives or rebates for this equipment.

Computer Power Management Software

Many computers consume power during nights, weekends, and holidays. Screen savers are commonly confused as a power management strategy. This contributes to avoidable, excessive electrical energy consumption. There are innovative power management software packages available that are designed to deliver significant energy saving and provide ongoing tracking measurements. A central power management platform helps enforce energy savings policies as well as identify and eliminate underutilized devices.

[5] For additional information refer to "Assessing and Reducing Plug and Process Load in Office Buildings" https://www.nrel.gov/docs/fy13osti/54175.pdf or "Plug Load Best Practices Guide" http://www.advancedbuildings.net/plug-load-best-practices-guide-offices.

Water Conservation

Installing dual flush or low-flow toilets and low-flow/waterless urinals are ways to reduce water use. The EPA WaterSense™ ratings for urinals is 0.5 gpf and for flush valve toilets is 1.28 gpf (this is lower than the current 1.6 gpf federal standard).

For more information regarding water conservation go to the EPA's WaterSense™ website[6] or download a copy of EPA's "WaterSense at Work: Best Management Practices for Commercial and Institutional Facilities"[7] to get ideas for creating a water management plan and best practices for a wide range of water using systems.

Water conservation devices that do not reduce hot water consumption will not provide energy savings at the site level, but they may significantly affect your water and sewer usage costs. 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.

If the facility has detached buildings with a master water meter for the entire campus, check for unnatural wet areas in the lawn or water seeping in the foundation at water pipe penetrations through the foundation. Periodically check overnight meter readings when the facility is unoccupied, and there is no other scheduled water usage.

Manage irrigation systems to use water more effectively outside the building. Adjust spray patterns so that water lands on intended lawns and plantings and not on pavement and walls. Consider installing an evapotranspiration irrigation controller that will prevent over-watering.

Procurement Strategies

Purchasing efficient products reduces energy costs without compromising quality. Consider modifying your procurement policies and language to require ENERGY STAR® or WaterSense™ products where available.

[6] https://www.epa.gov/watersense.

[7] https://www.epa.gov/watersense/watersense-work-0.

6 On-site Generation

You don't have to look far in New Jersey to see one of the thousands of solar electric systems providing clean power to homes, businesses, schools, and government buildings. On-site generation includes both renewable (e.g., solar, wind) and non-renewable (e.g., fuel cells) technologies that generate power to meet all or a portion of the facility's electric energy needs. Also referred to as distributed generation, these systems contribute to greenhouse gas (GHG) emission reductions, demand reductions and reduced customer electricity purchases reduction, which results in improved electric grid reliability through better use of transmission and distribution systems.

Preliminary screenings were performed to determine if an on-site generation measure could be a cost-effective solution for your facility. Before deciding to install an on-site generation system, we recommend conducting a feasibility study to analyze 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 Solar Photovoltaic

Photovoltaic (PV) panels convert sunlight into electricity. Individual panels are combined into an array that produces direct current (DC) electricity. The DC is converted to alternating current (AC) through an inverter. The inverter is then connected to the building's electrical distribution system.

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

The amount of free area, ease of installation (roof and parking lot), and the lack of shading elements contribute to the high potential. A PV array located on the roof may be feasible. If you are interested in pursuing the installation of PV, we recommend conducting a full feasibility study.

The graphic below displays the results of the PV potential screening conducted as a part of this audit. The position of each slider indicates the potential (potential increases to the right) that each factor contributes to the overall site potential.

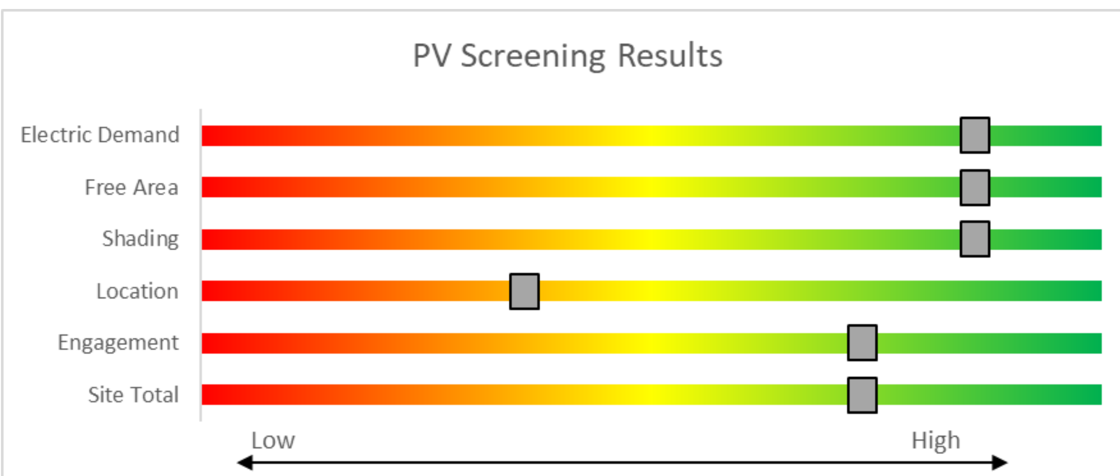


Figure 9 - Photovoltaic Screening

Solar Renewable Energy Certificate (SREC) Registration Program (SRP)

Rebates are not available for solar projects, but owners of solar projects MUST register their projects in the SREC Registration Program before starting construction. Once your PV system is up and running, you periodically earn credits, which can then be sold on the open market for up to 15 years.

If you are considering installing solar photovoltaics on your building, visit www.njcleanenergy.com/srec for more information about the SREC Registration Program.

Get more information about solar power in New Jersey or find a qualified solar installer who can help you decide if solar is right for your building:

- **Basic Info on Solar PV in NJ**: www.njcleanenergy.com/whysolar
- **NJ Solar Market FAQs**: www.njcleanenergy.com/renewable-energy/program-updates-and-background-information/solar-transition/solar-market-faqs
- **Approved Solar Installers in the NJ Market**: 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) generates electricity at the facility and puts waste heat energy to good use. Common types of CHP systems are reciprocating engines, microturbines, fuel cells, backpressure steam turbines, and (at large facilities) gas turbines.

CHP systems typically produce a portion of the electric power used on-site, with the balance of electric power needs supplied by the local utility company. The heat is used to supplement (or replace) existing boilers and provide space heating and/or domestic hot water heating. Waste heat can also be routed through absorption chillers for space cooling.

The key criteria used for screening is the amount of time that the CHP system would operate at full load and the facility's ability to use the recovered heat. Facilities with a continuous need 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 **no** potential for installing a cost-effective CHP system.

Based on a preliminary analysis, the facility does not appear to meet the minimum requirements for a cost-effective CHP installation. The lack of gas service, low or infrequent thermal load, and lack of space for siting the equipment are the most significant factors contributing to the lack of CHP potential.

The graphic below displays the results of the CHP potential screening conducted as a part of this audit. The position of each slider indicates the potential (potential increases to the right) that each factor contributes to the overall site potential.

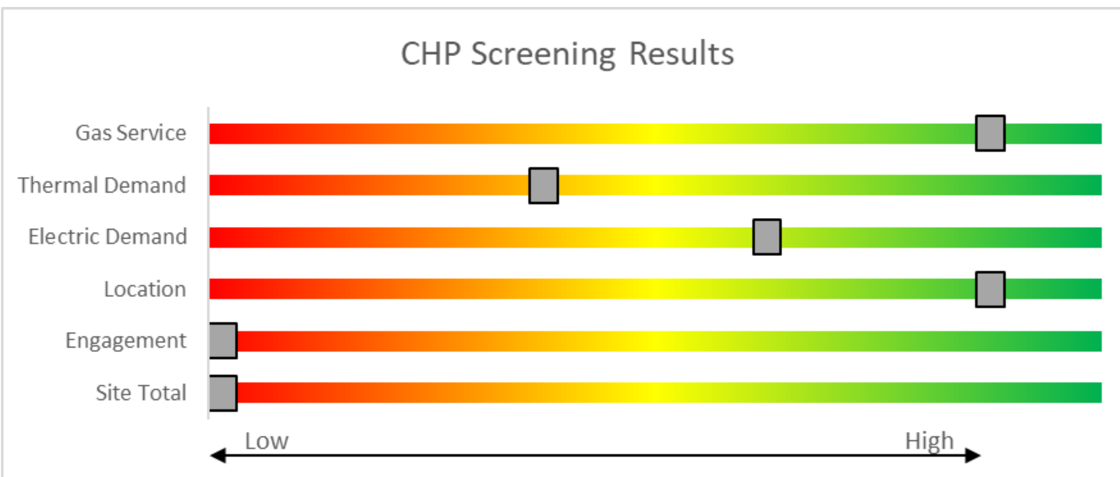


Figure 10 - Combined Heat and Power Screening

Find a qualified firm that specializes in commercial CHP cost assessment and installation: [http://www.njcleanenergy.com/commercial-industrial/programs/nj-smartstart-buildings/tools-and-resources/tradeally/approved_vendorsearch/.](http://www.njcleanenergy.com/commercial-industrial/programs/nj-smartstart-buildings/tools-and-resources/tradeally/approved_vendorsearch/)

7 PROJECT FUNDING AND INCENTIVES

Ready to improve your building's performance? New Jersey Clean Energy Programs can help. Pick the program that works best for you. Incentive programs that may apply to this facility are identified in the Executive Summary. This section provides an overview of currently available in New Jersey Clean Energy Programs.

	SmartStart *Flexibility to install at your own pace*	**Direct Install** *Turnkey installation*	**Pay for Performance** *Whole building upgrades*
Who should use it?	Buildings installing individual measures or small group of measures.	Small to mid-size facilities that can bundle multiple measures together. Average peak demand should be below 200 kW. Not suitable for significant building shell issues.	Mid to large size facilities looking to implement as many measures as possible at one time. Peak demand should be over 200 kW.
How does it work?	Use in-house staff or your preferred contractor.	Pre-approved contractors pass savings along to you via reduced material and labor costs.	Whole-building approach to energy upgrades designed to reduce energy use by at least 15%. The more you save, the higher the incentives.
What are the Incentives?	Fixed incentives for specific energy efficiency measures.	Incentives pay up to 70% of eligible costs, up to $125,000 per project. You pay the remaining 30% directly to the contractor.	Up to 25% of installation cost, calculated based on level of energy savings per square foot.
How do I participate?	Submit an application for the specific equipment to be installed.	Contact a participating contractor in your region.	Contact a pre-qualified Partner to develop your Energy Reduction Plan and set your energy savings targets.

Take the next step by visiting **www.njcleanenergy.com** for program details, applications, and to contact a qualified contractor.

7.1 SmartStart

SmartStart offers incentives for installing prescriptive and custom energy efficiency measures at your facility. This program provides an effective mechanism for securing incentives for energy efficiency measures installed individually or as part of a package of energy upgrades. This program serves most common equipment types and sizes.

SmartStart routinely 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

Incentives

The SmartStart Prescriptive program provides fixed incentives for specific energy efficiency measures. Prescriptive incentives vary by equipment type.

SmartStart Custom provides incentives for more unique or specialized technologies or systems that are not addressed through prescriptive incentives. Custom incentives are calculated at $0.16/kWh and $1.60/therm based on estimated annual savings. Incentives are 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

Submit an application for the specific equipment to be installed. Many applications are designed as rebates, although others require application approval prior to installation. You can work with your preferred contractor or use internal staff to install measures.

Visit www.njcleanenergy.com/SSB for a detailed program description, instructions for applying, and applications.

7.2 Direct Install

Direct Install is a turnkey program available to existing small to medium-sized facilities with an average peak electric demand that does not exceed 200 kW over the recent 12-month period. You 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. Each entity is limited to incentives up to $250,000 per fiscal year.

How to Participate

To participate in Direct Install, you will need to contact the participating contractor assigned to 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.

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

7.3 Pay for Performance - Existing Buildings

Pay for Performance works for larger customers with a peak demand over 200 kW. The minimum installed scope of work must include at least two unique measures that results in at least 15% source energy savings, and 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 to achieve deep energy savings. This program has an added benefit of addressing measures that may not qualify for other programs. Many facilities pursuing an Energy Savings Improvement Program loan also use this program.

Incentives

Incentives are 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

Contact one of the pre-approved consultants and contractors ("Partners"). Under direct contract to you, they will help further evaluate the measures identified in this report through development of the energy reduction plan), assist you in implementing selected measures, and verify actual savings one year after the installation. Your Partner will also help you apply for incentives.

Approval of the final scope of work is required by the program prior to installation. Installation can be done by the contractor of your choice (some P4P Partners are also contractors) or by internal staff, but the Partner remains involved throughout construction to ensure compliance with the program requirements.

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

7.4 Energy Savings Improvement Program

The Energy Savings Improvement Program (ESIP) serves New Jersey's government agencies by financing energy projects. 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. Annual payments are lower than the savings projected from the ECMs, ensuring that ESIP projects are cash flow positive for the life of the contract.

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 described above can also be used to help further reduce the total project cost of eligible measures.

How to Participate

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 used 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. Carefully consider all alternatives to develop an approach that best meets your needs. A detailed program descriptions and application can be found at: www.njcleanenergy.com/ESIP.

ESIP is a program delivered directly by the NJBPU and is not an NJCEP incentive program. As mentioned above, you can use NJCEP incentive programs to help further reduce costs when developing the energy savings plan. Refer to the ESIP guidelines at the link above for further information and guidance on next steps.

7.5 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 prior to the start of construction 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. SRECs 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 SRECs 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 Renewable Portfolio Standard. Purchasing SRECs can help them meet those requirements. As SRECs are traded in a competitive market, the price may vary significantly. The actual price of an SREC during a trading period fluctuates depending on supply and demand.

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

8 Energy Purchasing and Procurement Strategies

8.1 Retail Electric Supply Options

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 already buys electricity from a third-party supplier, review and compare prices at the end of each contract year.

A list of licensed third-party electric suppliers is available at the NJBPU website.[8]

8.2 Retail Natural Gas Supply Options

The natural gas market in New Jersey is also deregulated. Most customers that remain with the utility for natural gas service pay rates that are market-based and that fluctuate monthly. 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 typically depends on whether a customer prefers 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 does not already purchase natural gas from a third-party supplier, consider shopping for a reduced rate from third-party natural gas suppliers. If your facility already purchases natural gas from a third-party supplier, review and compare prices at the end of each contract year.

A list of licensed third-party natural gas suppliers is available at the NJBPU website.[9]

[8] www.state.nj.us/bpu/commercial/shopping.html.

[9] 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	Light Level	Watts per Fixture	Annual Operating Hours	ECM #	Fixture Recommendation	Add Controls?	Fixture Quantity	Fixture Description	Control System	Watts per Fixture	Annual Operating Hours	Total Peak kW Savings	Total Annual kWh Savings	Total Annual MMBtu Savings	Total Annual Energy Cost Savings	Total Installation Cost	Total Incentives	Simple Payback w/ Incentives in Years
213 Bathroom	1	U-Bend Fluorescent - T8: U T8 (32W) - 2L	Wall Switch	S	62	1,980	2	Relamp	No	1	LED - Linear Tubes: (2) U-Lamp	Wall Switch	33	1,980	0.0	63	0	$10	$72	$10	6.4
112 Bathroom	1	U-Bend Fluorescent - T8: U T8 (32W) - 2L	Wall Switch	S	62	1,980	2	Relamp	No	1	LED - Linear Tubes: (2) U-Lamp	Wall Switch	33	1,980	0.0	63	0	$10	$72	$10	6.4
119 Restroom	1	U-Bend Fluorescent - T8: U T8 (32W) - 2L	Wall Switch	S	62	1,980	2	Relamp	No	1	LED - Linear Tubes: (2) U-Lamp	Wall Switch	33	1,980	0.0	63	0	$10	$72	$10	6.4
Restroom	1	U-Bend Fluorescent - T8: U T8 (32W) - 2L	Wall Switch	S	62	1,980	2	Relamp	No	1	LED - Linear Tubes: (2) U-Lamp	Wall Switch	33	1,980	0.0	63	0	$10	$72	$10	6.4
Restroom	1	U-Bend Fluorescent - T8: U T8 (32W) - 2L	Wall Switch	S	62	1,980	2	Relamp	No	1	LED - Linear Tubes: (2) U-Lamp	Wall Switch	33	1,980	0.0	63	0	$10	$72	$10	6.4
Boys	1	U-Bend Fluorescent - T8: U T8 (32W) - 2L	Wall Switch	S	62	1,980	2	Relamp	No	1	LED - Linear Tubes: (2) U-Lamp	Wall Switch	33	1,980	0.0	63	0	$10	$72	$10	6.4
Girls	1	U-Bend Fluorescent - T8: U T8 (32W) - 2L	Wall Switch	S	62	1,980	2	Relamp	No	1	LED - Linear Tubes: (2) U-Lamp	Wall Switch	33	1,980	0.0	63	0	$10	$72	$10	6.4
Restroom	1	U-Bend Fluorescent - T8: U T8 (32W) - 2L	Wall Switch	S	62	1,980	2	Relamp	No	1	LED - Linear Tubes: (2) U-Lamp	Wall Switch	33	1,980	0.0	63	0	$10	$72	$10	6.4
Room 203	2	U-Bend Fluorescent - T8: U T8 (32W) - 2L	Wall Switch	S	62	1,980	2, 3	Relamp	Yes	2	LED - Linear Tubes: (2) U-Lamp	Occupancy Sensor	33	1,366	0.1	171	0	$26	$261	$20	9.1
143 Storage	3	U-Bend Fluorescent - T8: U T8 (32W) - 2L	Wall Switch	S	62	1,980	2, 3	Relamp	Yes	3	LED - Linear Tubes: (2) U-Lamp	Occupancy Sensor	33	1,366	0.1	256	0	$40	$333	$30	7.6
Hallway	4	U-Bend Fluorescent - T8: U T8 (32W) - 2L	Wall Switch	S	62	1,980	2, 4	Relamp	Yes	4	LED - Linear Tubes: (2) U-Lamp	High/Low Control	33	1,366	0.1	342	0	$53	$490	$40	8.5
Room 115	4	U-Bend Fluorescent - T8: U T8 (32W) - 2L	Wall Switch	S	62	1,980	2, 3	Relamp	Yes	4	LED - Linear Tubes: (2) U-Lamp	Occupancy Sensor	33	1,366	0.1	342	0	$53	$560	$75	9.2
2nd Fl Hall	16	U-Bend Fluorescent - T8: U T8 (32W) - 2L	Wall Switch	S	62	1,980	2, 4	Relamp	Yes	16	LED - Linear Tubes: (2) U-Lamp	High/Low Control	33	1,366	0.5	1,367	0	$212	$1,359	$160	5.7
3rd Fl. Hall	19	U-Bend Fluorescent - T8: U T8 (32W) - 2L	Wall Switch	S	62	1,980	2, 4	Relamp	Yes	19	LED - Linear Tubes: (2) U-Lamp	High/Low Control	33	1,366	0.5	1,623	0	$251	$1,577	$190	5.5
1st Fl Hallway	36	U-Bend Fluorescent - T8: U T8 (32W) - 2L	Wall Switch	S	62	1,980	2, 4	Relamp	Yes	36	LED - Linear Tubes: (2) U-Lamp	High/Low Control	33	1,366	1.0	3,076	-1	$476	$2,809	$360	5.1
Exterior	9	Metal Halide: (1) 150W Lamp	Photocell	S	190	4,380	1	Fixture Replacement	No	9	LED - Fixtures: Other	Photocell	57	4,380	0.6	5,243	0	$825	$1,788	$45	2.1
Maintenance	3	Linear Fluorescent - T8: 4' T8 (32W) - 4L	Wall Switch	S	114	1,980	2, 3	Relamp	Yes	3	LED - Linear Tubes: (4) 4' Lamps	Occupancy Sensor	58	1,366	0.2	483	0	$75	$489	$95	5.3
Stairs 6	3	Linear Fluorescent - T8: 4' T8 (32W) - 4L	Wall Switch	S	114	1,980	2, 3	Relamp	Yes	3	LED - Linear Tubes: (4) 4' Lamps	Occupancy Sensor	58	1,366	0.2	483	0	$75	$335	$60	3.7
Stairs 4	4	Linear Fluorescent - T8: 4' T8 (32W) - 4L	Wall Switch	S	114	1,980	2, 3	Relamp	Yes	4	LED - Linear Tubes: (4) 4' Lamps	Occupancy Sensor	58	1,366	0.2	645	0	$100	$408	$80	3.3
Stairs 2	4	Linear Fluorescent - T8: 4' T8 (32W) - 4L	Wall Switch	S	114	1,980	2, 3	Relamp	Yes	4	LED - Linear Tubes: (4) 4' Lamps	Occupancy Sensor	58	1,366	0.2	645	0	$100	$408	$80	3.3
Stairs 1	4	Linear Fluorescent - T8: 4' T8 (32W) - 4L	Wall Switch	S	114	1,980	2, 3	Relamp	Yes	4	LED - Linear Tubes: (4) 4' Lamps	Occupancy Sensor	58	1,366	0.2	645	0	$100	$408	$80	3.3
Library	5	Linear Fluorescent - T8: 4' T8 (32W) - 4L	Wall Switch	S	114	1,980	2, 3	Relamp	Yes	5	LED - Linear Tubes: (4) 4' Lamps	Occupancy Sensor	58	1,366	0.3	806	0	$125	$635	$135	4.0
Staris 5	6	Linear Fluorescent - T8: 4' T8 (32W) - 4L	Wall Switch	S	114	1,980	2, 3	Relamp	Yes	6	LED - Linear Tubes: (4) 4' Lamps	Occupancy Sensor	58	1,366	0.3	967	0	$150	$708	$155	3.7
Stairs 2	6	Linear Fluorescent - T8: 4' T8 (32W) - 4L	Wall Switch	S	114	1,980	2, 3	Relamp	Yes	6	LED - Linear Tubes: (4) 4' Lamps	Occupancy Sensor	58	1,366	0.3	967	0	$150	$554	$120	2.9
Stairs 1	7	Linear Fluorescent - T8: 4' T8 (32W) - 4L	Wall Switch	S	114	1,980	2, 3	Relamp	Yes	7	LED - Linear Tubes: (4) 4' Lamps	Occupancy Sensor	58	1,366	0.4	1,128	0	$175	$627	$140	2.8

	Existing Conditions						Proposed Conditions								Energy Impact & Financial Analysis						
Location	Fixture Quantity	Fixture Description	Control System	Light Level	Watts per Fixture	Annual Operating Hours	ECM #	Fixture Recommendation	Add Controls?	Fixture Quantity	Fixture Description	Control System	Watts per Fixture	Annual Operating Hours	Total Peak kW Savings	Total Annual kWh Savings	Total Annual MMBtu Savings	Total Annual Energy Cost Savings	Total Installation Cost	Total Incentives	Simple Payback w/ Incentives in Years
Room 315	10	Linear Fluorescent - T8: 4' T8 (32W) - 4L	Wall Switch	S	114	1,980	2, 3	Relamp	Yes	10	LED - Linear Tubes: (4) 4' Lamps	Occupancy Sensor	58	1,366	0.5	1,611	0	$249	$1,000	$235	3.1
Kitchen	1	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Wall Switch	S	93	1,980	2	Relamp	No	1	LED - Linear Tubes: (3) 4' Lamps	Wall Switch	44	1,980	0.0	108	0	$17	$55	$15	2.4
Room 216	2	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Wall Switch	S	93	1,980	2, 3	Relamp	Yes	2	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	44	1,366	0.1	274	0	$42	$380	$65	7.4
Room 203	2	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Wall Switch	S	93	1,980	2, 3	Relamp	Yes	2	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	44	1,366	0.1	274	0	$42	$380	$65	7.4
Sec. Office	2	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Wall Switch	S	93	1,980	2, 3	Relamp	Yes	2	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	44	1,366	0.1	274	0	$42	$380	$65	7.4
Room 140	2	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Wall Switch	S	93	1,980	2, 3	Relamp	Yes	2	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	44	1,366	0.1	274	0	$42	$380	$65	7.4
Room 152	2	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Wall Switch	S	93	1,980	2, 3	Relamp	Yes	2	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	44	1,366	0.1	274	0	$42	$380	$65	7.4
Room 157	2	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Wall Switch	S	93	1,980	2, 3	Relamp	Yes	2	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	44	1,366	0.1	274	0	$42	$380	$65	7.4
Room 159	2	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Wall Switch	S	93	1,980	2, 3	Relamp	Yes	2	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	44	1,366	0.1	274	0	$42	$380	$65	7.4
Room 154	3	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Wall Switch	S	93	1,980	2, 3	Relamp	Yes	3	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	44	1,366	0.1	412	0	$64	$434	$80	5.6
Room 220	4	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Wall Switch	S	93	1,980	2, 3	Relamp	Yes	4	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	44	1,366	0.2	549	0	$85	$489	$95	4.6
Room 205	4	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Wall Switch	S	93	1,980	2, 3	Relamp	Yes	4	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	44	1,366	0.2	549	0	$85	$489	$95	4.6
Principal	4	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Wall Switch	S	93	1,980	2, 3	Relamp	Yes	4	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	44	1,366	0.2	549	0	$85	$489	$95	4.6
Room 114	4	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Wall Switch	S	93	1,980	2, 3	Relamp	Yes	4	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	44	1,366	0.2	549	0	$85	$489	$95	4.6
Room 116	4	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Wall Switch	S	93	1,980	2, 3	Relamp	Yes	4	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	44	1,366	0.2	549	0	$85	$489	$95	4.6
Room 226	5	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Wall Switch	S	93	1,980	2, 3	Relamp	Yes	5	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	44	1,366	0.2	686	0	$106	$544	$110	4.1
Room 312	6	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Wall Switch	S	93	1,980	2, 3	Relamp	Yes	6	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	44	1,366	0.3	823	0	$127	$599	$125	3.7
Room 217	6	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Wall Switch	S	93	1,980	2, 3	Relamp	Yes	6	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	44	1,366	0.3	823	0	$127	$599	$125	3.7
Room 111	6	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Wall Switch	S	93	1,980	2, 3	Relamp	Yes	6	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	44	1,366	0.3	823	0	$127	$599	$125	3.7
Room 215	7	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Wall Switch	S	93	1,980	2, 3	Relamp	Yes	7	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	44	1,366	0.3	960	0	$149	$653	$140	3.5
213 Nurse	8	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Wall Switch	S	93	1,980	2, 3	Relamp	Yes	8	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	44	1,366	0.4	1,097	0	$170	$708	$155	3.3
Room 119	8	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Wall Switch	S	93	1,980	2, 3	Relamp	Yes	8	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	44	1,366	0.4	1,097	0	$170	$708	$155	3.3
Room 121	8	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Wall Switch	S	93	1,980	2, 3	Relamp	Yes	8	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	44	1,366	0.4	1,097	0	$170	$708	$155	3.3
Room 326	9	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Wall Switch	S	93	1,980	2, 3	Relamp	Yes	9	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	44	1,366	0.4	1,235	0	$191	$763	$170	3.1
Room 322	9	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Wall Switch	S	93	1,980	2, 3	Relamp	Yes	9	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	44	1,366	0.4	1,235	0	$191	$763	$170	3.1

	Existing Conditions						Proposed Conditions								Energy Impact & Financial Analysis						
Location	Fixture Quantity	Fixture Description	Control System	Light Level	Watts per Fixture	Annual Operating Hours	ECM #	Fixture Recommendation	Add Controls?	Fixture Quantity	Fixture Description	Control System	Watts per Fixture	Annual Operating Hours	Total Peak kW Savings	Total Annual kWh Savings	Total Annual MMBtu Savings	Total Annual Energy Cost Savings	Total Installation Cost	Total Incentives	Simple Payback w/ Incentives in Years
Room 202	10	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Wall Switch	S	93	1,980	2, 3	Relamp	Yes	10	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	44	1,366	0.5	1,372	0	$212	$818	$185	3.0
Room 324	11	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Wall Switch	S	93	1,980	2, 3	Relamp	Yes	11	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	44	1,366	0.5	1,509	0	$234	$872	$200	2.9
Room 323	11	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Wall Switch	S	93	1,980	2, 3	Relamp	Yes	11	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	44	1,366	0.5	1,509	0	$234	$872	$200	2.9
Room 212	11	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Wall Switch	S	93	1,980	2, 3	Relamp	Yes	11	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	44	1,366	0.5	1,509	0	$234	$872	$200	2.9
Room 112	11	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Wall Switch	S	93	1,980	2, 3	Relamp	Yes	11	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	44	1,366	0.5	1,509	0	$234	$872	$200	2.9
Room 325	12	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Wall Switch	S	93	1,980	2, 3	Relamp	Yes	12	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	44	1,366	0.5	1,646	0	$255	$927	$215	2.8
Room 317	12	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Wall Switch	S	93	1,980	2, 3	Relamp	Yes	12	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	44	1,366	0.5	1,646	0	$255	$927	$215	2.8
Room 231	12	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Wall Switch	S	93	1,980	2, 3	Relamp	Yes	12	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	44	1,366	0.5	1,646	0	$255	$927	$215	2.8
Room 230	12	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Wall Switch	S	93	1,980	2, 3	Relamp	Yes	12	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	44	1,366	0.5	1,646	0	$255	$927	$215	2.8
Room 229	12	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Wall Switch	S	93	1,980	2, 3	Relamp	Yes	12	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	44	1,366	0.5	1,646	0	$255	$927	$215	2.8
Room 225	12	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Wall Switch	S	93	1,980	2, 3	Relamp	Yes	12	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	44	1,366	0.5	1,646	0	$255	$927	$215	2.8
Room 134	12	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Wall Switch	S	93	1,980	2, 3	Relamp	Yes	12	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	44	1,366	0.5	1,646	0	$255	$927	$215	2.8
Room 129	13	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Wall Switch	S	93	1,980	2, 3	Relamp	Yes	13	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	44	1,366	0.6	1,783	0	$276	$982	$230	2.7
Room 132	13	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Wall Switch	S	93	1,980	2, 3	Relamp	Yes	13	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	44	1,366	0.6	1,783	0	$276	$982	$230	2.7
Room 313	15	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Wall Switch	S	93	1,980	2, 3	Relamp	Yes	15	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	44	1,366	0.7	2,058	0	$319	$1,092	$260	2.6
Room 138	16	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Wall Switch	S	93	1,980	2, 3	Relamp	Yes	16	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	44	1,366	0.7	2,195	0	$340	$1,146	$275	2.6
Room 302	18	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Wall Switch	S	93	1,980	2, 3	Relamp	Yes	18	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	44	1,366	0.8	2,469	-1	$382	$1,256	$305	2.5
Custodian	1	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	S	62	1,980	2	Relamp	No	1	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	29	1,980	0.0	72	0	$11	$37	$10	2.4
Maintenance	1	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	S	62	1,980	2	Relamp	No	1	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	29	1,980	0.0	72	0	$11	$37	$10	2.4
Restroom	1	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	S	62	1,980	2	Relamp	No	1	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	29	1,980	0.0	72	0	$11	$37	$10	2.4
228 Storage	1	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	S	62	1,980	2	Relamp	No	1	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	29	1,980	0.0	72	0	$11	$37	$10	2.4
Restroom	1	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	S	62	1,980	2	Relamp	No	1	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	29	1,980	0.0	72	0	$11	$37	$10	2.4
Storage	1	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	S	62	1,980	2	Relamp	No	1	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	29	1,980	0.0	72	0	$11	$37	$10	2.4
Storage 2	1	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	S	62	1,980	2	Relamp	No	1	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	29	1,980	0.0	72	0	$11	$37	$10	2.4
Storage 3	1	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	S	62	1,980	2	Relamp	No	1	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	29	1,980	0.0	72	0	$11	$37	$10	2.4

	Existing Conditions						Proposed Conditions								Energy Impact & Financial Analysis						
Location	**Fixture Quantity**	**Fixture Description**	**Control System**	**Light Level**	**Watts per Fixture**	**Annual Operating Hours**	**ECM #**	**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**
Elevator 2	1	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	S	62	1,980	2	Relamp	No	1	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	29	1,980	0.0	72	0	$11	$37	$10	2.4
Storage	1	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	S	62	1,980	2	Relamp	No	1	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	29	1,980	0.0	72	0	$11	$37	$10	2.4
Storage	1	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	S	62	1,980	2	Relamp	No	1	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	29	1,980	0.0	72	0	$11	$37	$10	2.4
Storage	1	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	S	62	1,980	2	Relamp	No	1	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	29	1,980	0.0	72	0	$11	$37	$10	2.4
Closet	1	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	S	62	1,980	2	Relamp	No	1	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	29	1,980	0.0	72	0	$11	$37	$10	2.4
Closet	1	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	S	62	1,980	2	Relamp	No	1	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	29	1,980	0.0	72	0	$11	$37	$10	2.4
Room 134	1	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	S	62	1,980	2	Relamp	No	1	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	29	1,980	0.0	72	0	$11	$37	$10	2.4
Room 150	1	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	S	62	1,980	2	Relamp	No	1	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	29	1,980	0.0	72	0	$11	$37	$10	2.4
Women	2	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	S	62	1,980	2, 3	Relamp	Yes	2	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,366	0.1	183	0	$28	$189	$20	6.0
Girls	2	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	S	62	1,980	2, 3	Relamp	Yes	2	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,366	0.1	183	0	$28	$189	$20	6.0
Boys	2	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	S	62	1,980	2, 3	Relamp	Yes	2	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,366	0.1	183	0	$28	$189	$20	6.0
Girls	2	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	S	62	1,980	2, 3	Relamp	Yes	2	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,366	0.1	183	0	$28	$189	$20	6.0
Boys	2	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	S	62	1,980	2, 3	Relamp	Yes	2	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,366	0.1	183	0	$28	$189	$20	6.0
Restroom	2	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	S	62	1,980	2, 3	Relamp	Yes	2	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,366	0.1	183	0	$28	$189	$20	6.0
Restroom	2	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	S	62	1,980	2, 3	Relamp	Yes	2	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,366	0.1	183	0	$28	$189	$20	6.0
013 Elevator Room	2	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	S	62	1,980	2, 3	Relamp	Yes	2	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,366	0.1	183	0	$28	$189	$20	6.0
Room 139	2	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	S	62	1,980	2, 3	Relamp	Yes	2	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,366	0.1	183	0	$28	$189	$20	6.0
Room 154	2	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	S	62	1,980	2, 3	Relamp	Yes	2	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,366	0.1	183	0	$28	$189	$20	6.0
142 Mechanical Room	3	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	S	62	1,980	2, 3	Relamp	Yes	3	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,366	0.1	274	0	$42	$380	$65	7.4
310 Storage	3	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	S	62	1,980	2, 3	Relamp	Yes	3	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,366	0.1	274	0	$42	$226	$30	4.6
305 Storage	3	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	S	62	1,980	2, 3	Relamp	Yes	3	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,366	0.1	274	0	$42	$226	$30	4.6
Room 302	3	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	S	62	1,980	2, 3	Relamp	Yes	3	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,366	0.1	274	0	$42	$380	$65	7.4
Room 304	3	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	S	62	1,980	2, 3	Relamp	Yes	3	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,366	0.1	274	0	$42	$380	$65	7.4
Room 003	3	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	S	62	1,980	2, 3	Relamp	Yes	3	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,366	0.1	274	0	$42	$380	$65	7.4
Storage 007	3	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	S	62	1,980	2, 3	Relamp	Yes	3	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,366	0.1	274	0	$42	$226	$30	4.6

	Existing Conditions						Proposed Conditions								Energy Impact & Financial Analysis						
Location	Fixture Quantity	Fixture Description	Control System	Light Level	Watts per Fixture	Annual Operating Hours	ECM #	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
Boys	4	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	S	62	1,980	2, 3	Relamp	Yes	4	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,366	0.1	366	0	$57	$416	$75	6.0
Girls	4	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	S	62	1,980	2, 3	Relamp	Yes	4	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,366	0.1	366	0	$57	$416	$75	6.0
Maintenance	6	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	S	62	1,980	2, 3	Relamp	Yes	6	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,366	0.2	549	0	$85	$489	$95	4.6
Main Office	11	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	S	62	1,980	2, 3	Relamp	Yes	11	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,366	0.3	1,006	0	$156	$672	$145	3.4
153 Mech Room	12	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	S	62	1,980	2, 3	Relamp	Yes	12	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,366	0.4	1,097	0	$170	$708	$155	3.3
Basement	12	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	S	62	1,980	2, 3	Relamp	Yes	12	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,366	0.4	1,097	0	$170	$708	$155	3.3
Kitchen	14	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	S	62	1,980	2, 3	Relamp	Yes	14	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,366	0.4	1,280	0	$198	$781	$175	3.1
Room 156	16	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	S	62	1,980	2, 3	Relamp	Yes	16	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,366	0.5	1,463	0	$226	$1,124	$230	3.9
Library	28	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	S	62	1,980	2, 3	Relamp	Yes	28	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,366	0.8	2,561	-1	$396	$1,832	$385	3.7
Room 002	28	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	S	62	1,980	2, 3	Relamp	Yes	28	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,366	0.8	2,561	-1	$396	$1,832	$385	3.7
Main Office	5	Linear Fluorescent - T8: 4' T8 (32W) - 1L	Wall Switch	S	32	1,980	2, 3	Relamp	Yes	5	LED - Linear Tubes: (1) 4' Lamp	Occupancy Sensor	15	1,366	0.1	240	0	$37	$207	$25	4.9
Main Office	12	Linear Fluorescent - T8: 4' T8 (32W) - 1L	Wall Switch	S	32	1,980	2, 3	Relamp	Yes	12	LED - Linear Tubes: (1) 4' Lamp	Occupancy Sensor	15	1,366	0.2	575	0	$89	$759	$130	7.1
Elevator 1	2	Linear Fluorescent - T12: 4' T12 (40W) - 2L	Wall Switch	S	88	1,980	2	Relamp	No	2	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	29	1,980	0.1	257	0	$40	$73	$20	1.3
Kitchen	1	Exit Signs: LED - 2 W Lamp	None	S	6	8,760		None	No	1	Exit Signs: LED - 2 W Lamp	None	6	8,760	0.0	0	0	$0	$0	$0	0.0
Maintenance	1	Exit Signs: LED - 2 W Lamp	None	S	6	8,760		None	No	1	Exit Signs: LED - 2 W Lamp	None	6	8,760	0.0	0	0	$0	$0	$0	0.0
Stairs 6	1	Exit Signs: LED - 2 W Lamp	None	S	6	8,760		None	No	1	Exit Signs: LED - 2 W Lamp	None	6	8,760	0.0	0	0	$0	$0	$0	0.0
Vestibule	1	Exit Signs: LED - 2 W Lamp	None	S	6	8,760		None	No	1	Exit Signs: LED - 2 W Lamp	None	6	8,760	0.0	0	0	$0	$0	$0	0.0
Stairs 1	1	Exit Signs: LED - 2 W Lamp	None	S	6	8,760		None	No	1	Exit Signs: LED - 2 W Lamp	None	6	8,760	0.0	0	0	$0	$0	$0	0.0
Room 129	1	Exit Signs: LED - 2 W Lamp	None	S	6	8,760		None	No	1	Exit Signs: LED - 2 W Lamp	None	6	8,760	0.0	0	0	$0	$0	$0	0.0
Room 134	1	Exit Signs: LED - 2 W Lamp	None	S	6	8,760		None	No	1	Exit Signs: LED - 2 W Lamp	None	6	8,760	0.0	0	0	$0	$0	$0	0.0
Room 132	1	Exit Signs: LED - 2 W Lamp	None	S	6	8,760		None	No	1	Exit Signs: LED - 2 W Lamp	None	6	8,760	0.0	0	0	$0	$0	$0	0.0
Room 138	1	Exit Signs: LED - 2 W Lamp	None	S	6	8,760		None	No	1	Exit Signs: LED - 2 W Lamp	None	6	8,760	0.0	0	0	$0	$0	$0	0.0
Basement	1	Exit Signs: LED - 2 W Lamp	None	S	6	8,760		None	No	1	Exit Signs: LED - 2 W Lamp	None	6	8,760	0.0	0	0	$0	$0	$0	0.0
153 Mech Room	2	Exit Signs: LED - 2 W Lamp	None	S	6	8,760		None	No	2	Exit Signs: LED - 2 W Lamp	None	6	8,760	0.0	0	0	$0	$0	$0	0.0
Stairs 4	2	Exit Signs: LED - 2 W Lamp	None	S	6	8,760		None	No	2	Exit Signs: LED - 2 W Lamp	None	6	8,760	0.0	0	0	$0	$0	$0	0.0

	Existing Conditions						Proposed Conditions								Energy Impact & Financial Analysis						
Location	Fixture Quantity	Fixture Description	Control System	Light Level	Watts per Fixture	Annual Operating Hours	ECM #	Fixture Recommendation	Add Controls?	Fixture Quantity	Fixture Description	Control System	Watts per Fixture	Annual Operating Hours	Total Peak kW Savings	Total Annual kWh Savings	Total Annual MMBtu Savings	Total Annual Energy Cost Savings	Total Installation Cost	Total Incentives	Simple Payback w/ Incentives in Years
Room 002	2	Exit Signs: LED - 2 W Lamp	None	S	6	8,760		None	No	2	Exit Signs: LED - 2 W Lamp	None	6	8,760	0.0	0	0	$0	$0	$0	0.0
Stairs 2	2	Exit Signs: LED - 2 W Lamp	None	S	6	8,760		None	No	2	Exit Signs: LED - 2 W Lamp	None	6	8,760	0.0	0	0	$0	$0	$0	0.0
Hallway	2	Exit Signs: LED - 2 W Lamp	None	S	6	8,760		None	No	2	Exit Signs: LED - 2 W Lamp	None	6	8,760	0.0	0	0	$0	$0	$0	0.0
156 Stage	2	Exit Signs: LED - 2 W Lamp	None	S	6	8,760		None	No	2	Exit Signs: LED - 2 W Lamp	None	6	8,760	0.0	0	0	$0	$0	$0	0.0
Library	3	Exit Signs: LED - 2 W Lamp	None	S	6	8,760		None	No	3	Exit Signs: LED - 2 W Lamp	None	6	8,760	0.0	0	0	$0	$0	$0	0.0
2nd Fl Hall	5	Exit Signs: LED - 2 W Lamp	None	S	6	8,760		None	No	5	Exit Signs: LED - 2 W Lamp	None	6	8,760	0.0	0	0	$0	$0	$0	0.0
158 Multi Purpose Room	5	Exit Signs: LED - 2 W Lamp	None	S	6	8,760		None	No	5	Exit Signs: LED - 2 W Lamp	None	6	8,760	0.0	0	0	$0	$0	$0	0.0
3rd Fl. Hall	8	Exit Signs: LED - 2 W Lamp	None	S	6	8,760		None	No	8	Exit Signs: LED - 2 W Lamp	None	6	8,760	0.0	0	0	$0	$0	$0	0.0
1st Fl Hallway	12	Exit Signs: LED - 2 W Lamp	None	S	6	8,760		None	No	12	Exit Signs: LED - 2 W Lamp	None	6	8,760	0.0	0	0	$0	$0	$0	0.0
Library	8	Compact Fluorescent: U-type Long CFL (50W) - 3L	Wall Switch	S	150	1,980	2, 3	Relamp	Yes	8	LED - Fixtures: Other	Occupancy Sensor	105	1,366	0.4	1,351	0	$209	$408	$35	1.8
Exterior	2	Compact Fluorescent: Spiral Bulb (42W) - 1L	Photocell	S	42	4,380	2	Relamp	No	2	LED - Fixtures: Other	Photocell	29	4,380	0.0	110	0	$17	$34	$0	2.0
Library	8	Compact Fluorescent: Spiral Bulb (32W) - 1L	Wall Switch	S	32	1,980	2, 3	Relamp	Yes	8	LED - Fixtures: Other	Occupancy Sensor	22	1,366	0.1	288	0	$45	$408	$35	8.4
Room 156	16	Compact Fluorescent: CFL Floods (13W) - 2L	Wall Switch	S	26	1,980	2, 3	Relamp	Yes	16	LED - Fixtures: Other	Occupancy Sensor	18	1,366	0.2	468	0	$73	$816	$70	10.3
158 Multi Purpose Room	24	Compact Fluorescent: 4 Pin CFL (42W) - 8L	Wall Switch	S	336	1,980	2, 3	Relamp	Yes	24	LED - Fixtures: Other	Occupancy Sensor	235	1,366	3.0	9,080	-2	$1,405	$1,223	$105	0.8
Library	24	Compact Fluorescent: 4 Pin CFL (42W) - 3L	Wall Switch	S	126	1,980	2, 3	Relamp	Yes	24	LED - Fixtures: Other	Occupancy Sensor	88	1,366	1.1	3,405	-1	$527	$1,223	$105	2.1
Exterior	17	Compact Fluorescent: 4 Pin CFL (32W) - 2L	Photocell	S	64	4,380	2	Relamp	No	17	LED - Fixtures: Other	Photocell	45	4,380	0.2	1,430	0	$225	$293	$0	1.3
Boys	1	Compact Fluorescent: 4 Pin CFL (32W) - 1L	Wall Switch	S	32	1,980	2	Relamp	No	1	LED - Fixtures: Other	Wall Switch	22	1,980	0.0	21	0	$3	$17	$0	5.3
Boys	1	Compact Fluorescent: 4 Pin CFL (32W) - 1L	Wall Switch	S	32	1,980	2	Relamp	No	1	LED - Fixtures: Other	Wall Switch	22	1,980	0.0	21	0	$3	$17	$0	5.3
Restroom	1	Compact Fluorescent: 4 Pin CFL (32W) - 1L	Wall Switch	S	32	1,980	2	Relamp	No	1	LED - Fixtures: Other	Wall Switch	22	1,980	0.0	21	0	$3	$17	$0	5.3
Boys	1	Compact Fluorescent: 4 Pin CFL (32W) - 1L	Wall Switch	S	32	1,980	2	Relamp	No	1	LED - Fixtures: Other	Wall Switch	22	1,980	0.0	21	0	$3	$17	$0	5.3
Girls	1	Compact Fluorescent: 4 Pin CFL (32W) - 1L	Wall Switch	S	32	1,980	2	Relamp	No	1	LED - Fixtures: Other	Wall Switch	22	1,980	0.0	21	0	$3	$17	$0	5.3
1st Fl Hallway	1	Compact Fluorescent: 4 Pin CFL (32W) - 1L	Wall Switch	S	32	1,980	2, 4	Relamp	Yes	1	LED - Fixtures: Other	High/Low Control	22	1,366	0.0	36	0	$6	$217	$0	38.9
Girls	2	Compact Fluorescent: 4 Pin CFL (32W) - 1L	Wall Switch	S	32	1,980	2, 3	Relamp	Yes	2	LED - Fixtures: Other	Occupancy Sensor	22	1,366	0.0	72	0	$11	$150	$0	13.5
Girls	2	Compact Fluorescent: 4 Pin CFL (32W) - 1L	Wall Switch	S	32	1,980	2, 3	Relamp	Yes	2	LED - Fixtures: Other	Occupancy Sensor	22	1,366	0.0	72	0	$11	$150	$0	13.5
Exterior	4	Compact Fluorescent: 4 Pin CFL (32W) - 1L	Photocell	S	32	4,380	2	Relamp	No	4	LED - Fixtures: Other	Photocell	22	4,380	0.0	168	0	$26	$69	$0	2.6

	Existing Conditions						Proposed Conditions								Energy Impact & Financial Analysis						
Location	Fixture Quantity	Fixture Description	Control System	Light Level	Watts per Fixture	Annual Operating Hours	ECM #	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
Vestibule	4	Compact Fluorescent: 4 Pin CFL (18W) - 2L	Wall Switch	S	36	1,980	2, 3	Relamp	Yes	4	LED - Fixtures: Other	Occupancy Sensor	25	1,366	0.1	162	0	$25	$185	$0	7.4

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?**	**Remaining Useful Life**	**Annual Operating Hours**	**ECM #**	**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**
Outdoor	Cooling Tower	2	Cooling Tower Fan	7.5	88.5%	No	W	1,696	NR, 6	Yes	91.7%	Yes	2	-0.2	4,855	0	$764	$9,521	$0	12.5
Outdoor	Cooling Tower	1	Other	3.0	86.5%	No	W	1,760		No	86.5%	No		0.0	0	0	$0	$0	$0	0.0
Roof	Kitchen Hood Supply air Fan	1	Kitchen Hood Exhaust Fan	0.3	68.0%	No	W	1,760		No	68.0%	No		0.0	0	50	$0	$0	$0	0.0
Roof	Mech Room 308	1	Exhaust Fan	0.1	60.0%	No	W	1,760		No	60.0%	No		0.0	0	0	$0	$0	$0	0.0
Roof	Mech Room 308	1	Exhaust Fan	0.3	65.0%	No	W	1,760		No	65.0%	No		0.0	0	0	$0	$0	$0	0.0
Roof	Kitchen Hood	1	Exhaust Fan	1.0	82.0%	No	W	1,760		No	82.0%	No		0.0	0	0	$0	$0	$0	0.0
Roof	Dish washer hood	1	Exhaust Fan	0.1	60.0%	No	W	1,760		No	60.0%	No		0.0	0	0	$0	$0	$0	0.0
Roof	Exhaust Fan for Mech Room 153	1	Exhaust Fan	0.3	65.0%	No	W	1,760		No	65.0%	No		0.0	0	0	$0	$0	$0	0.0
Roof	Toilet Room Exhaust Fan	1	Exhaust Fan	0.3	65.0%	No	W	1,760		No	65.0%	No		0.0	0	0	$0	$0	$0	0.0
Roof	Toilet Room Exhaust Fan	1	Exhaust Fan	0.2	62.0%	No	W	1,760		No	62.0%	No		0.0	0	0	$0	$0	$0	0.0
Roof	Toilet Room Exhaust Fan	1	Exhaust Fan	0.3	65.0%	No	W	1,760		No	65.0%	No		0.0	0	0	$0	$0	$0	0.0
Roof	Toilet Room Exhaust Fan	1	Exhaust Fan	0.8	68.0%	No	W	1,760		No	68.0%	No		0.0	0	0	$0	$0	$0	0.0
Roof	Elec Room Exhaust Fan	1	Exhaust Fan	0.3	62.0%	No	W	1,760		No	62.0%	No		0.0	0	0	$0	$0	$0	0.0
Roof	Storage room Exhaust	1	Exhaust Fan	0.3	62.0%	No	W	1,760		No	62.0%	No		0.0	0	0	$0	$0	$0	0.0
Roof	Storage room 011	1	Exhaust Fan	0.3	62.0%	No	W	1,760		No	62.0%	No		0.0	0	0	$0	$0	$0	0.0
Mech Room	Boiler	1	Heating Hot Water Pump	20.0	91.0%	Yes	W	1,696		No	91.0%	No		0.0	0	0	$0	$0	$0	0.0
Mech Room	Boiler	1	Heating Hot Water Pump	20.0	91.0%	Yes	W	0		No	91.0%	No		0.0	0	0	$0	$0	$0	0.0
Mech Room	Cooling Tower	1	Condenser Water Pump	10.0	91.7%	No	W	1,696		No	91.7%	No		0.0	0	0	$0	$0	$0	0.0
Mech Room	Cooling Tower	1	Condenser Water Pump	10.0	91.7%	No	W	0		No	91.7%	No		0.0	0	0	$0	$0	$0	0.0
Mech Room	Boiler	1	Boiler Feed Water Pump	1.0	82.0%	No	W	1,373		No	82.0%	No		0.0	0	0	$0	$0	$0	0.0

		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?	Remaining Useful Life	Annual Operating Hours	ECM #	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
Mech Room	Boiler	1	Boiler Feed Water Pump	1.0	82.0%	No	W	0		No	82.0%	No		0.0	0	0	$0	$0	$0	0.0
Roof	Multi Purpose Room	1	Supply Fan	3.0	89.5%	No	W	1,373	NR, 5	Yes	89.5%	Yes	1	0.9	1,287	0	$202	$4,076	$0	20.1
Roof	Multi Purpose Room	1	Supply Fan	3.0	89.5%	No	W	1,373	NR, 5	Yes	89.5%	Yes	1	0.9	1,287	0	$202	$4,076	$0	20.1
Roof	Multi Purpose Room	1	Supply Fan	3.0	89.5%	No	W	1,373	NR, 5	Yes	89.5%	Yes	1	0.9	1,287	0	$202	$4,076	$0	20.1
Roof	Multi Purpose Room	1	Supply Fan	3.0	89.5%	No	W	1,373	NR, 5	Yes	89.5%	Yes	1	0.9	1,287	0	$202	$4,076	$0	20.1
Roof	Stage storage	1	Supply Fan	2.0	86.5%	No	W	1,373	NR, 5	Yes	86.5%	Yes	1	0.6	888	0	$140	$3,623	$0	25.9
Roof	Kitchen	1	Supply Fan	1.0	82.0%	No	W	1,373		No	82.0%	No		0.0	0	0	$0	$0	$0	0.0
Roof	Corridor	1	Supply Fan	1.0	82.0%	No	W	1,373		No	82.0%	No		0.0	0	0	$0	$0	$0	0.0
1st & 2nd Floors	Make Up Air Unit	1	Supply Fan	5.0	87.5%	No	W	1,373	NR, 5	Yes	89.5%	Yes	1	1.5	2,282	0	$359	$4,197	$775	9.5
1st,2nd & 3rd Floors	Make Up Air Unit	1	Supply Fan	5.0	87.5%	No	W	1,373	NR, 5	Yes	89.5%	Yes	1	1.5	2,282	0	$359	$4,197	$775	9.5
Music room 138	Make Up Air Unit	1	Supply Fan	1.5	84.0%	No	W	1,373	NR, 5	Yes	87.5%	Yes	1	0.5	735	0	$116	$3,391	$0	29.3
Third Floor	Make Up Air Unit	1	Supply Fan	5.0	87.5%	No	W	1,373	NR, 5	Yes	89.5%	Yes	1	1.5	2,282	0	$359	$4,197	$775	9.5
1st & 2nd Floors	Make Up Air Unit	1	Return Fan	2.0	85.5%	No	W	1,373	NR, 5	Yes	88.5%	Yes	1	0.6	953	0	$150	$3,493	$0	23.3
1st,2nd & 3rd Floors	Make Up Air Unit	1	Return Fan	3.0	89.5%	No	W	1,373	NR, 5	Yes	89.5%	Yes	1	0.9	1,287	0	$202	$4,076	$0	20.1
Music room 138	Make Up Air Unit	1	Return Fan	0.5	68.0%	No	W	1,373	NR, 5	Yes	78.2%	Yes	1	0.2	349	0	$55	$2,958	$0	53.9
Third Floor	Make Up Air Unit	1	Return Fan	1.5	84.0%	No	W	1,373	NR, 5	Yes	87.5%	Yes	1	0.5	735	0	$116	$3,391	$0	29.3
Mech Room	DCW Pump	1	Other	3.0	76.6%	No	W	880		No	76.6%	No		0.0	0	0	$0	$0	$0	0.0
Mech Room	DCW Pump	1	Other	3.0	76.6%	No	W	880		No	76.6%	No		0.0	0	0	$0	$0	$0	0.0
Mech Room	Sprinkler Pump	1	Process Pump	50.0	92.4%	No	W	440		No	92.4%	No		0.0	0	0	$0	$0	$0	0.0
Mech Room	Boiler	2	Combustion Air Fan	0.5	68.0%	No	W	1,373		No	68.0%	No		0.0	0	0	$0	$0	$0	0.0

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 (MBh)	Remaining Useful Life	ECM #	Install High Efficiency System?	System Quantity	System Type	Cooling Capacity per Unit (Tons)	Heating Capacity per Unit (MBh)	Cooling Mode Efficiency (SEER/EER)	Heating Mode Efficiency (COP)	Total Peak kW Savings	Total Annual kWh Savings	Total Annual MMBtu Savings	Total Annual Energy Cost Savings	Total Installation Cost	Total Incentives	Simple Payback w/ Incentives in Years
Room 316	HP-1	3	Water Source HP	0.58	9.20	W		No							0.0	0	0	$0	$0	$0	0.0
Room 107	HP-2	1	Water Source HP	0.67	10.65	W		No							0.0	0	0	$0	$0	$0	0.0
Various Areas	HP-3	3	Water Source HP	0.99	13.60	W		No							0.0	0	0	$0	$0	$0	0.0
Various Areas	HP-4	3	Water Source HP	1.09	16.90	W		No							0.0	0	0	$0	$0	$0	0.0
Various Areas	HP-5	3	Water Source HP	1.52	22.20	W		No							0.0	0	0	$0	$0	$0	0.0
Various Areas	HP-6	9	Water Source HP	1.98	30.30	W		No							0.0	0	0	$0	$0	$0	0.0
Various Areas	HP-7	8	Water Source HP	2.18	32.00	W		No							0.0	0	0	$0	$0	$0	0.0
Various Areas	HP-8	3	Water Source HP	3.09	46.60	W		No							0.0	0	0	$0	$0	$0	0.0
Various Areas	HP-9	9	Water Source HP	0.58	8.00	W		No							0.0	0	0	$0	$0	$0	0.0
Various Areas	HP-10	1	Water Source HP	0.60	8.00	W		No							0.0	0	0	$0	$0	$0	0.0
Various Areas	HP-11	3	Water Source HP	0.55	7.40	W		No							0.0	0	0	$0	$0	$0	0.0
Various Areas	HP-12	2	Water Source HP	0.68	10.50	W		No							0.0	0	0	$0	$0	$0	0.0
Room 201	HP-13	1	Water Source HP	0.99	13.60	W		No							0.0	0	0	$0	$0	$0	0.0
Various Areas	HP-14	5	Water Source HP	1.09	17.00	W		No							0.0	0	0	$0	$0	$0	0.0
Room 308	HP-18	2	Water Source HP	3.98	57.70	W		No							0.0	0	0	$0	$0	$0	0.0
Various Areas	HP-19	2	Water Source HP	3.81	58.20	W		No							0.0	0	0	$0	$0	$0	0.0
Room 308	HP-20	1	Water Source HP	4.72	75.60	W		No							0.0	0	0	$0	$0	$0	0.0
Room 012	HP-21	5	Water Source HP	2.83	43.10	W		No							0.0	0	0	$0	$0	$0	0.0
Roof	AC-1	1	Packaged AC	10.00		W		No							0.0	0	0	$0	$0	$0	0.0
Roof	AC-2	1	Packaged AC	10.00		W		No							0.0	0	0	$0	$0	$0	0.0

		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)	Remaining Useful Life	ECM #	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)	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	AC-3	1	Packaged AC	10.00		W		No							0.0	0	0	$0	$0	$0	0.0
Roof	AC-4	1	Packaged AC	10.00		W		No							0.0	0	0	$0	$0	$0	0.0
Roof	AC-5	1	Packaged AC	5.00		W		No							0.0	0	0	$0	$0	$0	0.0
Roof	AC-6	1	Packaged AC	8.00		W		No							0.0	0	0	$0	$0	$0	0.0
Roof	AC-7	1	Packaged AC	4.00		W		No							0.0	0	0	$0	$0	$0	0.0
Roof access room	Unit Heater	1	Electric Resistance Heat		10.24	W		No							0.0	0	0	$0	$0	$0	0.0

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)	Remaining Useful Life	ECM #	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
Mech Room	B-1 School	1	Natural Draft Steam Boiler	######	W		No						0.0	0	0	$0	$0	$0	0.0
Mech Room	B-2 School	1	Natural Draft Steam Boiler	######	W		No						0.0	0	0	$0	$0	$0	0.0
Roof	AC-1	1	Furnace	146.00	W		No						0.0	0	0	$0	$0	$0	0.0
Roof	AC-2	1	Furnace	146.00	W		No						0.0	0	0	$0	$0	$0	0.0
Roof	AC-3	1	Furnace	146.00	W		No						0.0	0	0	$0	$0	$0	0.0
Roof	AC-4	1	Furnace	146.00	W		No						0.0	0	0	$0	$0	$0	0.0
Roof	AC-5	1	Furnace	73.00	W		No						0.0	0	0	$0	$0	$0	0.0
Roof	AC-6	1	Furnace	146.00	W		No						0.0	0	0	$0	$0	$0	0.0
Roof	AC-7	1	Furnace	73.00	W		No						0.0	0	0	$0	$0	$0	0.0

DHW Inventory & Recommendations

		Existing Conditions			Proposed Conditions							Energy Impact & Financial Analysis						
Location	Area(s)/System(s) Served	System Quantity	System Type	Remaining Useful Life	ECM #	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
Mech Room	Kitchen & Restrooms	2	Storage Tank Water Heater (> 50 Gal)	W		No						0.0	0	0	$0	$0	$0	0.0

Low-Flow Device Recommendations

	Recommedation Inputs					Energy Impact & Financial Analysis						
Location	ECM #	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
Restrooms	7	11	Faucet Aerator (Lavatory)	2.20	0.50	0.0	0	31	$380	$79	$0	0.2
Restrooms	7	13	Faucet Aerator (Lavatory)	2.50	0.50	0.0	0	44	$528	$93	$0	0.2

Walk-In Cooler/Freezer Inventory & Recommendations

	Existing Conditions		Proposed Conditions				Energy Impact & Financial Analysis						
Location	Cooler/ Freezer Quantity	Case Type/Temperature	ECM #	Install EC Evaporator Fan Motors?	Install Electric Defrost Control?	Install Evaporator Fan Control?	Total Peak kW Savings	Total Annual kWh Savings	Total Annual MMBtu Savings	Total Annual Energy Cost Savings	Total Installation Cost	Total Incentives	Simple Payback w/ Incentives in Years
Kitchen	1	Cooler (35F to 55F)	8	Yes	No	No	0.0	207	0	$33	$303	$0	9.3
Kitchen	1	Low Temp Freezer (-35F to -5F)	8	Yes	No	No	0.0	207	0	$33	$303	$0	9.3

Commercial Refrigerator/Freezer Inventory & Recommendations

	Existing Conditions			Proposed Conditions		Energy Impact & Financial Analysis						
Location	Quantity	Refrigerator/ Freezer Type	ENERGY STAR Qualified?	ECM #	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	3	Stand-Up Refrigerator, Solid Door (16 - 30 cu. ft.)	Yes		No	0.0	0	0	$0	$0	$0	0.0

Cooking Equipment Inventory & Recommendations

	Existing Conditions			Proposed Conditions		Energy Impact & Financial Analysis						
Location	Quantity	Equipment Type	High Efficiency Equipement?	ECM #	Install High Efficiency Equipment?	Total Peak kW Savings	Total Annual kWh Savings	Total Annual MMBtu Savings	Total Annual Energy Cost Savings	Total Installation Cost	Total Incentives	Simple Payback w/ Incentives in Years
Kitchen	1	Insulated Food Holding Cabinet (Full Size)	No		No	0.0	0	0	$0	$0	$0	0.0
Kitchen	1	Electric Convection Oven (Full Size)	Yes		No	0.0	0	0	$0	$0	$0	0.0
Kitchen	1	Gas Combination Oven/Steam Cooker (15 - 28 Pans)	Yes		No	0.0	0	0	$0	$0	$0	0.0
Kitchen	1	Gas Griddle (3 Feet Width)	Yes		No	0.0	0	0	$0	$0	$0	0.0
Kitchen	1	Gas Steamer	Yes		No	0.0	0	0	$0	$0	$0	0.0
Kitchen	1	Insulated Food Holding Cabinet (1/2 Size)	No		No	0.0	0	0	$0	$0	$0	0.0
Kitchen	1	Insulated Food Holding Cabinet (1/2 Size)	No		No	0.0	0	0	$0	$0	$0	0.0
Kitchen	2	Insulated Food Holding Cabinet (1/2 Size)	No		No	0.0	0	0	$0	$0	$0	0.0

Dishwasher Inventory & Recommendations

	Existing Conditions					Proposed Conditions		Energy Impact & Financial Analysis						
Location	Quantity	Dishwasher Type	Water Heater Fuel Type	Booster Heater Fuel Type	ENERGY STAR Qualified?	ECM #	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	Payback w/ Incentives in Years
Kitchen	1	Single Tank Conveyor (High Temp)	Electric	Electric	Yes		No	0.0	0	0	$0	$0	$0	0.0

Plug Load Inventory

	Existing Conditions			
Location	Quantity	Equipment Description	Energy Rate (W)	ENERGY STAR Qualified?
Classrooms	73	Computer	120.0	No
Staffrooms	3	Laptop	55.0	Yes
Classrooms	20	Small Printer	46.0	Yes
Staffrooms	5	Medium Printer	55.0	Yes
Copy room	5	Copy Machine	600.0	Yes
Staffrooms	1	Paper Shredder	46.0	No
Classrooms	24	Projector	120.0	Yes
Kitchen	2	Microwave	800.0	No
Kitchen	4	Small Refrigerator	120.0	No
Pantry	2	Medium Refrigerator	145.0	Yes
Kitchen	1	Large Refrigerator	255.0	Yes
Kitchen	3	Coffee Machine	1,500.0	No
Kitchen	1	Toaster	300.0	No
Classrooms	5	CRT Tv	244.0	No
Lobby	1	Plasma Tv	150.0	No
Lobby	1	LED Tv	120.0	Yes
Staffrooms	2	Space Heater	600.0	No

Vending Machine Inventory & Recommendations

	Existing Conditions		Proposed Conditions		Energy Impact & Financial Analysis						
Location	Quantity	Vending Machine Type	ECM #	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
Lobby	1	Non-Refrigerated	9	Yes	0.0	343	0	$54	$230	$0	4.3
Lobby	1	Refrigerated	9	Yes	0.2	1,612	0	$254	$230	$0	0.9

APPENDIX B: ENERGY STAR® STATEMENT OF ENERGY PERFORMANCE

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.

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ENERGY STAR® Statement of Energy Performance

85

ENERGY STAR® Score[1]

Walter Hill School

Primary Property Type: K-12 School
Gross Floor Area (ft²): 71,374
Built: 1922

For Year Ending: January 31, 2018
Date Generated: October 22, 2018

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
Walter Hill School 1815 Kings Hwy. Swedesboro, New Jersey 08085	SWEDESBORO-WOOLWICH BOARD OF EDUCATION 15 Fredrick Boulevard Woolwich Twp, NJ 08085 (____)____-______	Christopher DeStratis 15 Fredrick Boulevard Woolwich Twp, NJ 08085 856-241-1552 x 1008 cdestratis@swsdk6.com

Property ID: 6571001

Energy Consumption and Energy Use Intensity (EUI)

Site EUI
39.3 kBtu/ft²

Annual Energy by Fuel

Natural Gas (kBtu)	1,023,837 (36%)
Electric - Grid (kBtu)	1,779,814 (64%)

Source EUI
84.9 kBtu/ft²

National Median Comparison

National Median Site EUI (kBtu/ft²)	59
National Median Source EUI (kBtu/ft²)	127.4
% Diff from National Median Source EUI	-33%

Annual Emissions

Greenhouse Gas Emissions (Metric Tons CO2e/year)	235

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)

Appendix C: Glossary

TERM	DEFINITION
Blended Rate	Used to calculate financial savings. The blended rate is calculated by dividing the amount of your bill by the total energy use. For example, if your bill is $22,217.22, and you used 266,400 kilowatt-hours, your blended rate is 8.3 cents per kilowatt-hour.
BTU	A British thermal unit is the amount of heat required to increase the temperature of one pound water by one-degree Fahrenheit. Commonly used to measure natural gas consumption.
Demand Response	Demand response reduces or shifts electricity usage at or among participating buildings/sites during peak energy use periods in response to time-based rates or other forms of financial incentives.
Energy Efficiency	Reducing the amount of energy necessary to provide comfort and service to a building/area. Achieved through the installation of new equipment and/or optimizing energy management systems.
Generation	The process of generating electric power from sources of primary energy (e.g., natural gas, the sun, oil).
HVAC	Heating, ventilation, and air conditioning.
kW	Kilowatt. Equal to 1,000 Watts.
Load	The total amount of power used by a building system at any given time.
Measure	A single activity, or installation of a single type of equipment, that is implemented in a building system to reduce total energy consumption.
MMBtu	One million British thermal units.
psig	Pounds per square inch.
Plug Load	Refers to the amount of energy used in a space by products that are powered by means of an ordinary AC plug.
Simple Payback	The amount of time needed to recoup the funds expended in an investment, or to reach the break-even point.
Temperature Setpoint	The temperature at which a temperature regulating device (thermostat, for example) has been set.
Turnkey	Provision of a complete product or service that is ready for immediate use
Watt (W)	Unit of power commonly used to measure electricity use.

Local Government Energy Audit Report

General Charles G. Harker School

March 11, 2019

Prepared for:
Swedesboro-Woolwich School District
1771 Oldmans Creek Road
Woolwich Township, NJ 08085

Prepared by:
TRC Energy Services
900 Route 9 North
Woodbridge, NJ 07095

Disclaimer

The goal of this audit report is to identify potential energy efficiency opportunities, help prioritize specific measures for implementation, and provide information about financial incentives that may be available. Most energy conservation measures have received preliminary analysis of feasibility that identifies expected ranges of savings and costs. This level of analysis is usually considered sufficient to establish a basis for further discussion and to help prioritize energy measures.

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

TRC bases estimated installation costs on our experience at similar facilities, pricing from local contractors and vendors, and/or cost estimates from RS Means. We encourage the owner of the facility is encouraged to independently confirm these cost estimates and to obtain multiple estimates when considering measure installations. Actual installation costs can vary widely based on individual 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.

The New Jersey 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. Please review all available program incentives and eligibility requirements prior to selecting and installing any energy conservation measures.

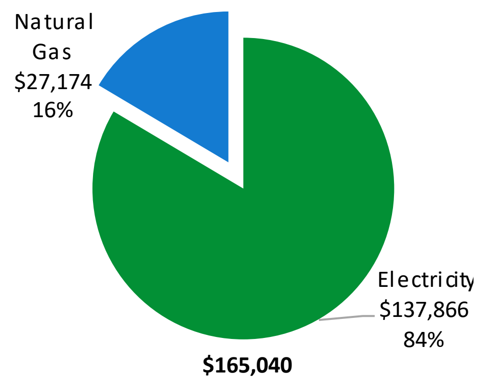
The customer and their respective contractor(s) are responsible to implement energy conservation measures in complete conformance with all applicable local, state and federal requirements.

Table of Contents

1 Executive Summary

The New Jersey Board of Public Utilities (NJBPU) has sponsored this Local Government Energy Audit (LGEA) report for General Charles G. Harker School. This report provides you with information about your facility's energy use, identifies energy conservation measures (ECMs) that can reduce your energy use, and provides information and assistance to help make changes in your facility. TRC Energy Services (TRC) conducted this study as part of a comprehensive effort to assist New Jersey school districts and local governments in controlling their energy costs and help protect our environment by reducing statewide energy consumption.

BUILDING PERFORMANCE REPORT

Annual Utilities	Costs: $165,040 Electricity: 839,136 kWh Natural Gas: 23,524 Therms	
ENERGY STAR® Benchmarking Score	81 *(1-100 scale)*	Congratulations, your building performs better than the national average. This report has suggestions about how to keep your building running efficiently, further improve performance and lower your energy bills even more.

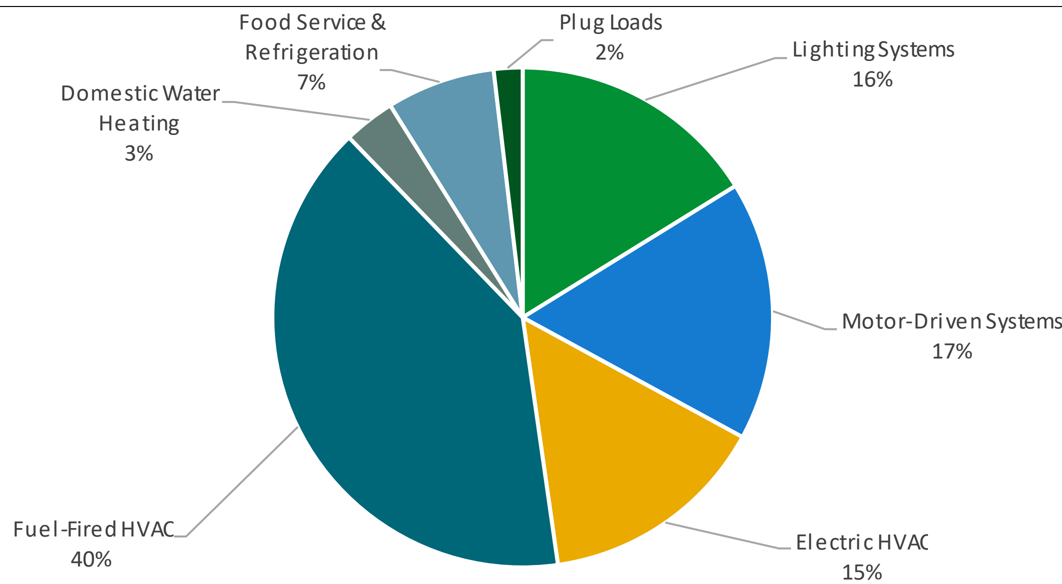


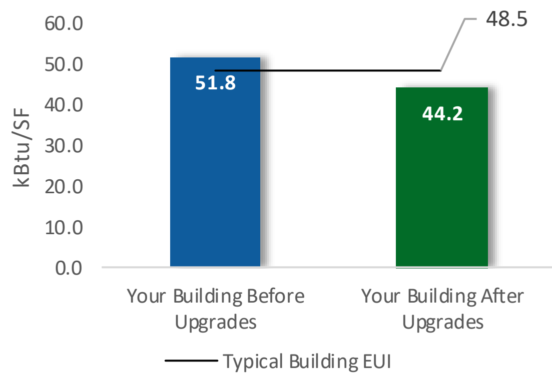
Figure 1 - Energy Use by System

POTENTIAL IMPROVEMENTS

This energy audit considered a range of potential energy improvements in your building. Costs and savings will vary between improvements. Presented below are two potential scopes of work for your consideration.

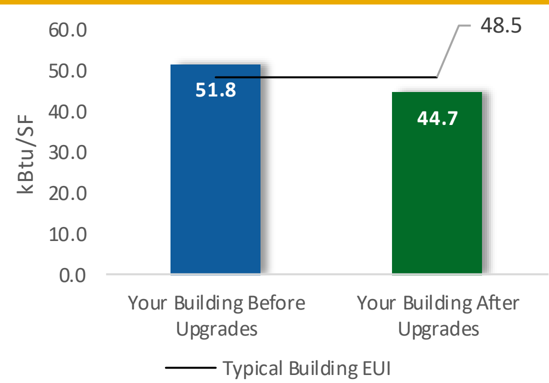
Scenario 1: Full Package (all evaluated measures)

Installation Cost	$277,431
Potential Rebates & Incentives[1]	$38,940
Annual Cost Savings	$35,557
Annual Energy Savings	Electricity: 214,615 kWh Natural Gas: 257 Therms
Greenhouse Gas Emission Savings	110 Tons
Simple Payback	6.7 Years
Site Energy Savings (all utilities)	15%



Scenario 2: Cost Effective Package[2]

Installation Cost	$207,523
Potential Rebates & Incentives	$33,515
Annual Cost Savings	$33,774
Annual Energy Savings	Electricity: 204,914 kWh Natural Gas: 93 Therms
Greenhouse Gas Emission Savings	104 Tons
Simple Payback	5.2 Years
Site Energy Savings (all utilities)	14%



On-site Generation Potential

Photovoltaic	High
Combined Heat and Power	None

[1] Incentives are based on current SmartStart Prescriptive incentives. Other program incentives may apply.

[2] A cost-effective measure is defined as one where the simple payback does not exceed two-thirds of the expected proposed equipment useful life. Simple payback is based on the net measure cost after potential incentives.

#	Energy Conservation Measure	Annual Electric Savings (kWh)	Peak Demand Savings (kW)	Annual Fuel Savings (MMBtu)	Annual Energy Cost Savings ($)	Lifetime Energy Cost Savings ($)	Estimated Install Cost ($)	Estimated Incentive ($)*	Estimated Net Cost ($)	Simple Payback Period (yrs)**	CO_2e Emissions Reduction (lbs)
Lighting Upgrades		**140,239**	**41.7**	**-23**	**$22,773**	**$341,594**	**$124,552**	**$18,210**	**$106,342**	**4.7**	**138,506**
ECM 1	Install LED Fixtures	37,909	6.2	-2	$6,207	$93,105	$65,589	$4,200	$61,389	9.9	37,959
ECM 2	Retrofit Fixtures with LED Lamps	102,330	35.5	-21	$16,566	$248,488	$58,962	$14,010	$44,952	2.7	100,547
Lighting Control Measures		**35,446**	**11.8**	**-7**	**$5,738**	**$45,904**	**$48,460**	**$13,905**	**$34,555**	**6.0**	**34,826**
ECM 3	Install Occupancy Sensor Lighting Controls	30,195	10.1	-6	$4,888	$39,103	$39,660	$5,370	$34,290	7.0	29,666
ECM 4	Install High/Low Lighting Controls	5,251	1.7	-1	$850	$6,800	$8,800	$8,535	$265	0.3	5,159
Motor Upgrades		**397**	**0.2**	**0**	**$65**	**$979**	**$11,762**	**$0**	**$11,762**	**180.2**	**400**
	Premium Efficiency Motors	397	0.2	0	$65	$979	$11,762	$0	$11,762	180.2	400
Variable Frequency Drive (VFD) Measures		**26,358**	**11.1**	**0**	**$4,331**	**$64,958**	**$33,243**	**$1,400**	**$31,843**	**7.4**	**26,542**
ECM 5	Install VFDs on Constant Volume (CV) Fans	7,773	2.8	0	$1,277	$19,155	$17,660	$1,400	$16,260	12.7	7,827
ECM 6	Install VFDs on Chilled Water Pumps	18,585	8.3	0	$3,053	$45,802	$15,583	$0	$15,583	5.1	18,715
Domestic Water Heating Upgrade		**0**	**0.0**	**40**	**$460**	**$4,604**	**$201**	**$0**	**$201**	**0.4**	**4,667**
ECM 7	Install Low-Flow DHW Devices	0	0.0	40	$460	$4,604	$201	$0	$201	0.4	4,667
Food Service & Refrigeration Measures		**12,175**	**3.3**	**16**	**$2,190**	**$24,487**	**$59,213**	**$5,425**	**$53,788**	**24.6**	**14,185**
	Food Service Equipment Replacement	4,950	2.5	16	$1,003	$12,036	$48,377	$4,975	$43,402	43.3	6,909
ECM 8	Refrigerator/Freezer Case Electrically Commutated Motors	917	0.1	0	$151	$2,261	$607	$0	$607	4.0	924
	Replace Refrigeration Equipment	4,354	0.5	0	$715	$8,584	$9,769	$450	$9,319	13.0	4,384
ECM 9	Vending Machine Control	1,954	0.2	0	$321	$1,605	$460	$0	$460	1.4	1,968
TOTALS		**214,615**	**68.2**	**26**	**$35,557**	**$482,525**	**$277,431**	**$38,940**	**$238,491**	**6.7**	**219,125**

* - All incentives presented in this table are based on NJ SmartStart 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).

Figure 2 – Evaluated Energy Improvements

1.1 Planning Your Project

Careful planning makes for a successful energy project. When considering this scope of work, you will have some decisions to make, such as:

- How will the project be funded and/or financed?
- Is it best to pursue individual ECMs, groups of ECMs, or use a comprehensive approach where all ECMs are installed together?
- Are there other facility improvements that should happen at the same time?

Pick Your Installation Approach

New Jersey Clean Energy Programs give you the flexibility to do a little or a lot. Rebates, incentives, and financing are available to help reduce both your installation costs and your energy bills. If you are planning to take advantage of these programs, make sure to review incentive program guidelines before proceeding. This is important because in most cases you will need to submit applications for the incentives before purchasing materials or starting installation.

The potential ECMs identified for this building likely qualify for multiple incentive and funding programs. Based on current program rules and requirements, your measures are likely to qualify for the following programs:

Energy Conservation Measure		SmartStart	Direct Install	Pay For Performance
ECM 1	Install LED Fixtures	X		X
ECM 2	Retrofit Fixtures with LED Lamps	X		X
ECM 3	Install Occupancy Sensor Lighting Controls	X		X
ECM 4	Install High/Low Lighting Controls			X
ECM 5	Install VFDs on Constant Volume (CV) HVAC	X		X
ECM 6	Install VFDs on Chilled Water Pumps			X
ECM 7	Install Low-Flow Domestic Hot Water Devices			X
ECM 8	Refrigerator/Freezer Case Electrically Commutated Motors			X
ECM 9	Vending Machine Control			X

Figure 3 – Funding Options

New Jersey Clean Energy Programs At-A-Glance

	SmartStart Flexibility to install at your own pace	**Direct Install** Turnkey installation	**Pay for Performance** Whole building upgrades
Who should use it?	Buildings installing individual measures or small group of measures.	Small to mid-size facilities that can bundle multiple measures together. Peak demand should be below 200 kW. Not suitable for significant building shell issues.	Mid to large size facilities looking to implement as many measures as possible at one time. Peak demand should be over 200 kW.
How does it work?	Use in-house staff or your preferred contractor.	Pre-approved contractors pass savings along to you via reduced material and labor costs.	Whole-building approach to energy upgrades designed to reduce energy use by at least 15%. The more you save, the higher the incentives.
What are the Incentives?	Fixed incentives for specific energy efficiency measures.	Incentives pay up to 70% of eligible costs, up to $125,000 per project. You pay the remaining 30% directly to the contractor.	Up to 25% of installation cost, calculated based on level of energy savings per square foot.
How do I participate?	Submit an application for the specific equipment to be installed.	Contact a participating contractor in your region.	Contact a pre-qualified Partner to develop your Energy Reduction Plan and set your energy savings targets.

Take the next step by visiting **www.njcleanenergy.com** for program details, applications, and to contact a qualified contractor.

Individual Measures with SmartStart

For facilities wishing 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, you can use internal resources or an outside firm or contractor to perform the final design of the ECM(s) and install the equipment. Program pre-approval is required for some SmartStart incentives, so only after receiving pre-approval should you proceed with ECM installation.

Turnkey Installation with Direct Install

The Direct Install program provides 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. Direct Install contractors will assess and verify individual measure eligibility, and, in most cases, they perform the installation work. The Direct Install program is available to sites with an average peak demand of less than 200 kW.

Whole Building Approach with Pay for Performance

Pay for Performance can be a good option for medium to large sized facilities to achieve deep energy savings. Pay for Performance allows you to install as many measures as possible under a single project as well as address measures that may not qualify for other programs. Many facilities pursuing an Energy Savings Improvement Program (ESIP) loan also use this program. Pay for Performance works for larger customers with a peak demand over 200 kW. 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.

More Options from Around the State

Financing and Planning Support with the Energy Savings Improvement Program (ESIP)

For larger facilities with limited capital availability to implement ECMs, project financing may be available through the 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. You have already taken the first step as an LGEA customer, because this report is required to participate in ESIP.

Resiliency with Return on Investment through Combined Heat & Power (CHP)

The CHP program provides incentives for combined heat and power (aka cogeneration) and waste heat to power projects. Combined heat and power systems generate power on-site and recover heat from the generation system to meet on-site thermal loads. Waste heat to power systems use waste heat to generate power. You will work with a qualified developer who will design a system that meets your building's heating and cooling needs.

Ongoing Electric Savings with Demand Response

The Demand Response Energy Aggregator program reduces 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. By enabling commercial facilities to reduce their electric demand 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 demand response (DR) programs. Program participation is voluntary, and facilities receive payments regardless of whether they are called upon to curtail their load during times of peak demand.

2 Existing Conditions

The New Jersey Board of Public Utilities (NJBPU) has sponsored this Local Government Energy Audit (LGEA) Report for General Charles G. Harker School. This report provides information on how your facility uses energy, identifies energy conservation measures (ECMs) that can reduce your energy use, and provides information and assistance to help you implement the ECMs. This report also contains valuable information on financial incentives from New Jersey's Clean Energy Program (NJCEP) for implementing ECMs.

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

2.1 Site Overview

On August 22, 2018, TRC performed an energy audit at General Charles G. Harker School located in Woolwich Township, NJ. TRC met with Anthony Tobin, Facility Representative to review the facility operations and help focus our investigation on specific energy-using systems.

General Charles G. Harker School is a one-story, 100,748 square foot building built in 2008. Spaces include: classrooms, gymnasium, cafeteria/auditorium, main office, media center, corridors, staffrooms, nurses office, a commercial kitchen and mechanical room.

Facility concerns include: high energy use, heat load and high electric bills.

2.2 Building Occupancy

The school is occupied ten months a year from September through June, however, the facility operates year-round for maintenance and cleaning in summer. Typical weekday occupancy is 50 staff and 655 students. There are no weekend activities.

Building Name	Weekday/Weekend	Operating Schedule
General Charles G. Harker School	Weekday	7:00 AM - 4:00 PM
	Weekend	Unoccupied

Figure 4 - Building Occupancy Schedule

2.3 Building Envelope

Building walls are made of brick over structural steel and the entrance area is made of concrete blocks. The walls are made of concrete masonry units (CMUs) with a brick veneer and gypsum drywall interior finish.

The roof is flat and covered with a black membrane, and it is in good condition. The flat roof is supported with steel trusses and a reinforced concrete deck and finished with an insulated layer and a covering of EPDM.

Most of the windows are double glazed with low-e glass and have aluminum thermal break frames. The glass-to-frame seals are in good condition. The operable window weather seals are in good condition, showing little evidence of excessive wear. Exterior doors have aluminum frames and are in good condition with undamaged door seals.

Image 1 Building exterior

Image 2 Building roof

Image 3 Building surroundings

Image 4 Black membrane on roof

2.4 Lighting Systems

The primary interior lighting system uses 32-Watt linear fluorescent T8 lamps. There are also several 28-Watt T5 fixtures. Additionally, there are some compact fluorescent lamps (CFL), incandescent and halogen general purpose lamps. Typically, T8 fluorescent lamps use electronic ballasts.

Fixture types include 2- 3- or 4-lamp, 2- or 4-foot long troffer mounted fixtures and 2-foot fixtures with U-bend and linear tube lamps. Most fixtures are in good condition.

Gymnasium fixtures have high bay 42-Watt CFL lamps and are manually controlled. Library fixtures have high output (HO) linear fluorescent 28-Watt T5 lamps and are controlled by occupancy sensors. All exit signs are LED.

Cafeteria fixtures have 2 and 4-foot long T8 surface mounted fixtures and controlled manually. Lighting fixtures in hallway consist of linear fluorescent, U-bend fluorescent and CFL lamps and are manually controlled. Interior lighting levels were generally sufficient.

Most lighting fixtures are controlled manually and the remainder by occupancy sensors.

Exterior fixtures include wall packs with 150-Watt and 175-Watt metal halide lamps and canopy mounted CFL lamps. Exterior light fixtures are controlled by photocell.

Image 5 Sample CFL lamp

Image 6 Sample bulb

Image 7 Sample 65-Watt incandescent lamp

Image 8 Sample 60-Watt incandescent lamp

2.5 Air Handling Systems

Packaged Units

The school is served by six York packaged roof top units (RTUs) with cooling capacity ranging from 4 to 12.5-tons. There are six gas-fired furnace units ranging in size from 100 to 192 MBh. These units are not equipped with economizers. They are in good condition.

Two McQuay packaged units with cooling capacity of 25-ton and 40-ton are equipped with gas-fired furnaces which have a heating capacity of 75 and 100 MBh respectively. Both units are rated 10.30 EER.

Refer to Appendix A for detailed information about each unit.

Air Conditioners

Staff rooms use three Mitsubishi ductless mini-split air conditioning (AC) units. These vary in capacity between 1 and 3 tons. The units are in good condition. They have an efficiency of 11.90 EER. They are ENERGY STAR® labeled.

The HVAC system is controlled by the energy management system (EMS) located in the maintenance office. HVAC System operates daily 6:00 AM to 4:00 PM from Monday to Friday only.

Image 9 AHUs on roof

Image 10 AHU controls

Image 11 Split system condensing unit

Image 12 RTU nameplate

2.6 Heating Hot Water Systems

Three Fulton 1800 MBh condensing hot water boilers serve the building heating load. The burners are non-modulating with a nominal efficiency of 90%. The boilers are configured in a control scheme. Only one boiler is required under high load conditions. Installed in 2008, they are in good condition. There is a service contract in place.

The boilers are configured in a variable flow primary distribution with two 25 hp, VFD-controlled hot water pumps operating with a lead-lag control scheme. The boilers provide hot water to fan coil units throughout the building.

Hot water is supplied at 120°F when the outside air temperature is low, and the setpoint is adjusted linearly to 72°F when the outside air is above 50°F. The hot water return temperature is typically 86°F. The system is locked out at an outside temperature of 72°F.

Image 13 Heating hot water pumps

Image 14 VFDs for heating hot water pumps

Image 15 Boiler plant

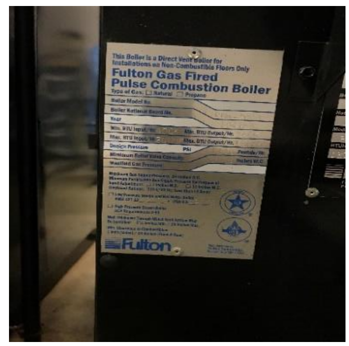


Image 16 Boiler nameplate

2.7 Chilled Water Systems

The chiller plant consists of a two 145-ton, McQuay, R-22, air-cooled screw chillers (CH1 and CH2). The chillers are configured in a primary- secondary distribution loop with three constant flow primary pumps (CHW-4, 5, and 6) and two 15-hp variable flow secondary pumps (CHW-1 and 2). Variable frequency drives control the secondary distribution pumps.

The chilled water supply temperature is reset based on outside air temperature. Chilled water is distributed at 42°F when the outside air temperature is above 60°F and the setpoint is reset to 50°F when the outside air is below 55°F. The chiller plant is locked out when the outside air temperature is below 45°F, and it is turned off from mid-December through February.

The chiller plant supplies chilled water to air handlers one to five (AHUs), and two energy recovery units (HRU-1 & 2). The chiller plant has a peak load of 300 tons. The chiller plant is ten years old but is well maintained and controlled by the building EMS.

Image 17 Chiller 1 on roof

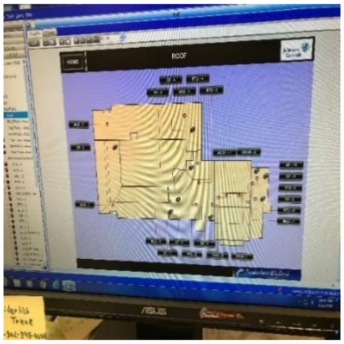
Image 18 Chiller 2 on roof

Image 19 Primary chilled water pumps

Image 20 Secondary chilled water pumps

2.8 Building Energy Management Systems (EMS)

A Johnson Controls EMS controls the HVAC equipment, the boilers, the chillers, the air handlers and the package units. The EMS provides equipment scheduling control and monitors and controls space temperatures, supply air temperatures, humidity, heating water loop temperatures and chilled water loop temperatures.



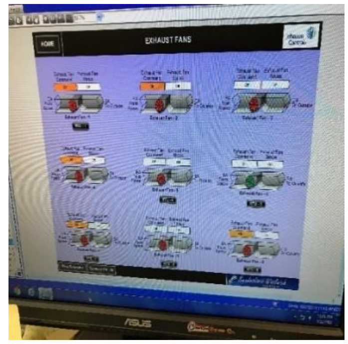
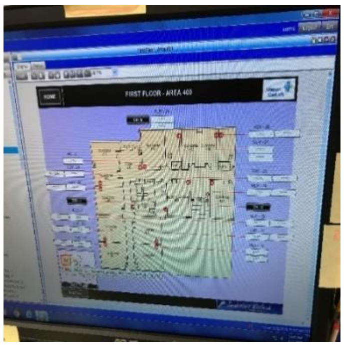


Image 21 Setpoints in EMS

Image 22 Exhaust fan graphics



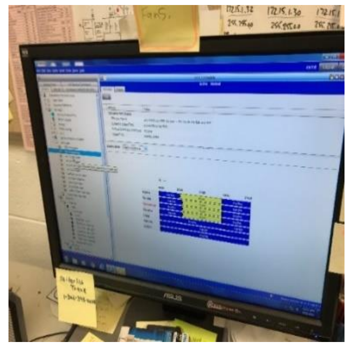


Image 23 School layout in EMS

Image 24 Equipment schedule

2.9 Domestic Hot Water

Hot water is produced with a 500 MBH, gas-fired, tankless condensing water heater with a nominal thermal efficiency of 80%. At the time of the site visit, the domestic water heaters were set at 120°F.

The domestic hot water pipes are insulated, and the insulation is in good condition.

There are three 7.5 hp domestic cold-water (DCW) pumps used to provide cold water to the kitchen and restrooms.

Image 25 Tankless hot water heater

Image 26 DHW nameplate

2.10 Food Service Equipment

The kitchen has mixed gas and electric equipment that is used to prepare lunches for students. Most cooking is done using three electric ovens. Bulk prepared foods are held in six electric holding cabinets. Equipment is not high efficiency and is in good condition. There is a gas steamer and gas griddle to grill vegetables and boiled food.

The dishwasher is an ENERGY STAR® high temperature, single tank conveyor type unit with electric booster heater.

Visit https://www.energystar.gov/products/commercial_food_service_equipment for the latest information on high efficiency food service equipment.

Image 27 Electric convection ovens

Image 28 Food warmers

Image 29 Gas griddle

Image 30 Gas steamer

2.11 Refrigeration

The kitchen has two stand-up refrigerators with glass doors, two stand-up freezers with glass doors, two chest-type freezer units for ice cream storage and two chest-type refrigerator units. All equipment is standard efficiency and in good condition.

The walk-in refrigerator has an estimated 1-ton compressor located on roof and a fan evaporator with evaporator fan and electric defrost control.

The walk-in low temperature freezer has a 2-ton compressor located on roof and an evaporator fan with evaporator fan control.

Visit https://www.energystar.gov/products/commercial_food_service_equipment for the latest information on high efficiency food service equipment.

Image 31 Walk in freezer

Image 32 Stand up refrigerator

Image 33 Condensing units on roof

Image 34 Stand up refrigerator

2.12 Plug Load & Vending Machines

The utility bill analysis indicates that plug loads consume approximately 1.86% of total building energy use. This is lower than a typical building.

You seem to already be doing a great job managing your electrical plug loads. This report makes additional suggestions for ECMs in this area as well as energy efficient best practices.

There are 115 computer work stations throughout the facility. Plug loads throughout the building include general café and office equipment. There are classroom typical loads such as smart boards, projectors, and printers.

There are several residential-style refrigerators throughout the building that are used to store staff lunches and cold beverage for teachers' events. These vary in condition and efficiency.

There is one refrigerated beverage vending machine and one non-refrigerated vending machine. Vending machines are not equipped with occupancy-based controls.

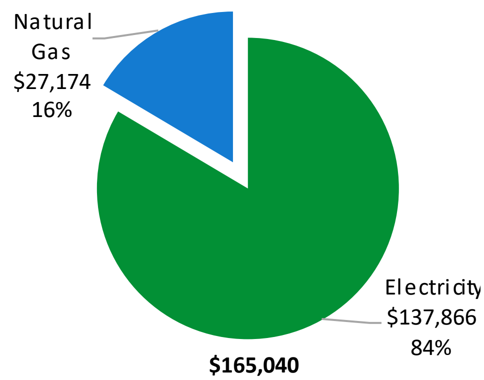
2.13 Water-Using Systems

There are 12 restrooms with toilets, urinals, and sinks. Faucet flow rates are at 2.2 gallons per minute (gpm) or higher. Toilets are rated at 2.5 gallons per flush (gpf) and urinals are rated at 2.2 gpf.

3 Energy Use and Costs

Twelve months of utility billing data are used to develop annual energy consumption and cost data. This information creates a profile of the annual energy consumption and energy costs.

Utility Summary		
Fuel	**Usage**	**Cost**
Electricity	839,136 kWh	$137,866
Natural Gas	23,524 Therms	$27,174
Total		**$165,040**



An energy balance identifies and quantifies energy use in your various building systems. This can highlight areas with the most potential for improvement. This energy balance was developed using calculated energy use for each of the end uses noted in the figure.

The energy auditor collects information regarding equipment operating hours, capacity, efficiency and other operational parameters from facility staff, drawings, and on-site observations. This information is used as the inputs to calculate the existing conditions energy use for the site. The calculated energy use is then compared to the historical energy use and the initial inputs are revised, as necessary, to balance the calculated energy use to the historical energy use.

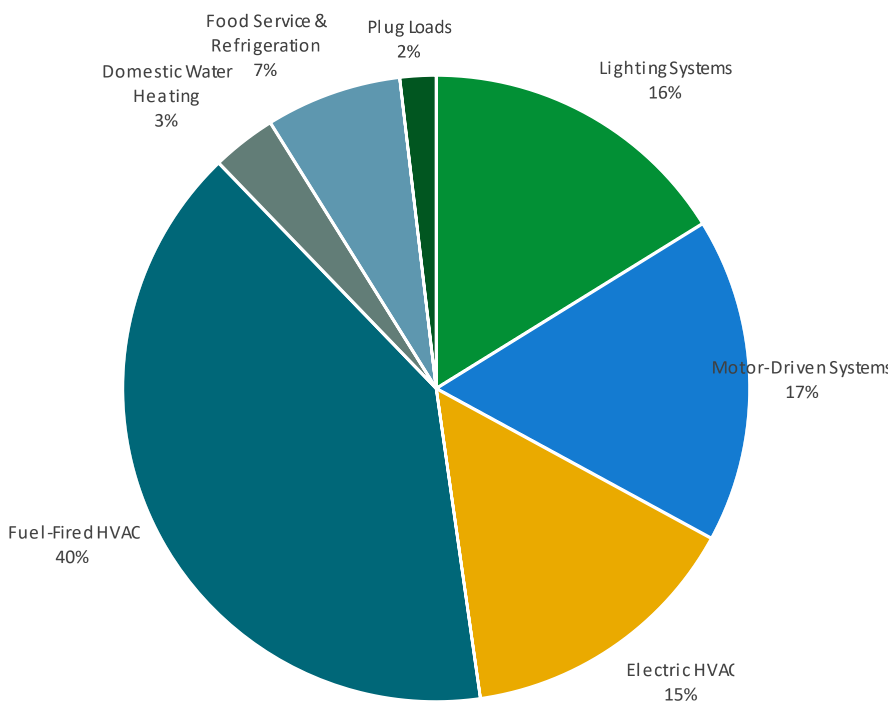
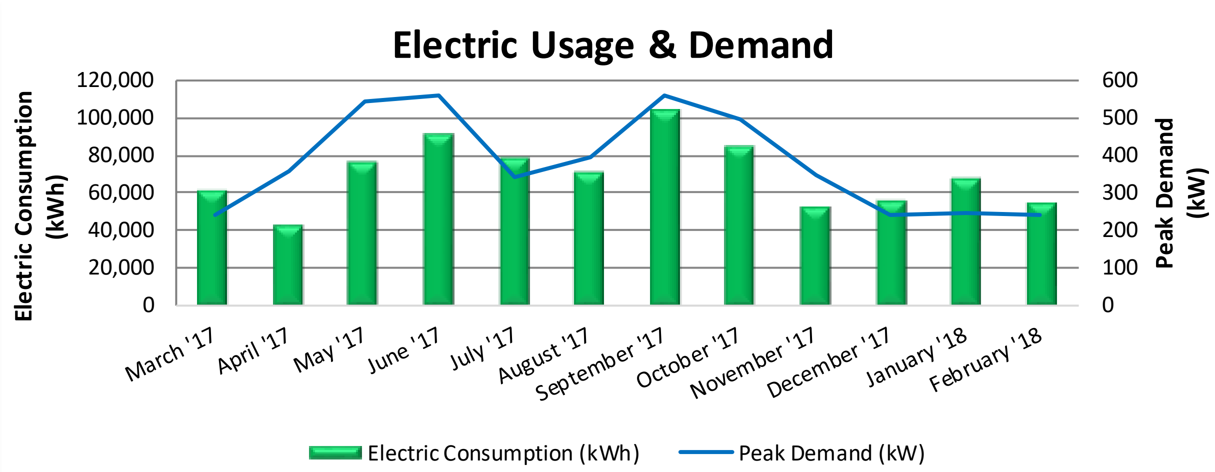


Figure 5 - Energy Balance

3.1 Electricity

Atlantic City Electric delivers electricity under rate class annual general service secondary.



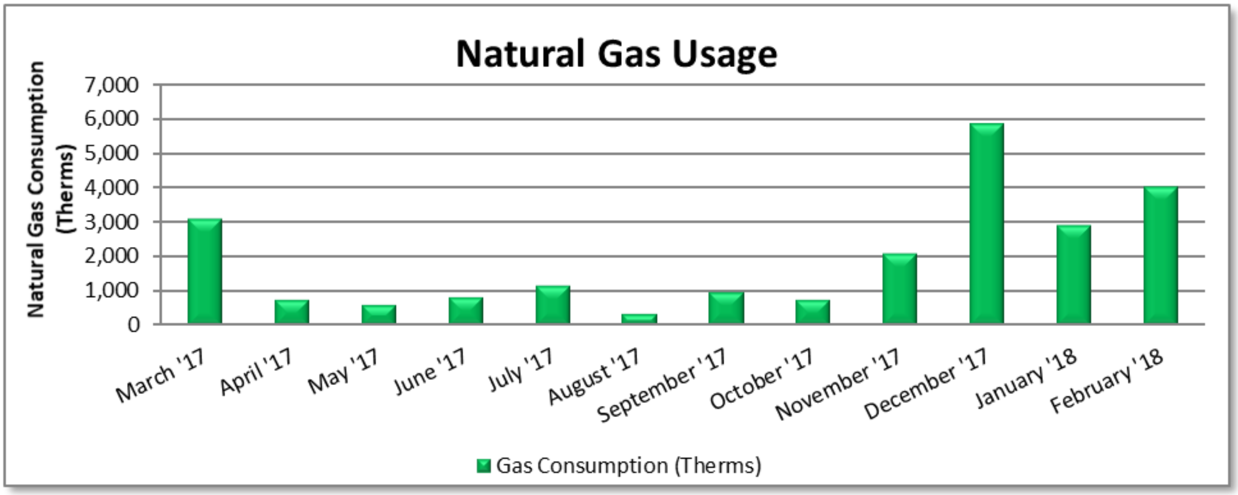
Electric Billing Data					
Period Ending	**Days in Period**	**Electric Usage (kWh)**	**Demand (kW)**	**Demand Cost**	**Total Electric Cost**
3/30/17	30	60,912	239	$4,131	$11,288
4/27/17	28	42,557	359	$3,732	$8,842
5/30/17	33	75,857	544	$5,281	$14,199
6/29/17	30	90,911	558	$4,923	$13,450
7/30/17	31	78,391	341	$4,131	$11,520
8/30/17	31	70,589	394	$4,131	$10,712
9/28/17	29	103,529	558	$4,759	$14,847
10/30/17	32	84,371	496	$5,137	$13,091
11/29/17	30	52,420	347	$4,363	$9,208
12/28/17	29	55,204	240	$4,217	$9,294
1/30/18	33	67,582	244	$4,790	$11,513
2/27/18	28	54,514	241	$4,064	$9,525
Totals	**364**	**836,837**	**558**	**$53,659**	**$137,489**
Annual	**365**	**839,136**	**558**	**$53,807**	**$137,866**

Notes:

- Peak demand of 558 kW occurred in September 2017.
- The average electric cost over the past 12 months was $0.164/kWh, which is the blended rate that includes energy supply, distribution, demand, and other charges. This report uses this blended rate to estimate energy cost savings.

3.2 Natural Gas

South Jersey Gas delivers natural gas under rate class General Service, with natural gas supply provided by South Jersey Energy, a third-party supplier.



Gas Billing Data				
Period Ending	Days in Period	Natural Gas Usage (Therms)	Natural Gas Cost	TRC Estimated Usage?
4/5/17	30	3,106	$3,114	No
5/4/17	29	744	$827	No
6/5/17	32	598	$680	No
7/6/17	31	840	$901	Yes
8/4/17	29	1,180	$1,292	No
9/7/17	34	343	$421	No
10/4/17	27	973	$1,063	No
11/6/17	33	765	$885	Yes
12/5/17	29	2,095	$2,521	Yes
1/8/18	34	5,874	$7,010	No
2/7/18	30	2,947	$3,543	No
3/6/18	27	4,060	$4,917	No
Totals	**365**	**23,524**	**$27,174**	
Annual	**365**	**23,524**	**$27,174**	

Notes:

- The average gas cost for the past 12 months is $1.155/therm, which is the blended rate used throughout the analysis.

3.3 Benchmarking

Your building was benchmarked using the United States Environmental Protection Agency's (EPA) *Portfolio Manager®* software. Benchmarking compares your building's energy use to that of similar buildings across the county, while neutralizing variations due to location, occupancy and operating hours. Some building types can be scored with a 1-100 ranking of a building's energy performance relative to the national building market. A score of 50 represents the national average and a score of 100 is best.

This ENERGY STAR® benchmarking score provides a comprehensive snapshot of your building's energy performance. It assesses the building's physical assets, operations, and occupant behavior, which is compiled into a quick and easy-to-understand score.

Benchmarking Score	81

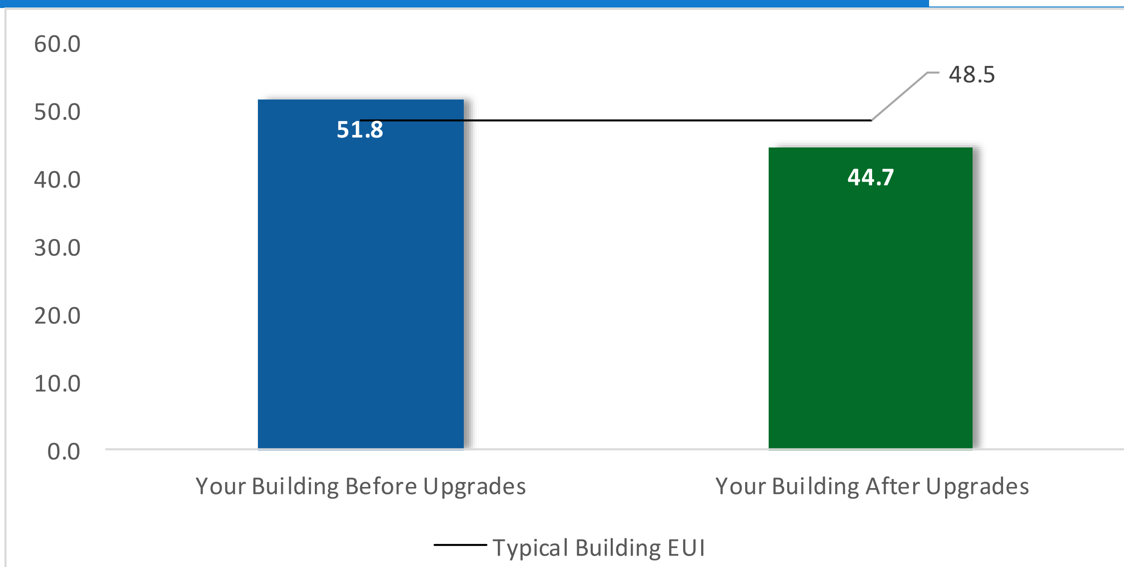


Figure 6 - Energy Use Intensity Comparison

Congratulations, your building performs better than the national average. This report has suggestions about how to keep your building running efficiently, further improve performance, and lower your energy bills even more.

Energy use intensity (EUI) measures energy consumption per square foot and is the standard metric for comparing buildings' energy performance. A lower EUI means better performance and less energy consumed. A number of factors can cause as building to vary from the "typical" energy usage. Local weather conditions, building age and insulation levels, equipment efficiency, daily occupancy hours, changes in occupancy throughout the year, equipment operating hours, and occupant behavior all contribute to a building's energy use and the benchmarking score.

Tracking Your Energy Performance

Keeping track of your energy use on a monthly basis is one of the best ways to keep energy costs in check. Update your utility information in Portfolio Manager® regularly, so that you can keep track of your building's performance.

We have created a Portfolio Manager® account for your facility and we have already entered the monthly utility data shown above for you. Account login information for your account will be sent via email.

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.

For more information on ENERGY STAR® and Portfolio Manager®, visit their website.[3]

[3] https://www.energystar.gov/buildings/facility-owners-and-managers/existing-buildings/earn-recognition/energy-star-certification/how-app-1.

4 Energy Conservation Measures

The goal of this audit report is to identify and evaluate potential energy efficiency improvements, provide information about the cost effectiveness of those improvements, and recognize potential financial incentives from NJBPU. Most energy conservation measures have received preliminary analysis of feasibility which identifies expected ranges of savings and costs. This level of analysis is typically sufficient to demonstrate project cost-effectiveness and help prioritize energy measures.

Calculations of energy use and savings are based on the current version of the *New Jersey Clean Energy Program Protocols to Measure Resource Savings*, which is approved by the NJBPU. Further analysis or investigation may be required to calculate more precise savings based on specific circumstances.

Operation and maintenance costs for the proposed new equipment will generally be lower than the current costs for the existing equipment—especially if the existing equipment is at or past its normal useful life. We have conservatively assumed there to be no impact on overall maintenance costs over the life of the equipment.

Financial incentives are based on the current NJCEP prescriptive SmartStart program. A higher level of investigation may be necessary to support any SmartStart Custom, Pay for Performance, or Direct Install incentive applications. Some measures and proposed upgrades may be eligible for higher incentives than those shown below through other NJCEP programs described in a following section of this report.

Appendix A: Equipment Inventory & Recommendations provides a detailed list of the locations and recommended upgrades for each energy conservation measure.

#	Energy Conservation Measure	Annual Electric Savings (kWh)	Peak Demand Savings (kW)	Annual Fuel Savings (MMBtu)	Annual Energy Cost Savings ($)	Lifetime Energy Cost Savings ($)	Estimated Install Cost ($)	Estimated Incentive ($)*	Estimated Net Cost ($)	Simple Payback Period (yrs)**	CO_2e Emissions Reduction (lbs)
Lighting Upgrades		**140,239**	**41.7**	**-23**	**$22,773**	**$341,594**	**$124,552**	**$18,210**	**$106,342**	**4.7**	**138,506**
ECM 1	Install LED Fixtures	37,909	6.2	-2	$6,207	$93,105	$65,589	$4,200	$61,389	9.9	37,959
ECM 2	Retrofit Fixtures with LED Lamps	102,330	35.5	-21	$16,566	$248,488	$58,962	$14,010	$44,952	2.7	100,547
Lighting Control Measures		**35,446**	**11.8**	**-7**	**$5,738**	**$45,904**	**$48,460**	**$13,905**	**$34,555**	**6.0**	**34,826**
ECM 3	Install Occupancy Sensor Lighting Controls	30,195	10.1	-6	$4,888	$39,103	$39,660	$5,370	$34,290	7.0	29,666
ECM 4	Install High/Low Lighting Controls	5,251	1.7	-1	$850	$6,800	$8,800	$8,535	$265	0.3	5,159
Motor Upgrades		**397**	**0.2**	**0**	**$65**	**$979**	**$11,762**	**$0**	**$11,762**	**180.2**	**400**
	Premium Efficiency Motors	397	0.2	0	$65	$979	$11,762	$0	$11,762	180.2	400
Variable Frequency Drive (VFD) Measures		**26,358**	**11.1**	**0**	**$4,331**	**$64,958**	**$33,243**	**$1,400**	**$31,843**	**7.4**	**26,542**
ECM 5	Install VFDs on Constant Volume (CV) Fans	7,773	2.8	0	$1,277	$19,155	$17,660	$1,400	$16,260	12.7	7,827
ECM 6	Install VFDs on Chilled Water Pumps	18,585	8.3	0	$3,053	$45,802	$15,583	$0	$15,583	5.1	18,715
Domestic Water Heating Upgrade		**0**	**0.0**	**40**	**$460**	**$4,604**	**$201**	**$0**	**$201**	**0.4**	**4,667**
ECM 7	Install Low-Flow DHW Devices	0	0.0	40	$460	$4,604	$201	$0	$201	0.4	4,667
Food Service & Refrigeration Measures		**12,175**	**3.3**	**16**	**$2,190**	**$24,487**	**$59,213**	**$5,425**	**$53,788**	**24.6**	**14,185**
	Food Service Equipment Replacement	4,950	2.5	16	$1,003	$12,036	$48,377	$4,975	$43,402	43.3	6,909
ECM 8	Refrigerator/Freezer Case Electrically Commutated Motors	917	0.1	0	$151	$2,261	$607	$0	$607	4.0	924
	Replace Refrigeration Equipment	4,354	0.5	0	$715	$8,584	$9,769	$450	$9,319	13.0	4,384
ECM 9	Vending Machine Control	1,954	0.2	0	$321	$1,605	$460	$0	$460	1.4	1,968
TOTALS		**214,615**	**68.2**	**26**	**$35,557**	**$482,525**	**$277,431**	**$38,940**	**$238,491**	**6.7**	**219,125**

* - All incentives presented in this table are based on NJ SmartStart 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).

Figure 7 – All Evaluated ECMs

#	Energy Conservation Measure	Annual Electric Savings (kWh)	Peak Demand Savings (kW)	Annual Fuel Savings (MMBtu)	Annual Energy Cost Savings ($)	Lifetime Energy Cost Savings ($)	Estimated Install Cost ($)	Estimated Incentive ($)*	Estimated Net Cost ($)	Simple Payback Period (yrs)**	CO_2e Emissions Reduction (lbs)
Lighting Upgrades		**140,239**	**41.7**	**-23**	**$22,773**	**$341,594**	**$124,552**	**$18,210**	**$106,342**	**4.7**	**138,506**
ECM 1	Install LED Fixtures	37,909	6.2	-2	$6,207	$93,105	$65,589	$4,200	$61,389	9.9	37,959
ECM 2	Retrofit Fixtures with LED Lamps	102,330	35.5	-21	$16,566	$248,488	$58,962	$14,010	$44,952	2.7	100,547
Lighting Control Measures		**35,446**	**11.8**	**-7**	**$5,738**	**$45,904**	**$48,460**	**$13,905**	**$34,555**	**6.0**	**34,826**
ECM 3	Install Occupancy Sensor Lighting Controls	30,195	10.1	-6	$4,888	$39,103	$39,660	$5,370	$34,290	7.0	29,666
ECM 4	Install High/Low Lighting Controls	5,251	1.7	-1	$850	$6,800	$8,800	$8,535	$265	0.3	5,159
Variable Frequency Drive (VFD) Measures		**26,358**	**11.1**	**0**	**$4,331**	**$64,958**	**$33,243**	**$1,400**	**$31,843**	**7.4**	**26,542**
ECM 5	Install VFDs on Constant Volume (CV) Fans	7,773	2.8	0	$1,277	$19,155	$17,660	$1,400	$16,260	12.7	7,827
ECM 6	Install VFDs on Chilled Water Pumps	18,585	8.3	0	$3,053	$45,802	$15,583	$0	$15,583	5.1	18,715
Domestic Water Heating Upgrade		**0**	**0.0**	**40**	**$460**	**$4,604**	**$201**	**$0**	**$201**	**0.4**	**4,667**
ECM 7	Install Low-Flow DHW Devices	0	0.0	40	$460	$4,604	$201	$0	$201	0.4	4,667
Food Service & Refrigeration Measures		**12,175**	**3.3**	**16**	**$2,190**	**$24,487**	**$59,213**	**$5,425**	**$53,788**	**24.6**	**14,185**
ECM 8	Refrigerator/Freezer Case Electrically Commutated Motors	917	0.1	0	$151	$2,261	$607	$0	$607	4.0	924
ECM 9	Vending Machine Control	1,954	0.2	0	$321	$1,605	$460	$0	$460	1.4	1,968
TOTALS		**214,615**	**68.2**	**26**	**$35,557**	**$482,525**	**$277,431**	**$38,940**	**$238,491**	**6.7**	**219,125**

* - All incentives presented in this table are based on NJ SmartStart 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).

Figure 8 – Cost Effective ECMs

4.1 Lighting

#	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		**140,239**	**41.7**	**-23**	**$22,773**	**$124,552**	**$18,210**	**$106,342**	**4.7**	**138,506**
ECM 1	Install LED Fixtures	37,909	6.2	-2	$6,207	$65,589	$4,200	$61,389	9.9	37,959
ECM 2	Retrofit Fixtures with LED Lamps	102,330	35.5	-21	$16,566	$58,962	$14,010	$44,952	2.7	100,547

When considering lighting upgrades, we suggest using a comprehensive design approach that simultaneously upgrades lighting fixtures and controls to maximize energy savings and improve occupant lighting. Comprehensive design will also consider appropriate lighting levels for different space types to make sure that the right amount of light is delivered where needed. If conversion to LED light sources are proposed, we suggest converting all of a specific lighting type (e.g. linear fluorescent) to LED lamps to minimize the number of lamp types in use at the facility, which should help reduce future maintenance costs.

ECM 1: Install LED Fixtures

Replace existing fixtures containing halogen, incandescent and metal halide lamps with new LED light fixtures. This measure saves energy by installing LEDs which use less power than other technologies with a comparable light output.

In some cases, HID fixtures can be retrofitted with screw-based LED lamps. Replacing an existing HID fixture with a new LED fixture will generally provide better overall lighting optics; however, replacing the HID lamp with a LED screw-in lamp is typically a less expensive retrofit. We recommend you work with your lighting contractor to determine which retrofit solution is best suited to your needs and will be compatible with the existing fixture(s).

Maintenance savings may also be achieved since LED lamps last longer than other light sources and therefore do not need to be replaced as often.

Affected building areas: exterior fixtures

ECM 2: Retrofit Fixtures with LED Lamps

Replace linear fluorescent, CFL, or incandescent lamps with LED lamps. Many LED tubes are direct replacements for existing fluorescent tubes and can be installed while leaving the fluorescent fixture ballast in place. LED lamps 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. Maintenance savings may also be available, as longer-lasting LEDs lamps will not need to be replaced as often as the existing lamps.

Affected building areas: classrooms, staff rooms, library, hallways, main office, nurses' room, auditorium and restrooms

4.2 Lighting Controls

#	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		**35,446**	**11.8**	**-7**	**$5,738**	**$48,460**	**$13,905**	**$34,555**	**6.0**	**34,826**
ECM 3	Install Occupancy Sensor Lighting Controls	30,195	10.1	-6	$4,888	$39,660	$5,370	$34,290	7.0	29,666
ECM 4	Install High/Low Lighting Controls	5,251	1.7	-1	$850	$8,800	$8,535	$265	0.3	5,159

Lighting controls reduce energy use by turning off or lowering, lighting fixture power levels when not in use. A comprehensive approach to lighting design should upgrade the lighting fixtures and the controls together for maximum energy savings and improved lighting for occupants.

ECM 3: Install Occupancy Sensor Lighting Controls

Install occupancy sensors to control lighting fixtures in areas that are frequently unoccupied, even for short periods. For most spaces, we recommend lighting controls use dual technology sensors, which reduce the possibility of lights turning off unexpectedly.

Occupancy sensors detect occupancy using ultrasonic and/or infrared sensors. When an occupant enters the space, the lighting fixtures switch to full lighting levels. Most occupancy sensor lighting controls allow users to manually turn fixtures on/off, as needed. Some controls can also provide dimming options.

Occupancy sensors can be mounted on the wall at existing switch locations, mounted on the ceiling, or in remote locations. In general, wall switch replacement sensors are best suited to single occupant offices and other small rooms. Ceiling-mounted or remote mounted sensors are used in large spaces, locations without local switching, and where wall switches are not in the line-of-sight of the main work area.

This measure provides energy savings by reducing the lighting operating hours.

Affected building areas: offices, conference rooms, classrooms, gymnasium, library, restrooms, and storage rooms

ECM 4: Install High/Low Lighting Controls

Install occupancy sensors to provide dual level lighting control for lighting fixtures in spaces that are infrequently occupied but may require some level of continuous lighting for safety or security reasons.

Lighting fixtures with these controls operate at default low levels when the area is unoccupied to provide minimal lighting to meet security or safety requirements. Sensors detect occupancy using ultrasonic and/or infrared sensors. When an occupant enters the space, the lighting fixtures switch to full lighting levels. Fixtures automatically switch back to low level after a predefined period of vacancy. In parking lots and parking garages with significant ambient lighting, this control can sometimes be combined with photocell controls to turn the lights off when there is sufficient daylight.

This measure provides energy savings by reducing the light fixture power draw when reduced light output is appropriate.

Affected building areas: hallways

For this type of measure the occupancy sensors will generally be ceiling or fixture mounted. Sufficient sensor coverage must be provided to ensure that lights turn on in each area as an occupant approaches.

4.3 Motors

#	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)
Motor Upgrades		**397**	**0.2**	**0**	**$65**	**$11,762**	**$0**	**$11,762**	**180.2**	**400**
	Premium Efficiency Motors	397	0.2	0	$65	$11,762	$0	$11,762	180.2	400

Premium Efficiency Motors

Replace standard efficiency motors with IHP 2014 efficiency motors. This evaluation assumes that existing motors will be replaced with motors of equivalent size and type. In some cases, additional savings may be possible by downsizing motors to better meet the motor's current load requirements.

Replacing standard efficiency motors with NEMA Premium® efficiency motors has a long payback period and may not be justifiable based simply on energy considerations. Typically, the marginal cost of purchasing a high efficiency motor can be justified by the marginal savings from the improved efficiency. When the motors are eventually replaced, consider purchasing equipment that exceeds the minimum efficiency required by building codes.

Affected motors:

Location	Area(s)/System(s) Served	Motor Quantity	Motor Application	HP Per Motor	Additional Motor Description
Mechanical Room	CHW-4	1	Chilled Water Pump	15.0	CHW Supply Pump
Mechanical Room	CHW-5	1	Chilled Water Pump	15.0	CHW Supply Pump
Mechanical Room	CHW-6	1	Chilled Water Pump	15.0	CHW Supply Pump

Location	Area(s)/System(s) Served	Motor Quantity	Motor Application	HP Per Motor	Additional Motor Description
Roof	RTU-1	1	Supply Fan	3.0	Supply Fan
Roof	RTU-2	1	Supply Fan	3.0	Supply Fan
Roof	RTU-3	1	Supply Fan	5.0	Supply Fan
Roof	RTU-4	1	Supply Fan	1.5	Supply Fan
Roof	RTU-5	1	Supply Fan	3.0	Supply Fan
Roof	RTU-6	1	Supply Fan	2.0	Supply Fan

Savings are based on the difference between baseline and proposed efficiencies and the assumed annual operating hours. The base case motor energy consumption is estimated using the efficiencies found on nameplates or estimated based on the age of the motor and our best estimates of motor run hours. Efficiencies of proposed motor upgrades are obtained from the current *New Jersey's Clean Energy Program Protocols to Measure Resource Savings*.

4.4 Variable Frequency Drives (VFD)

#	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)
Variable Frequency Drive (VFD) Measures		**26,358**	**11.1**	**0**	**$4,331**	**$33,243**	**$1,400**	**$31,843**	**7.4**	**26,542**
ECM 5	Install VFDs on Constant Volume (CV) Fans	7,773	2.8	0	$1,277	$17,660	$1,400	$16,260	12.7	7,827
ECM 6	Install VFDs on Chilled Water Pumps	18,585	8.3	0	$3,053	$15,583	$0	$15,583	5.1	18,715

Variable frequency drives control motors for fans, pumps, and process equipment based on the actual output required of the driven equipment. Energy savings result from more efficient control of motor energy usage when equipment operates at partial load. The magnitude of energy savings depends on the estimated amount of time that the motor would operate at partial load. For equipment with proposed VFDs, we have included replacing the controlled motor with a new motor —unless the existing motor meets or exceeds IHP 2014 standards—to conservatively account for the cost of an inverter duty rated motor. The savings and cost associated with the new motor are presented with the Premium Efficiency Motor measures. If the proposed VFD measure is not selected for implementation the motor replacement should be reevaluated.

ECM 5: Install VFDs on Constant Volume (CV) Fans

Install VFDs to control constant volume fan motor speeds. This converts a constant-volume, single-zone air handling system into a variable-air-volume (VAV) system. A separate VFD is usually required to control the return fan motor or dedicated exhaust fan motor if the air handler has one.

Zone thermostats signal the VFD to adjust fan speed to maintain the appropriate temperature in the zone, while maintaining a constant supply air temperature.

For air handlers with direct expansion (DX) cooling systems, the minimum air flow across the cooling coil required to prevent the coil from freezing must be determined during the final project design. The control system programming should maintain the minimum air flow whenever the compressor is operating.

Energy savings result from reducing the fan speed (and power) when conditions allow for reduced air flow.

Affected air handlers: RTU-1 through 6

ECM 6: Install VFDs on Chilled Water Pumps

Install VFDs to control chilled water pumps. Two-way valves must serve the chilled water coils being served and the chilled water loop must have a differential pressure sensor installed. If three-way valves or a bypass leg are used in the chilled water distribution they will need to be modified when this measure is implemented. As the chilled water valves close, the differential pressure increases, and the VFD modulates the pump speed to maintain a differential pressure setpoint.

For systems with variable chilled water flow through the chiller, the minimum flow to prevent the chiller from tripping off will need to be determined during the final project design. The control system should be programmed to maintain the minimum flow through the chiller and to prevent pump cavitation.

Energy savings result from reducing the pump motor speed (and power) as chilled water valves close. The magnitude of energy savings is based on the estimated amount of time that the system operates at reduced loads.

Affected pumps: CHW-4, 5 & 6

4.5 Domestic Water Heating

#	Energy Conservation Measure	Annual Electric Savings (kWh)	Peak Demand Savings (kW)	Annual Fuel Savings (MMBtu)	Annual Energy Cost Savings ($)	Estimated Install Cost ($)	Estimated Incentive ($)*	Estimated Net Cost ($)	Simple Payback Period (yrs)**	CO_2e Emissions Reduction (lbs)
Domestic Water Heating Upgrade		**0**	**0.0**	**40**	**$460**	**$201**	**$0**	**$201**	**0.4**	**4,667**
ECM 7	Install Low-Flow DHW Devices	0	0.0	40	$460	$201	$0	$201	0.4	4,667

ECM 7: Install Low-Flow DHW Devices

Install low-flow devices to reduce overall hot water demand. The following low flow devices are recommended to reduce hot water usage:

Device	Flow Rate
Faucet aerators (lavatory)	0.5 gpm
Faucet aerator (kitchen)	1.5 gpm
Showerhead	2.0 gpm
Pre-rinse spray valve (kitchen)	1.28 gpm

Low-flow devices reduce the overall water flow from the fixture, while still providing adequate pressure for washing.

Additional cost savings may result from reduced water usage.

Affected areas: restroom and kitchen sinks

4.6 Food Service & Refrigeration Measures

#	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)
Food Service & Refrigeration Measures		**12,175**	**3.3**	**16**	**$2,190**	**$59,213**	**$5,425**	**$53,788**	**24.6**	**14,185**
	Food Service Equipment Replacement	4,950	2.5	16	$1,003	$48,377	$4,975	$43,402	43.3	6,909
ECM 8	Refrigerator/Freezer Case Electrically Commutated Motors	917	0.1	0	$151	$607	$0	$607	4.0	924
	Replace Refrigeration Equipment	4,354	0.5	0	$715	$9,769	$450	$9,319	13.0	4,384
ECM 9	Vending Machine Control	1,954	0.2	0	$321	$460	$0	$460	1.4	1,968

Food Service Equipment Replacement

Buildings that use a lot of food service equipment are often among the most energy intensive commercial buildings. Replace existing food service equipment with new high efficiency equipment. Consider replacing the following equipment with high efficiency or ENERGY STAR® labeled versions:

Location	Quantity	Equipment Type	Manufacturer	Model
Kitchen	2	Insulated Food Holding Cabinet (Full Size)	True	TR1HPT-2HS-2HS
Kitchen	2	Insulated Food Holding Cabinet (Full Size)	Wells	MOO400DM
Kitchen	2	Insulated Food Holding Cabinet (Full Size)	APW Wyott	CW-4
Kitchen	1	Electric Convection Oven (Full Size)	Blodgett	Zephaire-100-G
Kitchen	2	Electric Convection Oven (Full Size)	Vulcan	VC4GD-10
Kitchen	1	Gas Steamer	Vulcan	VSX24G5
Kitchen	1	Gas Griddle (≤2 Feet Width)	Vulcan	24S-4BN

Replacing food service equipment with ENERGY STAR® labeled equipment has a long payback period and may not be justifiable based simply on energy considerations. Typically, the marginal cost of purchasing a high efficiency equipment can be justified by the marginal savings from the improved efficiency. When the equipment is eventually replaced, consider purchasing equipment that exceeds the minimum efficiency required by building codes.

Visit https://www.energystar.gov/products/commercial_food_service_equipment for the latest information on high efficiency food service equipment.

ECM 8: Refrigerator/Freezer Case Electrically Commutated Motors

Replace shaded pole or permanent split capacitor (PSC) motors with electronically commutated (EC) motors in [walk-in coolers and freezers]. Fractional horsepower EC motors are significantly more efficient than mechanically commutated, brushed motors, particularly at low speeds or partial load. By using variable-speed technology, EC motors can optimize fan usage. Because these motors are brushless and use DC power, losses due to friction and phase shifting are eliminated.

Savings for this measure consider both the increased efficiency of the motor as well as the reduction in refrigeration load due to motor heat loss.

Replace Refrigeration Equipment

Replace existing commercial refrigerators and freezers with new ENERGY STAR® rated equipment. The energy savings associated with this measure come from reduced energy usage, due to more efficient technology, and reduced run times.

Replacing refrigeration equipment with ENERGY STAR® labeled equipment has a long payback period and may not be justifiable based simply on energy considerations. Typically, the marginal cost of purchasing a high efficiency equipment can be justified by the marginal savings from the improved efficiency. When the equipment will eventually replace, consider purchasing equipment that exceeds the minimum efficiency required by building codes.

ECM 9: Vending Machine Control

Vending machines operate continuously, even during unoccupied hours. Install occupancy sensor controls to reduce energy use. These controls power down vending machines when the vending machine area has been vacant for some time, and, they power up the machines at necessary regular intervals or when the surrounding area is occupied. Energy savings are dependent on the vending machine and activity level in the area surrounding the machines.

5 ENERGY EFFICIENT BEST PRACTICES

A whole building maintenance plan will extend equipment life; improve occupant comfort, health, and safety; and reduce energy and maintenance costs. You may already be doing some of these things— see our list below for potential additions to your maintenance plan. Be sure to consult with qualified equipment specialists for details on proper maintenance and system operation.

Energy Tracking with ENERGY STAR® Portfolio Manager®

You've heard it before - you can't manage what you don't measure. ENERGY STAR® Portfolio Manager® is an online tool that you can use to measure and track energy and water consumption, as well as greenhouse gas emissions.[4] Your account has already been established. Now you can continue to keep tabs on your energy performance every month.

Doors and Windows

Close exterior doors and windows in heated and cooled areas. Leaving doors and windows open leads to a loss of heat during the winter and chilled air during the summer. Reducing air changes per hour (ACH) can lead to increased occupant comfort as well as heating and cooling savings, especially when combined with proper HVAC controls and adequate ventilation.

Lighting Controls

As part of a lighting maintenance schedule, test lighting controls to ensure proper functioning. For occupancy sensors, this requires triggering the sensor and verifying that the sensor's timer settings are correct. For daylight and photocell sensors, maintenance involves cleaning sensor lenses and confirming that setpoints and sensitivity are configured properly.

Motor Maintenance

Motors have many moving parts. As these parts degrade over time, the efficiency of the motor is reduced. Routine maintenance prevents damage to motor components. Routine maintenance should include cleaning surfaces and ventilation openings on motors to prevent overheating, lubricating moving parts to reduce friction, inspecting belts and pulleys for wear and to ensure they are at proper alignment and tension, and cleaning and lubricating bearings. Consult a licensed technician to assess these and other motor maintenance strategies.

[4] https://www.energystar.gov/buildings/facility-owners-and-managers/existing-buildings/use-portfolio-manager.

Thermostat Schedules and Temperature Resets

Use thermostat setback temperatures and schedules to reduce heating and cooling energy use during periods of low or no occupancy. Thermostats should be programmed for a setback of 5°F-10°F during low occupancy hours (reduce heating setpoints and increase cooling setpoints). Cooling load can be reduced 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.

Chiller Maintenance

Service chillers regularly to keep them operating properly. Chillers are responsible for a substantial portion of a commercial building's overall energy usage and when they do not work well, there is usually a noticeable increase in energy bills and increased occupant complaints. Regular diagnostics and service can save five to ten percent of the cost of operating your chiller. If you already have a maintenance contract in place, your existing service company should be able to provide these services.

AC System Evaporator/Condenser Coil Cleaning

Dirty evaporator and condenser coils restrict air flow and restrict heat transfer. This increases the loads on the evaporator and condenser fan, and decreases overall cooling system performance. Keeping the coils clean allows the fans and cooling system to operate more efficiently.

HVAC Filter Cleaning and Replacement

Air filters should be checked regularly (often monthly) and cleaned or replaced when appropriate. Air filters reduce indoor air pollution, increase occupant comfort, and help keep equipment operating efficiently. If the building has a building management system, consider installing a differential pressure switch across filters to send an alarm about premature fouling or overdue filter replacement. Over time, filters become less and less effective as particulate buildup increases. Dirty filters also restrict air flow through the air conditioning or heat pump system, which increases the load on the distribution fans.

Boiler Maintenance

Many boiler problems develop slowly over time, so regular inspection and maintenance is essential to keeping the heating system running efficiently and preventing expensive repairs. Annual tune-ups should include a combustion analysis to analyze the exhaust from the boilers and to ensure the boiler is operating safely. Boilers should be cleaned according to the manufacturer's instructions to remove soot and scale from the water side or fire side of the boiler.

Furnace Maintenance

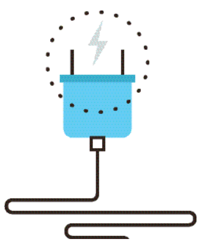
Preventative maintenance can extend the life of the system, maintain energy efficiency, and ensure safe operation. Following the manufacturer's instructions, a yearly tune-up should: check for gas/carbon monoxide leaks; change the air and fuel filters; check components for cracks, corrosion, dirt, or debris build-up; ensure the ignition system is working properly; test and adjust operation and safety controls; inspect electrical connections; and lubricate motors and bearings.

Water Heater Maintenance

Preventative maintenance can extend the life of the system, maintain energy efficiency, and ensure safe operation. At least once a year, follow manufacturer instructions to drain a few gallons out of the water heater using the drain valve. If there is a lot of sediment or debris, then a full flush is recommended. Turn the temperature down and then completely drain the tank. Annual checks should include checks for:

- Leaks or heavy corrosion on the pipes and valves.
- Corrosion or wear on the gas line and on the piping. If you noticed any black residue, soot, or charred metal, this is a sign you may be having combustion issues and you should have the unit serviced by a professional.
- For electric water heaters, look for signs of leaking such as rust streaks or residue around the upper and lower panels covering the electrical components on the tank.
- For water heaters more than three years old, have a technician inspect the sacrificial anode annually.

Plug Load Controls



Reducing plug loads is a common way to decrease your electrical use. Limiting the energy use of plug loads can include increasing occupant awareness, removing under-used equipment, installing hardware controls, and using software controls. Consider enabling the most aggressive power settings on existing devices or install load sensing or occupancy sensing (advanced) power strips.[5] Your local utility may offer incentives or rebates for this equipment.

Computer Power Management Software

Many computers consume power during nights, weekends, and holidays. Screen savers are commonly confused as a power management strategy. This contributes to avoidable, excessive electrical energy consumption. There are innovative power management software packages available that are designed to deliver significant energy saving and provide ongoing tracking measurements. A central power management platform helps enforce energy savings policies as well as identify and eliminate underutilized devices.

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[5] For additional information refer to "Assessing and Reducing Plug and Process Loads in Office Buildings" http://www.nrel.gov/docs/fy13osti/54175.pdf, or "Plug Load Best Practices Guide" http://www.advancedbuildings.net/plug-load-best-practices-guide-offices.

Water Conservation

Installing dual flush or low-flow toilets and low-flow/waterless urinals are ways to reduce water use. The EPA WaterSense™ ratings for urinals is 0.5 gpf and for flush valve toilets is 1.28 gpf (this is lower than the current 1.6 gpf federal standard).

For more information regarding water conservation go to the EPA's WaterSense™ website[6] or download a copy of EPA's "WaterSense at Work: Best Management Practices for Commercial and Institutional Facilities"[7] to get ideas for creating a water management plan and best practices for a wide range of water using systems.

Water conservation devices that do not reduce hot water consumption will not provide energy savings at the site level, but they may significantly affect your water and sewer usage costs. 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.

If the facility has detached buildings with a master water meter for the entire campus, check for unnatural wet areas in the lawn or water seeping in the foundation at water pipe penetrations through the foundation. Periodically check overnight meter readings when the facility is unoccupied, and there is no other scheduled water usage.

Manage irrigation systems to use water more effectively outside the building. Adjust spray patterns so that water lands on intended lawns and plantings and not on pavement and walls. Consider installing an evapotranspiration irrigation controller that will prevent over-watering.

Procurement Strategies

Purchasing efficient products reduces energy costs without compromising quality. Consider modifying your procurement policies and language to require ENERGY STAR® or WaterSense™ products where available.

[6] https://www.epa.gov/watersense.

[7] https://www.epa.gov/watersense/watersense-work-0.

6 On-site Generation

You don't have to look far in New Jersey to see one of the thousands of solar electric systems providing clean power to homes, businesses, schools, and government buildings. On-site generation includes both renewable (e.g., solar, wind) and non-renewable (e.g., fuel cells) technologies that generate power to meet all or a portion of the facility's electric energy needs. Also referred to as distributed generation, these systems contribute to greenhouse gas (GHG) emission reductions, demand reductions and reduced customer electricity purchases reduction, which results in improved electric grid reliability through better use of transmission and distribution systems.

Preliminary screenings were performed to determine if an on-site generation measure could be a cost-effective solution for your facility. Before deciding to install an on-site generation system, we recommend conducting a feasibility study to analyze 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 Solar Photovoltaic

Photovoltaic (PV) panels convert sunlight into electricity. Individual panels are combined into an array that produces direct current (DC) electricity. The DC is converted to alternating current (AC) through an inverter. The inverter is then connected to the building's electrical distribution system.

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

The amount of free area, ease of installation on roof, and the lack of shading elements contribute to the high potential. A PV array located on the roof may be feasible. If you are interested in pursuing the installation of PV, we recommend conducting a full feasibility study.

The graphic below displays the results of the PV potential screening conducted as a part of this audit. The position of each slider indicates the potential (potential increases to the right) that each factor contributes to the overall site potential.

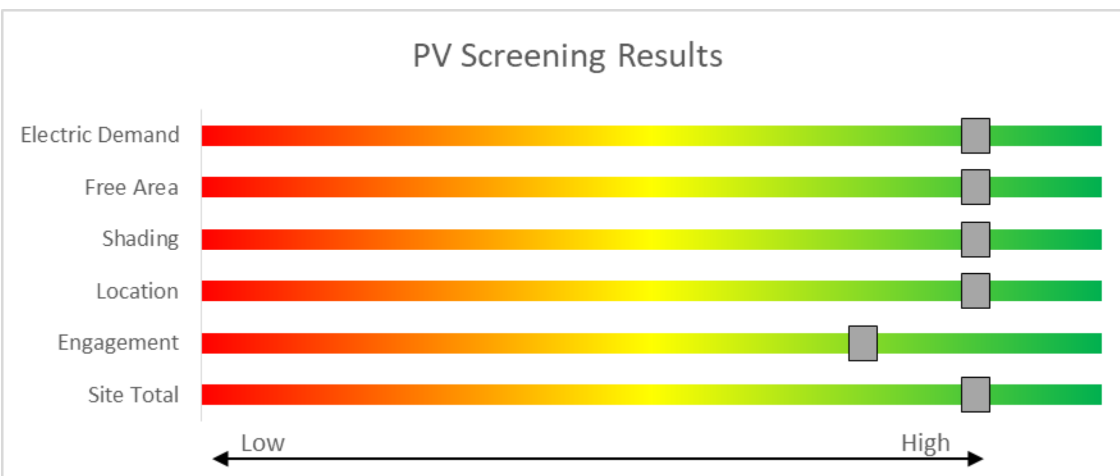


Figure 9 - Photovoltaic Screening

Solar Renewable Energy Certificate (SREC) Registration Program (SRP)

Rebates are not available for solar projects, but owners of solar projects MUST register their projects in the SREC Registration Program before starting construction. Once your PV system is up and running, you periodically earn credits, which can then be sold on the open market for up to 15 years.

If you are considering installing solar photovoltaics on your building, visit www.njcleanenergy.com/srec for more information about the SREC Registration Program.

Get more information about solar power in New Jersey or find a qualified solar installer who can help you decide if solar is right for your building:

- **Basic Info on Solar PV in NJ**: www.njcleanenergy.com/whysolar
- **NJ Solar Market FAQs**: www.njcleanenergy.com/renewable-energy/program-updates-and-background-information/solar-transition/solar-market-faqs
- **Approved Solar Installers in the NJ Market**: 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) generates electricity at the facility and puts waste heat energy to good use. Common types of CHP systems are reciprocating engines, microturbines, fuel cells, backpressure steam turbines, and (at large facilities) gas turbines.

CHP systems typically produce a portion of the electric power used on-site, with the balance of electric power needs supplied by the local utility company. The heat is used to supplement (or replace) existing boilers and provide space heating and/or domestic hot water heating. Waste heat can also be routed through absorption chillers for space cooling.

The key criteria used for screening is the amount of time that the CHP system would operate at full load and the facility's ability to use the recovered heat. Facilities with a continuous need 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 **no** potential for installing a cost-effective CHP system.

Based on a preliminary analysis, the facility does not appear to meet the minimum requirements for a cost-effective CHP installation. The lack of gas service, low or infrequent thermal load, and lack of space for siting the equipment are the most significant factors contributing to the lack of CHP potential.

The graphic below displays the results of the CHP potential screening conducted as a part of this audit. The position of each slider indicates the potential (potential increases to the right) that each factor contributes to the overall site potential.

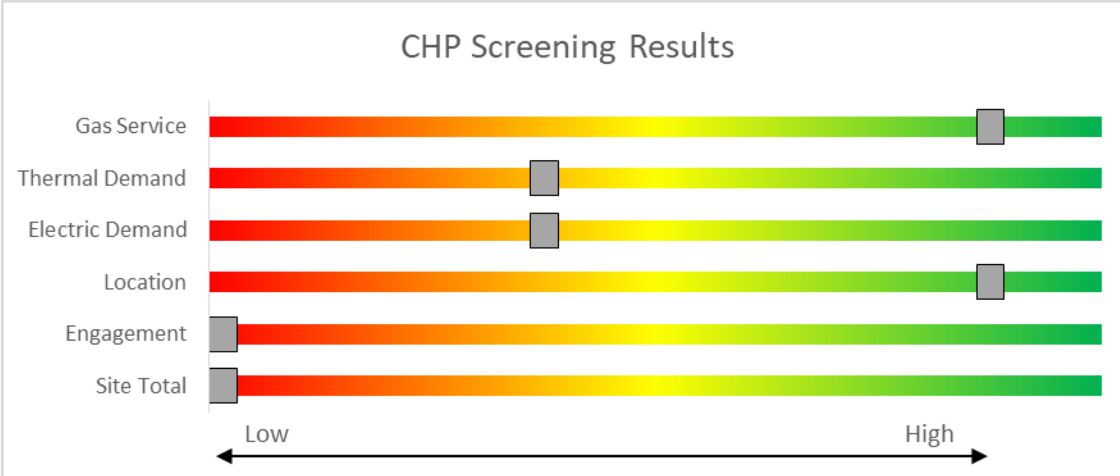


Figure 10 - Combined Heat and Power Screening

Find a qualified firm that specializes in commercial CHP cost assessment and installation: http://www.njcleanenergy.com/commercial-industrial/programs/nj-smartstart-buildings/tools-and-resources/tradeally/approved_vendorsearch/.

7 PROJECT FUNDING AND INCENTIVES

Ready to improve your building's performance? New Jersey Clean Energy Programs can help. Pick the program that works best for you. Incentive programs that may apply to this facility are identified in the Executive Summary. This section provides an overview of currently available in New Jersey Clean Energy Programs.

	SmartStart *Flexibility to install at your own pace*	**Direct Install** *Turnkey installation*	**Pay for Performance** *Whole building upgrades*
Who should use it?	Buildings installing individual measures or small group of measures.	Small to mid-size facilities that can bundle multiple measures together. Average peak demand should be below 200 kW. Not suitable for significant building shell issues.	Mid to large size facilities looking to implement as many measures as possible at one time. Peak demand should be over 200 kW.
How does it work?	Use in-house staff or your preferred contractor.	Pre-approved contractors pass savings along to you via reduced material and labor costs.	Whole-building approach to energy upgrades designed to reduce energy use by at least 15%. The more you save, the higher the incentives.
What are the Incentives?	Fixed incentives for specific energy efficiency measures.	Incentives pay up to 70% of eligible costs, up to $125,000 per project. You pay the remaining 30% directly to the contractor.	Up to 25% of installation cost, calculated based on level of energy savings per square foot.
How do I participate?	Submit an application for the specific equipment to be installed.	Contact a participating contractor in your region.	Contact a pre-qualified Partner to develop your Energy Reduction Plan and set your energy savings targets.

Take the next step by visiting **www.njcleanenergy.com** for program details, applications, and to contact a qualified contractor.

7.1 SmartStart

SmartStart offers incentives for installing prescriptive and custom energy efficiency measures at your facility. This program provides an effective mechanism for securing incentives for energy efficiency measures installed individually or as part of a package of energy upgrades. This program serves most common equipment types and sizes.

SmartStart routinely 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

Incentives

The SmartStart Prescriptive program provides fixed incentives for specific energy efficiency measures. Prescriptive incentives vary by equipment type.

SmartStart Custom provides incentives for more unique or specialized technologies or systems that are not addressed through prescriptive incentives. Custom incentives are calculated at $0.16/kWh and $1.60/therm based on estimated annual savings. Incentives are 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

Submit an application for the specific equipment to be installed. Many applications are designed as rebates, although others require application approval prior to installation. You can work with your preferred contractor or use internal staff to install measures.

Visit www.njcleanenergy.com/SSB for a detailed program description, instructions for applying, and applications.

7.2 Pay for Performance - Existing Buildings

Pay for Performance works for larger customers with a peak demand over 200 kW. The minimum installed scope of work must include at least two unique measures that results in at least 15% source energy savings, and 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 to achieve deep energy savings. This program has an added benefit of addressing measures that may not qualify for other programs. Many facilities pursuing an Energy Savings Improvement Program loan also use this program.

The scope of work presented in this audit report does not quite meet the requirements of the current P4P program. However, due to the size of the facility and existing conditions, should additional measures be identified at a later point in time, for example through further evaluation or the Energy Savings Improvement Program process, this facility could potentially meet the requirements necessary to participate in the P4P program.

Incentives

Incentives are 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

Contact one of the pre-approved consultants and contractors ("Partners"). Under direct contract to you, they will help further evaluate the measures identified in this report through development of the energy reduction plan), assist you in implementing selected measures, and verify actual savings one year after the installation. Your Partner will also help you apply for incentives.

Approval of the final scope of work is required by the program prior to installation. Installation can be done by the contractor of your choice (some P4P Partners are also contractors) or by internal staff, but the Partner remains involved throughout construction to ensure compliance with the program requirements.

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

7.3 Combined Heat and Power

The Combined Heat & Power (CHP) program provides incentives for eligible CHP or waste heat to power (WHP) projects. Eligible CHP or WHP projects must achieve an annual system efficiency of at least 65% (lower heating value, or LHV), based on total energy input and total utilized energy output. Mechanical energy may be included in the efficiency evaluation.

Incentives

Eligible Technologies	Size (Installed Rated Capacity)[1]	Incentive ($/kW)	% of Total Cost Cap per Project[3]	$ Cap per Project[3]
Powered by non-renewable or renewable fuel source[4]	≤500 kW	$2,000	30-40%[2]	$2 million
Gas Internal Combustion Engine	>500 kW - 1 MW	$1,000		
Gas Combustion Turbine	> 1 MW - 3 MW	$550	30%	$3 million
Microturbine Fuel Cells with Heat Recovery	>3 MW	$350		
Waste Heat to Power*	<1 MW	$1,000	30%	$2 million
	> 1MW	$500		$3 million

*Waste Heat to Power: Powered by non-renewable fuel source, heat recovery or other mechanical recovery from existing equipment utilizing new electric generation equipment (e.g. steam turbine).

Check the NJCEP website for details on program availability, current incentive levels, and requirements.

How to Participate

You work with a qualified developer or consulting firm to complete the CHP application. Once the application is approved the project can be installed. Information about the CHP program can be found at: www.njcleanenergy.com/CHP.

7.4 Energy Savings Improvement Program

The Energy Savings Improvement Program (ESIP) serves New Jersey's government agencies by financing energy projects. 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. Annual payments are lower than the savings projected from the ECMs, ensuring that ESIP projects are cash flow positive for the life of the contract.

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 described above can also be used to help further reduce the total project cost of eligible measures.

How to Participate

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 used 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. Carefully consider all alternatives to develop an approach that best meets your needs. A detailed program descriptions and application can be found at: www.njcleanenergy.com/ESIP.

ESIP is a program delivered directly by the NJBPU and is not an NJCEP incentive program. As mentioned above, you can use NJCEP incentive programs to help further reduce costs when developing the energy savings plan. Refer to the ESIP guidelines at the link above for further information and guidance on next steps.

7.5 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 prior to the start of construction 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. SRECs 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 SRECs 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 Renewable Portfolio Standard. Purchasing SRECs can help them meet those requirements. As SRECs are traded in a competitive market, the price may vary significantly. The actual price of an SREC during a trading period fluctuates depending on supply and demand.

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

8 ENERGY PURCHASING AND PROCUREMENT STRATEGIES

8.1 Retail Electric Supply Options

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 already buys electricity from a third-party supplier, review and compare prices at the end of each contract year.

A list of licensed third-party electric suppliers is available at the NJBPU website.[8]

8.2 Retail Natural Gas Supply Options

The natural gas market in New Jersey is also deregulated. Most customers that remain with the utility for natural gas service pay rates that are market-based and that fluctuate monthly. 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 typically depends on whether a customer prefers 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 does not already purchase natural gas from a third-party supplier, consider shopping for a reduced rate from third-party natural gas suppliers. If your facility already purchases natural gas from a third-party supplier, review and compare prices at the end of each contract year.

A list of licensed third-party natural gas suppliers is available at the NJBPU website.[9]

[8] www.state.nj.us/bpu/commercial/shopping.html.

[9] 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	Light Level	Watts per Fixture	Annual Operating Hours	ECM #	Fixture Recommendation	Add Controls?	Fixture Quantity	Fixture Description	Control System	Watts per Fixture	Annual Operating Hours	Total Peak kW Savings	Total Annual kWh Savings	Total Annual MMBtu Savings	Total Annual Energy Cost Savings	Total Installation Cost	Total Incentives	Simple Payback w/ Incentives in Years
Room 509	12	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	S	62	1,980	2, 3	Relamp	Yes	12	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,366	0.4	1,097	0	$178	$978	$190	4.4
Room 508	12	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Wall Switch	S	93	1,980	2, 3	Relamp	Yes	12	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	44	1,366	0.5	1,646	0	$266	$1,197	$250	3.6
Room 507	12	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	S	62	1,980	2, 3	Relamp	Yes	12	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,366	0.4	1,097	0	$178	$978	$190	4.4
Room 506	12	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Wall Switch	S	93	1,980	2, 3	Relamp	Yes	12	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	44	1,366	0.5	1,646	0	$266	$1,197	$250	3.6
Room 505	12	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Wall Switch	S	93	1,980	2, 3	Relamp	Yes	12	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	44	1,366	0.5	1,646	0	$266	$1,197	$250	3.6
Room 504	12	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Wall Switch	S	93	1,980	2, 3	Relamp	Yes	12	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	44	1,366	0.5	1,646	0	$266	$1,197	$250	3.6
Room 503	12	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Wall Switch	S	93	1,980	2, 3	Relamp	Yes	12	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	44	1,366	0.5	1,646	0	$266	$1,197	$250	3.6
Room 502	12	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Wall Switch	S	93	1,980	2, 3	Relamp	Yes	12	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	44	1,366	0.5	1,646	0	$266	$1,197	$250	3.6
Room 501	12	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Wall Switch	S	93	1,980	2, 3	Relamp	Yes	12	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	44	1,366	0.5	1,646	0	$266	$1,197	$250	3.6
Room 421	12	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Wall Switch	S	93	1,980	2, 3	Relamp	Yes	12	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	44	1,366	0.5	1,646	0	$266	$1,197	$250	3.6
Room 420	8	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Wall Switch	S	93	1,980	2, 3	Relamp	Yes	8	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	44	1,366	0.4	1,097	0	$178	$708	$155	3.1
Room 418	8	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Wall Switch	S	93	1,980	2, 3	Relamp	Yes	8	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	44	1,366	0.4	1,097	0	$178	$708	$155	3.1
Room 417	8	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Wall Switch	S	93	1,980	2, 3	Relamp	Yes	8	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	44	1,366	0.4	1,097	0	$178	$708	$155	3.1
Room 416	8	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Wall Switch	S	93	1,980	2, 3	Relamp	Yes	8	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	44	1,366	0.4	1,097	0	$178	$708	$155	3.1
Room 415	1	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	S	62	1,980	2	Relamp	No	1	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	29	1,980	0.0	72	0	$12	$37	$10	2.3
Room 414	8	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Wall Switch	S	93	1,980	2, 3	Relamp	Yes	8	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	44	1,366	0.4	1,097	0	$178	$708	$155	3.1
Room 413	12	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Wall Switch	S	93	1,980	2, 3	Relamp	Yes	12	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	44	1,366	0.5	1,646	0	$266	$1,197	$250	3.6
Room 411	9	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Wall Switch	S	93	1,980	2, 3	Relamp	Yes	9	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	44	1,366	0.4	1,235	0	$200	$763	$170	3.0
Room 410	9	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Wall Switch	S	93	1,980	2, 3	Relamp	Yes	9	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	44	1,366	0.4	1,235	0	$200	$763	$170	3.0
Room 409	9	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Wall Switch	S	93	1,980	2, 3	Relamp	Yes	9	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	44	1,366	0.4	1,235	0	$200	$763	$170	3.0
Room 405	12	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Wall Switch	S	93	1,980	2, 3	Relamp	Yes	12	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	44	1,366	0.5	1,646	0	$266	$1,197	$250	3.6
Room 404	12	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Wall Switch	S	93	1,980	2, 3	Relamp	Yes	12	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	44	1,366	0.5	1,646	0	$266	$1,197	$250	3.6
Room 403	12	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Wall Switch	S	93	1,980	2, 3	Relamp	Yes	12	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	44	1,366	0.5	1,646	0	$266	$1,197	$250	3.6
Room 402	12	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Wall Switch	S	93	1,980	2, 3	Relamp	Yes	12	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	44	1,366	0.5	1,646	0	$266	$1,197	$250	3.6
Room 401	12	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Wall Switch	S	93	1,980	2, 3	Relamp	Yes	12	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	44	1,366	0.5	1,646	0	$266	$1,197	$250	3.6

	Existing Conditions						Proposed Conditions								Energy Impact & Financial Analysis						
Location	Fixture Quantity	Fixture Description	Control System	Light Level	Watts per Fixture	Annual Operating Hours	ECM #	Fixture Recommendation	Add Controls?	Fixture Quantity	Fixture Description	Control System	Watts per Fixture	Annual Operating Hours	Total Peak kW Savings	Total Annual kWh Savings	Total Annual MMBtu Savings	Total Annual Energy Cost Savings	Total Installation Cost	Total Incentives	Simple Payback w/ Incentives in Years
Room 316	12	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Wall Switch	S	93	1,980	2, 3	Relamp	Yes	12	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	44	1,366	0.5	1,646	0	$266	$1,197	$250	3.6
Room 315	12	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Wall Switch	S	93	1,980	2, 3	Relamp	Yes	12	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	44	1,366	0.5	1,646	0	$266	$1,197	$250	3.6
Room 314	12	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Wall Switch	S	93	1,980	2, 3	Relamp	Yes	12	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	44	1,366	0.5	1,646	0	$266	$1,197	$250	3.6
Room 313	12	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Wall Switch	S	93	1,980	2, 3	Relamp	Yes	12	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	44	1,366	0.5	1,646	0	$266	$1,197	$250	3.6
Room 311	6	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	S	62	1,980	2, 3	Relamp	Yes	6	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,366	0.2	549	0	$89	$489	$95	4.4
Room 311	1	Exit Signs: LED - 2 W Lamp	None		6	8,760		None	No	1	Exit Signs: LED - 2 W Lamp	None	6	8,760	0.0	0	0	$0	$0	$0	0.0
Room 310	12	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Wall Switch	S	93	1,980	2, 3	Relamp	Yes	12	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	44	1,366	0.5	1,646	0	$266	$927	$215	2.7
Room 309	9	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Wall Switch	S	93	1,980	2, 3	Relamp	Yes	9	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	44	1,366	0.4	1,235	0	$200	$763	$170	3.0
Room 308	12	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Wall Switch	S	93	1,980	2, 3	Relamp	Yes	12	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	44	1,366	0.5	1,646	0	$266	$927	$215	2.7
Room 306	8	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Occupancy Sensor	S	93	1,366	2	Relamp	No	8	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	44	1,366	0.3	595	0	$96	$438	$120	3.3
Room 306	1	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Occupancy Sensor	S	62	1,366	2	Relamp	No	1	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,366	0.0	50	0	$8	$37	$10	3.3
Room 306	1	Compact Fluorescent: 4 Pin CFL (42W) - 2L	Occupancy Sensor	S	84	1,366	2	Relamp	No	1	LED - Fixtures: Other	Occupancy Sensor	59	1,366	0.0	38	0	$6	$49	$0	8.0
Room 305	12	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Wall Switch	S	93	1,980	2, 3	Relamp	Yes	12	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	44	1,366	0.5	1,646	0	$266	$927	$215	2.7
Room 304	12	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Wall Switch	S	93	1,980	2, 3	Relamp	Yes	12	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	44	1,366	0.5	1,646	0	$266	$927	$215	2.7
Room 303	12	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Wall Switch	S	93	1,980	2, 3	Relamp	Yes	12	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	44	1,366	0.5	1,646	0	$266	$927	$215	2.7
Room 302	12	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Wall Switch	S	93	1,980	2, 3	Relamp	Yes	12	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	44	1,366	0.5	1,646	0	$266	$927	$215	2.7
Room 301	12	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Wall Switch	S	93	1,980	2, 3	Relamp	Yes	12	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	44	1,366	0.5	1,646	0	$266	$927	$215	2.7
Room 218	2	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	S	62	1,980	2, 3	Relamp	Yes	2	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,366	0.1	183	0	$30	$189	$40	5.0
Room 217	4	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Wall Switch	S	93	1,980	2, 3	Relamp	Yes	4	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	44	1,366	0.2	549	0	$89	$489	$95	4.4
Room 215	12	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Wall Switch	S	93	1,980	2, 3	Relamp	Yes	12	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	44	1,366	0.5	1,646	0	$266	$927	$215	2.7
Room 214	12	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Wall Switch	S	93	1,980	2, 3	Relamp	Yes	12	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	44	1,366	0.5	1,646	0	$266	$927	$215	2.7
Room 213	12	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Wall Switch	S	93	1,980	2, 3	Relamp	Yes	12	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	44	1,366	0.5	1,646	0	$266	$927	$215	2.7
Room 212	12	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Wall Switch	S	93	1,980	2, 3	Relamp	Yes	12	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	44	1,366	0.5	1,646	0	$266	$927	$215	2.7
Room 211	12	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Wall Switch	S	93	1,980	2, 3	Relamp	Yes	12	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	44	1,366	0.5	1,646	0	$266	$927	$215	2.7
Room 210	12	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Wall Switch	S	93	1,980	2, 3	Relamp	Yes	12	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	44	1,366	0.5	1,646	0	$266	$927	$215	2.7

	Existing Conditions						Proposed Conditions								Energy Impact & Financial Analysis						
Location	Fixture Quantity	Fixture Description	Control System	Light Level	Watts per Fixture	Annual Operating Hours	ECM #	Fixture Recommendation	Add Controls?	Fixture Quantity	Fixture Description	Control System	Watts per Fixture	Annual Operating Hours	Total Peak kW Savings	Total Annual kWh Savings	Total Annual MMBtu Savings	Total Annual Energy Cost Savings	Total Installation Cost	Total Incentives	Simple Payback w/ Incentives in Years
Room 125	4	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	S	62	1,980	2, 3	Relamp	Yes	4	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,366	0.1	366	0	$59	$416	$75	5.8
Room 116	6	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	S	62	1,980	2, 3	Relamp	Yes	6	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,366	0.2	549	0	$89	$489	$95	4.4
Room 111	6	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	S	62	1,980	2, 3	Relamp	Yes	6	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,366	0.2	549	0	$89	$489	$95	4.4
Room 110	2	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	S	62	1,980	2, 3	Relamp	Yes	2	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,366	0.1	183	0	$30	$189	$40	5.0
Room 109	2	Linear Fluorescent - T8: 4' T8 (32W) - 4L	Wall Switch	S	114	1,980	2, 3	Relamp	Yes	2	LED - Linear Tubes: (4) 4' Lamps	Occupancy Sensor	58	1,366	0.1	322	0	$52	$416	$75	6.5
Restroom 2	1	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	S	62	1,980	2	Relamp	No	1	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	29	1,980	0.0	72	0	$12	$37	$10	2.3
Restroom	1	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	S	62	1,980	2	Relamp	No	1	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	29	1,980	0.0	72	0	$12	$37	$10	2.3
Restroom	1	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	S	62	1,980	2	Relamp	No	1	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	29	1,980	0.0	72	0	$12	$37	$10	2.3
Restroom	2	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	S	62	1,980	2, 3	Relamp	Yes	2	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,366	0.1	183	0	$30	$189	$20	5.7
Restroom	1	Linear Fluorescent - T8: 2' T8 (17W) - 2L	Wall Switch	S	33	1,980	2	Relamp	No	1	LED - Linear Tubes: (2) 2' Lamps	Wall Switch	17	1,980	0.0	35	0	$6	$33	$6	4.7
Refrigerator	2	Linear Fluorescent - T5: 4' T5 (28W) - 2L	Wall Switch	S	60	440	2	Relamp	No	2	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	29	440	0.0	30	0	$5	$73	$20	10.9
Refrigerator	1	Incandescent: Bulb (60W) - 1L	Wall Switch	S	60	440	2	Relamp	No	1	LED Screw-In Lamps: LED Bulb - 1L	Wall Switch	9	440	0.0	25	0	$4	$17	$1	4.1
Kitchen	21	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	S	62	1,980	2, 3	Relamp	Yes	21	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,366	0.6	1,921	0	$311	$1,307	$280	3.3
Kitchen	4	Exit Signs: LED - 2 W Lamp	None		6	8,760		None	No	4	Exit Signs: LED - 2 W Lamp	None	6	8,760	0.0	0	0	$0	$0	$0	0.0
Hallway	58	U-Bend Fluorescent - T8: U T8 (32W) - 2L	Wall Switch	S	62	1,980	2, 4	Relamp	Yes	58	LED - Linear Tubes: (2) U-Lamp	High/Low Control	33	1,366	1.6	4,956	-1	$802	$6,003	$2,380	4.5
Hallway	6	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Wall Switch	S	93	1,980	2, 4	Relamp	Yes	6	LED - Linear Tubes: (3) 4' Lamps	High/Low Control	44	1,366	0.3	823	0	$133	$529	$290	1.8
Hallway	83	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	S	62	1,980	2, 4	Relamp	Yes	83	LED - Linear Tubes: (2) 4' Lamps	High/Low Control	29	1,366	2.5	7,591	-2	$1,229	$5,831	$3,630	1.8
Hallway	12	Linear Fluorescent - T5: 4' T5 (28W) - 1L	Wall Switch	S	30	1,980	2, 4	Relamp	Yes	12	LED - Linear Tubes: (1) 4' Lamp	High/Low Control	15	1,366	0.2	523	0	$85	$619	$460	1.9
Hallway	19	Exit Signs: LED - 2 W Lamp	None		6	8,760		None	No	19	Exit Signs: LED - 2 W Lamp	None	6	8,760	0.0	0	0	$0	$0	$0	0.0
Hallway	2	Compact Fluorescent: Curveloom Bulb (50W) - 2L	Wall Switch	S	100	1,980	2, 4	Relamp	Yes	2	LED - Fixtures: Downlight Pendant	High/Low Control	70	1,366	0.1	225	0	$36	$298	$70	6.2
Hallway	3	Compact Fluorescent: 4 Pin CFL (46W) - 2L	Wall Switch	S	92	1,980	2, 4	Relamp	Yes	3	LED - Fixtures: Other	High/Low Control	64	1,366	0.1	311	0	$50	$346	$105	4.8
Hallway	16	Compact Fluorescent: 4 Pin CFL (42W) - 2L	Wall Switch	S	84	1,980	2, 4	Relamp	Yes	16	LED - Fixtures: Other	High/Low Control	59	1,366	0.5	1,513	0	$245	$1,380	$560	3.3
Hallway	78	Compact Fluorescent: 4 Pin CFL (32W) - 1L	Wall Switch	S	32	1,980	2, 4	Relamp	Yes	78	LED - Fixtures: Other	High/Low Control	22	1,366	0.9	2,811	-1	$455	$3,868	$2,600	2.8
Girls 4	3	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	S	62	1,980	2, 3	Relamp	Yes	3	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,366	0.1	274	0	$44	$380	$65	7.1
Girls 3	3	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	S	62	1,980	2, 3	Relamp	Yes	3	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,366	0.1	274	0	$44	$380	$65	7.1

	Existing Conditions						Proposed Conditions								Energy Impact & Financial Analysis						
Location	Fixture Quantity	Fixture Description	Control System	Light Level	Watts per Fixture	Annual Operating Hours	ECM #	Fixture Recommendation	Add Controls?	Fixture Quantity	Fixture Description	Control System	Watts per Fixture	Annual Operating Hours	Total Peak kW Savings	Total Annual kWh Savings	Total Annual MMBtu Savings	Total Annual Energy Cost Savings	Total Installation Cost	Total Incentives	Simple Payback w/ Incentives in Years
Girls 2	3	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	S	62	1,980	2, 3	Relamp	Yes	3	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,366	0.1	274	0	$44	$380	$65	7.1
Girls	2	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	S	62	1,980	2, 3	Relamp	Yes	2	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,366	0.1	183	0	$30	$189	$20	5.7
Freezer	2	Linear Fluorescent - T5: 4' T5 (28W) - 2L	Wall Switch	S	60	440	2	Relamp	No	2	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	29	440	0.0	30	0	$5	$73	$20	10.9
Freezer	1	Incandescent: Bulb (60W) - 1L	Wall Switch	S	60	440	2	Relamp	No	1	LED Screw-In Lamps: LED Bulb - 1L	Wall Switch	9	440	0.0	25	0	$4	$17	$1	4.1
Exterior	34	Metal Halide: (1) 175W Lamp	Photocell		215	4,380	1	Fixture Replacement	No	34	LED - Fixtures: Outdoor Wall-Mounted Area Fixture	Photocell	53	4,380	2.8	24,200	0	$3,976	$32,843	$3,400	7.4
Exterior	6	Metal Halide: (1) 150W Lamp	Photocell		190	4,380	1	Fixture Replacement	No	6	LED - Fixtures: Outdoor Wall-Mounted Area Fixture	Photocell	45	4,380	0.4	3,811	0	$626	$5,796	$600	8.3
Exterior	2	Halogen Incandescent: Bulb (150W) - 1L	Photocell		150	4,380	1	Fixture Replacement	No	2	LED - Fixtures: Outdoor Wall-Mounted Area Fixture	Photocell	23	4,380	0.1	1,117	0	$184	$1,932	$200	9.4
Exterior	12	Compact Fluorescent: 4 Pin CFL (18W) - 1L	Photocell		18	4,380	2	Relamp	No	12	LED - Fixtures: Other	Photocell	13	4,380	0.0	284	0	$47	$204	$0	4.4
Boys 4	3	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	S	62	1,980	2, 3	Relamp	Yes	3	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,366	0.1	274	0	$44	$380	$65	7.1
Boys 3	3	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	S	62	1,980	2, 3	Relamp	Yes	3	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,366	0.1	274	0	$44	$380	$65	7.1
Boys 2	3	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	S	62	1,980	2, 3	Relamp	Yes	3	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,366	0.1	274	0	$44	$380	$65	7.1
Boys	3	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	S	62	1,980	2, 3	Relamp	Yes	3	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,366	0.1	274	0	$44	$380	$65	7.1
516 Electrical Closet	2	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	S	62	440	2	Relamp	No	2	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	29	440	0.0	32	0	$5	$73	$20	10.3
515 Closet	2	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	S	62	440	2	Relamp	No	2	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	29	440	0.0	32	0	$5	$73	$20	10.3
514 IT Closet	1	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	S	62	440	2	Relamp	No	1	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	29	440	0.0	16	0	$3	$37	$10	10.3
513 Computer Lab	12	Linear Fluorescent - T8: 4' T8 (32W) - 4L	Wall Switch	S	114	1,980	2, 3	Relamp	Yes	12	LED - Linear Tubes: (4) 4' Lamps	Occupancy Sensor	58	1,366	0.6	1,934	0	$313	$1,146	$275	2.8
512 Faculty restroom	12	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Wall Switch	S	93	1,980	2, 3	Relamp	Yes	12	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	44	1,366	0.5	1,646	0	$266	$927	$215	2.7
510 Group room	9	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Wall Switch	S	93	1,980	2, 3	Relamp	Yes	9	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	44	1,366	0.4	1,235	0	$200	$763	$170	3.0
500 Custodian	1	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	S	62	1,980	2	Relamp	No	1	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	29	1,980	0.0	72	0	$12	$37	$10	2.3
419 Closet	1	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	S	62	440	2	Relamp	No	1	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	29	440	0.0	16	0	$3	$37	$10	10.3
406 Storage	6	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	S	62	440	2, 3	Relamp	Yes	6	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	304	0.2	122	0	$20	$335	$60	13.9
400 Custodian	1	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	S	62	1,980	2	Relamp	No	1	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	29	1,980	0.0	72	0	$12	$37	$10	2.3
300 Custodian	1	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	S	62	1,980	2	Relamp	No	1	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	29	1,980	0.0	72	0	$12	$37	$10	2.3
222 Computer Lab	12	Linear Fluorescent - T8: 4' T8 (32W) - 4L	Wall Switch	S	114	1,980	2, 3	Relamp	Yes	12	LED - Linear Tubes: (4) 4' Lamps	Occupancy Sensor	58	1,366	0.6	1,934	0	$313	$1,146	$275	2.8
221 Server room	2	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	S	62	1,980	2, 3	Relamp	Yes	2	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,366	0.1	183	0	$30	$189	$40	5.0

	Existing Conditions						Proposed Conditions								Energy Impact & Financial Analysis						
Location	Fixture Quantity	Fixture Description	Control System	Light Level	Watts per Fixture	Annual Operating Hours	ECM #	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
220 IT Office	3	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Wall Switch	S	93	1,980	2, 3	Relamp	Yes	3	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	44	1,366	0.1	412	0	$67	$434	$80	5.3
220 IT Office	1	Linear Fluorescent - T8: 2' T8 (17W) - 3L	Wall Switch	S	53	1,980	2	Relamp	No	1	LED - Linear Tubes: (3) 2' Lamps	Wall Switch	26	1,980	0.0	60	0	$10	$49	$9	4.1
219 Speech Room	2	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Wall Switch	S	93	1,980	2, 3	Relamp	Yes	2	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	44	1,366	0.1	274	0	$44	$380	$65	7.1
216 Library	4	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Occupancy Sensor	S	93	1,366	2	Relamp	No	4	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	44	1,366	0.1	298	0	$48	$219	$60	3.3
216 Library	30	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	S	62	1,980	2, 3	Relamp	Yes	30	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,366	0.9	2,744	-1	$444	$1,635	$370	2.8
216 Library	36	Linear Fluorescent - T5: 4' T5 (28W) - 1L	Occupancy Sensor	S	54	1,366	2	Relamp	No	36	LED - Linear Tubes: (1) 4' Lamp	Occupancy Sensor	15	1,366	1.0	2,137	0	$346	$657	$180	1.4
216 Library	3	Exit Signs: LED - 2 W Lamp	None		6	8,760		None	No	3	Exit Signs: LED - 2 W Lamp	None	6	8,760	0.0	0	0	$0	$0	$0	0.0
216 Library	17	Compact Fluorescent: Curveloom Bulb (50W) - 2L	Occupancy Sensor	S	100	1,366	2	Relamp	No	17	LED - Fixtures: Decorative Pendant	Occupancy Sensor	70	1,366	0.4	766	0	$124	$829	$0	6.7
216 Library	2	Compact Fluorescent: 4 Pin CFL (46W) - 2L	Wall Switch	S	92	1,980	2, 3	Relamp	Yes	2	LED - Fixtures: Other	Occupancy Sensor	64	1,366	0.1	207	0	$34	$65	$0	1.9
216 Library	23	Compact Fluorescent: 4 Pin CFL (42W) - 2L	Wall Switch	S	84	1,980	2, 3	Relamp	Yes	23	LED - Fixtures: Ceiling Mount	Occupancy Sensor	59	1,366	0.7	2,175	0	$352	$1,662	$70	4.5
209 Closet	2	Linear Fluorescent - T8: 2' T8 (17W) - 2L	Wall Switch	S	33	440	2	Relamp	No	2	LED - Linear Tubes: (2) 2' Lamps	Wall Switch	17	440	0.0	15	0	$3	$65	$12	21.2
208 Office	2	Linear Fluorescent - T8: 4' T8 (32W) - 4L	Wall Switch	S	114	1,980	2, 3	Relamp	Yes	2	LED - Linear Tubes: (4) 4' Lamps	Occupancy Sensor	58	1,366	0.1	322	0	$52	$416	$75	6.5
207 Office	2	Linear Fluorescent - T8: 4' T8 (32W) - 4L	Wall Switch	S	114	1,980	2, 3	Relamp	Yes	2	LED - Linear Tubes: (4) 4' Lamps	Occupancy Sensor	58	1,366	0.1	322	0	$52	$416	$75	6.5
206 Work Room	4	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	S	62	1,980	2, 3	Relamp	Yes	4	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,366	0.1	366	0	$59	$416	$75	5.8
205 Health	14	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	S	62	1,980	2, 3	Relamp	Yes	14	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,366	0.4	1,280	0	$207	$781	$175	2.9
205 Conference	9	Compact Fluorescent: 4 Pin CFL (42W) - 2L	Wall Switch	S	84	1,980	2, 3	Relamp	Yes	9	LED - Fixtures: Other	Occupancy Sensor	59	1,366	0.3	851	0	$138	$709	$35	4.9
204 Office	2	Linear Fluorescent - T8: 4' T8 (32W) - 4L	Wall Switch	S	114	1,980	2, 3	Relamp	Yes	2	LED - Linear Tubes: (4) 4' Lamps	Occupancy Sensor	58	1,366	0.1	322	0	$52	$416	$75	6.5
203 Office	2	Linear Fluorescent - T8: 4' T8 (32W) - 4L	Wall Switch	S	114	1,980	2, 3	Relamp	Yes	2	LED - Linear Tubes: (4) 4' Lamps	Occupancy Sensor	58	1,366	0.1	322	0	$52	$416	$75	6.5
202 Principal	4	Linear Fluorescent - T8: 4' T8 (32W) - 4L	Occupancy Sensor	S	114	1,366	2	Relamp	No	4	LED - Linear Tubes: (4) 4' Lamps	Occupancy Sensor	58	1,366	0.2	337	0	$54	$292	$80	3.9
200 Main	22	Linear Fluorescent - T8: 2' T8 (17W) - 2L	Wall Switch	S	33	1,980	2, 3	Relamp	Yes	22	LED - Linear Tubes: (2) 2' Lamps	Occupancy Sensor	17	1,366	0.3	1,019	0	$165	$1,255	$202	6.4
200 Main	3	Exit Signs: LED - 2 W Lamp	None		6	8,760		None	No	3	Exit Signs: LED - 2 W Lamp	None	6	8,760	0.0	0	0	$0	$0	$0	0.0
200 Main	7	Compact Fluorescent: 4 Pin CFL (32W) - 1L	Wall Switch	S	32	1,980	2, 3	Relamp	Yes	7	LED - Fixtures: Other	Occupancy Sensor	22	1,366	0.1	252	0	$41	$384	$35	8.5
134 Warewash	3	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Wall Switch	S	93	1,980	2, 3	Relamp	Yes	3	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	44	1,366	0.1	412	0	$67	$434	$80	5.3
133 Pot wash	2	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Wall Switch	S	93	1,980	2, 3	Relamp	Yes	2	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	44	1,366	0.1	274	0	$44	$380	$65	7.1
132 Art Storage	3	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	S	62	440	2	Relamp	No	3	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	29	440	0.1	48	0	$8	$110	$30	10.3

	Existing Conditions						Proposed Conditions								Energy Impact & Financial Analysis						
Location	Fixture Quantity	Fixture Description	Control System	Light Level	Watts per Fixture	Annual Operating Hours	ECM #	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
131 Art Room	33	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	S	62	1,980	2, 3	Relamp	Yes	33	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,366	1.0	3,018	-1	$489	$1,745	$400	2.8
129 Music Storage	2	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Wall Switch	S	93	440	2	Relamp	No	2	LED - Linear Tubes: (3) 4' Lamps	Wall Switch	44	440	0.1	48	0	$8	$110	$30	10.3
129 Music Storage	4	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	S	62	440	2	Relamp	No	4	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	29	440	0.1	64	0	$10	$146	$40	10.3
128 Music Room	20	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Wall Switch	S	93	1,980	2, 3	Relamp	Yes	20	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	44	1,366	0.9	2,744	-1	$444	$1,365	$335	2.3
127 IT	1	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	S	62	1,980	2	Relamp	No	1	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	29	1,980	0.0	72	0	$12	$37	$10	2.3
126 Vestibule	2	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	S	62	1,980	2, 3	Relamp	Yes	2	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,366	0.1	183	0	$30	$189	$40	5.0
126 Vestibule	1	Exit Signs: LED - 2 W Lamp	None		6	8,760		None	No	1	Exit Signs: LED - 2 W Lamp	None	6	8,760	0.0	0	0	$0	$0	$0	0.0
126 Storage	8	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	S	62	440	2, 3	Relamp	Yes	8	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	304	0.2	163	0	$26	$408	$80	12.5
126 Storage	1	Exit Signs: LED - 2 W Lamp	None		6	8,760		None	No	1	Exit Signs: LED - 2 W Lamp	None	6	8,760	0.0	0	0	$0	$0	$0	0.0
122 Janitor Closet	1	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	S	62	440	2	Relamp	No	1	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	29	440	0.0	16	0	$3	$37	$10	10.3
121 Kitchen Office	2	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Wall Switch	S	93	1,980	2, 3	Relamp	Yes	2	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	44	1,366	0.1	274	0	$44	$380	$65	7.1
120 Break room	2	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	S	62	1,980	2, 3	Relamp	Yes	2	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,366	0.1	183	0	$30	$189	$40	5.0
117 Custodian	3	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	S	62	1,980	2, 3	Relamp	Yes	3	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,366	0.1	274	0	$44	$380	$65	7.1
115 Stage	31	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	S	62	1,980	2, 3	Relamp	Yes	31	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,366	0.9	2,835	-1	$459	$1,672	$380	2.8
115 Stage	3	Exit Signs: LED - 2 W Lamp	None		6	8,760		None	No	3	Exit Signs: LED - 2 W Lamp	None	6	8,760	0.0	0	0	$0	$0	$0	0.0
115 Stage	7	Compact Fluorescent: 4 Pin CFL (42W) - 1L	Wall Switch	S	42	1,980	2, 3	Relamp	Yes	7	LED - Fixtures: Other	Occupancy Sensor	29	1,366	0.1	331	0	$54	$526	$35	9.2
114 Cafeteria	50	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Wall Switch	S	93	1,980	2, 3	Relamp	Yes	50	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	44	1,366	2.3	6,859	-1	$1,110	$3,549	$855	2.4
114 Cafeteria	4	Linear Fluorescent - T8: 2' T8 (17W) - 2L	Wall Switch	S	33	1,980	2, 3	Relamp	Yes	4	LED - Linear Tubes: (2) 2' Lamps	Occupancy Sensor	17	1,366	0.1	185	0	$30	$246	$44	6.7
114 Cafeteria	4	Exit Signs: LED - 2 W Lamp	None		6	8,760		None	No	4	Exit Signs: LED - 2 W Lamp	None	6	8,760	0.0	0	0	$0	$0	$0	0.0
112 Mechanical Room	21	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	S	62	440	2	Relamp	No	21	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	29	440	0.5	335	0	$54	$767	$210	10.3
112 Mechanical Room	1	Exit Signs: LED - 2 W Lamp	None		6	8,760		None	No	1	Exit Signs: LED - 2 W Lamp	None	6	8,760	0.0	0	0	$0	$0	$0	0.0
108 Gym	6	Exit Signs: LED - 2 W Lamp	None		6	8,760		None	No	6	Exit Signs: LED - 2 W Lamp	None	6	8,760	0.0	0	0	$0	$0	$0	0.0
108 Gym	40	Compact Fluorescent: 4 Pin CFL (42W) - 8L	Wall Switch	S	336	1,980	1, 3	Fixture Replacement	Yes	40	LED - Fixtures: Low-Bay	Occupancy Sensor	235	1,366	5.0	15,134	-3	$2,450	$33,819	$1,400	13.2

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?	Remaining Useful Life	Annual Operating Hours	ECM #	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
Mechanical Room	School	3	Water Supply Pump	7.5	86.5%	No	W	1,130		No	86.5%	No		0.0	0	0	$0	$0	$0	0.0
Mechanical Room	CHW-1	1	Chilled Water Pump	40.0	94.1%	Yes	W	2,034		No	94.1%	No		0.0	0	0	$0	$0	$0	0.0
Mechanical Room	CHW-2	1	Chilled Water Pump	40.0	94.1%	Yes	W	2,034		No	94.1%	No		0.0	0	0	$0	$0	$0	0.0
Mechanical Room	CHW-4	1	Chilled Water Pump	15.0	93.0%	No	W	1,373	NR, 6	Yes	93.0%	Yes	1	2.8	6,195	0	$1,018	$7,086	$0	7.0
Mechanical Room	CHW-5	1	Chilled Water Pump	15.0	93.0%	No	W	1,373	NR, 6	Yes	93.0%	Yes	1	2.8	6,195	0	$1,018	$7,086	$0	7.0
Mechanical Room	CHW-6	1	Chilled Water Pump	15.0	93.0%	No	W	1,373	NR, 6	Yes	93.0%	Yes	1	2.8	6,195	0	$1,018	$7,086	$0	7.0
Mechanical Room	HHWP-1	1	Heating Hot Water Pump	25.0	93.6%	Yes	W	1,676		No	93.6%	No		0.0	0	0	$0	$0	$0	0.0
Mechanical Room	HHWP-2	1	Heating Hot Water Pump	25.0	93.6%	Yes	W	1,676		No	93.6%	No		0.0	0	0	$0	$0	$0	0.0
Mechanical Room	Glycol plant	1	Process Pump	1.0	82.5%	No	W	1,373		No	82.5%	No		0.0	0	0	$0	$0	$0	0.0
Roof	Chiller-1	10	Other	2.0	85.5%	Yes	W	1,373		No	85.5%	No		0.0	0	0	$0	$0	$0	0.0
Roof	Chiller-2	10	Other	2.0	85.5%	Yes	W	1,373		No	85.5%	No		0.0	0	0	$0	$0	$0	0.0
Roof	HRU-1	1	Supply Fan	10.0	89.5%	Yes	W	1,373		No	89.5%	No		0.0	0	0	$0	$0	$0	0.0
Roof	HRU-1	1	Return Fan	7.5	88.5%	Yes	W	1,373		No	88.5%	No		0.0	0	0	$0	$0	$0	0.0
Roof	HRU-2	1	Supply Fan	10.0	89.5%	Yes	W	1,373		No	89.5%	No		0.0	0	0	$0	$0	$0	0.0
Roof	HRU-2	1	Return Fan	5.0	87.5%	Yes	W	1,373		No	87.5%	No		0.0	0	0	$0	$0	$0	0.0
Roof	AHU-1	1	Supply Fan	5.0	87.5%	Yes	W	1,373		No	87.5%	No		0.0	0	0	$0	$0	$0	0.0
Roof	AHU-1	1	Return Fan	2.0	85.5%	Yes	W	1,373		No	85.5%	No		0.0	0	0	$0	$0	$0	0.0
Roof	AHU-2	1	Supply Fan	5.0	87.5%	Yes	W	1,373		No	87.5%	No		0.0	0	0	$0	$0	$0	0.0
Roof	AHU-2	1	Return Fan	2.0	85.5%	Yes	W	1,373		No	85.5%	No		0.0	0	0	$0	$0	$0	0.0
Roof	AHU-3	1	Supply Fan	5.0	87.5%	Yes	W	1,373		No	87.5%	No		0.0	0	0	$0	$0	$0	0.0

		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?	Remaining Useful Life	Annual Operating Hours	ECM #	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	AHU-3	1	Return Fan	2.0	85.5%	Yes	W	1,373		No	85.5%	No		0.0	0	0	$0	$0	$0	0.0
Roof	AHU-4	1	Supply Fan	1.5	84.0%	Yes	W	1,373		No	84.0%	No		0.0	0	0	$0	$0	$0	0.0
Roof	AHU-4	1	Return Fan	1.0	82.5%	Yes	W	1,373		No	82.5%	No		0.0	0	0	$0	$0	$0	0.0
Roof	AHU-5	1	Supply Fan	1.5	84.0%	Yes	W	1,373		No	84.0%	No		0.0	0	0	$0	$0	$0	0.0
Roof	AHU-5	1	Return Fan	1.0	82.5%	Yes	W	1,373		No	82.5%	No		0.0	0	0	$0	$0	$0	0.0
Roof	MAU-1	1	Makeup Air Fan	0.8	68.0%	Yes	W	1,373		No	68.0%	No		0.0	0	0	$0	$0	$0	0.0
Roof	MAU-2	1	Makeup Air Fan	1.5	84.0%	Yes	W	1,373		No	84.0%	No		0.0	0	0	$0	$0	$0	0.0
Closet	FCU-1,2,3	3	Fan Coil Unit	0.3	68.0%	No	W	1,373		No	68.0%	No		0.0	0	0	$0	$0	$0	0.0
Roof	RTU-1	1	Supply Fan	3.0	86.5%	No	W	1,373	NR, 5	Yes	89.5%	Yes	1	0.5	1,412	0	$232	$4,076	$240	16.5
Roof	RTU-2	1	Supply Fan	3.0	86.5%	No	W	1,373	NR, 5	Yes	89.5%	Yes	1	0.5	1,412	0	$232	$4,076	$240	16.5
Roof	RTU-3	1	Supply Fan	5.0	87.5%	No	W	1,373	NR, 5	Yes	89.5%	Yes	1	0.8	2,282	0	$375	$4,505	$400	10.9
Roof	RTU-4	1	Supply Fan	1.5	84.0%	No	W	1,373	NR, 5	Yes	87.5%	Yes	1	0.3	735	0	$121	$3,391	$120	27.1
Roof	RTU-5	1	Supply Fan	3.0	86.5%	No	W	1,373	NR, 5	Yes	89.5%	Yes	1	0.5	1,412	0	$232	$4,076	$240	16.5
Roof	RTU-6	1	Supply Fan	2.0	85.5%	No	W	1,373	NR, 5	Yes	86.5%	Yes	1	0.3	917	0	$151	$3,623	$160	23.0

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 (MBh)	Remaining Useful Life	ECM #	Install High Efficiency System?	System Quantity	System Type	Cooling Capacity per Unit (Tons)	Heating Capacity per Unit (MBh)	Cooling Mode Efficiency (SEER/EER)	Heating Mode Efficiency (COP)	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	HRU-1	1	Packaged AC	40.00		W		No							0.0	0	0	$0	$0	$0	0.0
Roof	HRU-1	1	Packaged AC	25.00		W		No							0.0	0	0	$0	$0	$0	0.0
Roof/Staffroom	Staffroom	2	Ductless Mini-Split AC	1.00		W		No							0.0	0	0	$0	$0	$0	0.0
Roof	RTU-1	1	Packaged AC	10.00		W		No							0.0	0	0	$0	$0	$0	0.0
Roof	RTU-2	1	Packaged AC	10.00		W		No							0.0	0	0	$0	$0	$0	0.0
Roof	RTU-3	1	Packaged AC	12.50		W		No							0.0	0	0	$0	$0	$0	0.0
Roof	RTU-4	1	Packaged AC	4.00		W		No							0.0	0	0	$0	$0	$0	0.0
Roof	RTU-5	1	Packaged AC	10.00		W		No							0.0	0	0	$0	$0	$0	0.0
Roof	RTU-6	1	Packaged AC	10.00		W		No							0.0	0	0	$0	$0	$0	0.0
Roof/Staffroom	Staffroom	1	Ductless Mini-Split AC	3.00		W		No							0.0	0	0	$0	$0	$0	0.0

Electric Chiller Inventory & Recommendations

		Existing Conditions				Proposed Conditions								Energy Impact & Financial Analysis						
Location	Area(s)/System(s) Served	Chiller Quantity	System Type	Cooling Capacity per Unit (Tons)	Remaining Useful Life	ECM #	Install High Efficiency Chillers?	Chiller Quantity	System Type	Constant/ Variable Speed	Cooling Capacity (Tons)	Full Load Efficiency (kW/Ton)	IPLV Efficiency (kW/Ton)	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	Chiller-1	1	Air-Cooled Screw Chiller	145.00	W		No							0.0	0	0	$0	$0	$0	0.0
Roof	Chiller-2	1	Air-Cooled Screw Chiller	145.00	W		No							0.0	0	0	$0	$0	$0	0.0

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)	Remaining Useful Life	ECM #	Install High Efficiency System?	System Quantity	System Type	Output Capacity per Unit (MBh)	Heating Efficiency	Heating Efficiency Units	Total Peak kW Savings	Total Annual kWh Savings	Total Annual MMBtu Savings	Total Annual Energy Cost Savings	Total Installation Cost	Total Incentives	Simple Payback w/ Incentives in Years
Mechanical Room	B-1	1	Condensing Hot Water Boiler	######	W		No						0.0	0	0	$0	$0	$0	0.0
Mechanical Room	B-2	1	Condensing Hot Water Boiler	######	W		No						0.0	0	0	$0	$0	$0	0.0
Mechanical Room	B-3	1	Condensing Hot Water Boiler	######	W		No						0.0	0	0	$0	$0	$0	0.0
Roof	RTU-1	1	Furnace	192.00	W		No						0.0	0	0	$0	$0	$0	0.0
Roof	RTU-2	1	Furnace	192.00	W		No						0.0	0	0	$0	$0	$0	0.0
Roof	RTU-3	1	Furnace	192.00	W		No						0.0	0	0	$0	$0	$0	0.0
Roof	RTU-4	1	Furnace	100.60	W		No						0.0	0	0	$0	$0	$0	0.0
Roof	RTU-5	1	Furnace	192.00	W		No						0.0	0	0	$0	$0	$0	0.0
Roof	RTU-6	2	Furnace	144.00	W		No						0.0	0	0	$0	$0	$0	0.0
Roof	HRU-1	1	Furnace	100.00	W		No						0.0	0	0	$0	$0	$0	0.0
Roof	HRU-2	1	Furnace	75.00	W		No						0.0	0	0	$0	$0	$0	0.0

DHW Inventory & Recommendations

		Existing Conditions			Proposed Conditions							Energy Impact & Financial Analysis						
Location	Area(s)/System(s) Served	System Quantity	System Type	Remaining Useful Life	ECM #	Replace?	System Quantity	System Type	Fuel Type	System Efficiency	Efficiency Units	Total Peak kW Savings	Total Annual kWh Savings	Total Annual MMBtu Savings	Total Annual Energy Cost Savings	Total Installation Cost	Total Incentives	Simple Payback w/ Incentives in Years
Mechanical Room	DWH-1 kitchen/restrooms	1	Tankless Water Heater	W		No						0.0	0	0	$0	$0	$0	0.0

Low-Flow Device Recommendations

	Recommedation Inputs					Energy Impact & Financial Analysis						
Location	ECM #	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
Restrooms	7	28	Faucet Aerator (Lavatory)	2.20	0.50	0.0	0	40	$460	$201	$0	0.4

Walk-In Cooler/Freezer Inventory & Recommendations

	Existing Conditions		Proposed Conditions				Energy Impact & Financial Analysis						
Location	Cooler/ Freezer Quantity	Case Type/Temperature	ECM #	Install EC Evaporator Fan Motors?	Install Electric Defrost Control?	Install Evaporator Fan Control?	Total Peak kW Savings	Total Annual kWh Savings	Total Annual MMBtu Savings	Total Annual Energy Cost Savings	Total Installation Cost	Total Incentives	Simple Payback w/ Incentives in Years
Kitchen	1	Cooler (35F to 55F)	8	Yes	No	No	0.0	262	0	$43	$303	$0	7.0
Kitchen	1	Low Temp Freezer (-35F to -5F)	8	Yes	No	No	0.1	655	0	$108	$303	$0	2.8

Commercial Refrigerator/Freezer Inventory & Recommendations

	Existing Conditions			Proposed Conditions		Energy Impact & Financial Analysis						
Location	Quantity	Refrigerator/ Freezer Type	ENERGY STAR Qualified?	ECM #	Install ENERGY STAR Equipment?	Total Peak kW Savings	Total Annual kWh Savings	Total Annual MMBtu Savings	Total Annual Energy Cost Savings	Total Installation Cost	Total Incentives	Simple Payback w/ Incentives in Years
Kitchen	1	Stand-Up Refrigerator, Solid Door (>50 cu. ft.)	No	NR	Yes	0.1	1,045	0	$172	$2,432	$200	13.0
Kitchen	1	Stand-Up Refrigerator, Solid Door (31 - 50 cu. ft.)	No	NR	Yes	0.1	646	0	$106	$1,632	$125	14.2
Kitchen	1	Refrigerator Chest	No	NR	Yes	0.1	1,002	0	$165	$2,314	$0	14.1
Kitchen	1	Refrigerator Chest	No	NR	Yes	0.1	1,015	0	$167	$1,759	$0	10.5
Kitchen	2	Stand-Up Refrigerator, Glass Door (≤15 cu. ft.)	Yes		No	0.0	0	0	$0	$0	$0	0.0
Kitchen	2	Freezer Chest	Yes		No	0.0	0	0	$0	$0	$0	0.0
Kitchen	1	Stand-Up Refrigerator, Solid Door (31 - 50 cu. ft.)	No	NR	Yes	0.1	646	0	$106	$1,632	$125	14.2

Cooking Equipment Inventory & Recommendations

	Existing Conditions			Proposed Conditions		Energy Impact & Financial Analysis						
Location	Quantity	Equipment Type	High Efficiency Equipement?	ECM #	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	Insulated Food Holding Cabinet (Full Size)	No	NR	Yes	0.4	792	0	$130	$5,757	$600	39.6
Kitchen	2	Insulated Food Holding Cabinet (Full Size)	No	NR	Yes	0.4	792	0	$130	$5,757	$600	39.6
Kitchen	2	Insulated Food Holding Cabinet (Full Size)	No	NR	Yes	0.4	792	0	$130	$5,757	$600	39.6
Kitchen	1	Electric Convection Oven (Full Size)	Yes	NR	Yes	0.4	858	0	$141	$7,441	$350	50.3
Kitchen	2	Electric Convection Oven (Full Size)	No	NR	Yes	0.9	1,716	0	$282	$14,881	$700	50.3
Kitchen	1	Gas Steamer	No	NR	Yes	0.0	0	12	$144	$7,423	$2,000	37.7
Kitchen	1	Gas Griddle (≤2 Feet Width)	No	NR	Yes	0.0	0	4	$46	$1,362	$125	26.9

Dishwasher Inventory & Recommendations

	Existing Conditions					Proposed Conditions		Energy Impact & Financial Analysis						
Location	Quantity	Dishwasher Type	Water Heater Fuel Type	Booster Heater Fuel Type	ENERGY STAR Qualified?	ECM #	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	Payback w/ Incentives in Years
Kitchen	1	Multi-Tank Conveyor (High Temp)	Electric	Electric	Yes		No	0.0	0	0	$0	$0	$0	0.0

Plug Load Inventory

	Existing Conditions			
Location	Quantity	Equipment Description	Energy Rate (W)	ENERGY STAR Qualified?
Classrooms	115	Computers	120.0	No
Classrooms	60	Small Printer	46.0	Yes
Staffrooms	3	Medium Printer	55.0	Yes
Copy room	6	Copy Machine	600.0	Yes
Staffrooms	1	Paper Shredder	46.0	No
Classrooms	50	Projector	120.0	Yes
Kitchen/staffrooms	8	Microwave	800.0	No
Staffrooms	4	Small Refrigerator	120.0	No
Kitchen	3	Large Refrigerator	255.0	Yes
Kitchen	2	Coffee Machine	1,500.0	No
Kitchen	1	Toaster	300.0	No
Kitchen	1	Toaster oven	550.0	No
Lobby	3	CRT TV	240.0	No
Classrooms	2	Dehumidifier	520.0	Yes

Vending Machine Inventory & Recommendations

	Existing Conditions		Proposed Conditions		Energy Impact & Financial Analysis						
Location	Quantity	Vending Machine Type	ECM #	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
Break Room	1	Refrigerated	9	Yes	0.2	1,612	0	$265	$230	$0	0.9
Break Room	1	Non-Refrigerated	9	Yes	0.0	343	0	$56	$230	$0	4.1

APPENDIX B: ENERGY STAR® STATEMENT OF ENERGY PERFORMANCE

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.

LEARN MORE AT energystar.gov

ENERGY STAR® Statement of Energy Performance

81

ENERGY STAR® Score[1]

General Charles G. Harker School

Primary Property Type: K-12 School
Gross Floor Area (ft²): 100,748
Built: 2008

For Year Ending: January 31, 2018
Date Generated: October 22, 2018

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
General Charles G. Harker School 1771 Oldmans Creek Rd. Woolwich Twp., New Jersey 08085	SWEDESBORO-WOOLWICH BOARD OF EDUCATION 15 Fredrick Boulevard Woolwich Twp, NJ 08085 (____)____-______	Christopher DeStratis 15 Fredrick Boulevard Woolwich Twp, NJ 08085 856-241-1552 x 1008 cdestratis@swsdk6.com

Property ID: 6571004

Energy Consumption and Energy Use Intensity (EUI)

Site EUI
50.1 kBtu/ft²

Annual Energy by Fuel

Electric - Grid (kBtu)	2,847,878 (56%)
Natural Gas (kBtu)	2,199,152 (44%)

Source EUI
102.1 kBtu/ft²

National Median Comparison

National Median Site EUI (kBtu/ft²)	69.8
National Median Source EUI (kBtu/ft²)	141.8
% Diff from National Median Source EUI	-28%

Annual Emissions

Greenhouse Gas Emissions (Metric Tons CO2e/year)	405

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)

APPENDIX C: GLOSSARY

TERM	DEFINITION
Blended Rate	Used to calculate financial savings. The blended rate is calculated by dividing the amount of your bill by the total energy use. For example, if your bill is $22,217.22, and you used 266,400 kilowatt-hours, your blended rate is 8.3 cents per kilowatt-hour.
BTU	A British thermal unit is the amount of heat required to increase the temperature of one pound water by one-degree Fahrenheit. Commonly used to measure natural gas consumption.
Demand Response	Demand response reduces or shifts electricity usage at or among participating buildings/sites during peak energy use periods in response to time-based rates or other forms of financial incentives.
Energy Efficiency	Reducing the amount of energy necessary to provide comfort and service to a building/area. Achieved through the installation of new equipment and/or optimizing energy management systems.
Generation	The process of generating electric power from sources of primary energy (e.g., natural gas, the sun, oil).
HVAC	Heating, ventilation, and air conditioning.
kW	Kilowatt. Equal to 1,000 Watts.
Load	The total amount of power used by a building system at any given time.
Measure	A single activity, or installation of a single type of equipment, that is implemented in a building system to reduce total energy consumption.
MMBtu	One million British thermal units.
psig	Pounds per square inch.
Plug Load	Refers to the amount of energy used in a space by products that are powered by means of an ordinary AC plug.
Simple Payback	The amount of time needed to recoup the funds expended in an investment, or to reach the break-even point.
Temperature Setpoint	The temperature at which a temperature regulating device (thermostat, for example) has been set.
Turnkey	Provision of a complete product or service that is ready for immediate use
Watt (W)	Unit of power commonly used to measure electricity use.

Local Government Energy Audit Report

Governor Charles C. Stratton School

March 11, 2019

Prepared for:
Swedesboro-Woolwich School District
15 Fredrick Blvd
Woolwich Township, NJ 08085

Prepared by:
TRC Energy Services
900 Route 9 North
Woodbridge, NJ 07095

Disclaimer

The goal of this audit report is to identify potential energy efficiency opportunities, help prioritize specific measures for implementation, and provide information about financial incentives that may be available. Most energy conservation measures have received preliminary analysis of feasibility that identifies expected ranges of savings and costs. This level of analysis is usually considered sufficient to establish a basis for further discussion and to help prioritize energy measures.

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

TRC bases estimated installation costs on our experience at similar facilities, pricing from local contractors and vendors, and/or cost estimates from RS Means. We encourage the owner of the facility is encouraged to independently confirm these cost estimates and to obtain multiple estimates when considering measure installations. Actual installation costs can vary widely based on individual 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.

The New Jersey 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. Please review all available program incentives and eligibility requirements prior to selecting and installing any energy conservation measures.

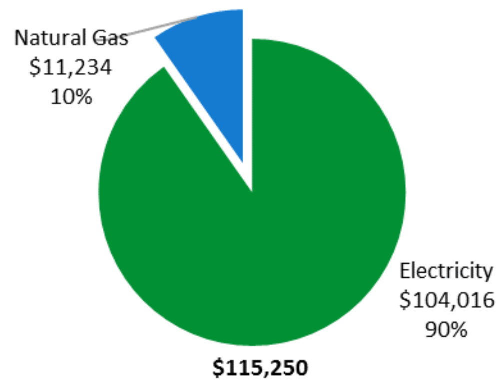
The customer and their respective contractor(s) are responsible to implement energy conservation measures in complete conformance with all applicable local, state and federal requirements.

Table of Contents

1 Executive Summary

The New Jersey Board of Public Utilities (NJBPU) has sponsored this Local Government Energy Audit (LGEA) report for Governor Charles C. Stratton School. This report provides you with information about your facility's energy use, identifies energy conservation measures (ECMs) that can reduce your energy use, and provides information and assistance to help make changes in your facility. TRC Energy Services (TRC) conducted this study as part of a comprehensive effort to assist New Jersey school districts and local governments in controlling their energy costs and help protect our environment by reducing statewide energy consumption.

BUILDING PERFORMANCE REPORT

Annual Utilities	Costs: $115,250 Electricity: 651,437 kWh Natural Gas: 9,876 Therms	
ENERGY STAR® Benchmarking Score	80 *(1-100 scale)*	Congratulations, your building performs better than the national average. This report has suggestions about how to keep your building running efficiently, further improve performance and lower your energy bills even more.

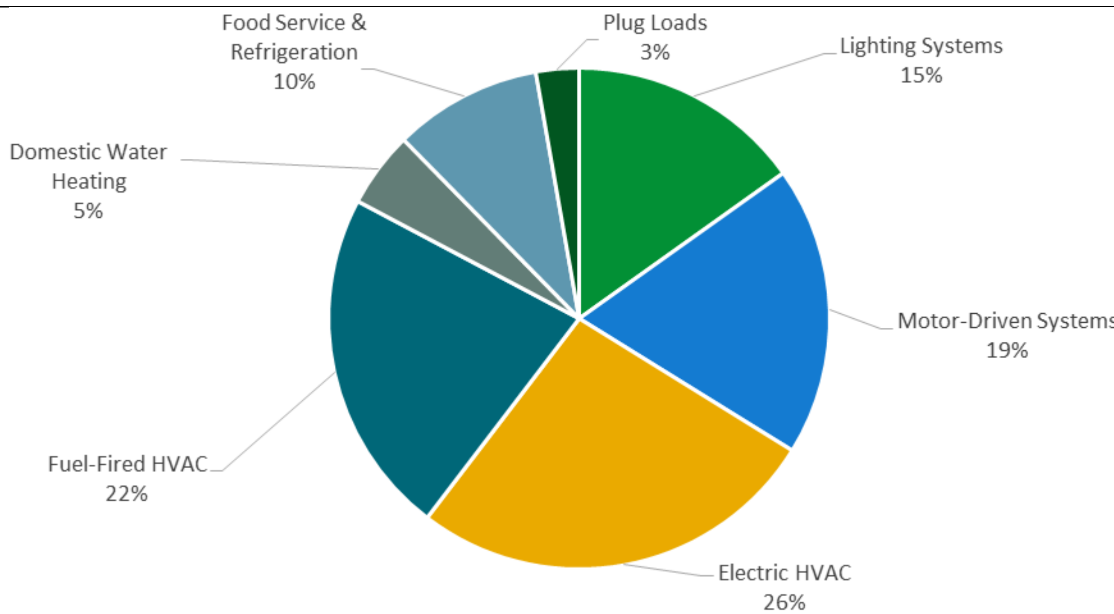


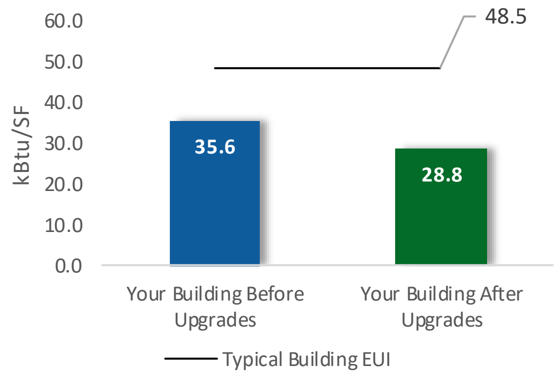
Figure 1 - Energy Use by System

POTENTIAL IMPROVEMENTS

This energy audit considered a range of potential energy improvements in your building. Costs and savings will vary between improvements. Presented below are two potential scopes of work for your consideration.

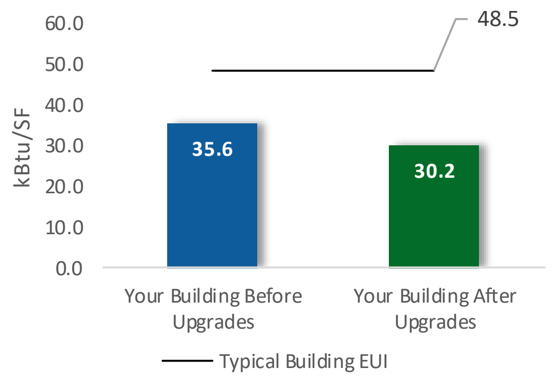
Scenario 1: Full Package (all evaluated measures)

Installation Cost	$447,541
Potential Rebates & Incentives[1]	$30,611
Annual Cost Savings	$27,345
Annual Energy Savings	Electricity: 168,444 kWh Natural Gas: 395 Therms
Greenhouse Gas Emission Savings	87 Tons
Simple Payback	15.2 Years
Site Energy Savings (all utilities)	19%



Scenario 2: Cost Effective Package[2]

Installation Cost	$136,332
Potential Rebates & Incentives	$16,753
Annual Cost Savings	$21,982
Annual Energy Savings	Electricity: 135,981 kWh Natural Gas: 237 Therms
Greenhouse Gas Emission Savings	70 Tons
Simple Payback	5.4 Years
Site Energy Savings (all utilities)	15%



On-site Generation Potential

Photovoltaic	High
Combined Heat and Power	None

[1] Incentives are based on current SmartStart Prescriptive incentives. Other program incentives may apply.

[2] A cost-effective measure is defined as one where the simple payback does not exceed two-thirds of the expected proposed equipment useful life. Simple payback is based on the net measure cost after potential incentives.

#	Energy Conservation Measure	Annual Electric Savings (kWh)	Peak Demand Savings (kW)	Annual Fuel Savings (MMBtu)	Annual Energy Cost Savings ($)	Lifetime Energy Cost Savings ($)	Estimated Install Cost ($)	Estimated Incentive ($)*	Estimated Net Cost ($)	Simple Payback Period (yrs)**	CO_2e Emissions Reduction (lbs)
Lighting Upgrades		**77,567**	**20.3**	**-16**	**$12,201**	**$183,012**	**$80,302**	**$10,808**	**$69,494**	**5.7**	**76,211**
	Install LED Fixtures	13,269	2.0	-3	$2,087	$31,306	$42,502	$4,400	$38,102	18.3	13,037
ECM 1	Retrofit Fixtures with LED Lamps	64,299	18.3	-13	$10,114	$151,706	$37,799	$6,408	$31,391	3.1	63,174
Lighting Control Measures		**22,169**	**6.3**	**-5**	**$3,487**	**$27,896**	**$29,286**	**$2,695**	**$26,591**	**7.6**	**21,781**
ECM 2	Install Occupancy Sensor Lighting Controls	18,135	5.2	-4	$2,852	$22,820	$27,286	$2,695	$24,591	8.6	17,818
ECM 3	Install High/Low Lighting Controls	4,034	1.1	-1	$635	$5,076	$2,000	$0	$2,000	3.2	3,964
Motor Upgrades		**3,408**	**1.4**	**0**	**$544**	**$8,162**	**$21,755**	**$0**	**$21,755**	**40.0**	**3,432**
	Premium Efficiency Motors	3,408	1.4	0	$544	$8,162	$21,755	$0	$21,755	40.0	3,432
Variable Frequency Drive (VFD) Measures		**47,901**	**17.7**	**0**	**$7,648**	**$114,727**	**$68,860**	**$7,650**	**$61,210**	**8.0**	**48,236**
ECM 4	Install VFD on Variable Air Volume (VAV) Fans	33,401	18.9	0	$5,333	$79,999	$52,854	$4,650	$48,204	9.0	33,635
ECM 5	Install VFDs on Cooling Tower Fans	14,500	-1.3	0	$2,315	$34,729	$16,005	$3,000	$13,005	5.6	14,601
Electric Unitary HVAC Measures		**13,655**	**17.3**	**0**	**$2,180**	**$32,706**	**$221,007**	**$6,583**	**$214,424**	**98.3**	**13,751**
	Install High Efficiency Air Conditioning Units	13,655	17.3	0	$2,180	$32,706	$221,007	$6,583	$214,424	98.3	13,751
Gas Heating (HVAC/Process) Replacement		**0**	**0.0**	**19**	**$212**	**$4,239**	**$21,389**	**$2,800**	**$18,589**	**87.7**	**2,182**
	Install High Efficiency Furnaces	0	0.0	19	$212	$4,239	$21,389	$2,800	$18,589	87.7	2,182
Domestic Water Heating Upgrade		**0**	**0.0**	**42**	**$475**	**$4,750**	**$158**	**$0**	**$158**	**0.3**	**4,889**
ECM 6	Install Low-Flow DHW Devices	0	0.0	42	$475	$4,750	$158	$0	$158	0.3	4,889
Food Service & Refrigeration Measures		**3,743**	**0.4**	**0**	**$598**	**$5,558**	**$4,785**	**$75**	**$4,710**	**7.9**	**3,769**
	Refrigerator/Freezer Case Electrically Commutated Motors	393	0.0	0	$63	$942	$1,213	$0	$1,213	19.3	396
	Replace Refrigeration Equipment	1,738	0.2	0	$277	$3,329	$3,342	$75	$3,267	11.8	1,750
ECM 7	Vending Machine Control	1,612	0.2	0	$257	$1,287	$230	$0	$230	0.9	1,623
TOTALS		**168,444**	**63.5**	**40**	**$27,345**	**$381,051**	**$447,541**	**$30,611**	**$416,930**	**15.2**	**174,250**

* - All incentives presented in this table are based on NJ SmartStart equipment incentives and assume proposed equipment meets minimum performance criteria for that pro

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

Figure 2 – Evaluated Energy Improvements

1.1 Planning Your Project

Careful planning makes for a successful energy project. When considering this scope of work, you will have some decisions to make, such as:

- How will the project be funded and/or financed?
- Is it best to pursue individual ECMs, groups of ECMs, or use a comprehensive approach where all ECMs are installed together?
- Are there other facility improvements that should happen at the same time?

Pick Your Installation Approach

New Jersey Clean Energy Programs give you the flexibility to do a little or a lot. Rebates, incentives, and financing are available to help reduce both your installation costs and your energy bills. If you are planning to take advantage of these programs, make sure to review incentive program guidelines before proceeding. This is important because in most cases you will need to submit applications for the incentives before purchasing materials or starting installation.

The potential ECMs identified for this building likely qualify for multiple incentive and funding programs. Based on current program rules and requirements, your measures are likely to qualify for the following programs:

Energy Conservation Measure		SmartStart	Direct Install	Pay For Performance
ECM 1	Retrofit Fixtures with LED Lamps	X		X
ECM 2	Install Occupancy Sensor Lighting Controls	X		X
ECM 3	Install High/Low Lighting Controls			X
ECM 4	Install VFD on Variable Air Volume (VAV) HVAC	X		X
ECM 5	Install VFDs on Cooling Tower Fans	X		X
ECM 6	Install Low-Flow Domestic Hot Water Devices			X
ECM 7	Vending Machine Control			X

Figure 3 – Funding Options

New Jersey Clean Energy Programs At-A-Glance

	SmartStart Flexibility to install at your own pace	**Direct Install** Turnkey installation	**Pay for Performance** Whole building upgrades
Who should use it?	Buildings installing individual measures or small group of measures.	Small to mid-size facilities that can bundle multiple measures together. Peak demand should be below 200 kW. Not suitable for significant building shell issues.	Mid to large size facilities looking to implement as many measures as possible at one time. Peak demand should be over 200 kW.
How does it work?	Use in-house staff or your preferred contractor.	Pre-approved contractors pass savings along to you via reduced material and labor costs.	Whole-building approach to energy upgrades designed to reduce energy use by at least 15%. The more you save, the higher the incentives.
What are the Incentives?	Fixed incentives for specific energy efficiency measures.	Incentives pay up to 70% of eligible costs, up to $125,000 per project. You pay the remaining 30% directly to the contractor.	Up to 25% of installation cost, calculated based on level of energy savings per square foot.
How do I participate?	Submit an application for the specific equipment to be installed.	Contact a participating contractor in your region.	Contact a pre-qualified Partner to develop your Energy Reduction Plan and set your energy savings targets.

Take the next step by visiting **www.njcleanenergy.com** for program details, applications, and to contact a qualified contractor.

Individual Measures with SmartStart

For facilities wishing 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, you can use internal resources or an outside firm or contractor to perform the final design of the ECM(s) and install the equipment. Program pre-approval is required for some SmartStart incentives, so only after receiving pre-approval should you proceed with ECM installation.

Turnkey Installation with Direct Install

The Direct Install program provides 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. Direct Install contractors will assess and verify individual measure eligibility, and, in most cases, they perform the installation work. The Direct Install program is available to sites with an average peak demand of less than 200 kW.

Whole Building Approach with Pay for Performance

Pay for Performance can be a good option for medium to large sized facilities to achieve deep energy savings. Pay for Performance allows you to install as many measures as possible under a single project as well as address measures that may not qualify for other programs. Many facilities pursuing an Energy Savings Improvement Program (ESIP) loan also use this program. Pay for Performance works for larger customers with a peak demand over 200 kW. 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.

More Options from Around the State

Financing and Planning Support with the Energy Savings Improvement Program (ESIP)

For larger facilities with limited capital availability to implement ECMs, project financing may be available through the 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. You have already taken the first step as an LGEA customer, because this report is required to participate in ESIP.

Resiliency with Return on Investment through Combined Heat & Power (CHP)

The CHP program provides incentives for combined heat and power (aka cogeneration) and waste heat to power projects. Combined heat and power systems generate power on-site and recover heat from the generation system to meet on-site thermal loads. Waste heat to power systems use waste heat to generate power. You will work with a qualified developer who will design a system that meets your building's heating and cooling needs.

Ongoing Electric Savings with Demand Response

The Demand Response Energy Aggregator program reduces 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. By enabling commercial facilities to reduce their electric demand 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 demand response (DR) programs. Program participation is voluntary, and facilities receive payments regardless of whether they are called upon to curtail their load during times of peak demand.

2 Existing Conditions

The New Jersey Board of Public Utilities (NJBPU) has sponsored this Local Government Energy Audit (LGEA) Report for Governor Charles C. Stratton School. This report provides information on how your facility uses energy, identifies energy conservation measures (ECMs) that can reduce your energy use, and provides information and assistance to help you implement the ECMs. This report also contains valuable information on financial incentives from New Jersey's Clean Energy Program (NJCEP) for implementing ECMs.

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

2.1 Site Overview

On August 9, 2018, TRC performed an energy audit at Governor Charles C. Stratton School located in Woolwich Township, New Jersey. TRC met with Anthony Tobin, Facility Representative to review the facility operations and help focus our investigation on specific energy-using systems.

Governor Charles C. Stratton School is a two-story, 90,274 square foot building built in 2002. Spaces include: classrooms, multipurpose room, library, main office, board office, faculty room, corridors, stairwells, staffrooms, a commercial kitchen and mechanical space.

The school has water source heat pumps which provide heating and cooling to classrooms. Packaged air conditioning (AC) with direct expansion (DX) cooling serves corridors, kitchen and multipurpose room(s).

2.2 Building Occupancy

The school is occupied ten months, from September through June, and the facility operates year around. Typical weekday occupancy is 40 staff and 395 students. Summer occupancy includes continuing maintenance activities. There are no weekend activities.

Building Name	Weekday/Weekend	Operating Schedule
Governor Charles C. Stratton School	Weekday	6:00 AM - 6:30 PM
	Weekend	Unoccupied

Figure 4 - Building Occupancy Schedule

2.3 Building Envelope

Building walls are concrete block over structural steel. The walls are made of poured concrete with a brick veneer and painted CMU interior finish.

The flat roof is supported with steel trusses and reinforced concrete deck and finished with an insulated layer and a covering of black roll roofing. Steel trusses support a pitched roof with a metal deck covered with slate shingles. The thermal barrier is between attic space and the conditioned space below.

Most of the windows are double-glazed with low-e glass and have aluminum frames with a thermal break fiberglass frames. The glass-to-frame seals are in good condition. The operable window weather seals are in good condition, showing no evidence of excessive wear. Exterior doors have aluminum frames and are in good condition with undamaged door seals.

Image 1 Building exterior

Image 2 Building roof

Image 3 Flat roof

Image 4 Flat roof

2.4 Lighting Systems

The primary interior lighting system uses 32-Watt linear fluorescent T8 lamps. Additionally, there are some compact fluorescent lamps (CFL) general purpose lamps. Typically, T8 fluorescent lamps use electronic ballasts.

Fixture types include 1, 2 or 3 lamps, 2 and 4-foot long troffer mounted fixtures and 2-foot fixtures with 32-Watt U-bend as well as 32-Watt linear tube lamps. Most fixtures are in good condition.

Multipurpose room fixtures have high bay 8 lamp and 6 lamp 42-Watt CFL fixtures and are manually controlled. Library fixtures have U-type 36-Watt CFL lamps, 4-pin 42-Watt CFL lamps and are manually controlled. All exit signs are LED. Interior lighting levels were generally sufficient. Most lighting fixtures are controlled manually by wall switches.

Exterior fixtures include wall packs and canopy lights with 50-Watt and 100-Watt metal halide fixtures along with 4 pin 42-Watt CFL lamps. Exterior light fixtures are controlled by photocells.

Image 5 Lighting fixtures

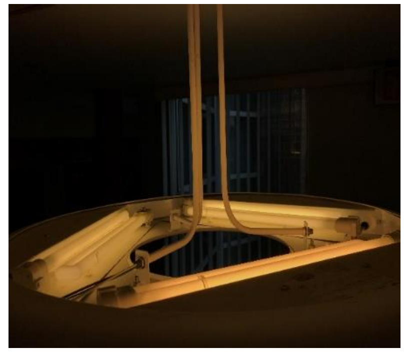


Image 6 U-type CFLs in Library

Image 7 Exterior wall pack fixture

2.5 Air Handling Systems

Packaged Units & Heat Pumps

Classrooms are served with 64 water source heat pump units controlled by the building energy management system (EMS). These 10.50 EER units have a heating capacity ranging from 9.10 MBh to 124 MBH and 0.5 ton to 8.50 ton cooling capacity.

A 1 ton packaged terminal air conditioning (PTAC) unit provides cooling in reception area. Stairwells and vestibules have electric unit heaters and are controlled by thermostats located in zones.

The multipurpose room, kitchen and faculty dining room are served by seven Aaon direct expansion (DX) packaged roof top units air conditioners (ACs) which have a 7 ton to 10 ton cooling capacity with gas-fired furnaces ranging in size from 73 to 218 MBh. These units are in fair condition with EER of 9 controlled by the EMS.

There are three Aaon make up air units with supply and return fans. Supply fan motors range in size from 2 to 7.5 hp and return fan motors range in size from 3 to 5 hp.

Twelve Penn ventilator exhaust fans serve restrooms, the mechanical room and dishwasher hood. The kitchen hood exhaust fan has 2 hp motor.

The school has a 250-ton BAC cooling tower with two 25 hp constant speed supply fans which is part of the water source heat pump arrangement. Water circulates through the boiler and the tower loop, which act as a heat source or sink depending on the mode of operation. Two 20 hp loop pumps circulate water in terminal units; two 10 hp condenser water pumps moves the condensate reverse from the loop of condensate water into the HVAC system.

Refer to Appendix A for detailed information about each unit.

Image 8 Aaon RTU unit

Image 9 Roof units layout

Image 10 Units on flat roof

Image 11 Roof material

Image 12 Cooling towers

Image 13 CT Fan motor nameplate

2.6 Heating Hot Water Systems

Two Smith cast iron 2,020 MBh non-condensing hot water boilers serve the building heating load. The burners are non-modulating with a nominal efficiency of 80%. The boilers are configured in a lead-lag control scheme. Only one boiler is required under high load conditions. Installed in 2002, they are in good condition. There is a service contract in place.

The boilers are configured in a variable flow primary distribution with two 20 hp VFD-controlled hot water pumps operating in a lead-lag arrangement. The hot water from the boilers passes through a heat exchanger to provide hot water to makeup air units and water source heat pumps throughout the building. Two 20-hp variable flow condenser water pumps circulate hot water in water source heat pumps.

Hot water is supplied at 180°F when the outside air temperature is low, and the setpoint is adjusted linearly to 78°F when the outside air is above 81°F. The hot water return temperature is typically 86.4°F.

Image 14 Boiler burner nameplate

Image 15 Condenser water pumps

Image 16 Heating hot water pump

Image 17 VFD for HHWP pump

2.7 Building Energy Management Systems (EMS)

A Trane Tracer Summit EMS controls the HVAC equipment, cooling tower, the boilers, make up units and the package units. The EMS provides equipment scheduling monitors and controls space temperatures, supply air temperatures, humidity, heating water loop temperatures and chilled water loop temperatures.

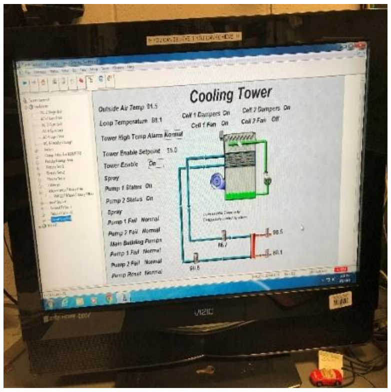


Image 18 Cooling tower graphic

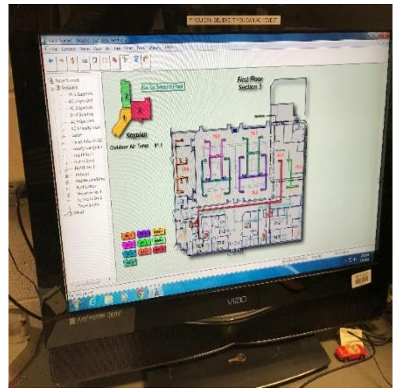


Image 19 Floor plan layout

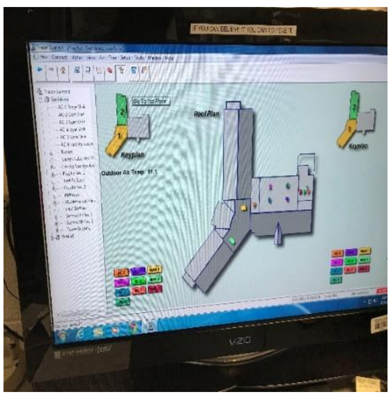


Image 20 HVAC unit layout on roof

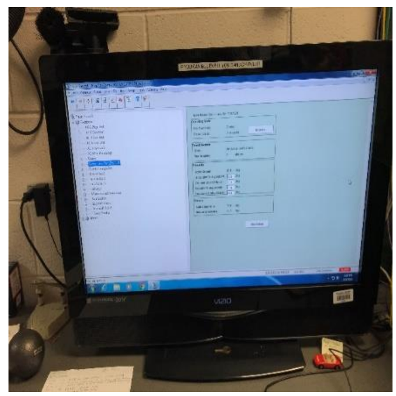


Image 21 Setpoints in EMS

2.8 Domestic Hot Water

Hot water is produced with two Bradford White 250 gallon, 270 MBh, gas-fired storage water heaters with an 80% efficiency.

Image 22 DHW heaters

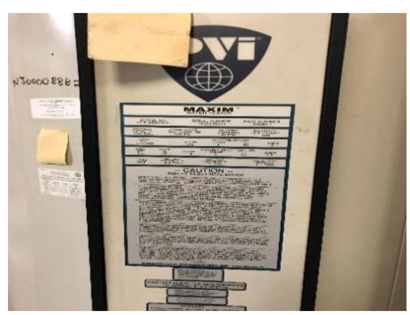


Image 23 DHW heater nameplate

2.9 Food Service Equipment

The kitchen has mixed gas and electric equipment that is used to prepare lunches for students. Most cooking is done using a combination of an electric oven and a gas-fired combination oven/steam cooker. Bulk prepared foods are held in one full-size and four half-size electric holding cabinets. Equipment is high efficiency and in good condition.

The dishwasher is a Hobart ENERGY STAR® high temperature, single tank rack electric unit.

Visit https://www.energystar.gov/products/commercial_food_service_equipment for the latest information on high efficiency food service equipment.

Image 24 Gas griddle

Image 25 Electric skillet

Image 26 Convection oven

Image 27 Insulated heating cabinets

2.10 Refrigeration

The kitchen has four stand-up refrigerators with solid doors and one stand-up refrigerator with glass door. All equipment is high efficiency and in good condition. The walk-in refrigerator has an estimated 0.73-ton compressor located on the roof and two 1/20 hp evaporator fan with fan control and electric defrost control. The walk-in low temperature freezer has a 0.73-ton compressor located on the roof and a single fan 1/20 hp evaporator with evaporator fan control and electric defrost control.

Visit https://www.energystar.gov/products/commercial_food_service_equipment for the latest information on high efficiency food service equipment.

Image 28 Walk in freezer

Image 29 Walk in cooler

2.11 Plug Load & Vending Machines

The utility bill analysis indicates that plug loads consume approximately 2.78% of total building energy use. This is lower than a typical building.

You seem to already be doing a great job managing your electrical plug loads. This report makes additional suggestions for ECMs in this area as well as energy efficient best practices.

There are 82 computer work stations throughout the facility. Plug loads throughout the building include general cafeteria and office equipment. There are classroom typical loads such as printers, computer, projectors, and fans.

There are several residential-style refrigerators throughout the building that are used to store beverages and staff lunches. These vary in condition and efficiency.

There is one refrigerated beverage vending machine and one non-refrigerated vending machines. The non-refrigerated vending machine is equipped with occupancy-based controls.

Image 30 Refrigerated vending machine

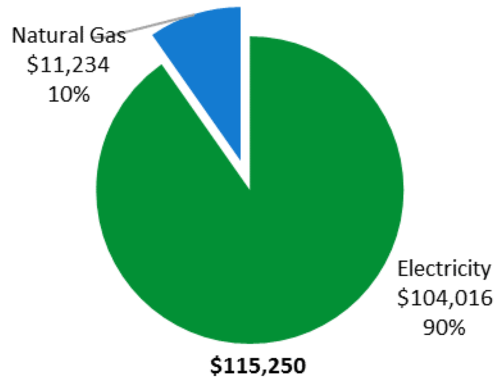
2.12 Water-Using Systems

There are 18 restrooms with toilets, urinals, and sinks. Faucet flow rates are at 2.2 gallons per minute (gpm) or higher. Toilets are rated at 2.5 gallons per flush (gpf) and urinals are rated at 2 gpf.

3 Energy Use and Costs

Twelve months of utility billing data is used to develop annual energy consumption and cost data. This information creates a profile of the annual energy consumption and energy costs.

Utility Summary		
Fuel	**Usage**	**Cost**
Electricity	651,437 kWh	$104,016
Natural Gas	9,876 Therms	$11,234
Total		**$115,250**



An energy balance identifies and quantifies energy use in your various building systems. This can highlight areas with the most potential for improvement. This energy balance was developed using calculated energy use for each of the end uses noted in the figure.

The energy auditor collects information regarding equipment operating hours, capacity, efficiency and other operational parameters from facility staff, drawings, and on-site observations. This information is used as the inputs to calculate the existing conditions energy use for the site. The calculated energy use is then compared to the historical energy use and the initial inputs are revised, as necessary, to balance the calculated energy use to the historical energy use.

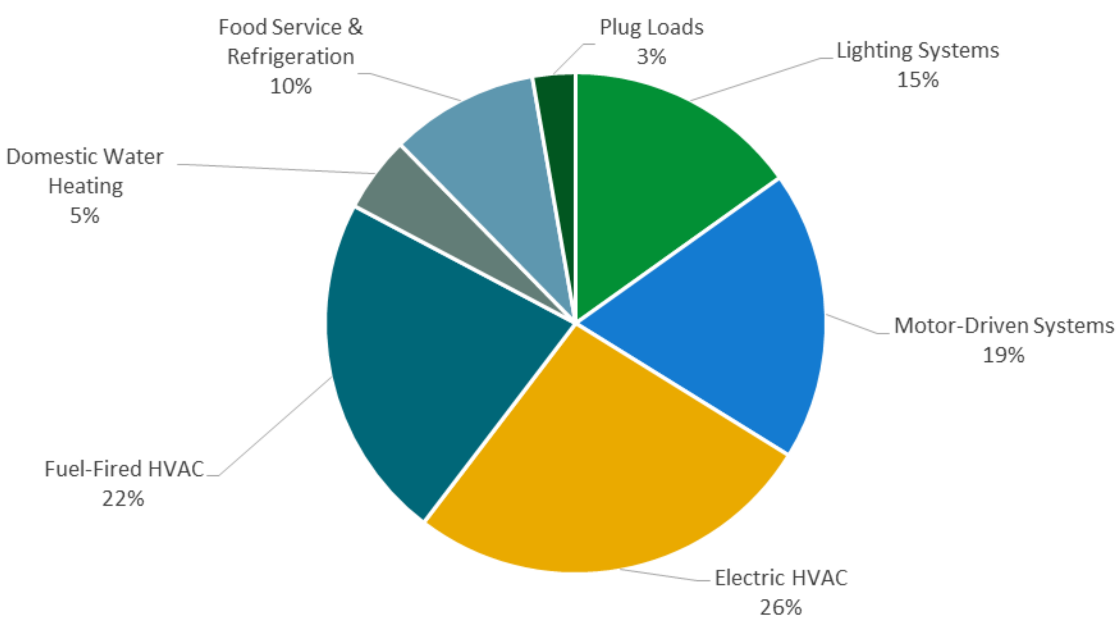
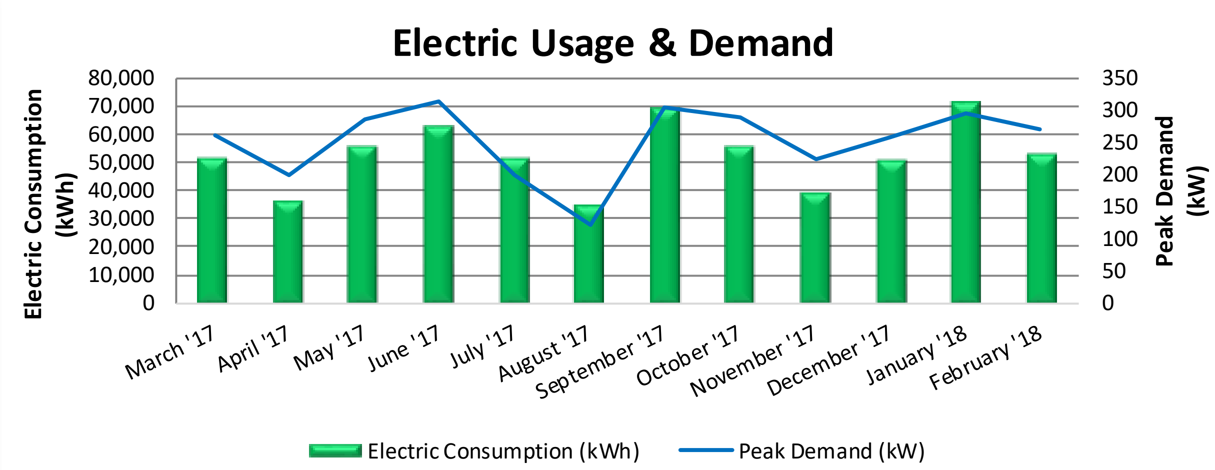


Figure 5 - Energy Balance

3.1 Electricity

Atlantic City Electric delivers electricity under rate class Monthly General Service Secondary.



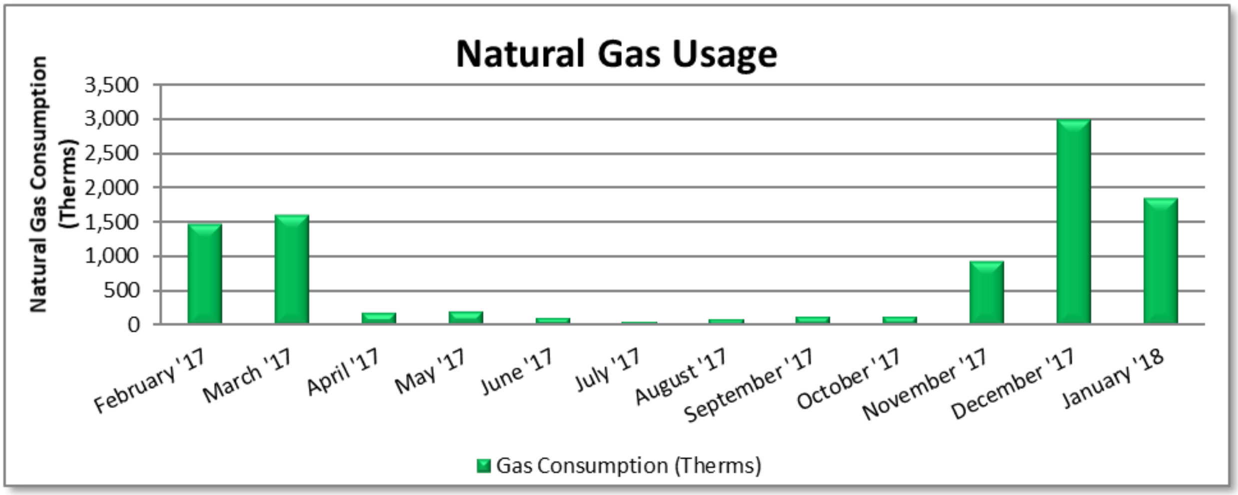
Electric Billing Data					
Period Ending	**Days in Period**	**Electric Usage (kWh)**	**Demand (kW)**	**Demand Cost**	**Total Electric Cost**
3/30/17	30	51,241	261	2,374	9,062
4/27/17	27	35,971	200	2,011	6,982
5/30/17	32	55,735	286	2,776	10,007
6/29/17	29	62,728	316	2,786	9,197
7/30/17	30	51,202	198	2,303	7,684
8/30/17	30	34,915	123	2,303	5,461
9/28/17	28	68,688	305	2,604	9,831
10/30/17	31	55,654	289	2,989	8,807
11/29/17	29	39,357	225	2,469	6,677
12/28/17	28	50,700	258	2,439	7,738
1/30/18	32	71,414	297	3,181	10,888
2/27/18	27	52,415	271	2,466	8,261
Totals	**353**	**630,020**	**316**	**$30,700**	**$100,596**
Annual	**365**	**651,437**	**316**	**$31,743**	**$104,016**

Notes:

- Peak demand of 316 kW occurred in January 2018.
- The average electric cost over the past 12 months was $0.160/kWh, which is the blended rate that includes energy supply, distribution, demand, and other charges. This report uses this blended rate to estimate energy cost savings.

3.2 Natural Gas

South Jersey Gas delivers natural gas under rate class General Service, with natural gas supply provided by South Jersey Energy, a third-party supplier.



Gas Billing Data				
Period Ending	**Days in Period**	**Natural Gas Usage (Therms)**	**Natural Gas Cost**	**TRC Estimated Usage?**
3/7/17	29	1,490	$1,470	No
4/6/17	30	1,615	$1,624	No
5/5/17	29	197	$233	No
6/6/17	32	217	$256	No
7/7/17	31	124	$159	No
8/7/17	31	64	$80	Yes
9/8/17	32	104	$137	No
10/6/17	28	145	$180	No
11/6/17	31	145	$185	No
12/6/17	30	934	$1,130	No
1/9/18	34	3,004	$3,583	No
2/7/18	29	1,863	$2,228	No
Totals	**366**	**9,903**	**$11,265**	
Annual	**365**	**9,876**	**$11,234**	

Notes:

- The average gas cost for the past 12 months is $1.138/therm, which is the blended rate used throughout the analysis.

3.3 Benchmarking

Your building was benchmarked using the United States Environmental Protection Agency's (EPA) *Portfolio Manager®* software. Benchmarking compares your building's energy use to that of similar buildings across the county, while neutralizing variations due to location, occupancy and operating hours. Some building types can be scored with a 1-100 ranking of a building's energy performance relative to the national building market. A score of 50 represents the national average and a score of 100 is best.

This ENERGY STAR® benchmarking score provides a comprehensive snapshot of your building's energy performance. It assesses the building's physical assets, operations, and occupant behavior, which is compiled into a quick and easy-to-understand score.

Benchmarking Score	80

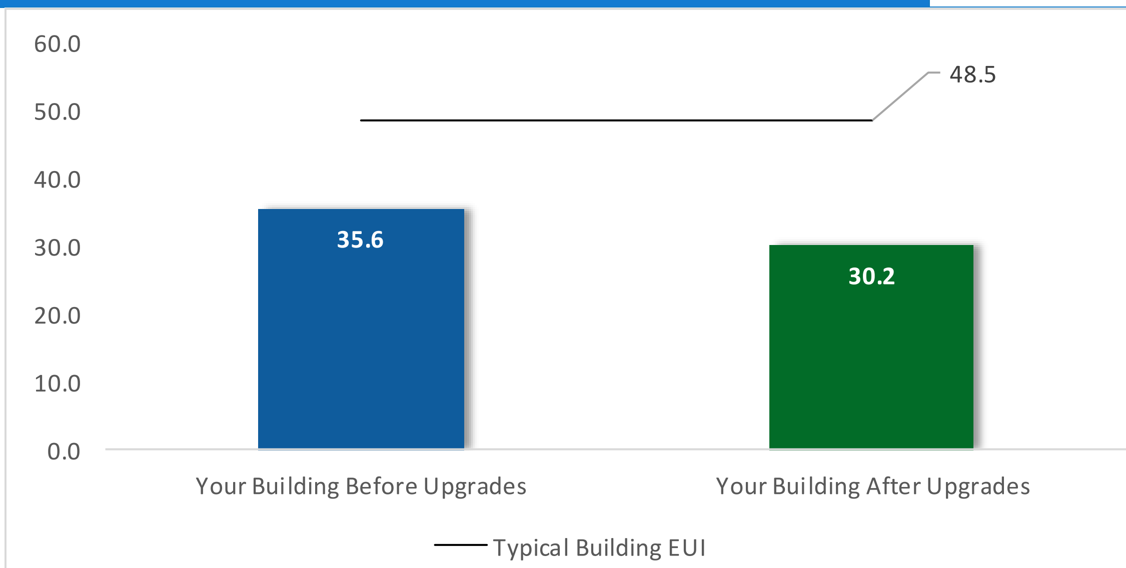


Figure 6 - Energy Use Intensity Comparison

Congratulations, your building performs better than the national average. This report has suggestions about how to keep your building running efficiently, further improve performance, and lower your energy bills even more.

Energy use intensity (EUI) measures energy consumption per square foot and is the standard metric for comparing buildings' energy performance. A lower EUI means better performance and less energy consumed. A number of factors can cause as building to vary from the "typical" energy usage. Local weather conditions, building age and insulation levels, equipment efficiency, daily occupancy hours, changes in occupancy throughout the year, equipment operating hours, and occupant behavior all contribute to a building's energy use and the benchmarking score.

Tracking Your Energy Performance

Keeping track of your energy use on a monthly basis is one of the best ways to keep energy costs in check. Update your utility information in Portfolio Manager® regularly, so that you can keep track of your building's performance.

We have created a Portfolio Manager® account for your facility and we have already entered the monthly utility data shown above for you. Account login information for your account will be sent via email.

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.

For more information on ENERGY STAR® and Portfolio Manager®, visit their website.[3]

[3] https://www.energystar.gov/buildings/facility-owners-and-managers/existing-buildings/earn-recognition/energy-star-certification/how-app-1.

4 Energy Conservation Measures

The goal of this audit report is to identify and evaluate potential energy efficiency improvements, provide information about the cost effectiveness of those improvements, and recognize potential financial incentives from NJBPU. Most energy conservation measures have received preliminary analysis of feasibility which identifies expected ranges of savings and costs. This level of analysis is typically sufficient to demonstrate project cost-effectiveness and help prioritize energy measures.

Calculations of energy use and savings are based on the current version of the *New Jersey Clean Energy Program Protocols to Measure Resource Savings*, which is approved by the NJBPU. Further analysis or investigation may be required to calculate more precise savings based on specific circumstances.

Operation and maintenance costs for the proposed new equipment will generally be lower than the current costs for the existing equipment—especially if the existing equipment is at or past its normal useful life. We have conservatively assumed there to be no impact on overall maintenance costs over the life of the equipment.

Financial incentives are based on the current NJCEP prescriptive SmartStart program. A higher level of investigation may be necessary to support any SmartStart Custom, Pay for Performance, or Direct Install incentive applications. Some measures and proposed upgrades may be eligible for higher incentives than those shown below through other NJCEP programs described in a following section of this report.

Appendix A: Equipment Inventory & Recommendations provides a detailed list of the locations and recommended upgrades for each energy conservation measure.

#	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		**77,567**	**20.3**	**-16**	**$12,201**	**$80,302**	**$10,808**	**$69,494**	**5.7**	**76,211**
	Install LED Fixtures	13,269	2.0	-3	$2,087	$42,502	$4,400	$38,102	18.3	13,037
ECM 1	Retrofit Fixtures with LED Lamps	64,299	18.3	-13	$10,114	$37,799	$6,408	$31,391	3.1	63,174
Lighting Control Measures		**22,169**	**6.3**	**-5**	**$3,487**	**$29,286**	**$2,695**	**$26,591**	**7.6**	**21,781**
ECM 2	Install Occupancy Sensor Lighting Controls	18,135	5.2	-4	$2,852	$27,286	$2,695	$24,591	8.6	17,818
ECM 3	Install High/Low Lighting Controls	4,034	1.1	-1	$635	$2,000	$0	$2,000	3.2	3,964
Motor Upgrades		**3,408**	**1.4**	**0**	**$544**	**$21,755**	**$0**	**$21,755**	**40.0**	**3,432**
	Premium Efficiency Motors	3,408	1.4	0	$544	$21,755	$0	$21,755	40.0	3,432
Variable Frequency Drive (VFD) Measures		**47,901**	**17.7**	**0**	**$7,648**	**$68,860**	**$7,650**	**$61,210**	**8.0**	**48,236**
ECM 4	Install VFD on Variable Air Volume (VAV) Fans	33,401	18.9	0	$5,333	$52,854	$4,650	$48,204	9.0	33,635
ECM 5	Install VFDs on Cooling Tower Fans	14,500	-1.3	0	$2,315	$16,005	$3,000	$13,005	5.6	14,601
Electric Unitary HVAC Measures		**13,655**	**17.3**	**0**	**$2,180**	**$221,007**	**$6,583**	**$214,424**	**98.3**	**13,751**
	Install High Efficiency Air Conditioning Units	13,655	17.3	0	$2,180	$221,007	$6,583	$214,424	98.3	13,751
Gas Heating (HVAC/Process) Replacement		**0**	**0.0**	**19**	**$212**	**$21,389**	**$2,800**	**$18,589**	**87.7**	**2,182**
	Install High Efficiency Furnaces	0	0.0	19	$212	$21,389	$2,800	$18,589	87.7	2,182
Domestic Water Heating Upgrade		**0**	**0.0**	**42**	**$475**	**$158**	**$0**	**$158**	**0.3**	**4,889**
ECM 6	Install Low-Flow DHW Devices	0	0.0	42	$475	$158	$0	$158	0.3	4,889
Food Service & Refrigeration Measures		**3,743**	**0.4**	**0**	**$598**	**$4,785**	**$75**	**$4,710**	**7.9**	**3,769**
	Refrigerator/Freezer Case Electrically Commutated Motors	393	0.0	0	$63	$1,213	$0	$1,213	19.3	396
	Replace Refrigeration Equipment	1,738	0.2	0	$277	$3,342	$75	$3,267	11.8	1,750
ECM 7	Vending Machine Control	1,612	0.2	0	$257	$230	$0	$230	0.9	1,623
TOTALS		**168,444**	**63.5**	**40**	**$27,345**	**$447,541**	**$30,611**	**$416,930**	**15.2**	**174,250**

* - All incentives presented in this table are based on NJ SmartStart equipment incentives and assume proposed equipment meets minimum performance criteria

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

Figure 7 – All Evaluated 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		**64,299**	**18.3**	**-13**	**$10,114**	**$37,799**	**$6,408**	**$31,391**	**3.1**	**63,174**
ECM 1	Retrofit Fixtures with LED Lamps	64,299	18.3	-13	$10,114	$37,799	$6,408	$31,391	3.1	63,174
Lighting Control Measures		**22,169**	**6.3**	**-5**	**$3,487**	**$29,286**	**$2,695**	**$26,591**	**7.6**	**21,781**
ECM 2	Install Occupancy Sensor Lighting Controls	18,135	5.2	-4	$2,852	$27,286	$2,695	$24,591	8.6	17,818
ECM 3	Install High/Low Lighting Controls	4,034	1.1	-1	$635	$2,000	$0	$2,000	3.2	3,964
Variable Frequency Drive (VFD) Measures		**47,901**	**17.7**	**0**	**$7,648**	**$68,860**	**$7,650**	**$61,210**	**8.0**	**48,236**
ECM 4	Install VFD on Variable Air Volume (VAV) Fans	33,401	18.9	0	$5,333	$52,854	$4,650	$48,204	9.0	33,635
ECM 5	Install VFDs on Cooling Tower Fans	14,500	-1.3	0	$2,315	$16,005	$3,000	$13,005	5.6	14,601
Domestic Water Heating Upgrade		**0**	**0.0**	**42**	**$475**	**$158**	**$0**	**$158**	**0.3**	**4,889**
ECM 6	Install Low-Flow DHW Devices	0	0.0	42	$475	$158	$0	$158	0.3	4,889
Food Service & Refrigeration Measures		**1,612**	**0.2**	**0**	**$257**	**$230**	**$0**	**$230**	**0.9**	**1,623**
ECM 7	Vending Machine Control	1,612	0.2	0	$257	$230	$0	$230	0.9	1,623
TOTALS		**135,981**	**42.5**	**24**	**$21,982**	**$136,332**	**$16,753**	**$119,579**	**5.4**	**139,703**

* - All incentives presented in this table are based on NJ SmartStart equipment incentives and assume proposed equipment meets minimum performance criteria

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

Figure 8 – Cost Effective ECMs

4.1 Lighting

#	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		**77,567**	**20.3**	**-16**	**$12,201**	**$80,302**	**$10,808**	**$69,494**	**5.7**	**76,211**
	Install LED Fixtures	13,269	2.0	-3	$2,087	$42,502	$4,400	$38,102	18.3	13,037
ECM 1	Retrofit Fixtures with LED Lamps	64,299	18.3	-13	$10,114	$37,799	$6,408	$31,391	3.1	63,174

When considering lighting upgrades, we suggest using a comprehensive design approach that simultaneously upgrades lighting fixtures and controls to maximize energy savings and improve occupant lighting. Comprehensive design will also consider appropriate lighting levels for different space types to make sure that the right amount of light is delivered where needed. If conversion to LED light sources are proposed, we suggest converting all of a specific lighting type (e.g. linear fluorescent) to LED lamps to minimize the number of lamp types in use at the facility, which should help reduce future maintenance costs.

Install LED Fixtures

Replace existing fixtures containing metal halide lamps with new LED light fixtures. This measure saves energy by installing LEDs which use less power than other technologies with a comparable light output.

In some cases, HID fixtures can be retrofitted with screw-based LED lamps. Replacing an existing HID fixture with a new LED fixture will generally provide better overall lighting optics; however, replacing the HID lamp with a LED screw-in lamp is typically a less expensive retrofit. We recommend you work with your lighting contractor to determine which retrofit solution is best suited to your needs and will be compatible with the existing fixture(s).

Maintenance savings may also be achieved since LED lamps last longer than other light sources and therefore do not need to be replaced as often.

Affected building areas: exterior metal halide fixtures

ECM 1: Retrofit Fixtures with LED Lamps

Replace fluorescent lamps with LED lamps. Many LED tubes are direct replacements for existing fluorescent tubes and can be installed while leaving the fluorescent fixture ballast in place. LED lamps 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. Maintenance savings may also be available, as longer-lasting LEDs lamps will not need to be replaced as often as the existing lamps.

Affected building areas: library, multipurpose room(s), classrooms, restrooms and all other areas with fluorescent fixtures with T8 tubes

4.2 Lighting Controls

#	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		**22,169**	**6.3**	**-5**	**$3,487**	**$29,286**	**$2,695**	**$26,591**	**7.6**	**21,781**
ECM 2	Install Occupancy Sensor Lighting Controls	18,135	5.2	-4	$2,852	$27,286	$2,695	$24,591	8.6	17,818
ECM 3	Install High/Low Lighting Controls	4,034	1.1	-1	$635	$2,000	$0	$2,000	3.2	3,964

Lighting controls reduce energy use by turning off or lowering, lighting fixture power levels when not in use. A comprehensive approach to lighting design should upgrade the lighting fixtures and the controls together for maximum energy savings and improved lighting for occupants.

ECM 2: Install Occupancy Sensor Lighting Controls

Install occupancy sensors to control lighting fixtures in areas that are frequently unoccupied, even for short periods. For most spaces, we recommend lighting controls use dual technology sensors, which reduce the possibility of lights turning off unexpectedly.

Occupancy sensors detect occupancy using ultrasonic and/or infrared sensors. When an occupant enters the space, the lighting fixtures switch to full lighting levels. Most occupancy sensor lighting controls allow users to manually turn fixtures on/off, as needed. Some controls can also provide dimming options.

Occupancy sensors can be mounted on the wall at existing switch locations, mounted on the ceiling, or in remote locations. In general, wall switch replacement sensors are best suited to single occupant offices and other small rooms. Ceiling-mounted or remote mounted sensors are used in large spaces, locations without local switching, and where wall switches are not in the line-of-sight of the main work area.

This measure provides energy savings by reducing the lighting operating hours.

Affected building areas: offices, multipurpose room(s), classrooms, library, restrooms, and storage rooms

ECM 3: Install High/Low Lighting Controls

Install occupancy sensors to provide dual level lighting control for lighting fixtures in spaces that are infrequently occupied but may require some level of continuous lighting for safety or security reasons.

Lighting fixtures with these controls operate at default low levels when the area is unoccupied to provide minimal lighting to meet security or safety requirements. Sensors detect occupancy using ultrasonic and/or infrared sensors. When an occupant enters the space, the lighting fixtures switch to full lighting levels. Fixtures automatically switch back to low level after a predefined period of vacancy. In parking lots and parking garages with significant ambient lighting, this control can sometimes be combined with photocell controls to turn the lights off when there is sufficient daylight.

This measure provides energy savings by reducing the light fixture power draw when reduced light output is appropriate.

Affected building areas: hallways

For this type of measure the occupancy sensors will generally be ceiling or fixture mounted. Sufficient sensor coverage must be provided to ensure that lights turn on in each area as an occupant approaches.

4.3 Motors

#	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)
Motor Upgrades		**3,408**	**1.4**	**0**	**$544**	**$21,755**	**$0**	**$21,755**	**40.0**	**3,432**
	Premium Efficiency Motors	3,408	1.4	0	$544	$21,755	$0	$21,755	40.0	3,432

<u>Premium Efficiency Motors</u>

Replace standard efficiency motors with IHP 2014 efficiency motors. This evaluation assumes that existing motors will be replaced with motors of equivalent size and type. In some cases, additional savings may be possible by downsizing motors to better meet the motor's current load requirements.

Affected motors:

Location	Area(s)/System(s) Served	Motor Quantity	Motor Application	HP Per Motor	*Additional Motor Description*
Roof	AC-2 Multi Purpose Room	1	Supply Fan	3.0	Supply fan motor
Roof	AC-2 Multi Purpose Room	1	Return Fan	3.0	Return fan motor
Roof	AC-3 Multi Purpose Room	1	Supply Fan	3.0	Supply fan motor
Roof	AC-3 Multi Purpose Room	1	Return Fan	3.0	Return fan motor
Roof	AC-4 Multi Purpose Room	1	Supply Fan	3.0	Supply fan motor
Roof	AC-4 Multi Purpose Room	1	Return Fan	3.0	Return fan motor
Roof	AC-5 Multi Purpose Room	1	Supply Fan	3.0	Supply fan motor
Roof	AC-5 Multi Purpose Room	1	Return Fan	3.0	Return fan motor
Roof	MAU-1 Heat Pump Ventilation air part 1	2	Supply Fan	3.0	Supply fan motor
Roof	MAU-1 Heat Pump Ventilation air part 1	1	Return Fan	5.0	Return fan motor
Roof	MAU-2 Heat Pump Ventilation air part 2	2	Supply Fan	7.5	Supply fan motor
Roof	MAU-2 Heat Pump Ventilation air part 2	2	Return Fan	5.0	Return fan motor
Roof	MAU-3 Heat Pump Ventilation air part 3	1	Supply Fan	2.0	Supply fan motor
Roof	MAU-3 Heat Pump Ventilation air part 3	1	Return Fan	3.0	Return fan motor
Location	**Area(s)/System(s) Served**	**Motor Quantity**	**Motor Application**	**HP Per Motor**	***Additional Motor Description***
Outdoor	CTF-1	1	Cooling Tower Fan	25.0	Fan motor
Outdoor	CTF-2	1	Cooling Tower Fan	25.0	Fan motor

Savings are based on the difference between baseline and proposed efficiencies and the assumed annual operating hours. The base case motor energy consumption is estimated using the efficiencies found on nameplates or estimated based on the age of the motor and our best estimates of motor run hours. Efficiencies of proposed motor upgrades are obtained from the current *New Jersey's Clean Energy Program Protocols to Measure Resource Savings*.

4.4 Variable Frequency Drives (VFD)

#	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)
Variable Frequency Drive (VFD) Measures		**47,901**	**17.7**	**50**	**$7,648**	**$68,860**	**$7,650**	**$61,210**	**8.0**	**54,060**
ECM 4	Install VFD on Variable Air Volume (VAV) Fans	33,401	18.9	0	$5,333	$52,854	$4,650	$48,204	9.0	33,635
ECM 5	Install VFDs on Cooling Tower Fans	14,500	-1.3	0	$2,315	$16,005	$3,000	$13,005	5.6	14,601

Variable frequency drives control motors for fans, pumps, and process equipment based on the actual output required of the driven equipment. Energy savings result from more efficient control of motor energy usage when equipment operates at partial load. The magnitude of energy savings depends on the estimated amount of time that the motor would operate at partial load. For equipment with proposed VFDs, we have included replacing the controlled motor with a new motor —unless the existing motor meets or exceeds IHP 2014 standards—to conservatively account for the cost of an inverter duty rated motor. The savings and cost associated with the new motor are presented with the Premium Efficiency Motor measures. If the proposed VFD measure is not selected for implementation the motor replacement should be reevaluated.

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

Replace existing air volume control devices on variable volume fans, such as inlet vanes and variable pitch fan blades, with VFDs. Inlet guide vanes and variable pitch fan blades are an inefficient means of controlling the air volume compared to VFDs. The existing volume control device will be removed or permanently disabled, and the control signal will be redirected to the VFD to determine proper fan motor speed.

Energy savings result from using a more efficient control device to regulate the air flow provided by the fan. Additional maintenance savings may result from this measure. VFDs are solid state electronic devices, which generally requires less maintenance than mechanical air volume control devices.

Affected air handlers: MAU-1 to 3 & AC-2 to 5

ECM 5: Install VFDs on Cooling Tower Fans

Install a VFD to control the cooling tower fan motor. The VFD will allow the cooling tower fan to operate at the minimum speed necessary to maintain the temperature of the condenser water returning to the chiller.

Energy savings result from reducing fan speed (and power) when there is a reduced load on the chiller and outside air wet bulb temperatures are depressed. The magnitude of energy savings is based on the estimated amount of time that the system will operate at reduced load.

4.5 Electric Unitary HVAC

#	Energy Conservation Measure	Annual Electric Savings (kWh)	Peak Demand Savings (kW)	Annual Fuel Savings (MMBtu)	Annual Energy Cost Savings ($)	Estimated Install Cost ($)	Estimated Incentive ($)*	Estimated Net Cost ($)	Simple Payback Period (yrs)**	CO_2e Emissions Reduction (lbs)
Electric Unitary HVAC Measures		**13,655**	**17.3**	**0**	**$2,180**	**$221,007**	**$6,583**	**$214,424**	**98.3**	**13,751**
	Install High Efficiency Air Conditioning Units	13,655	17.3	0	$2,180	$221,007	$6,583	$214,424	98.3	13,751

Replacing the unitary HVAC units has a long payback period and may not be justifiable based simply on energy considerations. However, most of the units at this facility are nearing or have reached the end of their normal useful life. Typically, the marginal cost of purchasing a high efficiency unit can be justified by the marginal savings from the improved efficiency. When these ACs are eventually replaced, consider purchasing equipment that exceeds the minimum efficiency required by building codes.

Install High Efficiency Air Conditioning Units

Replace standard efficiency packaged air conditioning units with high efficiency packaged air conditioning units. The magnitude of energy savings for this measure depends on the relative efficiency of the older unit versus the new high efficiency unit, the average cooling load, and the estimated annual operating hours.

This measure is part of a measure to replace package units at this site and as such must be considered in combination with ECM- Install premium efficiency motors.

4.6 Gas-Fired Heating

#	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**	**19**	**$212**	**$21,389**	**$2,800**	**$18,589**	**87.7**	**2,182**
	Install High Efficiency Furnaces	0	0.0	19	$212	$21,389	$2,800	$18,589	87.7	2,182

Replacing gas-fired furnaces has a long payback period and may not be justifiable based simply on energy considerations. Typically, the marginal cost of purchasing a high efficiency unit can be justified by the marginal savings from the improved efficiency. When these furnaces are eventually replaced, consider purchasing equipment that exceeds the minimum efficiency required by building codes.

Install High Efficiency Furnaces

Replace standard efficiency furnaces with condensing furnaces. Improved combustion technology and heat exchanger design optimize heat recovery from the combustion gases which can significantly improve furnace efficiency. Savings result from improved system efficiency.

Note: these units produce acidic condensate that requires proper drainage.

This measure is part of a measure to replace package units at this site and as such must be considered in combination with ECM-Install high efficiency air conditioning units.

4.7 Domestic Water Heating

#	Energy Conservation Measure	Annual Electric Savings (kWh)	Peak Demand Savings (kW)	Annual Fuel Savings (MMBtu)	Annual Energy Cost Savings ($)	Estimated Install Cost ($)	Estimated Incentive ($)*	Estimated Net Cost ($)	Simple Payback Period (yrs)**	CO_2e Emissions Reduction (lbs)
Domestic Water Heating Upgrade		**0**	**0.0**	**42**	**$475**	**$158**	**$0**	**$158**	**0.3**	**4,889**
ECM 6	Install Low-Flow DHW Devices	0	0.0	42	$475	$158	$0	$158	0.3	4,889

ECM 6: Install Low-Flow DHW Devices

Install low-flow devices to reduce overall hot water demand. The following low flow devices are recommended to reduce hot water usage:

Device	Flow Rate
Faucet aerators (lavatory)	0.5 gpm
Faucet aerator (kitchen)	1.5 gpm
Showerhead	2.0 gpm
Pre-rinse spray valve (kitchen)	1.28 gpm

Low-flow devices reduce the overall water flow from the fixture, while still providing adequate pressure for washing. [Pre-rinse spray valves (PRSVs) — often used in commercial and institutional kitchens — remove food waste from dishes prior to dishwashing.]

Additional cost savings may result from reduced water usage.

4.8 Food Service & Refrigeration Measures

#	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)
Food Service & Refrigeration Measures		**3,743**	**0.4**	**0**	**$598**	**$4,785**	**$75**	**$4,710**	**7.9**	**3,769**
	Refrigerator/Freezer Case Electrically Commutated Motors	393	0.0	0	$63	$1,213	$0	$1,213	19.3	396
	Replace Refrigeration Equipment	1,738	0.2	0	$277	$3,342	$75	$3,267	11.8	1,750
ECM 7	Vending Machine Control	1,612	0.2	0	$257	$230	$0	$230	0.9	1,623

Refrigerator/Freezer Case Electrically Commutated Motors

Replace permanent split capacitor (PSC) motors with electronically commutated (EC) motors in walk-in cooler and freezer. Fractional horsepower EC motors are significantly more efficient than mechanically commutated, brushed motors, particularly at low speeds or partial load. By using variable-speed technology, EC motors can optimize fan usage. Because these motors are brushless and use DC power, losses due to friction and phase shifting are eliminated.

Savings for this measure consider both the increased efficiency of the motor as well as the reduction in refrigeration load due to motor heat loss. Replacing permanent split capacitor motors with electronically commutated motors has a long payback period and may not be justifiable based simply on energy considerations. Typically, the marginal cost of purchasing a high efficiency motors can be justified by the marginal savings from the improved efficiency.

Replace Refrigeration Equipment

Replace existing stand-up commercial refrigerator and one chest type refrigerator with new ENERGY STAR® rated equipment. The energy savings associated with this measure come from reduced energy usage, due to more efficient technology, and reduced run times. Replacing refrigeration equipment with ENERGY STAR® rated equipment has a long payback period and may not be justifiable based simply on energy considerations. Typically, the marginal cost of purchasing a high efficiency refrigerators can be justified by the marginal savings from the improved efficiency.

ECM 7: Vending Machine Control

Vending machines operate continuously, even during unoccupied hours. Install occupancy sensor controls to reduce energy use. These controls power down vending machines when the vending machine area has been vacant for some time, and, they power up the machines at necessary regular intervals or when the surrounding area is occupied. Energy savings are dependent on the vending machine and activity level in the area surrounding the machines.

5 Energy Efficient Best Practices

A whole building maintenance plan will extend equipment life; improve occupant comfort, health, and safety; and reduce energy and maintenance costs. You may already be doing some of these things— see our list below for potential additions to your maintenance plan. Be sure to consult with qualified equipment specialists for details on proper maintenance and system operation.

Energy Tracking with ENERGY STAR® Portfolio Manager®

You’ve heard it before - you can’t manage what you don’t measure. ENERGY STAR Portfolio Manager® is an online tool that you can use to measure and track energy and water consumption, as well as greenhouse gas emissions.[4] Your account has already been established. Now you can continue to keep tabs on your energy performance every month.

Doors and Windows

Close exterior doors and windows in heated and cooled areas. Leaving doors and windows open leads to a loss of heat during the winter and chilled air during the summer. Reducing air changes per hour (ACH) can lead to increased occupant comfort as well as heating and cooling savings, especially when combined with proper HVAC controls and adequate ventilation.

Window Treatments/Coverings

Use high-reflectivity films or cover windows with shades or shutters to reduce solar heat gain and reduce the load on cooling and heating systems. Older, single pane windows and east or west-facing windows are especially prone to solar heat gain. In addition, use shades or shutters at night during cold weather to reduce heat loss.

Lighting Maintenance

Clean lamps, reflectors and lenses of dirt, dust, oil, and smoke buildup every six to twelve months. Light levels decrease over time due to lamp aging, lamp and ballast failure, and buildup of dirt and dust. Together, this can reduce total light output by up to 60% while still drawing full power.

In addition to routine cleaning, developing a maintenance schedule can ensure that maintenance is performed regularly, and it can reduce the overall cost of fixture re-lamping and re-ballasting. Group re-lamping and re-ballasting maintains lighting levels and minimizes the number of site visits by a lighting technician or contractor, decreasing the overall cost of maintenance.

[4] https://www.energystar.gov/buildings/facility-owners-and-managers/existing-buildings/use-portfolio-manager.

Lighting Controls

As part of a lighting maintenance schedule, test lighting controls to ensure proper functioning. For occupancy sensors, this requires triggering the sensor and verifying that the sensor's timer settings are correct. For daylight and photocell sensors, maintenance involves cleaning sensor lenses and confirming that setpoints and sensitivity are configured properly.

Motor Maintenance

Motors have many moving parts. As these parts degrade over time, the efficiency of the motor is reduced. Routine maintenance prevents damage to motor components. Routine maintenance should include cleaning surfaces and ventilation openings on motors to prevent overheating, lubricating moving parts to reduce friction, inspecting belts and pulleys for wear and to ensure they are at proper alignment and tension, and cleaning and lubricating bearings. Consult a licensed technician to assess these and other motor maintenance strategies.

Thermostat Schedules and Temperature Resets

Use thermostat setback temperatures and schedules to reduce heating and cooling energy use during periods of low or no occupancy. 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 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.

AC System Evaporator/Condenser Coil Cleaning

Dirty evaporator and condenser coils restrict air flow and restrict heat transfer. This increases the loads on the evaporator and condenser fan and decreases overall cooling system performance. Keeping the coils clean allows the fans and cooling system to operate more efficiently.

HVAC Filter Cleaning and Replacement

Air filters should be checked regularly (often monthly) and cleaned or replaced when appropriate. Air filters reduce indoor air pollution, increase occupant comfort, and help keep equipment operating efficiently. If the building has a building management system, consider installing a differential pressure switch across filters to send an alarm about premature fouling or overdue filter replacement. Over time, filters become less and less effective as particulate buildup increases. Dirty filters also restrict air flow through the air conditioning or heat pump system, which increases the load on the distribution fans.

Boiler Maintenance

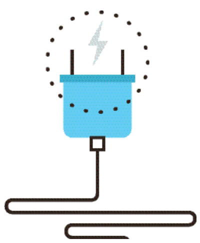
Many boiler problems develop slowly over time, so regular inspection and maintenance is essential to keeping the heating system running efficiently and preventing expensive repairs. Annual tune-ups should include a combustion analysis to analyze the exhaust from the boilers and to ensure the boiler is operating safely. Boilers should be cleaned according to the manufacturer's instructions to remove soot and scale from the water side or fire side of the boiler.

Water Heater Maintenance

Preventative maintenance can extend the life of the system, maintain energy efficiency, and ensure safe operation. At least once a year, follow manufacturer instructions to drain a few gallons out of the water heater using the drain valve. If there is a lot of sediment or debris, then a full flush is recommended. Turn the temperature down and then completely drain the tank. Annual checks should include checks for:

- Leaks or heavy corrosion on the pipes and valves.
- Corrosion or wear on the gas line and on the piping. If you noticed any black residue, soot, or charred metal, this is a sign you may be having combustion issues and you should have the unit serviced by a professional.
- For electric water heaters, look for signs of leaking such as rust streaks or residue around the upper and lower panels covering the electrical components on the tank.
- For water heaters more than three years old, have a technician inspect the sacrificial anode annually.

Plug Load Controls



Reducing plug loads is a common way to decrease your electrical use. Limiting the energy use of plug loads can include increasing occupant awareness, removing under-used equipment, installing hardware controls, and using software controls. Consider enabling the most aggressive power settings on existing devices or install load sensing or occupancy sensing (advanced) power strips.[5] Your local utility may offer incentives or rebates for this equipment.

Computer Power Management Software

Many computers consume power during nights, weekends, and holidays. Screen savers are commonly confused as a power management strategy. This contributes to avoidable, excessive electrical energy consumption. There are innovative power management software packages available that are designed to deliver significant energy saving and provide ongoing tracking measurements. A central power management platform helps enforce energy savings policies as well as identify and eliminate underutilized devices.

[5] For additional information refer to "Assessing and Reducing Plug and Process Loads in Office Buildings" http://www.nrel.gov/docs/fy13osti/54175.pdf, or "Plug Load Best Practices Guide" http://www.advancedbuildings.net/plug-load-best-practices-guide-offices.

Water Conservation

Installing dual flush or low-flow toilets and low-flow/waterless urinals are ways to reduce water use. The EPA WaterSense™ ratings for urinals is 0.5 gallons per flush (gpf) and for flush valve toilets is 1.28 gpf (this is lower than the current 1.6 gpf federal standard).

For more information regarding water conservation go to the EPA's WaterSense™ website[6] or download a copy of EPA's "WaterSense at Work: Best Management Practices for Commercial and Institutional Facilities"[7] to get ideas for creating a water management plan and best practices for a wide range of water using systems.

Water conservation devices that do not reduce hot water consumption will not provide energy savings at the site level, but they may significantly affect your water and sewer usage costs. 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.

If the facility has detached buildings with a master water meter for the entire campus, check for unnatural wet areas in the lawn or water seeping in the foundation at water pipe penetrations through the foundation. Periodically check overnight meter readings when the facility is unoccupied, and there is no other scheduled water usage.

Manage irrigation systems to use water more effectively outside the building. Adjust spray patterns so that water lands on intended lawns and plantings and not on pavement and walls. Consider installing an evapotranspiration irrigation controller that will prevent over-watering.

Procurement Strategies

Purchasing efficient products reduces energy costs without compromising quality. Consider modifying your procurement policies and language to require ENERGY STAR® or WaterSense™ products where available.

[6] https://www.epa.gov/watersense.

[7] https://www.epa.gov/watersense/watersense-work-0.

6 On-site Generation

You don't have to look far in New Jersey to see one of the thousands of solar electric systems providing clean power to homes, businesses, schools, and government buildings. On-site generation includes both renewable (e.g., solar, wind) and non-renewable (e.g., fuel cells) technologies that generate power to meet all or a portion of the facility's electric energy needs. Also referred to as distributed generation, these systems contribute to greenhouse gas (GHG) emission reductions, demand reductions and reduced customer electricity purchases reduction, which results in improved electric grid reliability through better use of transmission and distribution systems.

Preliminary screenings were performed to determine if an on-site generation measure could be a cost-effective solution for your facility. Before deciding to install an on-site generation system, we recommend conducting a feasibility study to analyze 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 Solar Photovoltaic

Photovoltaic (PV) panels convert sunlight into electricity. Individual panels are combined into an array that produces direct current (DC) electricity. The DC is converted to alternating current (AC) through an inverter. The inverter is then connected to the building's electrical distribution system.

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. A PV array located on the roof may be feasible. If you are interested in pursuing the installation of PV, we recommend conducting a full feasibility study.

The graphic below displays the results of the PV potential screening conducted as a part of this audit. The position of each slider indicates the potential (potential increases to the right) that each factor contributes to the overall site potential.

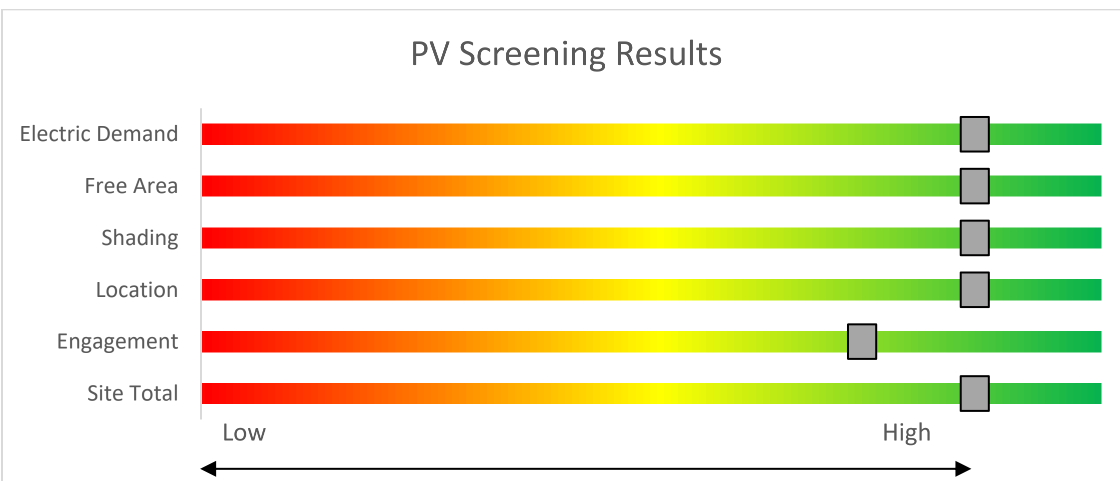


Figure 9 - Photovoltaic Screening

Solar Renewable Energy Certificate (SREC) Registration Program (SRP)

Rebates are not available for solar projects, but owners of solar projects MUST register their projects in the SREC Registration Program before starting construction. Once your PV system is up and running, you periodically earn credits, which can then be sold on the open market for up to 15 years.

If you are considering installing solar photovoltaics on your building, visit www.njcleanenergy.com/srec for more information about the SREC Registration Program.

Get more information about solar power in New Jersey or find a qualified solar installer who can help you decide if solar is right for your building:

- **Basic Info on Solar PV in NJ**: www.njcleanenergy.com/whysolar
- **NJ Solar Market FAQs**: www.njcleanenergy.com/renewable-energy/program-updates-and-background-information/solar-transition/solar-market-faqs
- **Approved Solar Installers in the NJ Market**: 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) generates electricity at the facility and puts waste heat energy to good use. Common types of CHP systems are reciprocating engines, microturbines, fuel cells, backpressure steam turbines, and (at large facilities) gas turbines.

CHP systems typically produce a portion of the electric power used on-site, with the balance of electric power needs supplied by the local utility company. The heat is used to supplement (or replace) existing boilers and provide space heating and/or domestic hot water heating. Waste heat can also be routed through absorption chillers for space cooling.

The key criteria used for screening is the amount of time that the CHP system would operate at full load and the facility's ability to use the recovered heat. Facilities with a continuous need 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 **no** potential for installing a cost-effective CHP system.

Based on a preliminary analysis, the facility does not appear to meet the minimum requirements for a cost-effective CHP installation. The lack of gas service, low or infrequent thermal load, and lack of space for siting the equipment are the most significant factors contributing to the lack of CHP potential.

The graphic below displays the results of the CHP potential screening conducted as a part of this audit. The position of each slider indicates the potential (potential increases to the right) that each factor contributes to the overall site potential.

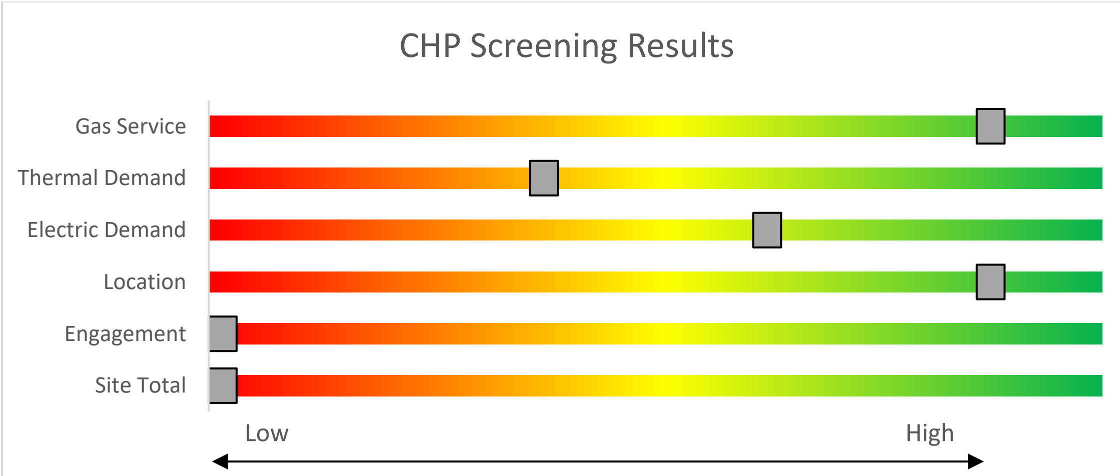


Figure 10 - Combined Heat and Power Screening

Find a qualified firm that specializes in commercial CHP cost assessment and installation: [http://www.njcleanenergy.com/commercial-industrial/programs/nj-smartstart-buildings/tools-and-resources/tradeally/approved_vendorsearch/.](http://www.njcleanenergy.com/commercial-industrial/programs/nj-smartstart-buildings/tools-and-resources/tradeally/approved_vendorsearch/)

7 PROJECT FUNDING AND INCENTIVES

Ready to improve your building's performance? New Jersey Clean Energy Programs can help. Pick the program that works best for you. Incentive programs that may apply to this facility are identified in the Executive Summary. This section provides an overview of currently available in New Jersey Clean Energy Programs.

	SmartStart *Flexibility to install at your own pace*	**Direct Install** *Turnkey installation*	**Pay for Performance** *Whole building upgrades*
Who should use it?	Buildings installing individual measures or small group of measures.	Small to mid-size facilities that can bundle multiple measures together. Average peak demand should be below 200 kW. Not suitable for significant building shell issues.	Mid to large size facilities looking to implement as many measures as possible at one time. Peak demand should be over 200 kW.
How does it work?	Use in-house staff or your preferred contractor.	Pre-approved contractors pass savings along to you via reduced material and labor costs.	Whole-building approach to energy upgrades designed to reduce energy use by at least 15%. The more you save, the higher the incentives.
What are the Incentives?	Fixed incentives for specific energy efficiency measures.	Incentives pay up to 70% of eligible costs, up to $125,000 per project. You pay the remaining 30% directly to the contractor.	Up to 25% of installation cost, calculated based on level of energy savings per square foot.
How do I participate?	Submit an application for the specific equipment to be installed.	Contact a participating contractor in your region.	Contact a pre-qualified Partner to develop your Energy Reduction Plan and set your energy savings targets.

Take the next step by visiting **www.njcleanenergy.com** for program details, applications, and to contact a qualified contractor.

7.1 SmartStart

SmartStart offers incentives for installing prescriptive and custom energy efficiency measures at your facility. This program provides an effective mechanism for securing incentives for energy efficiency measures installed individually or as part of a package of energy upgrades. This program serves most common equipment types and sizes.

SmartStart routinely 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

Incentives

The SmartStart Prescriptive program provides fixed incentives for specific energy efficiency measures. Prescriptive incentives vary by equipment type.

SmartStart Custom provides incentives for more unique or specialized technologies or systems that are not addressed through prescriptive incentives. Custom incentives are calculated at $0.16/kWh and $1.60/therm based on estimated annual savings. Incentives are 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

Submit an application for the specific equipment to be installed. Many applications are designed as rebates, although others require application approval prior to installation. You can work with your preferred contractor or use internal staff to install measures.

Visit www.njcleanenergy.com/SSB for a detailed program description, instructions for applying, and applications.

7.2 Pay for Performance - Existing Buildings

Pay for Performance works for larger customers with a peak demand over 200 kW. The minimum installed scope of work must include at least two unique measures that results in at least 15% source energy savings, and 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 to achieve deep energy savings. This program has an added benefit of addressing measures that may not qualify for other programs. Many facilities pursuing an Energy Savings Improvement Program loan also use this program.

Incentives

Incentives are 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

Contact one of the pre-approved consultants and contractors ("Partners"). Under direct contract to you, they will help further evaluate the measures identified in this report through development of the energy reduction plan), assist you in implementing selected measures, and verify actual savings one year after the installation. Your Partner will also help you apply for incentives.

Approval of the final scope of work is required by the program prior to installation. Installation can be done by the contractor of your choice (some P4P Partners are also contractors) or by internal staff, but the Partner remains involved throughout construction to ensure compliance with the program requirements.

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

7.3 Combined Heat and Power

The Combined Heat & Power (CHP) program provides incentives for eligible CHP or waste heat to power (WHP) projects. Eligible CHP or WHP projects must achieve an annual system efficiency of at least 65% (lower heating value, or LHV), based on total energy input and total utilized energy output. Mechanical energy may be included in the efficiency evaluation.

Incentives

Eligible Technologies	Size (Installed Rated Capacity)[1]	Incentive ($/kW)	% of Total Cost Cap per Project[3]	$ Cap per Project[3]
Powered by non-renewable or renewable fuel source[4]	≤500 kW	$2,000	30-40%[2]	$2 million
Gas Internal Combustion Engine	>500 kW - 1 MW	$1,000		
Gas Combustion Turbine	> 1 MW - 3 MW	$550	30%	$3 million
Microturbine Fuel Cells with Heat Recovery	>3 MW	$350		
Waste Heat to Power*	<1 MW	$1,000	30%	$2 million
	> 1MW	$500		$3 million

*Waste Heat to Power: Powered by non-renewable fuel source, heat recovery or other mechanical recovery from existing equipment utilizing new electric generation equipment (e.g. steam turbine).

Check the NJCEP website for details on program availability, current incentive levels, and requirements.

How to Participate

You work with a qualified developer or consulting firm to complete the CHP application. Once the application is approved the project can be installed. Information about the CHP program can be found at: www.njcleanenergy.com/CHP.

7.4 Energy Savings Improvement Program

The Energy Savings Improvement Program (ESIP) serves New Jersey's government agencies by financing energy projects. 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. Annual payments are lower than the savings projected from the ECMs, ensuring that ESIP projects are cash flow positive for the life of the contract.

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 described above can also be used to help further reduce the total project cost of eligible measures.

How to Participate

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 used 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. Carefully consider all alternatives to develop an approach that best meets your needs. A detailed program descriptions and application can be found at: www.njcleanenergy.com/ESIP.

ESIP is a program delivered directly by the NJBPU and is not an NJCEP incentive program. As mentioned above, you can use NJCEP incentive programs to help further reduce costs when developing the energy savings plan. Refer to the ESIP guidelines at the link above for further information and guidance on next steps.

7.5 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 prior to the start of construction 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. SRECs 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 SRECs 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 Renewable Portfolio Standard. Purchasing SRECs can help them meet those requirements. As SRECs are traded in a competitive market, the price may vary significantly. The actual price of an SREC during a trading period fluctuates depending on supply and demand.

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

8 Energy Purchasing and Procurement Strategies

8.1 Retail Electric Supply Options

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 already buys electricity from a third-party supplier, review and compare prices at the end of each contract year.

A list of licensed third-party electric suppliers is available at the NJBPU website.[8]

8.2 Retail Natural Gas Supply Options

The natural gas market in New Jersey is also deregulated. Most customers that remain with the utility for natural gas service pay rates that are market-based and that fluctuate monthly. 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 typically depends on whether a customer prefers 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 does not already purchase natural gas from a third-party supplier, consider shopping for a reduced rate from third-party natural gas suppliers. If your facility already purchases natural gas from a third-party supplier, review and compare prices at the end of each contract year.

A list of licensed third-party natural gas suppliers is available at the NJBPU website.[9]

[8] www.state.nj.us/bpu/commercial/shopping.html.

[9] 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	Light Level	Watts per Fixture	Annual Operating Hours	ECM #	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
MPR Kitchen	2	U-Bend Fluorescent - T8: U T8 (32W) - 2L	Wall Switch	S	62	2,300	1	Relamp	No	2	LED - Linear Tubes: (2) U-Lamp	Wall Switch	33	2,300	0.0	147	0	$23	$145	$20	5.4
Room 1310	2	U-Bend Fluorescent - T8: U T8 (32W) - 2L	Wall Switch	S	62	2,300	1, 2	Relamp	Yes	2	LED - Linear Tubes: (2) U-Lamp	Occupancy Sensor	33	1,587	0.1	199	0	$31	$261	$20	7.7
Room 1320	3	U-Bend Fluorescent - T8: U T8 (32W) - 2L	Wall Switch	S	62	2,300	1, 2	Relamp	Yes	3	LED - Linear Tubes: (2) U-Lamp	Occupancy Sensor	33	1,587	0.1	298	0	$47	$487	$65	9.0
Room 1322	4	U-Bend Fluorescent - T8: U T8 (32W) - 2L	Wall Switch	S	62	2,300	1, 2	Relamp	Yes	4	LED - Linear Tubes: (2) U-Lamp	Occupancy Sensor	33	1,587	0.1	397	0	$62	$560	$75	7.8
Room 1326	2	U-Bend Fluorescent - T8: U T8 (32W) - 2L	Wall Switch	S	62	2,300	1, 2	Relamp	Yes	2	LED - Linear Tubes: (2) U-Lamp	Occupancy Sensor	33	1,587	0.1	199	0	$31	$261	$20	7.7
Room 1329	3	U-Bend Fluorescent - T8: U T8 (32W) - 2L	Wall Switch	S	62	2,300	1, 2	Relamp	Yes	3	LED - Linear Tubes: (2) U-Lamp	Occupancy Sensor	33	1,587	0.1	298	0	$47	$487	$65	9.0
Room 1332	1	U-Bend Fluorescent - T8: U T8 (32W) - 2L	Wall Switch	S	62	2,300	1	Relamp	No	1	LED - Linear Tubes: (2) U-Lamp	Wall Switch	33	2,300	0.0	73	0	$12	$72	$10	5.4
Room 1109	1	U-Bend Fluorescent - T8: U T8 (32W) - 2L	Wall Switch	S	62	2,300	1	Relamp	No	1	LED - Linear Tubes: (2) U-Lamp	Wall Switch	33	2,300	0.0	73	0	$12	$72	$10	5.4
Room 1211	1	U-Bend Fluorescent - T8: U T8 (32W) - 2L	Wall Switch	S	62	2,300	1	Relamp	No	1	LED - Linear Tubes: (2) U-Lamp	Wall Switch	33	2,300	0.0	73	0	$12	$72	$10	5.4
2nd Fl Hallway	23	U-Bend Fluorescent - T8: U T8 (32W) - 2L	Wall Switch	S	62	2,300	1, 3	Relamp	Yes	23	LED - Linear Tubes: (2) U-Lamp	High/Low Control	33	1,587	0.6	2,283	0	$359	$1,867	$230	4.6
1st Fl Hallway	35	U-Bend Fluorescent - T8: U T8 (32W) - 2L	Wall Switch	S	62	2,300	1, 3	Relamp	Yes	35	LED - Linear Tubes: (2) U-Lamp	High/Low Control	33	1,587	1.0	3,474	-1	$546	$2,736	$350	4.4
MPR Kitchen	2	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Wall Switch	S	93	2,300	1, 2	Relamp	Yes	2	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	44	1,587	0.1	319	0	$50	$380	$65	6.3
1341 Office	1	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Wall Switch	S	93	2,300	1	Relamp	No	1	LED - Linear Tubes: (3) 4' Lamps	Wall Switch	44	2,300	0.0	125	0	$20	$55	$15	2.0
Room 1323	3	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Wall Switch	S	93	2,300	1, 2	Relamp	Yes	3	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	44	1,587	0.1	478	0	$75	$434	$80	4.7
Room 1115	8	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Wall Switch	S	93	2,300	1, 2	Relamp	Yes	8	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	44	1,587	0.4	1,275	0	$201	$708	$155	2.8
Room 1120	10	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Wall Switch	S	93	2,300	1, 2	Relamp	Yes	10	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	44	1,587	0.5	1,594	0	$251	$1,088	$220	3.5
Room 1118	10	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Wall Switch	S	93	2,300	1, 2	Relamp	Yes	10	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	44	1,587	0.5	1,594	0	$251	$1,088	$220	3.5
Room 1208	11	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Wall Switch	S	93	2,300	1, 2	Relamp	Yes	11	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	44	1,587	0.5	1,753	0	$276	$1,142	$235	3.3
Room 1203	2	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Wall Switch	S	93	2,300	1, 2	Relamp	Yes	2	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	44	1,587	0.1	319	0	$50	$380	$65	6.3
Room 1204	2	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Wall Switch	S	93	2,300	1, 2	Relamp	Yes	2	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	44	1,587	0.1	319	0	$50	$380	$65	6.3
Room 1211	15	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Wall Switch	S	93	2,300	1, 2	Relamp	Yes	15	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	44	1,587	0.7	2,390	0	$376	$1,362	$295	2.8
Room 1217	11	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Wall Switch	S	93	2,300	1, 2	Relamp	Yes	11	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	44	1,587	0.5	1,753	0	$276	$1,142	$235	3.3
Room 1220	11	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Wall Switch	S	93	2,300	1, 2	Relamp	Yes	11	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	44	1,587	0.5	1,753	0	$276	$1,142	$235	3.3
Room 1219	11	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Wall Switch	S	93	2,300	1, 2	Relamp	Yes	11	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	44	1,587	0.5	1,753	0	$276	$1,142	$235	3.3
Room 1222	11	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Wall Switch	S	93	2,300	1, 2	Relamp	Yes	11	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	44	1,587	0.5	1,753	0	$276	$1,142	$235	3.3

	Existing Conditions						Proposed Conditions								Energy Impact & Financial Analysis						
Location	Fixture Quantity	Fixture Description	Control System	Light Level	Watts per Fixture	Annual Operating Hours	ECM #	Fixture Recommendation	Add Controls?	Fixture Quantity	Fixture Description	Control System	Watts per Fixture	Annual Operating Hours	Total Peak kW Savings	Total Annual kWh Savings	Total Annual MMBtu Savings	Total Annual Energy Cost Savings	Total Installation Cost	Total Incentives	Simple Payback w/ Incentives in Years
Room 1223	11	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Wall Switch	S	93	2,300	1, 2	Relamp	Yes	11	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	44	1,587	0.5	1,753	0	$276	$1,142	$235	3.3
Room 1226	11	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Wall Switch	S	93	2,300	1, 2	Relamp	Yes	11	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	44	1,587	0.5	1,753	0	$276	$1,142	$235	3.3
Room 1225	11	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Wall Switch	S	93	2,300	1, 2	Relamp	Yes	11	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	44	1,587	0.5	1,753	0	$276	$1,142	$235	3.3
Room 1228	11	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Wall Switch	S	93	2,300	1, 2	Relamp	Yes	11	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	44	1,587	0.5	1,753	0	$276	$1,142	$235	3.3
Room 2114	10	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Wall Switch	S	93	2,300	1, 2	Relamp	Yes	10	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	44	1,587	0.5	1,594	0	$251	$1,088	$220	3.5
2203 Boiler Room	6	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	S	62	2,300	1, 2	Relamp	Yes	6	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,587	0.2	637	0	$100	$489	$95	3.9
1347 Electric Room	9	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	S	62	2,300	1, 2	Relamp	Yes	9	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,587	0.3	956	0	$150	$599	$125	3.1
MPR Kitchen	20	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	S	62	2,300	1, 2	Relamp	Yes	20	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,587	0.6	2,125	0	$334	$1,000	$235	2.3
Storage Room	2	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	S	62	2,300	1	Relamp	No	2	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	29	2,300	0.0	167	0	$26	$73	$20	2.0
Room 1344	2	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	S	62	2,300	1, 2	Relamp	Yes	2	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,587	0.1	212	0	$33	$189	$20	5.1
Room 1346	1	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	S	62	2,300	1	Relamp	No	1	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	29	2,300	0.0	83	0	$13	$37	$10	2.0
MPR Stage	14	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	S	62	2,300	1, 2	Relamp	Yes	14	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,587	0.4	1,487	0	$234	$1,051	$210	3.6
1304 Closet	1	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	S	62	2,300	1	Relamp	No	1	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	29	2,300	0.0	83	0	$13	$37	$10	2.0
Room 1307	4	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Occupancy Sensor	S	62	1,587	1	Relamp	No	4	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,587	0.1	230	0	$36	$146	$40	2.9
Room 1303	7	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	S	62	2,300	1, 2	Relamp	Yes	7	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,587	0.2	744	0	$117	$526	$105	3.6
Room 1308	4	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	S	62	2,300	1, 2	Relamp	Yes	4	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,587	0.1	425	0	$67	$416	$75	5.1
Room 1309	1	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	S	62	2,300	1	Relamp	No	1	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	29	2,300	0.0	83	0	$13	$37	$10	2.0
Room 1310	3	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	S	62	2,300	1, 2	Relamp	Yes	3	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,587	0.1	319	0	$50	$380	$65	6.3
Room 1337	8	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	S	62	2,300	1, 2	Relamp	Yes	8	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,587	0.2	850	0	$134	$562	$115	3.3
Room 1336	2	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	S	62	2,300	1, 2	Relamp	Yes	2	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,587	0.1	212	0	$33	$189	$20	5.1
Room 1319	2	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	S	62	2,300	1, 2	Relamp	Yes	2	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,587	0.1	212	0	$33	$189	$20	5.1
Room 1318	2	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	S	62	2,300	1, 2	Relamp	Yes	2	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,587	0.1	212	0	$33	$189	$20	5.1
Room 1315	2	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	S	62	2,300	1, 2	Relamp	Yes	2	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,587	0.1	212	0	$33	$189	$20	5.1
Room 1316	2	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	S	62	2,300	1, 2	Relamp	Yes	2	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,587	0.1	212	0	$33	$189	$20	5.1
Room 1325	4	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	S	62	2,300	1, 2	Relamp	Yes	4	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,587	0.1	425	0	$67	$416	$75	5.1

	Existing Conditions						Proposed Conditions								Energy Impact & Financial Analysis						
Location	Fixture Quantity	Fixture Description	Control System	Light Level	Watts per Fixture	Annual Operating Hours	ECM #	Fixture Recommendation	Add Controls?	Fixture Quantity	Fixture Description	Control System	Watts per Fixture	Annual Operating Hours	Total Peak kW Savings	Total Annual kWh Savings	Total Annual MMBtu Savings	Total Annual Energy Cost Savings	Total Installation Cost	Total Incentives	Simple Payback w/ Incentives in Years
Room 1329	4	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	S	62	2,300	1, 2	Relamp	Yes	4	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,587	0.1	425	0	$67	$416	$75	5.1
Room 1330	2	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	S	62	2,300	1, 2	Relamp	Yes	2	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,587	0.1	212	0	$33	$189	$20	5.1
Room 1332	1	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	S	62	2,300	1	Relamp	No	1	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	29	2,300	0.0	83	0	$13	$37	$10	2.0
Room 1109	15	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	S	62	2,300	1, 2	Relamp	Yes	15	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,587	0.5	1,594	0	$251	$1,088	$220	3.5
Room 1110	2	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	S	62	2,300	1, 2	Relamp	Yes	2	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,587	0.1	212	0	$33	$189	$20	5.1
Room 1112	4	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	S	62	2,300	1, 2	Relamp	Yes	4	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,587	0.1	425	0	$67	$416	$75	5.1
Stair 1	3	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	S	62	2,300	1, 2	Relamp	Yes	3	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,587	0.1	319	0	$50	$226	$30	3.9
Elevator 1	2	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	S	62	2,300	1, 2	Relamp	Yes	2	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,587	0.1	212	0	$33	$189	$20	5.1
Room 1205	3	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	S	62	2,300	1, 2	Relamp	Yes	3	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,587	0.1	319	0	$50	$380	$65	6.3
Room 1207	2	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	S	62	2,300	1, 2	Relamp	Yes	2	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,587	0.1	212	0	$33	$189	$20	5.1
Library 1106	46	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	S	62	2,300	1, 2	Relamp	Yes	46	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,587	1.4	4,887	-1	$769	$3,030	$635	3.1
Room 1107	2	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	S	62	2,300	1, 2	Relamp	Yes	2	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,587	0.1	212	0	$33	$189	$20	5.1
Room 1212	3	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	S	62	2,300	1, 2	Relamp	Yes	3	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,587	0.1	319	0	$50	$380	$65	6.3
Room 1214	6	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	S	62	2,300	1, 2	Relamp	Yes	6	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,587	0.2	637	0	$100	$489	$95	3.9
Room 1216	6	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	S	62	2,300	1, 2	Relamp	Yes	6	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,587	0.2	637	0	$100	$489	$95	3.9
Stairs 2	3	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	S	62	2,300	1, 2	Relamp	Yes	3	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,587	0.1	319	0	$50	$226	$30	3.9
Room 2106	15	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	S	62	2,300	1, 2	Relamp	Yes	15	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,587	0.5	1,594	0	$251	$1,088	$220	3.5
Room 2110	7	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	S	62	2,300	1, 2	Relamp	Yes	7	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,587	0.2	744	0	$117	$526	$105	3.6
Room 2109	2	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	S	62	2,300	1, 2	Relamp	Yes	2	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	1,587	0.1	212	0	$33	$189	$20	5.1
2nd Fl Hallway	5	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	S	62	2,300	1, 3	Relamp	Yes	5	LED - Linear Tubes: (2) 4' Lamps	High/Low Control	29	1,587	0.2	531	0	$84	$383	$50	4.0
2nd Fl Hallway	19	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	S	62	2,300	1, 3	Relamp	Yes	19	LED - Linear Tubes: (2) 4' Lamps	High/Low Control	29	1,587	0.6	2,018	0	$317	$894	$190	2.2
Room 1303	6	Linear Fluorescent - T8: 4' T8 (32W) - 1L	Wall Switch	S	32	2,300	1, 2	Relamp	Yes	6	LED - Linear Tubes: (1) 4' Lamp	Occupancy Sensor	15	1,587	0.1	334	0	$53	$380	$65	6.0
Room 1305	3	Linear Fluorescent - T8: 4' T8 (32W) - 1L	Wall Switch	S	32	2,300	1, 2	Relamp	Yes	3	LED - Linear Tubes: (1) 4' Lamp	Occupancy Sensor	15	1,587	0.0	167	0	$26	$171	$15	5.9
Room 1313	2	Linear Fluorescent - T8: 4' T8 (32W) - 1L	Wall Switch	S	32	2,300	1, 2	Relamp	Yes	2	LED - Linear Tubes: (1) 4' Lamp	Occupancy Sensor	15	1,587	0.0	111	0	$18	$153	$10	8.1
Room 1314	7	Linear Fluorescent - T8: 4' T8 (32W) - 1L	Wall Switch	S	32	2,300	1, 2	Relamp	Yes	7	LED - Linear Tubes: (1) 4' Lamp	Occupancy Sensor	15	1,587	0.1	390	0	$61	$398	$70	5.4

	Existing Conditions						Proposed Conditions								Energy Impact & Financial Analysis						
Location	Fixture Quantity	Fixture Description	Control System	Light Level	Watts per Fixture	Annual Operating Hours	ECM #	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
Vestibule	6	Linear Fluorescent - T8: 4' T8 (32W) - 1L	Wall Switch	S	32	2,300	1, 2	Relamp	Yes	6	LED - Linear Tubes: (1) 4' Lamp	Occupancy Sensor	15	1,587	0.1	334	0	$53	$380	$65	6.0
Room 1320	7	Linear Fluorescent - T8: 4' T8 (32W) - 1L	Wall Switch	S	32	2,300	1, 2	Relamp	Yes	7	LED - Linear Tubes: (1) 4' Lamp	Occupancy Sensor	15	1,587	0.1	390	0	$61	$398	$70	5.4
Room 1321	3	Linear Fluorescent - T8: 4' T8 (32W) - 1L	Wall Switch	S	32	2,300	1, 2	Relamp	Yes	3	LED - Linear Tubes: (1) 4' Lamp	Occupancy Sensor	15	1,587	0.0	167	0	$26	$171	$15	5.9
Room 1328	2	Linear Fluorescent - T8: 4' T8 (32W) - 1L	Wall Switch	S	32	2,300	1, 2	Relamp	Yes	2	LED - Linear Tubes: (1) 4' Lamp	Occupancy Sensor	15	1,587	0.0	111	0	$18	$153	$10	8.1
1st Fl Boys	8	Linear Fluorescent - T8: 4' T8 (32W) - 1L	Wall Switch	S	32	2,300	1, 2	Relamp	Yes	8	LED - Linear Tubes: (1) 4' Lamp	Occupancy Sensor	15	1,587	0.1	445	0	$70	$416	$75	4.9
Room 1104	1	Linear Fluorescent - T8: 4' T8 (32W) - 1L	Wall Switch	S	32	2,300	1	Relamp	No	1	LED - Linear Tubes: (1) 4' Lamp	Wall Switch	15	2,300	0.0	44	0	$7	$18	$5	1.9
1st Fl Girls	8	Linear Fluorescent - T8: 4' T8 (32W) - 1L	Wall Switch	S	32	2,300	1, 2	Relamp	Yes	8	LED - Linear Tubes: (1) 4' Lamp	Occupancy Sensor	15	1,587	0.1	445	0	$70	$416	$75	4.9
Room 1111	1	Linear Fluorescent - T8: 4' T8 (32W) - 1L	Wall Switch	S	32	2,300	1	Relamp	No	1	LED - Linear Tubes: (1) 4' Lamp	Wall Switch	15	2,300	0.0	44	0	$7	$18	$5	1.9
1st Fl Women	2	Linear Fluorescent - T8: 4' T8 (32W) - 1L	Wall Switch	S	32	2,300	1, 2	Relamp	Yes	2	LED - Linear Tubes: (1) 4' Lamp	Occupancy Sensor	15	1,587	0.0	111	0	$18	$153	$10	8.1
1st Fl Men	2	Linear Fluorescent - T8: 4' T8 (32W) - 1L	Wall Switch	S	32	2,300	1, 2	Relamp	Yes	2	LED - Linear Tubes: (1) 4' Lamp	Occupancy Sensor	15	1,587	0.0	111	0	$18	$153	$10	8.1
Room 1122	2	Linear Fluorescent - T8: 4' T8 (32W) - 1L	Wall Switch	S	32	2,300	1, 2	Relamp	Yes	2	LED - Linear Tubes: (1) 4' Lamp	Occupancy Sensor	15	1,587	0.0	111	0	$18	$153	$10	8.1
Room 1117	2	Linear Fluorescent - T8: 4' T8 (32W) - 1L	Wall Switch	S	32	2,300	1, 2	Relamp	Yes	2	LED - Linear Tubes: (1) 4' Lamp	Occupancy Sensor	15	1,587	0.0	111	0	$18	$153	$10	8.1
Room 1206	1	Linear Fluorescent - T8: 4' T8 (32W) - 1L	Wall Switch	S	32	2,300	1	Relamp	No	1	LED - Linear Tubes: (1) 4' Lamp	Wall Switch	15	2,300	0.0	44	0	$7	$18	$5	1.9
Room 1212	1	Linear Fluorescent - T8: 4' T8 (32W) - 1L	Wall Switch	S	32	2,300	1	Relamp	No	1	LED - Linear Tubes: (1) 4' Lamp	Wall Switch	15	2,300	0.0	44	0	$7	$18	$5	1.9
Room 1215	2	Linear Fluorescent - T8: 4' T8 (32W) - 1L	Wall Switch	S	32	2,300	1, 2	Relamp	Yes	2	LED - Linear Tubes: (1) 4' Lamp	Occupancy Sensor	15	1,587	0.0	111	0	$18	$153	$10	8.1
Room 1221	2	Linear Fluorescent - T8: 4' T8 (32W) - 1L	Wall Switch	S	32	2,300	1, 2	Relamp	Yes	2	LED - Linear Tubes: (1) 4' Lamp	Occupancy Sensor	15	1,587	0.0	111	0	$18	$153	$10	8.1
Room 1218	2	Linear Fluorescent - T8: 4' T8 (32W) - 1L	Wall Switch	S	32	2,300	1, 2	Relamp	Yes	2	LED - Linear Tubes: (1) 4' Lamp	Occupancy Sensor	15	1,587	0.0	111	0	$18	$153	$10	8.1
Room 1224	2	Linear Fluorescent - T8: 4' T8 (32W) - 1L	Wall Switch	S	32	2,300	1, 2	Relamp	Yes	2	LED - Linear Tubes: (1) 4' Lamp	Occupancy Sensor	15	1,587	0.0	111	0	$18	$153	$10	8.1
Room 1227	2	Linear Fluorescent - T8: 4' T8 (32W) - 1L	Wall Switch	S	32	2,300	1, 2	Relamp	Yes	2	LED - Linear Tubes: (1) 4' Lamp	Occupancy Sensor	15	1,587	0.0	111	0	$18	$153	$10	8.1
Room 2111	2	Linear Fluorescent - T8: 4' T8 (32W) - 1L	Wall Switch	S	32	2,300	1, 2	Relamp	Yes	2	LED - Linear Tubes: (1) 4' Lamp	Occupancy Sensor	15	1,587	0.0	111	0	$18	$153	$10	8.1
Room 2121	2	Linear Fluorescent - T8: 4' T8 (32W) - 1L	Wall Switch	S	32	2,300	1, 2	Relamp	Yes	2	LED - Linear Tubes: (1) 4' Lamp	Occupancy Sensor	15	1,587	0.0	111	0	$18	$153	$10	8.1
Room 2116	2	Linear Fluorescent - T8: 4' T8 (32W) - 1L	Wall Switch	S	32	2,300	1, 2	Relamp	Yes	2	LED - Linear Tubes: (1) 4' Lamp	Occupancy Sensor	15	1,587	0.0	111	0	$18	$153	$10	8.1
Room 2117	2	Linear Fluorescent - T8: 4' T8 (32W) - 1L	Wall Switch	S	32	2,300	1	Relamp	No	2	LED - Linear Tubes: (1) 4' Lamp	Wall Switch	15	2,300	0.0	89	0	$14	$37	$10	1.9
Room 2122	2	Linear Fluorescent - T8: 4' T8 (32W) - 1L	Wall Switch	S	32	2,300	1, 2	Relamp	Yes	2	LED - Linear Tubes: (1) 4' Lamp	Occupancy Sensor	15	1,587	0.0	111	0	$18	$153	$10	8.1
Room 2129	2	Linear Fluorescent - T8: 4' T8 (32W) - 1L	Wall Switch	S	32	2,300	1, 2	Relamp	Yes	2	LED - Linear Tubes: (1) 4' Lamp	Occupancy Sensor	15	1,587	0.0	111	0	$18	$153	$10	8.1

	Existing Conditions						Proposed Conditions								Energy Impact & Financial Analysis						
Location	Fixture Quantity	Fixture Description	Control System	Light Level	Watts per Fixture	Annual Operating Hours	ECM #	Fixture Recommendation	Add Controls?	Fixture Quantity	Fixture Description	Control System	Watts per Fixture	Annual Operating Hours	Total Peak kW Savings	Total Annual kWh Savings	Total Annual MMBtu Savings	Total Annual Energy Cost Savings	Total Installation Cost	Total Incentives	Simple Payback w/ Incentives in Years
Room 2124	2	Linear Fluorescent - T8: 4' T8 (32W) - 1L	Wall Switch	S	32	2,300	1, 2	Relamp	Yes	2	LED - Linear Tubes: (1) 4' Lamp	Occupancy Sensor	15	1,587	0.0	111	0	$18	$153	$10	8.1
Room 2131	2	Linear Fluorescent - T8: 4' T8 (32W) - 1L	Wall Switch	S	32	2,300	1, 2	Relamp	Yes	2	LED - Linear Tubes: (1) 4' Lamp	Occupancy Sensor	15	1,587	0.0	111	0	$18	$153	$10	8.1
Room 2126	2	Linear Fluorescent - T8: 4' T8 (32W) - 1L	Wall Switch	S	32	2,300	1, 2	Relamp	Yes	2	LED - Linear Tubes: (1) 4' Lamp	Occupancy Sensor	15	1,587	0.0	111	0	$18	$153	$10	8.1
Room 2132	2	Linear Fluorescent - T8: 4' T8 (32W) - 1L	Wall Switch	S	32	2,300	1, 2	Relamp	Yes	2	LED - Linear Tubes: (1) 4' Lamp	Occupancy Sensor	15	1,587	0.0	111	0	$18	$153	$10	8.1
Room 2127	2	Linear Fluorescent - T8: 4' T8 (32W) - 1L	Wall Switch	S	32	2,300	1, 2	Relamp	Yes	2	LED - Linear Tubes: (1) 4' Lamp	Occupancy Sensor	15	1,587	0.0	111	0	$18	$153	$10	8.1
2nd Fl Hallway	8	Linear Fluorescent - T8: 4' T8 (32W) - 1L	Wall Switch	S	32	2,300	1, 3	Relamp	Yes	8	LED - Linear Tubes: (1) 4' Lamp	High/Low Control	15	1,587	0.1	445	0	$70	$346	$40	4.4
1st Fl Hallway	8	Linear Fluorescent - T8: 4' T8 (32W) - 1L	Wall Switch	S	32	2,300	1, 3	Relamp	Yes	8	LED - Linear Tubes: (1) 4' Lamp	High/Low Control	15	1,587	0.1	445	0	$70	$346	$40	4.4
Staff Bathroom	2	Linear Fluorescent - T8: 2' T8 (17W) - 2L	Wall Switch	S	33	2,300	1, 2	Relamp	Yes	2	LED - Linear Tubes: (2) 2' Lamps	Occupancy Sensor	17	1,587	0.0	108	0	$17	$181	$12	10.0
Staff Bathroom 2	2	Linear Fluorescent - T8: 2' T8 (17W) - 2L	Wall Switch	S	33	2,300	1, 2	Relamp	Yes	2	LED - Linear Tubes: (2) 2' Lamps	Occupancy Sensor	17	1,587	0.0	108	0	$17	$181	$12	10.0
2106 Toilet	2	Linear Fluorescent - T8: 2' T8 (17W) - 2L	Wall Switch	S	33	2,300	1, 2	Relamp	Yes	2	LED - Linear Tubes: (2) 2' Lamps	Occupancy Sensor	17	1,587	0.0	108	0	$17	$181	$12	10.0
2nd Fl Women	2	Linear Fluorescent - T8: 2' T8 (17W) - 2L	Wall Switch	S	33	2,300	1, 2	Relamp	Yes	2	LED - Linear Tubes: (2) 2' Lamps	Occupancy Sensor	17	1,587	0.0	108	0	$17	$181	$12	10.0
2nd Fl Men	2	Linear Fluorescent - T8: 2' T8 (17W) - 2L	Wall Switch	S	33	2,300	1, 2	Relamp	Yes	2	LED - Linear Tubes: (2) 2' Lamps	Occupancy Sensor	17	1,587	0.0	108	0	$17	$181	$12	10.0
Room 2114	2	Linear Fluorescent - T8: 2' T8 (17W) - 2L	Wall Switch	S	33	2,300	1, 2	Relamp	Yes	2	LED - Linear Tubes: (2) 2' Lamps	Occupancy Sensor	17	1,587	0.0	108	0	$17	$181	$12	10.0
Room 2119	2	Linear Fluorescent - T8: 2' T8 (17W) - 2L	Wall Switch	S	33	2,300	1, 2	Relamp	Yes	2	LED - Linear Tubes: (2) 2' Lamps	Occupancy Sensor	17	1,587	0.0	108	0	$17	$181	$12	10.0
MPR Restroom	2	Linear Fluorescent - T8: 2' T8 (17W) - 1L	Wall Switch	S	22	2,300	1	Relamp	No	2	LED - Linear Tubes: (1) 2' Lamp	Wall Switch	9	2,300	0.0	68	0	$11	$33	$6	2.5
Men Restroom	2	Linear Fluorescent - T8: 2' T8 (17W) - 1L	Wall Switch	S	22	2,300	1	Relamp	No	2	LED - Linear Tubes: (1) 2' Lamp	Wall Switch	9	2,300	0.0	68	0	$11	$33	$6	2.5
Women Restroom	2	Linear Fluorescent - T8: 2' T8 (17W) - 1L	Wall Switch	S	22	2,300	1	Relamp	No	2	LED - Linear Tubes: (1) 2' Lamp	Wall Switch	9	2,300	0.0	68	0	$11	$33	$6	2.5
Restroom	2	Linear Fluorescent - T8: 2' T8 (17W) - 1L	Wall Switch	S	22	2,300	1	Relamp	No	2	LED - Linear Tubes: (1) 2' Lamp	Wall Switch	9	2,300	0.0	68	0	$11	$33	$6	2.5
Restroom	2	Linear Fluorescent - T8: 2' T8 (17W) - 1L	Wall Switch	S	22	2,300	1	Relamp	No	2	LED - Linear Tubes: (1) 2' Lamp	Wall Switch	9	2,300	0.0	68	0	$11	$33	$6	2.5
Restroom	2	Linear Fluorescent - T8: 2' T8 (17W) - 1L	Wall Switch	S	22	2,300	1	Relamp	No	2	LED - Linear Tubes: (1) 2' Lamp	Wall Switch	9	2,300	0.0	68	0	$11	$33	$6	2.5
1115 Toilet	2	Linear Fluorescent - T8: 2' T8 (17W) - 1L	Wall Switch	S	22	2,300	1	Relamp	No	2	LED - Linear Tubes: (1) 2' Lamp	Wall Switch	9	2,300	0.0	68	0	$11	$33	$6	2.5
1120 Bathroom	2	Linear Fluorescent - T8: 2' T8 (17W) - 1L	Wall Switch	S	22	2,300	1	Relamp	No	2	LED - Linear Tubes: (1) 2' Lamp	Wall Switch	9	2,300	0.0	68	0	$11	$33	$6	2.5
Room 1118	2	Linear Fluorescent - T8: 2' T8 (17W) - 1L	Wall Switch	S	22	2,300	1, 2	Relamp	Yes	2	LED - Linear Tubes: (1) 2' Lamp	Occupancy Sensor	9	1,587	0.0	82	0	$13	$149	$6	11.1
Room 1123	2	Linear Fluorescent - T8: 2' T8 (17W) - 1L	Wall Switch	S	22	2,300	1, 2	Relamp	Yes	2	LED - Linear Tubes: (1) 2' Lamp	Occupancy Sensor	9	1,587	0.0	82	0	$13	$149	$6	11.1
Room 1125	2	Linear Fluorescent - T8: 2' T8 (17W) - 1L	Wall Switch	S	22	2,300	1, 2	Relamp	Yes	2	LED - Linear Tubes: (1) 2' Lamp	Occupancy Sensor	9	1,587	0.0	82	0	$13	$149	$6	11.1

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Room 1130	2	Linear Fluorescent - T8: 2' T8 (17W) - 1L	Wall Switch	S	22	2,300	1, 2	Relamp	Yes	2	LED - Linear Tubes: (1) 2' Lamp	Occupancy Sensor	9	1,587	0.0	82	0	$13	$149	$6	11.1
Room 1128	2	Linear Fluorescent - T8: 2' T8 (17W) - 1L	Wall Switch	S	22	2,300	1, 2	Relamp	Yes	2	LED - Linear Tubes: (1) 2' Lamp	Occupancy Sensor	9	1,587	0.0	82	0	$13	$149	$6	11.1
Room 1133	2	Linear Fluorescent - T8: 2' T8 (17W) - 1L	Wall Switch	S	22	2,300	1, 2	Relamp	Yes	2	LED - Linear Tubes: (1) 2' Lamp	Occupancy Sensor	9	1,587	0.0	82	0	$13	$149	$6	11.1
Exterior	38	Metal Halide: (1) 50W Lamp	Photocell	S	72	4,380	NR	Fixture Replacement	No	38	LED - Fixtures: Outdoor Wall-Mounted Area Fixture	Photocell	15	4,380	1.6	10,436	-2	$1,641	$36,707	$3,800	20.0
Exterior	6	Metal Halide: (1) 100W Lamp	Photocell	S	128	4,380	NR	Fixture Replacement	No	6	LED - Fixtures: Outdoor Wall-Mounted Area Fixture	Photocell	30	4,380	0.4	2,833	-1	$446	$5,796	$600	11.7
MPR Restroom	2	Exit Signs: LED - 2 W Lamp	None	S	6	8,760		None	No	2	Exit Signs: LED - 2 W Lamp	None	6	8,760	0.0	0	0	$0	$0	$0	0.0
Multi Purpose Room 1335	8	Exit Signs: LED - 2 W Lamp	None	S	6	8,760		None	No	8	Exit Signs: LED - 2 W Lamp	None	6	8,760	0.0	0	0	$0	$0	$0	0.0
1102 Passage	3	Exit Signs: LED - 2 W Lamp	None	S	6	8,760		None	No	3	Exit Signs: LED - 2 W Lamp	None	6	8,760	0.0	0	0	$0	$0	$0	0.0
Stair 1	1	Exit Signs: LED - 2 W Lamp	None	S	6	8,760		None	No	1	Exit Signs: LED - 2 W Lamp	None	6	8,760	0.0	0	0	$0	$0	$0	0.0
Room 1107	5	Exit Signs: LED - 2 W Lamp	None	S	6	8,760		None	No	5	Exit Signs: LED - 2 W Lamp	None	6	8,760	0.0	0	0	$0	$0	$0	0.0
2nd Fl Hallway	8	Exit Signs: LED - 2 W Lamp	None	S	6	8,760		None	No	8	Exit Signs: LED - 2 W Lamp	None	6	8,760	0.0	0	0	$0	$0	$0	0.0
1st Fl Hallway	14	Exit Signs: LED - 2 W Lamp	None	S	6	8,760		None	No	14	Exit Signs: LED - 2 W Lamp	None	6	8,760	0.0	0	0	$0	$0	$0	0.0
Library 1106	4	Compact Fluorescent: U-type CFL (36W) - 6L	Wall Switch	S	216	2,300	1, 2	Relamp	Yes	4	LED - Fixtures: Other	Occupancy Sensor	151	1,587	0.3	1,130	0	$178	$1,070	$35	5.8
1st Fl Hallway	2	Compact Fluorescent: U-type CFL (36W) - 6L	Wall Switch	S	216	2,300	1, 3	Relamp	Yes	2	LED - Fixtures: Other	High/Low Control	151	1,587	0.2	565	0	$89	$600	$0	6.8
Library 1106	11	Compact Fluorescent: Spiral Bulb (32W) - 2L	Wall Switch	S	64	2,300	1, 2	Relamp	Yes	11	LED - Fixtures: Other	Occupancy Sensor	45	1,587	0.3	921	0	$145	$942	$70	6.0
Multi Purpose Room 1335	19	Compact Fluorescent: 4 Pin CFL (42W) - 8L	Wall Switch	S	336	2,300	1, 2	Relamp	Yes	19	LED - Fixtures: Other	Occupancy Sensor	235	1,587	2.4	8,350	-2	$1,313	$4,340	$70	3.3
Multi Purpose Room 1335	7	Compact Fluorescent: 4 Pin CFL (42W) - 6L	Wall Switch	S	252	2,300	1, 2	Relamp	Yes	7	LED - Fixtures: Other	Occupancy Sensor	176	1,587	0.7	2,307	0	$363	$1,670	$35	4.5
Library 1106	14	Compact Fluorescent: 4 Pin CFL (42W) - 1L	Wall Switch	S	42	2,300	1, 2	Relamp	Yes	14	LED - Fixtures: Other	Occupancy Sensor	29	1,587	0.2	769	0	$121	$1,051	$70	8.1
Room 2114	2	Compact Fluorescent: 4 Pin CFL (42W) - 1L	Wall Switch	S	42	2,300	1, 2	Relamp	Yes	2	LED - Fixtures: Other	Occupancy Sensor	29	1,587	0.0	110	0	$17	$189	$0	10.9
Exterior	3	Compact Fluorescent: 4 Pin CFL (42W) - 1L	Photocell	S	42	4,380	1	Relamp	No	3	LED - Fixtures: Other	Photocell	29	4,380	0.0	182	0	$29	$110	$0	3.8
2nd Fl Hallway	51	Compact Fluorescent: 4 Pin CFL (32W) - 1L	Wall Switch	S	32	2,300	1, 3	Relamp	Yes	51	LED - Fixtures: Other	High/Low Control	22	1,587	0.6	2,135	0	$336	$2,063	$0	6.1
1st Fl Hallway	35	Compact Fluorescent: 4 Pin CFL (32W) - 1L	Wall Switch	S	32	2,300	1, 3	Relamp	Yes	35	LED - Fixtures: Other	High/Low Control	22	1,587	0.4	1,465	0	$230	$1,478	$0	6.4
Room 1303	8	Compact Fluorescent: 4 Pin CFL (23W) - 1L	Wall Switch	S	23	2,300	1, 2	Relamp	Yes	8	LED - Fixtures: Other	Occupancy Sensor	16	1,587	0.1	241	0	$38	$400	$35	9.6
Room 1317	1	Compact Fluorescent: 4 Pin CFL (23W) - 1L	Wall Switch	S	23	2,300	1	Relamp	No	1	LED - Fixtures: Other	Wall Switch	16	2,300	0.0	17	0	$3	$16	$0	5.9
Vestibule	9	Compact Fluorescent: 4 Pin CFL (23W) - 1L	Wall Switch	S	23	2,300	1, 2	Relamp	Yes	9	LED - Fixtures: Other	Occupancy Sensor	16	1,587	0.1	271	0	$43	$416	$35	9.0

	Existing Conditions						Proposed Conditions								Energy Impact & Financial Analysis						
Location	Fixture Quantity	Fixture Description	Control System	Light Level	Watts per Fixture	Annual Operating Hours	ECM #	Fixture Recommendation	Add Controls?	Fixture Quantity	Fixture Description	Control System	Watts per Fixture	Annual Operating Hours	Total Peak kW Savings	Total Annual kWh Savings	Total Annual MMBtu Savings	Total Annual Energy Cost Savings	Total Installation Cost	Total Incentives	Simple Payback w/ Incentives in Years
Room 1115	2	Compact Fluorescent: 4 Pin CFL (23W) - 1L	Wall Switch	S	23	2,300	1, 2	Relamp	Yes	2	LED - Fixtures: Other	Occupancy Sensor	16	1,587	0.0	60	0	$9	$149	$0	15.7
Room 1120	2	Compact Fluorescent: 4 Pin CFL (23W) - 1L	Wall Switch	S	23	2,300	1, 2	Relamp	Yes	2	LED - Fixtures: Other	Occupancy Sensor	16	1,587	0.0	60	0	$9	$149	$0	15.7
Room 1118	2	Compact Fluorescent: 4 Pin CFL (23W) - 1L	Wall Switch	S	23	2,300	1, 2	Relamp	Yes	2	LED - Fixtures: Other	Occupancy Sensor	16	1,587	0.0	60	0	$9	$149	$0	15.7
1102 Passage	9	Compact Fluorescent: 2 Pin CFL (13W) - 2L	Wall Switch	S	26	2,300	1, 2	Relamp	Yes	9	LED - Fixtures: Other	Occupancy Sensor	18	1,587	0.1	306	0	$48	$416	$35	7.9
Stair 1	4	Compact Fluorescent: 2 Pin CFL (13W) - 2L	Wall Switch	S	26	2,300	1	Relamp	No	4	LED - Fixtures: Other	Wall Switch	18	2,300	0.0	79	0	$12	$65	$0	5.2
Stairs 2	2	Compact Fluorescent: 2 Pin CFL (13W) - 2L	Wall Switch	S	26	2,300	1	Relamp	No	2	LED - Fixtures: Other	Wall Switch	18	2,300	0.0	39	0	$6	$33	$0	5.2
1st Fl Hallway	4	Compact Fluorescent: 2 Pin CFL (13W) - 2L	Wall Switch	S	26	2,300	1, 3	Relamp	Yes	4	LED - Fixtures: Other	High/Low Control	18	1,587	0.0	136	0	$21	$265	$0	12.4

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?	Remaining Useful Life	Annual Operating Hours	ECM #	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	AC-1 Stage/storage	1	Supply Fan	1.0	82.5%	No	B	1,600		No	82.5%	No		0.0	0	0	$0	$0	$0	0.0
Roof	AC-2 Multi Purpose Room	1	Supply Fan	3.0	86.5%	No	B	1,600	NR, 4	Yes	89.5%	Yes	1	0.9	1,646	0	$263	$3,812	$0	14.5
Roof	AC-2 Multi Purpose Room	1	Return Fan	3.0	86.5%	No	B	1,600	NR, 4	Yes	89.5%	Yes	1	0.9	1,646	0	$263	$3,812	$0	14.5
Roof	AC-3 Multi Purpose Room	1	Supply Fan	3.0	86.5%	No	B	1,600	NR, 4	Yes	89.5%	Yes	1	0.9	1,646	0	$263	$3,812	$0	14.5
Roof	AC-3 Multi Purpose Room	1	Return Fan	3.0	86.5%	No	B	1,600	NR, 4	Yes	89.5%	Yes	1	0.9	1,646	0	$263	$3,812	$0	14.5
Roof	AC-4 Multi Purpose Room	1	Supply Fan	3.0	86.5%	No	B	1,600	NR, 4	Yes	89.5%	Yes	1	0.9	1,646	0	$263	$3,812	$0	14.5
Roof	AC-4 Multi Purpose Room	1	Return Fan	3.0	86.5%	No	B	1,600	NR, 4	Yes	89.5%	Yes	1	0.9	1,646	0	$263	$3,812	$0	14.5
Roof	AC-5 Multi Purpose Room	1	Supply Fan	3.0	86.5%	No	B	1,600	NR, 4	Yes	89.5%	Yes	1	0.9	1,646	0	$263	$3,812	$0	14.5
Roof	AC-5 Multi Purpose Room	1	Return Fan	3.0	86.5%	No	B	1,600	NR, 4	Yes	89.5%	Yes	1	0.9	1,646	0	$263	$3,812	$0	14.5
Roof	AC-6 Faculty Dinning	1	Supply Fan	0.5	68.0%	No	B	1,600		No	68.0%	No		0.0	0	0	$0	$0	$0	0.0
Roof	AC-6 Faculty Dinning	1	Return Fan	3.0	86.5%	No	B	1,600		No	86.5%	No		0.0	0	0	$0	$0	$0	0.0
Roof	AC-7 Kitchen	1	Supply Fan	1.5	84.0%	No	B	1,600		No	84.0%	No		0.0	0	0	$0	$0	$0	0.0
Roof	MAU-1 Heat Pump Ventilation air part 1	2	Supply Fan	3.0	86.5%	No	B	1,600	NR, 4	Yes	89.5%	Yes	2	1.8	3,292	0	$526	$7,625	$0	14.5
Roof	MAU-1 Heat Pump Ventilation air part 1	1	Return Fan	5.0	87.5%	No	B	1,600	NR, 4	Yes	89.5%	Yes	1	1.5	2,661	0	$425	$4,197	$775	8.1
Roof	MAU-2 Heat Pump Ventilation air part 2	2	Supply Fan	7.5	88.5%	No	B	1,600	NR, 4	Yes	91.7%	Yes	2	4.5	8,063	0	$1,287	$9,521	$2,325	5.6
Roof	MAU-2 Heat Pump Ventilation air part 2	2	Return Fan	5.0	87.5%	No	B	1,600	NR, 4	Yes	89.5%	Yes	2	3.1	5,321	0	$850	$8,394	$1,550	8.1
Roof	MAU-3 Heat Pump Ventilation air part 3	1	Supply Fan	2.0	84.0%	No	B	1,600	NR, 4	Yes	86.5%	Yes	1	0.6	1,121	0	$179	$3,623	$0	20.2
Roof	MAU-3 Heat Pump Ventilation air part 3	1	Return Fan	3.0	86.5%	No	B	1,600	NR, 4	Yes	89.5%	Yes	1	0.9	1,646	0	$263	$3,812	$0	14.5
Mechanical Room	P-1	1	Heating Hot Water Pump	20.0	91.7%	Yes	W	1,696		No	91.7%	No		0.0	0	0	$0	$0	$0	0.0
Mechanical Room	P-2	1	Heating Hot Water Pump	20.0	91.7%	Yes	W	200		No	91.7%	No		0.0	0	0	$0	$0	$0	0.0

		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?	Remaining Useful Life	Annual Operating Hours	ECM #	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
Mechanical Room	P-3	1	Condenser Water Pump	20.0	91.7%	Yes	W	1,696		No	91.7%	No		0.0	0	0	$0	$0	$0	0.0
Mechanical Room	P-4	1	Condenser Water Pump	20.0	91.7%	Yes	W	200		No	91.7%	No		0.0	0	0	$0	$0	$0	0.0
Roof	SAF-1	1	Exhaust Fan	0.3	68.0%	No	W	800		No	68.0%	No		0.0	0	0	$0	$0	$0	0.0
Roof	EF-1	1	Exhaust Fan	0.1	60.0%	No	W	800		No	60.0%	No		0.0	0	0	$0	$0	$0	0.0
Roof	EF-2	1	Kitchen Hood Exhaust Fan	2.0	84.0%	No	W	800		No	84.0%	No		0.0	0	50	$0	$0	$0	0.0
Roof	EF-3	1	Exhaust Fan	0.1	60.0%	No	W	800		No	60.0%	No		0.0	0	0	$0	$0	$0	0.0
Roof	EF-4	1	Exhaust Fan	0.3	68.0%	No	W	800		No	68.0%	No		0.0	0	0	$0	$0	$0	0.0
Roof	EF-5	1	Exhaust Fan	0.2	60.0%	No	W	800		No	60.0%	No		0.0	0	0	$0	$0	$0	0.0
Roof	EF-6	1	Exhaust Fan	0.2	60.0%	No	W	800		No	60.0%	No		0.0	0	0	$0	$0	$0	0.0
Roof	EF-7	1	Exhaust Fan	0.2	60.0%	No	W	800		No	60.0%	No		0.0	0	0	$0	$0	$0	0.0
Roof	EF-8	1	Exhaust Fan	0.3	68.0%	No	W	800		No	68.0%	No		0.0	0	0	$0	$0	$0	0.0
Roof	EF-9	1	Exhaust Fan	0.3	68.0%	No	W	800		No	68.0%	No		0.0	0	0	$0	$0	$0	0.0
Roof	EF-10	1	Exhaust Fan	0.5	68.0%	No	W	800		No	68.0%	No		0.0	0	0	$0	$0	$0	0.0
Roof	EF-11	1	Exhaust Fan	0.3	68.0%	No	W	800		No	68.0%	No		0.0	0	0	$0	$0	$0	0.0
Roof	EF-12	1	Exhaust Fan	0.3	68.0%	No	W	800		No	68.0%	No		0.0	0	0	$0	$0	$0	0.0
Outdoor	CTF-1	1	Cooling Tower Fan	25.0	91.0%	No	W	2,000	NR, 5	Yes	93.6%	Yes	1	-0.3	8,019	0	$1,280	$11,471	$1,500	7.8
Outdoor	CTF-2	1	Cooling Tower Fan	25.0	91.0%	No	W	2,000	NR, 5	Yes	93.6%	Yes	1	-0.3	8,019	0	$1,280	$11,471	$1,500	7.8
Mechanical Room	Boiler	2	Combustion Air Fan	1.0	82.5%	No	W	1,373		No	82.5%	No		0.0	0	0	$0	$0	$0	0.0

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 (MBh)	Remaining Useful Life	ECM #	Install High Efficiency System?	System Quantity	System Type	Cooling Capacity per Unit (Tons)	Heating Capacity per Unit (MBh)	Cooling Mode Efficiency (SEER/EER)	Heating Mode Efficiency (COP)	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	AC-1 Stage/storage	1	Packaged AC	7.00		B	NR	Yes	1	Packaged AC	7.00		11.50		1.0	799	0	$128	$12,475	$511	93.7
Roof	AC-2 Multi Purpose Room	1	Packaged AC	8.00		B	NR	Yes	1	Packaged AC	8.00		11.50		1.2	914	0	$146	$14,257	$584	93.7
Roof	AC-3 Multi Purpose Room	1	Packaged AC	8.00		B	NR	Yes	1	Packaged AC	8.00		11.50		1.2	914	0	$146	$14,257	$584	93.7
Roof	AC-4 Multi Purpose Room	1	Packaged AC	8.00		B	NR	Yes	1	Packaged AC	8.00		11.50		1.2	914	0	$146	$14,257	$584	93.7
Roof	AC-5 Multi Purpose Room	1	Packaged AC	8.00		B	NR	Yes	1	Packaged AC	8.00		11.50		1.2	914	0	$146	$14,257	$584	93.7
Roof	AC-6 Faculty Dinning	1	Packaged AC	4.00		B	NR	Yes	1	Packaged AC	4.00		14.00		1.0	750	0	$120	$9,076	$368	72.7
Roof	AC-7 Kitchen	1	Packaged AC	10.00		B	NR	Yes	1	Packaged AC	10.00		11.50		1.4	1,142	0	$182	$17,821	$730	93.7
Roof	MAU-1 Heat Pump Ventilation air part 1	1	Packaged AC	26.00		B	NR	Yes	1	Packaged AC	26.00		11.50		3.8	2,969	0	$474	$43,872	$2,054	88.2
Roof	MAU-2 Heat Pump Ventilation air part 2	1	Packaged AC	30.00		B	NR	Yes	1	Packaged AC	30.00		11.50		4.3	3,426	0	$547	$66,479	$0	121.5
Roof	MAU-3 Heat Pump Ventilation air part 3	1	Packaged AC	8.00		B	NR	Yes	1	Packaged AC	8.00		11.50		1.2	914	0	$146	$14,257	$584	93.7
Classrooms	HP-1	2	Water Source HP	0.50	9.10	W		No							0.0	0	0	$0	$0	$0	0.0
Classrooms	HP-2	5	Water Source HP	1.00	13.80	W		No							0.0	0	0	$0	$0	$0	0.0
Classrooms	HP-3	1	Water Source HP	1.25	17.50	W		No							0.0	0	0	$0	$0	$0	0.0
Classrooms	HP-4	1	Water Source HP	1.50	21.90	W		No							0.0	0	0	$0	$0	$0	0.0
Classrooms	HP-5	4	Water Source HP	1.50	22.50	W		No							0.0	0	0	$0	$0	$0	0.0
Classrooms	HP-6	5	Water Source HP	1.50	22.50	W		No							0.0	0	0	$0	$0	$0	0.0
Classrooms	HP-7	6	Water Source HP	2.00	31.00	W		No							0.0	0	0	$0	$0	$0	0.0
Classrooms	HP-8	2	Water Source HP	2.00	31.00	W		No							0.0	0	0	$0	$0	$0	0.0
Classrooms	HP-9	26	Water Source HP	2.50	33.50	W		No							0.0	0	0	$0	$0	$0	0.0
Classrooms	HP-10	2	Water Source HP	2.50	33.50	W		No							0.0	0	0	$0	$0	$0	0.0

		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)	Remaining Useful Life	ECM #	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)	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	HP-11	3	Water Source HP	3.00	44.00	W		No							0.0	0	0	$0	$0	$0	0.0
Classrooms	HP-12	1	Water Source HP	3.50	47.80	W		No							0.0	0	0	$0	$0	$0	0.0
Classrooms	HP-13	2	Water Source HP	4.00	57.00	W		No							0.0	0	0	$0	$0	$0	0.0
Classrooms	HP-14	3	Water Source HP	5.00	74.10	W		No							0.0	0	0	$0	$0	$0	0.0
Classrooms	HP-15	1	Water Source HP	8.50	124.00	W		No							0.0	0	0	$0	$0	$0	0.0
Stair No. 1,2	CUH-1	1	Electric Resistance Heat		10.24	W		No							0.0	0	0	$0	$0	$0	0.0
Vestibule	CUH-2	1	Electric Resistance Heat		17.06	W		No							0.0	0	0	$0	$0	$0	0.0
Stair No. 1,2	CUH-3	1	Electric Resistance Heat		10.24	W		No							0.0	0	0	$0	$0	$0	0.0
Electrical Room	UH-1	1	Electric Resistance Heat		10.24	W		No							0.0	0	0	$0	$0	$0	0.0
Reception	PTAC-1	1	Packaged Terminal AC	1.00		W		No							0.0	0	0	$0	$0	$0	0.0

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)	Remaining Useful Life	ECM #	Install High Efficiency System?	System Quantity	System Type	Output Capacity per Unit (MBh)	Heating Efficiency	Heating Efficiency Units	Total Peak kW Savings	Total Annual kWh Savings	Total Annual MMBtu Savings	Total Annual Energy Cost Savings	Total Installation Cost	Total Incentives	Simple Payback w/ Incentives in Years
Boiler Room	B-1	1	Non-Condensing Hot Water Boiler	######	W		No						0.0	0	0	$0	$0	$0	0.0
Boiler Room	B-2	1	Non-Condensing Hot Water Boiler	######	W		No						0.0	0	0	$0	$0	$0	0.0
Roof	AC-1 Stage/storage	1	Furnace	73.00	B	NR	Yes	1	Furnace	73.00	95.00%	AFUE	0.0	0	1	$16	$1,654	$400	76.5
Roof	AC-2 Multi Purpose Room	1	Furnace	145.00	B	NR	Yes	1	Furnace	145.00	95.00%	AFUE	0.0	0	3	$33	$3,285	$400	88.6
Roof	AC-3 Multi Purpose Room	1	Furnace	145.00	B	NR	Yes	1	Furnace	145.00	95.00%	AFUE	0.0	0	3	$33	$3,285	$400	88.6
Roof	AC-4 Multi Purpose Room	1	Furnace	145.00	B	NR	Yes	1	Furnace	145.00	95.00%	AFUE	0.0	0	3	$33	$3,285	$400	88.6
Roof	AC-5 Multi Purpose Room	1	Furnace	145.00	B	NR	Yes	1	Furnace	145.00	95.00%	AFUE	0.0	0	3	$33	$3,285	$400	88.6
Roof	AC-6 Faculty Dinning	1	Furnace	73.00	B	NR	Yes	1	Furnace	73.00	95.00%	AFUE	0.0	0	1	$16	$1,654	$400	76.5
Roof	AC-7 Kitchen	1	Furnace	218.00	B	NR	Yes	1	Furnace	218.00	95.00%	AFUE	0.0	0	4	$49	$4,939	$400	92.7

DHW Inventory & Recommendations

		Existing Conditions			Proposed Conditions							Energy Impact & Financial Analysis						
Location	Area(s)/System(s) Served	System Quantity	System Type	Remaining Useful Life	ECM #	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	Kitchen & Restrooms	1	Storage Tank Water Heater (> 50 Gal)	W		No						0.0	0	0	$0	$0	$0	0.0
Boiler Room	Kitchen & Restrooms	1	Storage Tank Water Heater (> 50 Gal)	W		No						0.0	0	0	$0	$0	$0	0.0

Low-Flow Device Recommendations

	Recommedation Inputs					Energy Impact & Financial Analysis						
Location	ECM #	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
Restrooms	6	22	Faucet Aerator (Lavatory)	2.20	0.50	0.0	0	42	$475	$158	$0	0.3

Walk-In Cooler/Freezer Inventory & Recommendations

	Existing Conditions		Proposed Conditions				Energy Impact & Financial Analysis						
Location	**Cooler/ Freezer Quantity**	**Case Type/Temperature**	**ECM #**	**Install EC Evaporator Fan Motors?**	**Install Electric Defrost Control?**	**Install Evaporator Fan Control?**	**Total Peak kW Savings**	**Total Annual kWh Savings**	**Total Annual MMBtu Savings**	**Total Annual Energy Cost Savings**	**Total Installation Cost**	**Total Incentives**	**Simple Payback w/ Incentives in Years**
Kitchen	1	Cooler (35F to 55F)	NR	Yes	No	No	0.0	197	0	$31	$607	$0	19.3
Kitchen	1	Low Temp Freezer (-35F to -5F)	NR	Yes	No	No	0.0	197	0	$31	$607	$0	19.3

Commercial Refrigerator/Freezer Inventory & Recommendations

	Existing Conditions			Proposed Conditions		Energy Impact & Financial Analysis						
Location	Quantity	Refrigerator/ Freezer Type	ENERGY STAR Qualified?	ECM #	Install ENERGY STAR Equipment?	Total Peak kW Savings	Total Annual kWh Savings	Total Annual MMBtu Savings	Total Annual Energy Cost Savings	Total Installation Cost	Total Incentives	Simple Payback w/ Incentives in Years
Kitchen	1	Freezer Chest	Yes		No	0.0	0	0	$0	$0	$0	0.0
Kitchen	4	Stand-Up Refrigerator, Solid Door (16 - 30 cu. ft.)	Yes		No	0.0	0	0	$0	$0	$0	0.0
Kitchen	1	Stand-Up Refrigerator, Glass Door (≤15 cu. ft.)	No	NR	Yes	0.1	722	0	$115	$1,583	$75	13.1
Kitchen	1	Refrigerator Chest	No	NR	Yes	0.1	1,015	0	$162	$1,759	$0	10.9

Cooking Equipment Inventory & Recommendations

	Existing Conditions			Proposed Conditions		Energy Impact & Financial Analysis						
Location	Quantity	Equipment Type	High Efficiency Equipement?	ECM #	Install High Efficiency Equipment?	Total Peak kW Savings	Total Annual kWh Savings	Total Annual MMBtu Savings	Total Annual Energy Cost Savings	Total Installation Cost	Total Incentives	Simple Payback w/ Incentives in Years
Kitchen	1	Gas Steamer	Yes		No	0.0	0	0	$0	$0	$0	0.0
Kitchen	1	Gas Combination Oven/Steam Cooker (<15 Pans)	Yes		No	0.0	0	0	$0	$0	$0	0.0
Kitchen	1	Electric Combination Oven/Steam Cooker (15 - 28 Pans)	Yes		No	0.0	0	0	$0	$0	$0	0.0
Kitchen	1	Electric Convection Oven (Full Size)	Yes		No	0.0	0	0	$0	$0	$0	0.0
Kitchen	1	Insulated Food Holding Cabinet (Full Size)	Yes		No	0.0	0	0	$0	$0	$0	0.0

Dishwasher Inventory & Recommendations

	Existing Conditions					Proposed Conditions		Energy Impact & Financial Analysis						
Location	**Quantity**	**Dishwasher Type**	**Water Heater Fuel Type**	**Booster Heater Fuel Type**	**ENERGY STAR Qualified?**	**ECM #**	**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**	**Payback w/ Incentives in Years**
Kitchen	1	Single Tank Conveyor (High Temp)	Electric	N/A	Yes		No	0.0	0	0	$0	$0	$0	0.0

Plug Load Inventory

Location	Existing Conditions			
	Quantity	Equipment Description	Energy Rate (W)	ENERGY STAR Qualified?
Classrooms & staffrooms	82	Computers	120.0	No
Classrooms	25	Small Printer	55.0	Yes
Kitchen & staffrooms	7	Microwave	800.0	No
Lobby	12	Tv	240.0	No
Staffrooms	2	Portable Heater	650.0	No
Staffrooms	4	Paper Shredder	46.0	No
Copy room	6	Large Printer	600.0	Yes
Kitchen	3	Coffee Maker	1,500.0	No
Kitchen	2	Big Refrigerator	255.0	Yes
Kitchen	4	Small Refrigerator	120.0	No
Staffrooms	1	Table Fan	55.0	No
Classrooms	20	Projectors	120.0	Yes
Kitchen	1	Heated Counter	4,800.0	No
Kitchen	1	Heated Counter	2,400.0	No
Kitchen	1	Heated Counter	2,400.0	No
Classroom	1	Clay heater	16,620.0	No

Vending Machine Inventory & Recommendations

	Existing Conditions		Proposed Conditions		Energy Impact & Financial Analysis						
Location	Quantity	Vending Machine Type	ECM #	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
Break Room	1	Non-Refrigerated	N/A	No	0.0	0	0	$0	$0	$0	0.0
Break Room	1	Refrigerated	7	Yes	0.2	1,612	0	$257	$230	$0	0.9

APPENDIX B: ENERGY STAR® STATEMENT OF ENERGY PERFORMANCE

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.

LEARN MORE AT energystar.gov

ENERGY STAR® Statement of Energy Performance

80

ENERGY STAR® Score[1]

Governor Charles C. Stratton School

Primary Property Type: K-12 School
Gross Floor Area (ft²): 90,274
Built: 2002

For Year Ending: January 31, 2018
Date Generated: October 22, 2018

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
Governor Charles C. Stratton School 15 Fredrick Blvd. Woolwich Twp., New Jersey 08085	SWEDESBORO-WOOLWICH BOARD OF EDUCATION 15 Fredrick Boulevard Woolwich Twp, NJ 08085 (____)____-______	Christopher DeStratis 15 Fredrick Boulevard Woolwich Twp, NJ 08085 856-241-1552 x 1008 cdestratis@swsdk6.com

Property ID: 6571003

Energy Consumption and Energy Use Intensity (EUI)

Site EUI
34.4 kBtu/ft²

Source EUI
77.4 kBtu/ft²

Annual Energy by Fuel

Electric - Grid (kBtu)	2,127,402 (68%)
Natural Gas (kBtu)	979,799 (32%)

National Median Comparison	
National Median Site EUI (kBtu/ft²)	48
National Median Source EUI (kBtu/ft²)	107.8
% Diff from National Median Source EUI	-28%
Annual Emissions	
Greenhouse Gas Emissions (Metric Tons CO2e/year)	268

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

____ ________
,
(____)____-______
____

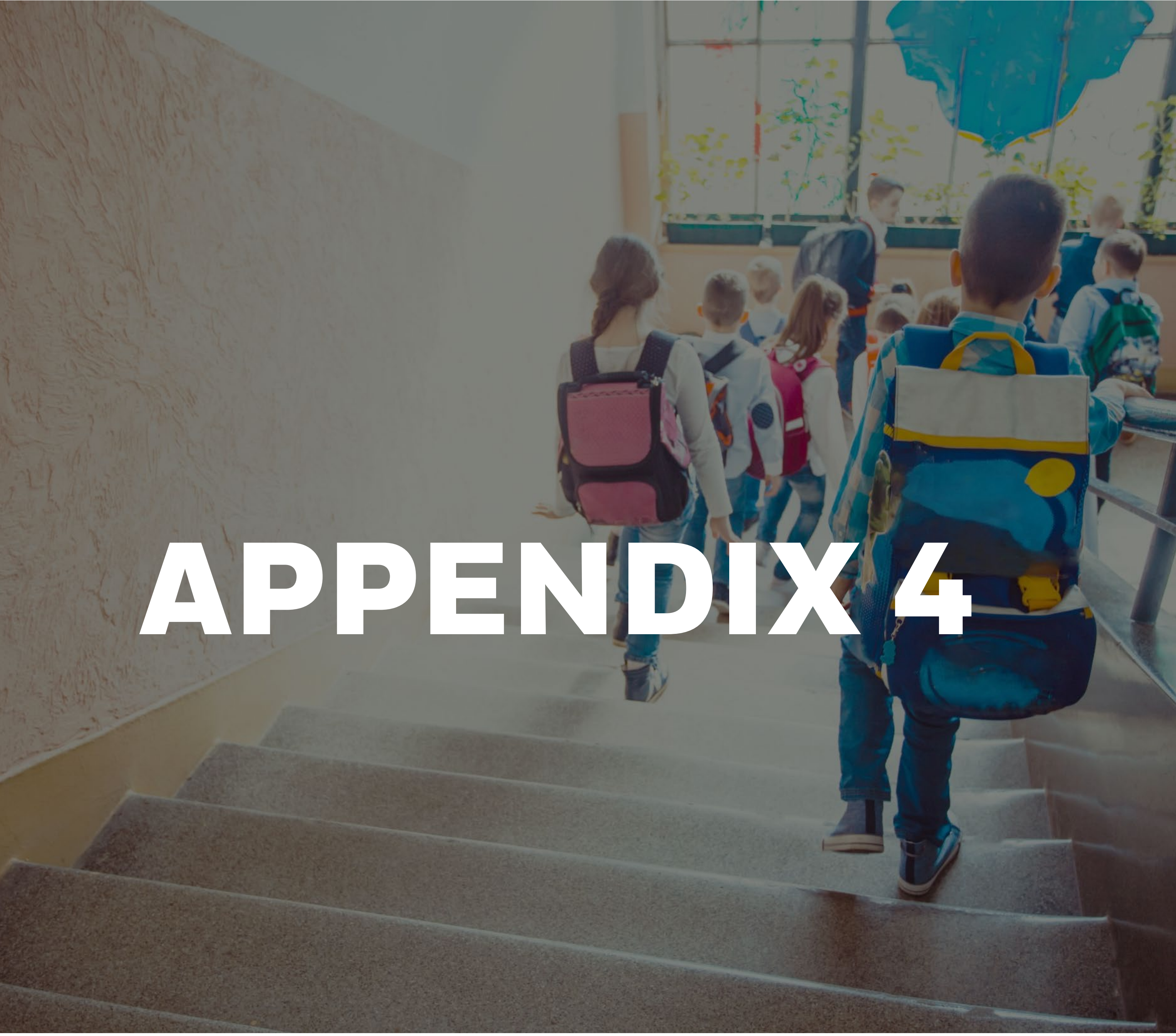
Professional Engineer Stamp
(if applicable)

Appendix C: Glossary

TERM	DEFINITION
Blended Rate	Used to calculate financial savings. The blended rate is calculated by dividing the amount of your bill by the total energy use. For example, if your bill is $22,217.22, and you used 266,400 kilowatt-hours, your blended rate is 8.3 cents per kilowatt-hour.
BTU	A British thermal unit is the amount of heat required to increase the temperature of one pound water by one-degree Fahrenheit. Commonly used to measure natural gas consumption.
Demand Response	Demand response reduces or shifts electricity usage at or among participating buildings/sites during peak energy use periods in response to time-based rates or other forms of financial incentives.
Energy Efficiency	Reducing the amount of energy necessary to provide comfort and service to a building/area. Achieved through the installation of new equipment and/or optimizing energy management systems.
Generation	The process of generating electric power from sources of primary energy (e.g., natural gas, the sun, oil).
HVAC	Heating, ventilation, and air conditioning.
kW	Kilowatt. Equal to 1,000 Watts.
Load	The total amount of power used by a building system at any given time.
Measure	A single activity, or installation of a single type of equipment, that is implemented in a building system to reduce total energy consumption.
MMBtu	One million British thermal units.
psig	Pounds per square inch.
Plug Load	Refers to the amount of energy used in a space by products that are powered by means of an ordinary AC plug.
Simple Payback	The amount of time needed to recoup the funds expended in an investment, or to reach the break-even point.
Temperature Setpoint	The temperature at which a temperature regulating device (thermostat, for example) has been set.
Turnkey	Provision of a complete product or service that is ready for immediate use
Watt (W)	Unit of power commonly used to measure electricity use.

APPENDIX 2

APPENDIX 3



APPENDIX 4

Thank you and We look forward to working with you in the future.