SPARTA TOWNSHIP SCHOOL DISTRICT

DISTRICT-WIDE ENERGY SAVINGS PLAN

May 6, 2021

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DISTRICT-WIDE ENERGY SAVINGS PLAN

PREPARED FOR:

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Notwithstanding anything to the contrary, in light of the COVID-19 pandemic, the effects of which cannot be foreseen, the parties agree that Honeywell shall be entitled to an equitable extension of time to deliver or perform its work and appropriate additional compensation to the extent Honeywell's delivery or performance, or the delivery or performance of its suppliers and/or subcontractors, is in any way delayed, hindered or otherwise affected by the COVID-19 pandemic.

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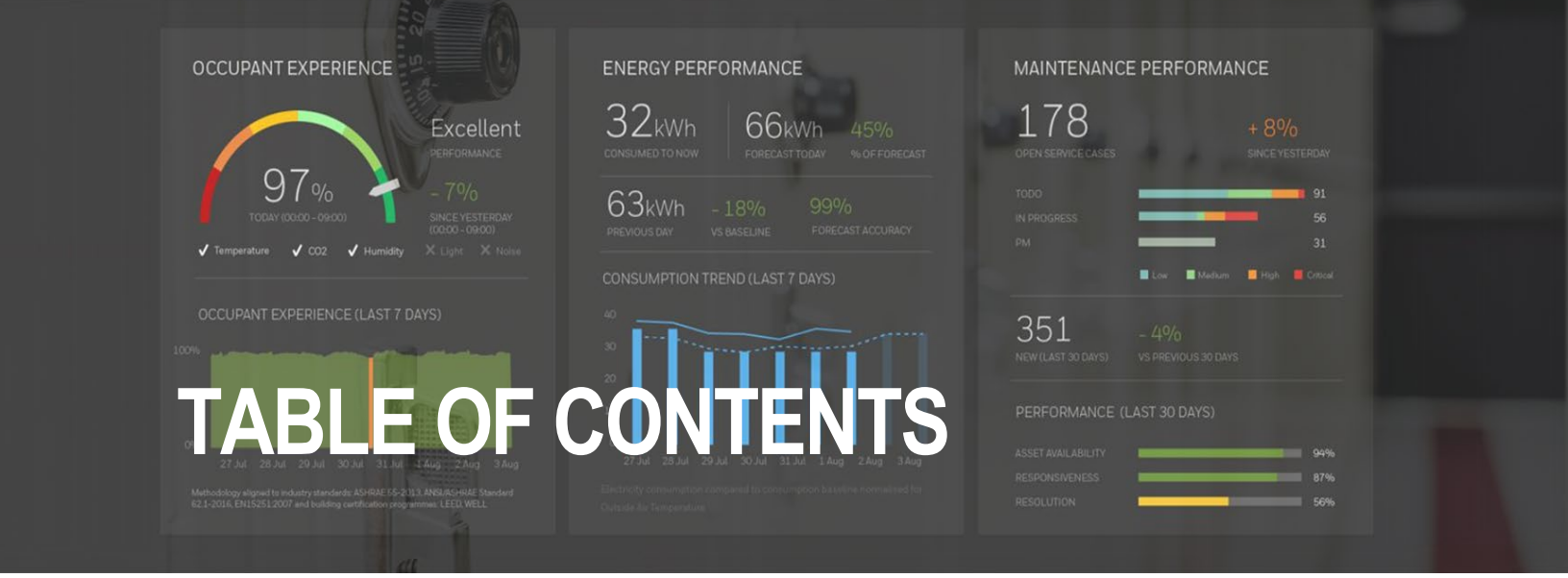

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SECTION A
EXECUTIVE SUMMARY

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SECTION A — EXECUTIVE SUMMARY

Thank you for selecting Honeywell to develop an Energy Savings Plan for the Sparta School District (District) with consideration for future DIY implementation by the District.

During the development of the Energy Savings Plan, Honeywell has completed a thorough investment grade energy audit of the Sparta School District buildings and grounds. Based on the audit findings and Honeywell's extensive experience in working with school districts, we can confidently state this plan can identify a project that is financially viable in a comprehensive manner to address Sparta School District's facility concerns and goals.

This 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:

- 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

The purpose of this document is to provide all the information required for the Sparta School District to determine the best path forward in the implementation of a District-Wide NJ ESIP Project. It is important to note that the Energy Savings Plan provides a comprehensive evaluation of ALL potential ECMs within the Sparta 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.

This 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 Sparta 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.

C. The report also compares the Sparta School District's utility consumption to that of other districts in the same region on a per square foot basis.

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D. **Energy Conservation Measures –** This section includes a detailed description of the ECMs we have selected and identified for your School District. 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 Sparta School District are identified for the purposes of potential inclusion in the program. Final selected ECMs are to be determined solely by the Sparta School District and the financial goals outlined within the ESIP program to be self funding within existing budget guidelines.

E. **Technical and Financial Summary –** This section includes an accounting of all technical and financial outcomes associated with the ECMs as presented. The 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-year term of the agreement.

F. **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.

Appendices 1-3 – The following files have been uploaded to the USB drive included with our submission:

Appendix 1 — ECM CALCULATIONS.pdf

Appendix 2— EQUIPMENT CUTSHEETS.pdf

Appendix 3— LIGHTING DETAILS

Benefits

The measures investigated in this Energy Savings Plan could result in an annual utility savings of 4,009,178 kWh of electricity. Additionally, these energy savings will result in a net reduction of greenhouse gases and will reduce the school district's carbon footprint by 1,579 MTE of CO2 annually. This is equivalent to removing 333 cars from the road annually and /or 1,495 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.

Overall, it is evident that the Sparta 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 appreciate the opportunity to provide the Sparta School District with this guideline to improve the comfort and efficiency of your facilities through the successful implementation of this Energy Savings Plan should the district decide to move forward with a project.

Sincerely,

Joseph Coscia - Senior Business Consultant

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SECTION B — PRELIMINARY UTILITY ANALYSIS

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Honeywell

Preliminary Utility Analysis

Sparta Township Public Schools
Sparta, NJ

Helping customers manage energy resources to improve financial performance

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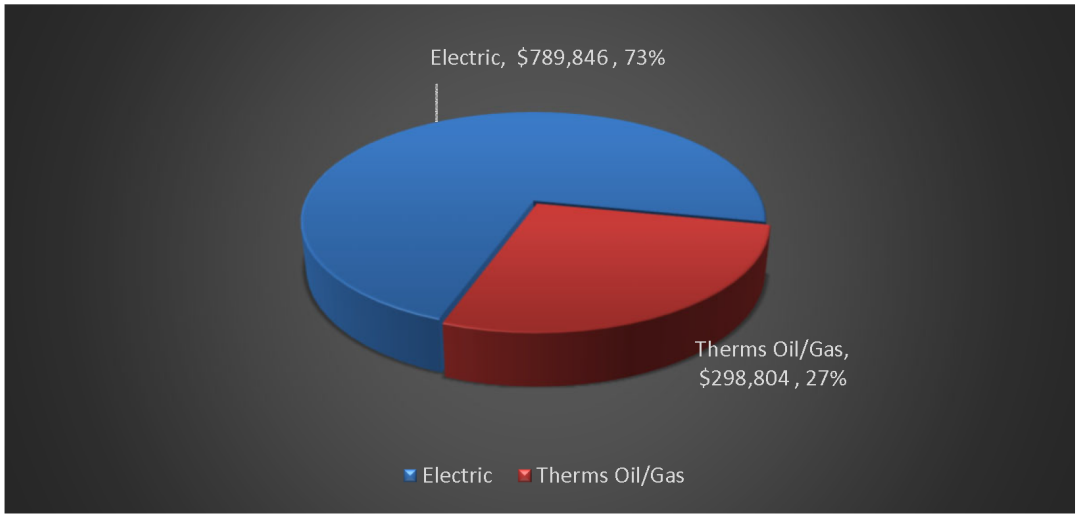
Historical Summary

Utility Analysis Period:
April 2018 - March 2019

	Electric	Therms Oil/Gas
Utility Costs*	$789,846	$298,804
Utility Usage (kWh, Therms)	5,877,498	225,342
$ Cost/Unit (kWh, Therms)	$0.13438	$1.326
Annual Electric Demand (kW)	20,536	

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

Actual Cost by Utility
April 2018 - March 2019



Total Cost
$1,088,650

Energy Benchmarking

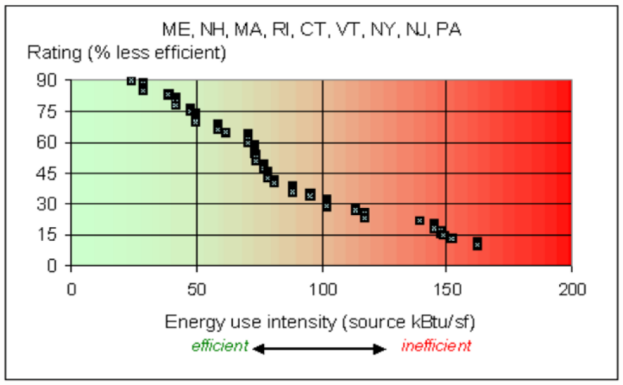
The calculation of EUI (Energy Use Intensity) is shown below. EUI, expressed in kBtu/sf, is normalized for floor area, the most dominant influence on energy use in most buildings. Its use usually provides a good approximation of how your building's energy performance compares to others. Site EUI indicates 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.)

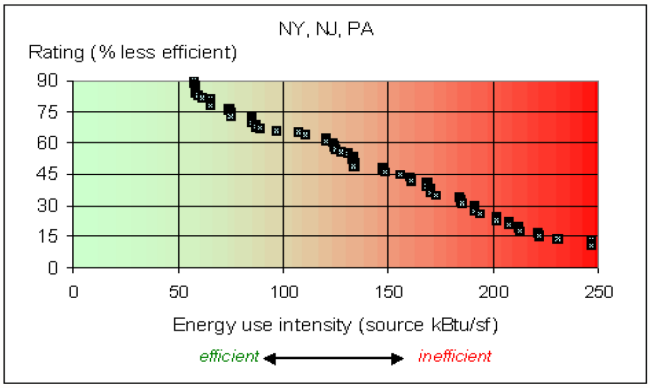
Source EUI Rating for your Building	Energy use and cost reduction potential (%)	Walk-thru energy assessment recommended?
above 60%	below 25%	No
40 to 60%	20 to 35%	Maybe
20 to 40%	35 to 50%	Yes
Below 20%	above 50%	Definitely

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	Sparta High School	3,166,340	86,407	255,000	**76**	**162**	**25%**
2	Sparta Middle School	1,183,314	71,172	132,500	**84**	**146**	**20%**
3	Mohawk Avenue School	243,437	23,766	47,300	**68**	**103**	**22%**
4	Alpine Elementary School	668,280	23,675	63,240	**73**	**147**	**50%**
5	Helen Morgan School	616,127	20,322	60,515	**68**	**139**	**45%**
		5,877,498					

School Facilities



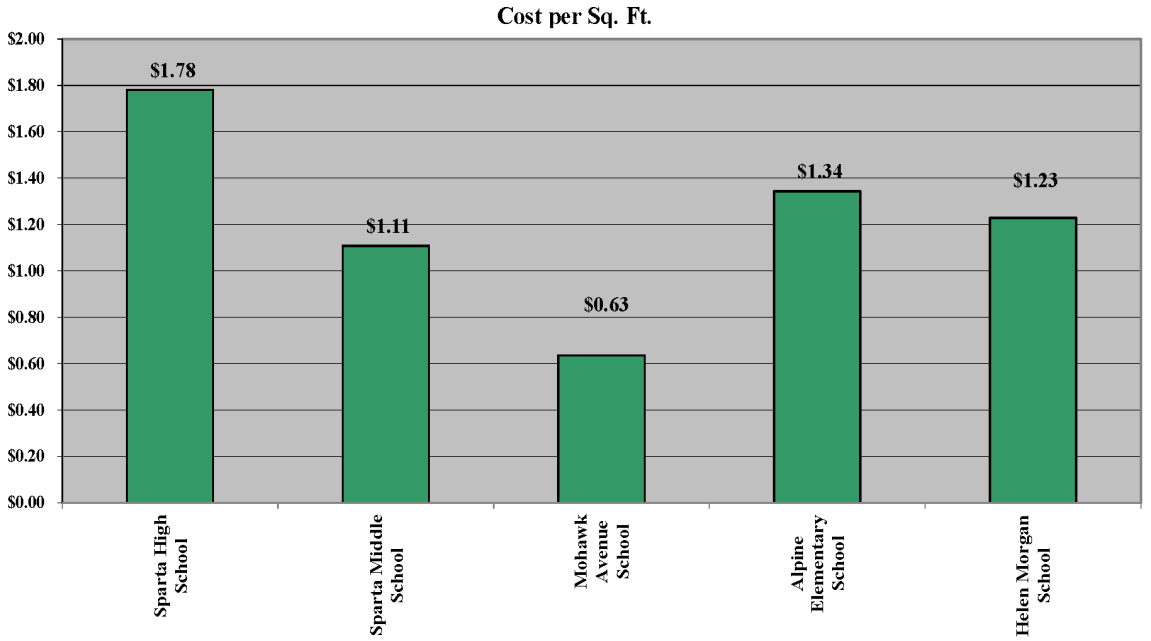
Offices

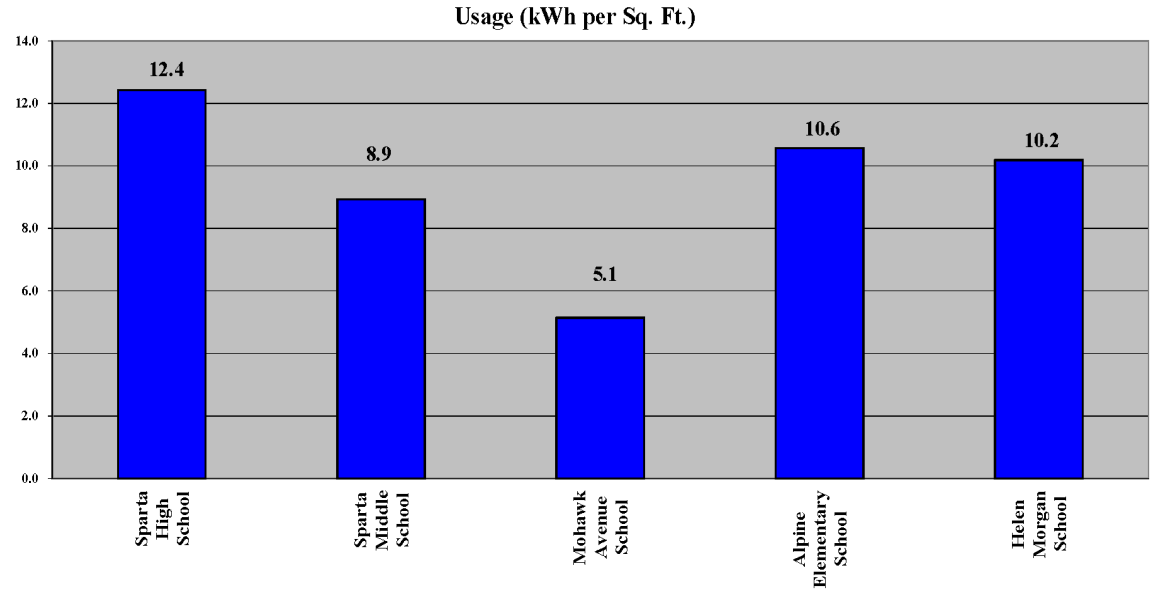


Utility Analysis

Electric

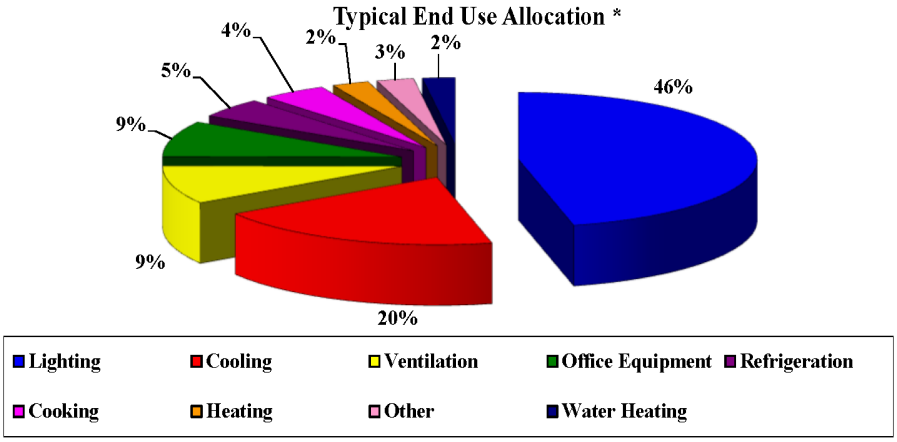
Square Footage Analysis





Utility Analysis - Electric

Sources of Electric Consumption

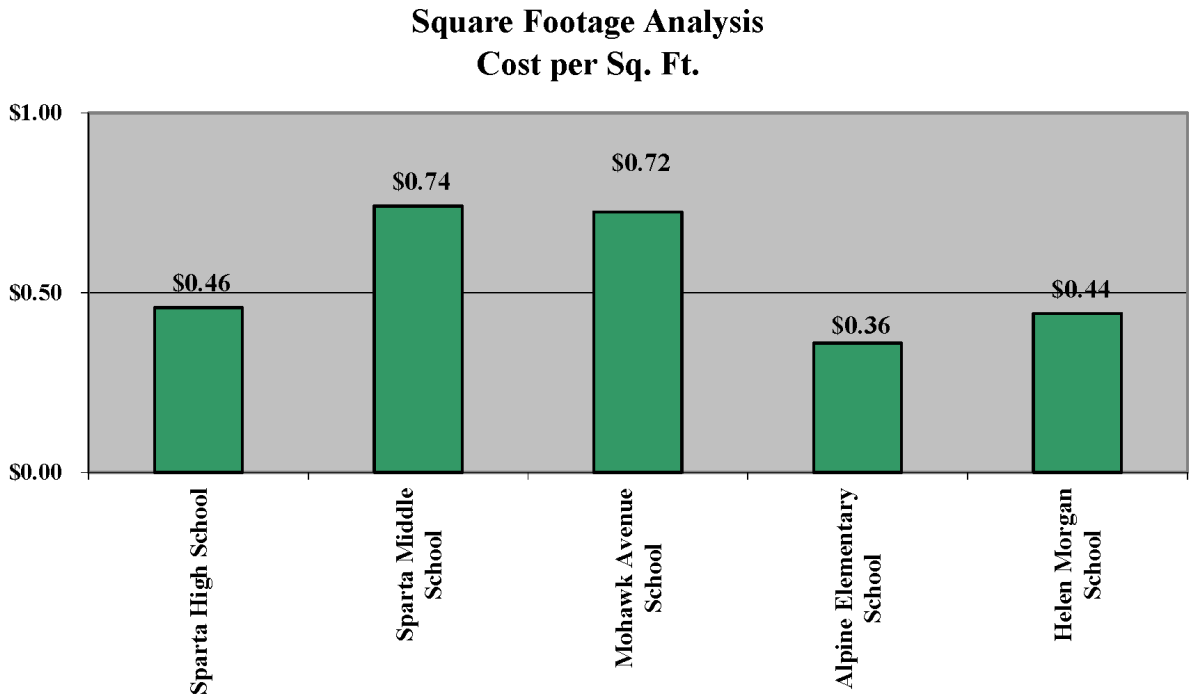


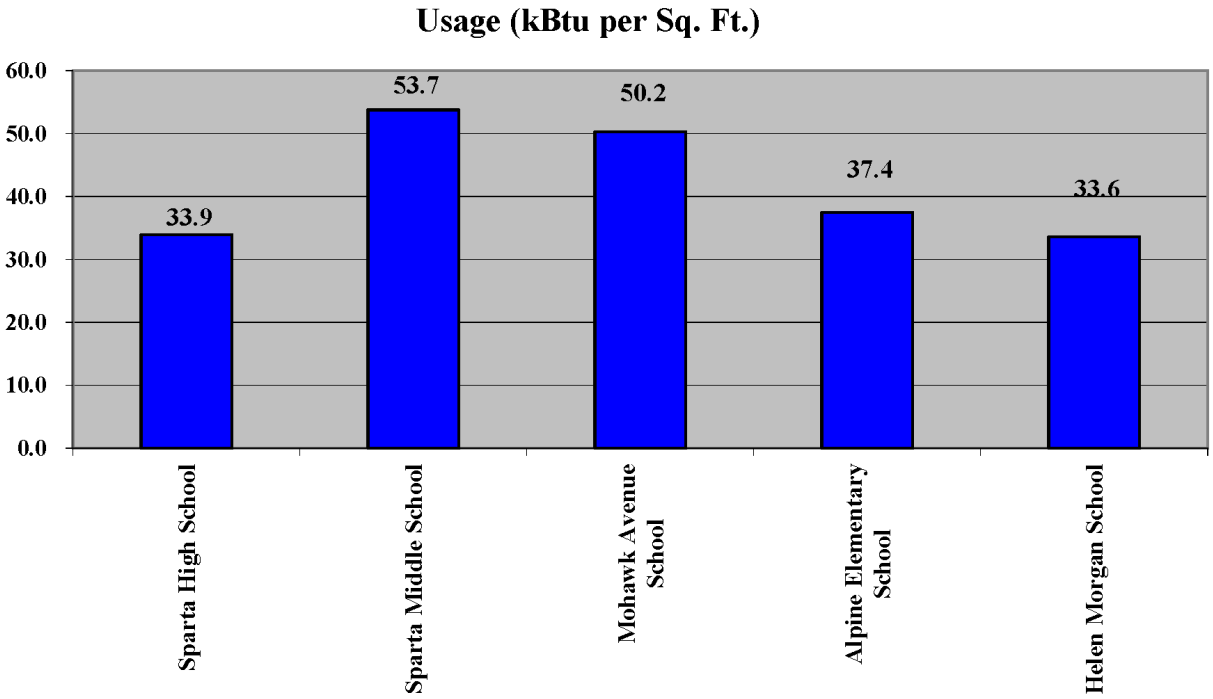
**This allocation is generic and is not a representation of the actual end use in your buildings included in this report.

Typical Allocation Applied to Your Electric Cost**

Lighting	$365,699
Cooling	$154,810
Ventilation	$72,666
Office Equipment	$67,927
Refrigeration	$37,123
Cooking	$34,753
Heating	$19,746
Other	$19,746
Water Heating	$17,377
Your Total Cost April 2018 - March 2019	**$789,846**

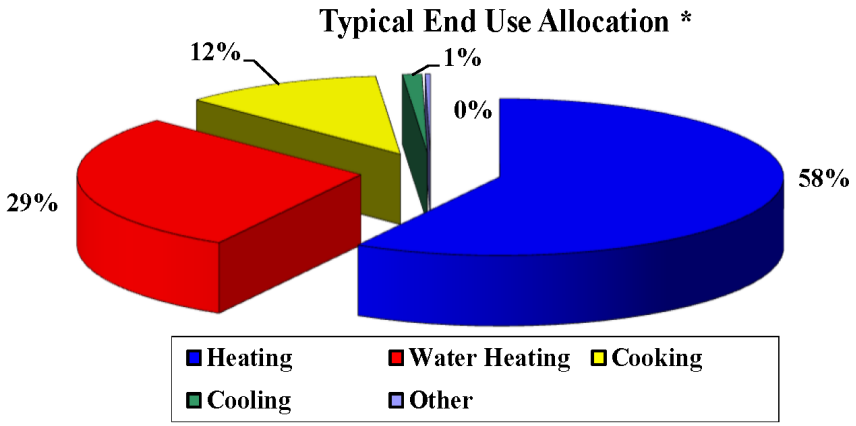
Utility Analysis
Therms Oil/Gas





Utility Analysis
Therms Oil/Gas

Sources of Usage
Therms Oil/Gas



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

Typical Allocation Applied to Your Cost**
Therms Oil/Gas

Heating	$174,203
Water Heating	$86,354
Cooking	$34,064
Cooling	$3,287
Other	$896
Your Total Cost April 2018 - March 2019	**$298,804**

Annual Emissions & Environmental Impact

Sparta Township Public Schools

April 2018 - March 2019

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	5,877,498	kWh
Annual Natural Gas usage	225,342	Therms

Electric Emissions	
0.00070742	$MTeCO_2$ per kWh saved
Oil/Gas	
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)	4,158	MT
eCO2 (Gas)	1,193	MT
Total eCO2	5,350.747	MT

This is equivalent to one of the following:	
1149	No. of passenger vehicles - annual greenhouse gas emissions
6990	No. of acres of U.S. forests - carbon sequestered annually

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SECTION C
ENERGY CONSERVATION MEASURES

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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 listed below. 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.

- ✓ Sparta High School
- ✓ Sparta Middle School
- ✓ Alpine Elementary School
- ✓ Helen Morgan School
- ✓ Mohawk Avenue School

Honeywell has done a review of the ECMs which would provide energy and cost savings for the Sparta Township Public Schools. 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 in the table below have been reviewed throughout your facilities for consideration within a complete ESP. What follows is a general description of the energy auditing process and the detailed descriptions of the ECMs for your facilities listed below.

ECM Description	Sparta High School	Sparta Middle School	Alpine Elementary School	Helen Morgan School	Mohawk Avenue School
1A LED Lighting	■	■	■	■	■
1B Vending Misers	■	■	■		
1C De-Stratification Fans w/ UV	■	■	■	■	■
2A Boiler Replacements	■	■		■	■
2B DHW Replacements	■	■			■
2C Rooftop Unit Replacement	■	■			
2D Split System Replacement					■
2E Kitchen Equipment	■	■	■	■	■
2F Premium Efficiency Motors and VFDs	■				
2G Chiller Replacements		■			
2H Unit Ventilator Upgrades					■
2I Addition of Cooling					■
2J Steam Traps					■
3A Building Controls	■	■			■
4A Building Envelope Improvements	■	■	■	■	■
4B Window Replacements					■
4C Roof Replacements	■	■			
5A Transformer Replacements	■	■			■

ECM Description	Sparta High School	Sparta Middle School	Alpine Elementary School	Helen Morgan School	Mohawk Avenue School
6A Cogeneration CHP	■				
7A Solar PPA	■	■			■
8A Energy Sourcing/Virtual PPA		■			
9A Pay for Performance	■	■			

Overview

Honeywell has closely evaluated and audited the Sparta Township School District to develop the optimum mix of energy saving measures. These site-specific measures have been selected and developed using the following process:

- Review Site Audits
- Engineering Team Site Visits
- Develop Measures
- Review Measures with Team

Reject and Accept Measures Based On

- Alignment with Critical Success Factors (CSF)
- Value to the School
- Economic Financial Payback
- Equipment Service Life
- Effect on Current Space Conditions

In developing the proposed measures, the following considerations were critical:

- Reduction of space heating and cooling loads by performing a systems review, with complete consideration of current indoor environmental quality standards.
- Review and redesign lighting systems noting reductions in the internal heat gain in the affected spaces.
- Load reduction measures always precede optimization measures.

Bin weather data was used from a 15-year average reported from Newark, NJ. Ventilation rates, taken from ASHRAE published standard, were predicted by using the building's population multiplied by cfm/person during occupied hours.

Reasonable infiltration rates were assumed based on the building's fenestration conditions and expected values for typical buildings. A reduced infiltration rate was assumed for the unoccupied hours. Envelope heat loss calculations assumed a reasonable heat transmission rate (U value) based on the construction of the buildings. Wall area and glass area were estimated by supplied drawings and field photographs.

Current efficiencies were derived from assumed and later to be measured boiler efficiencies, and assumed system losses due to thermal losses, distribution losses and loose operational control. The current assumed boiler system efficiencies were then applied to the calculated load and calibrated to last year's actual fuel consumption.

Demand Sensitive Operation

Review existing and proposed thermal loads. For example, the review process will facilitate the application of:

- Optimized flow rates (steam, water, and air).
- Optimized operation of equipment, matching current occupancy use profiles, and considering both outside and indoor space temperatures.

Benefits of Mechanical Improvements

Listed below are some of the benefits that the Sparta Township School District would reap from the mechanical portion of the measures:

- Avoid costly repairs and replace equipment that would have to be replaced in the next five years.
- Improved compliance with ASHRAE Ventilation Standards.
- Ability to trend ventilation rates; thus, ensuring compliance through documentation.
- Operating a more weather sensitive facility.
- Allowing for a greater capability of central monitoring and troubleshooting via remote.
- Greater operating flexibility to reduce costs and optimize staff efficiency.

Indoor Air Quality

The American Council of Governmental Industrial Hygienists (ACGIH) in their booklet “Threshold Limit Values,” has published air quality standards for the industrial environment. No such standards currently exist for the residential, commercial, and institutional environments, although the ACGIH standards are typically and perhaps inappropriately used. The EPA has been working to develop residential and commercial standards for quite some time.

Recent studies indicate that for even the healthiest students, indoor air pollution can reduce the ability to learn. As an example, if you were to place several students in a room where it is hot, there is little or no air circulation, and other children are coughing and sneezing, exposing the student body to airborne related illnesses such as the cold or flu. Honeywell has addressed this issue by focusing on the proper operation and replacement of the unit ventilators and air handler equipment which will assure IAQ standards are met.

ECM 1A LED LIGHTING

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 table below highlights facilities for consideration within the ESP for this ECM.

ECM Description	Sparta High School	Sparta Middle School	Alpine Elementary School	Helen Morgan School	Mohawk Avenue School
1A LED Lighting/Direct Install	■	■	■	■	■

Existing Conditions

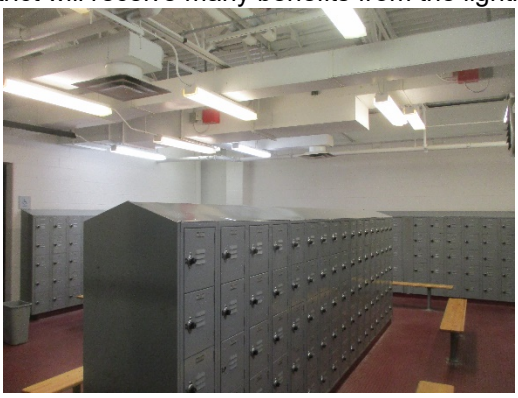
Indoor lighting predominantly consists of T-8 lamps, with a small quantity of T-12 and compact fluorescent lamps (CFLs) along with incandescent bulbs. In general, lighting is operated on switches.

Scope of Work

School	LED Lighting
Sparta High School	■
Sparta Middle School	■
Mohawk Avenue School	■
Alpine Elementary School	■
Helen Morgan School	■

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 T-8 and T-12 fixtures with high efficiency Light Emitting Diode (LED) lamps.

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



Existing Lighting at Sparta MS

Existing Lighting at Mohawk ES

Direct Install

Direct Install, offered through the Clean Energy Office of the NJ Board of Public Utilities (BPU), is another turnkey solution that makes it easy and affordable to upgrade to high efficiency equipment. The program pays up to 80% of retrofit costs, dramatically improving your payback on the project for eligible facilities.

Honeywell has not identified any schools which are eligible for the Direct Install program and are part of the LED Lighting Solution, but could be discovered in the future.

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.

Existing Outdoor Lighting at Sparta MS

Existing Wall Lighting at Sparta MS

Scope of Work

Outdoor Lighting

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 VENDING MISERS

The key benefits of this ECM include:

Energy savings by better managing the power consumption of electrical equipment.

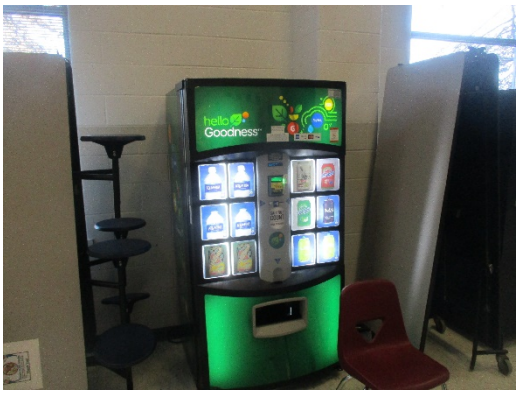
Longer equipment life thanks to reduced usage.

The table below highlights facilities for consideration within the ESP for this ECM.

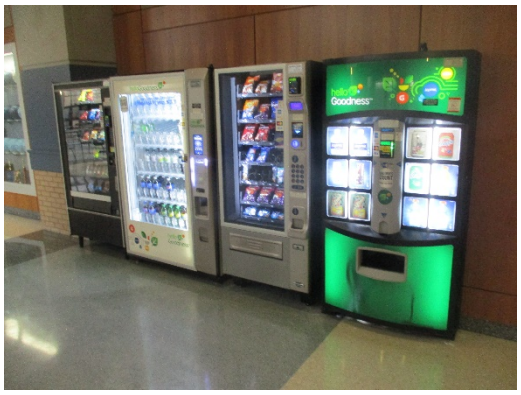
ECM Description	Sparta High School	Sparta Middle School	Alpine Elementary School	Helen Morgan School	Mohawk Avenue School
1B Vending Misers	■	■	■		

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 to the occupants. A typical cold drink machine consumes over 5,000 kWh annually.



Vending Machine – Sparta MS



Vending Machines – Sparta HS

Proposed Vending Machines for Vending Miser Controls:

School	Location	Type	Qty
Sparta High School	Cafeteria	Cold Beverage	1
Sparta High School	Cafeteria	Cold Beverage	1
Sparta High School	Cafeteria	Snack	1
Sparta High School	Cafeteria	Snack	1
Sparta High School	Faculty Dining	Cold Beverage	1
Sparta High School	Gym B	Cold Beverage	1
Sparta High School	Auxiliary Gym	Cold Beverage	1
Sparta Middle School	Cafetorium	Cold Beverage	1
Sparta Middle School	Cafetorium	Snack	1
Alpine Elementary School	Faculty Room	Cold Beverage	1

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.

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

Customer Support and Coordination with Utilities

Minor 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.
Waste Production	Proper disposal of any waste generated.
Environmental Regulations	No environmental impact is expected.

ECM 1C DE-STRATIFICATION FANS & 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.

The table below highlights facilities for consideration within the ESP for this ECM.

ECM Description	Sparta High School	Sparta Middle School	Alpine Elementary School	Helen Morgan School	Mohawk Avenue School
1C De-Stratification Fans & 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.

Sparta HS - Gym

Sparta MS - Gym

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.

Proposed De-Stratification Fans:

School	Location	Airius Model	Qty Puraire	Qty Airpear
Mohawk Avenue School	Gym	A-25-SP-STD-120-W-PHI	2	
Sparta High School	Auxiliary Gym	A-25-SP-STD-120-W		2
Sparta High School	Auxiliary Gym	A-25-SP-STD-120-W-PHI	4	
Sparta High School	Main Gym	A-25-SP-STD-120-W		5
Sparta High School	Main Gym	A-25-SP-STD-120-W-PHI	7	
Sparta High School	Cardio Room	S-10-SP-SH-120-W		3
Sparta High School	Cardio Room	S-10-SP-SH-120-W-PHI	3	
Sparta High School	Weight Room	S-10-SP-SH-120-W-PHI	2	
Sparta Middle School	Multi-Purpose Room	S-15-SP-STD-120-W		4
Sparta Middle School	Multi-Purpose Room	S-15-SP-STD-120-W-PHI	2	
Sparta Middle School	Gym	A-15-SP-STD-120-W		8
Sparta Middle School	Gym	A-15-SP-STD-120-W-PHI	4	
Alpine Elementary School	Multi-Purpose Room	A-25-SP-STD-120-W		2
Alpine Elementary School	Multi-Purpose Room	A-25-SP-STD-120-W-PHI	2	
Helen Morgan School	Multi-Purpose Room	A-25-SP-STD-120-W-PHI	2	

School	Location	Airius Model	Qty Puraire	Qty Airpear
Helen Morgan School	Annex Gym	S-15-SP-STD-120-W		2
Helen Morgan School	Annex Gym	S-15-SP-STD-120-W-PHI	1	
		Total	29	26

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. 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 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 2A BOILER/FURNACE REPLACEMENTS

The key benefits of this ECM include:

Reduced energy usage from improved boiler efficiency resulting from replacement of older equipment.

Lower operational costs through less frequent maintenance and operational issues.

The table below highlights facilities for consideration within the ESP for this ECM.

ECM Description	Sparta High School	Sparta Middle School	Alpine Elementary School	Helen Morgan School	Mohawk Avenue School
2A Boiler/Furnace Replacements	■	■		■	■

Existing Conditions

Some boilers within the Sparta Township 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 or High Efficiency Steam Boilers.

Boilers to Replace – Mohawk ES

Boilers to Replace – Sparta HS

Existing Boilers/Furnaces:

Building	Location	Type	Manufacturer	Model	Output (MBH)	Fuel	Qty
Sparta High School	Inside MR	Hot Water	Smith	28HE-14	3,567	Fuel Oil #2	2
Sparta High School	Outside MR	Hot Water	Smith	28A-14	2,766	Fuel Oil #2	2
Sparta High School	200 Wing	Hot Water	Weil McLain	P-588-W	1,084	Fuel Oil #2	2
Sparta Middle School	Boiler Room	Hot Water	Weil McLain	P-1788-W	4,370.0	Fuel Oil #2	2
Mohawk Avenue School	Boiler Room	Steam	Smith	28A-10	2,427.0	Fuel Oil #2	1
Helen Morgan School	Rooms 3-4	Forced Air	Armstrong Air	LHF80B112/125D20R-5A	120.0	Fuel Oil #2	1
Helen Morgan School	Rooms 5-6	Forced Air	Armstrong Air	LHF80B112/125D20R-5A	120.0	Fuel Oil #2	1
Helen Morgan School	Rooms 9-10	Forced Air	Armstrong Air	LHF80B112/125D20R-5A	120.0	Fuel Oil #2	1
Helen Morgan School	Rooms 11-12	Forced Air	Armstrong Air	LHF80B112/125D20R-4A	120.0	Fuel Oil #2	1

Helen Morgan School	Rooms 13-14	Forced Air	Armstrong Air	LHF80B112/125D20R-4D	120.0	Fuel Oil #2	1
Helen Morgan School	Rooms 7-8	Forced Air	Armstrong Air	LHF80B112/125D20R-4A	120.0	Fuel Oil #2	1
Helen Morgan School	Media Center	Forced Air	Armstrong Air	LHF80B112/125D20-3A	125.0	Fuel Oil #2	1
Helen Morgan School	Rooms 25-26	Forced Air	Armstrong Air	LHF80C112/125D20-1A	125.0	Fuel Oil #2	1
Helen Morgan School	Rooms 15-16	Forced Air	Armstrong Air	LHF80B112/125D20R-4A	120.0	Fuel Oil #2	1
Helen Morgan School	Rooms 17-18	Forced Air	Armstrong Air	LHF80B112/125D20R-4A	120.0	Fuel Oil #2	1
Helen Morgan School	Rooms 19-20	Forced Air	Armstrong Air	LHF80B112/125D20R-4A	120.0	Fuel Oil #2	1
Helen Morgan School	Rooms 21-22	Forced Air	Armstrong Air	LHF80B112/125D20-3A	125.0	Fuel Oil #2	1
Helen Morgan School	Rooms 23-24	Forced Air	Armstrong Air	LHF80B112/125D20R-4A	120.0	Fuel Oil #2	1

Proposed Solution

It is recommended that the boilers listed in the table above be replaced with boilers operating at higher efficiency listed 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. Compared to the existing boilers in these schools, the new boilers will provide an increase in boiler efficiency of anywhere between 10% to 15%. Boilers which cannot be converted from steam will be replaced with new steam boilers, which will still operate at to 10% more efficient than the existing boilers.

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

Proposed Boiler/Furnace Equipment:

Building	Location	Type	Manufacturer	Model	Output (MBH)	Fuel	Qty
Sparta High School	Inside MR	Hot Water	Aerco	BMK-4000	4,000	Natural Gas	2
Sparta High School	Outside MR	Hot Water	Smith	28HE-14	3,567	Natural Gas	2
Sparta High School	200 Wing	Hot Water	Aerco	BMK-750	750	Natural Gas	3
Sparta Middle School	Boiler Room	Hot Water	Aerco	BMK-3000	3,000	Natural Gas	3
Mohawk Avenue School	Boiler Room	Steam	Burnham	V1116H	2,477	Natural Gas	1
Helen Morgan School	Rooms 3-4	Forced Air	Armstrong Air	A962V	120	Natural Gas	1
Helen Morgan School	Rooms 5-6	Forced Air	Armstrong Air	A962V	120	Natural Gas	1
Helen Morgan School	Rooms 9-10	Forced Air	Armstrong Air	A962V	120	Natural Gas	1
Helen Morgan School	Rooms 11-12	Forced Air	Armstrong Air	A962V	120	Natural Gas	1
Helen Morgan School	Rooms 13-14	Forced Air	Armstrong Air	A962V	120	Natural Gas	1
Helen Morgan School	Rooms 7-8	Forced Air	Armstrong Air	A962V	120	Natural Gas	1
Helen Morgan School	Media Center	Forced Air	Armstrong Air	A962V	125	Natural Gas	1
Helen Morgan School	Rooms 25-26	Forced Air	Armstrong Air	A962V	125	Natural Gas	1
Helen Morgan School	Rooms 15-16	Forced Air	Armstrong Air	A962V	120	Natural Gas	1
Helen Morgan School	Rooms 17-18	Forced Air	Armstrong Air	A962V	120	Natural Gas	1
Helen Morgan School	Rooms 19-20	Forced Air	Armstrong Air	A962V	120	Natural Gas	1
Helen Morgan School	Rooms 21-22	Forced Air	Armstrong Air	A962V	125	Natural Gas	1
Helen Morgan School	Rooms 23-24	Forced Air	Armstrong Air	A962V	120	Natural Gas	1

*Additional boilers may be included as alternates.

Scope of Work

The following outlines the boiler replacement:

1. Disconnect gas back to shutoff valve and electric back to source panel-board.
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. 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 boilers will be installed in itemized locations; in addition, training for maintenance personnel will be required, as well as on-going, annual preventive maintenance. New gas piping will need to be run from the new gas service/meter to the equipment.

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 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 2B DOMESTIC HOT WATER 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.

The table below highlights facilities for consideration within the ESP for this ECM.

ECM Description	Sparta High School	Sparta Middle School	Alpine Elementary School	Helen Morgan School	Mohawk Avenue School
2B Domestic Water Heater Replacements	■	■			■

Existing Conditions

The existing Domestic Hot Water (DHW) heaters are generally in good condition but are not high-efficiency units.

Domestic Water Heater – Sparta MS

Domestic Water Heaters- Sparta HS

Existing Domestic Hot Water Heater Equipment:

Building	Manufacturer	Model	Output (MBH)	Storage (Gal)	Fuel	Qty
Sparta High School	PVI	270 P400A-E	190	400	Electric	3
Mohawk Avenue School	Bradford White	CF-70-3	108	68	Fuel Oil #2	1
Sparta Middle School	Bock	72E	159	68	Fuel Oil #2	1

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.

Proposed Domestic Hot Water Heater Equipment:

Building	Manufacturer	Model	Output (MBH)	Storage (Gal)	Fuel	Qty
Sparta High School	Bradford White	EF-120T-400-3N(A)	400	119	Natural Gas	3

Building	Manufacturer	Model	Output (MBH)	Storage (Gal)	Fuel	Qty
Mohawk Avenue School	Bradford White	EF-60T-199E-3N(A)	199	60	Natural Gas	1
Sparta Middle School	Bradford White	D-80T-199-3N	199	80	Natural Gas	1

*Additional units may be included as alternates.

Scope of Work

The following outlines the domestic hot water heater 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 Equipment Efficiency = Existing Boiler Efficiency + Existing Heat Exchanger Efficiency.

Proposed Equipment 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. 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

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.

Utility Interruptions

Proper phasing procedures will minimize gas interruptions.

Environmental Issues

Resource Use	Minor support will be required for the interruption of utilities for brief tie-in periods.
Waste Production	Existing equipment 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 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.

The table below highlights facilities for consideration within the ESP for this ECM.

ECM Description	Sparta High School	Sparta Middle School	Alpine Elementary School	Helen Morgan School	Mohawk Avenue School
2C Roof Top Unit Replacements	■	■			

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.

Roof Top Unit – Sparta HS

Roof Top Unit – Sparta MS

Existing Rooftops Units Recommended for Replacement:

Building	Location Served	Manufacturer	Model	Tons	Qty
Sparta High School	Guidance Offices	York	D3CE090A46JSC	7.5	1
Sparta High School	Special Services	York	D3CE090A46C	7.5	1
Sparta Middle School	Upper East Wing	Lennox	LCA120SN1G	10.0	1
Sparta Middle School	Media Center East	Lennox	LCA120SN1G	10.0	1
Sparta Middle School	Administration	Lennox	LCA180SN1G	15.0	1
Sparta Middle School	Media Center West	Lennox	LCA120SN1G	10.0	1
Sparta Middle School	Upper West Wing	Lennox	LCA120SN1G	10.0	1
Sparta Middle School	Kitchen	Lennox	LCA120SN1G	10.0	1
Sparta Middle School	Multipurpose Room	McQuay	RPS030CLW	30.0	1
Sparta Middle School	Cafetorium	McQuay	RPS030CLW	30.0	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.

Proposed Rooftop Units Recommended for Replacement:

Building	Location Served	Manufacturer	Model	Tons	Qty
Sparta High School	Guidance Offices	Lennox	LCH092H4M	7.5	1
Sparta High School	Special Services	Lennox	LCH092H4M	7.5	1
Sparta Middle School	Upper East Wing	Lennox	LCH120H4B	10.0	1
Sparta Middle School	Media Center East	Lennox	LCH120H4B	10.0	1
Sparta Middle School	Administration	Lennox	LCH180H4B	15.0	1
Sparta Middle School	Media Center West	Lennox	LCH120H4B	10.0	1
Sparta Middle School	Upper West Wing	Lennox	LCH120H4B	10.0	1
Sparta Middle School	Kitchen	Lennox	LCH120H4B	10.0	1
Sparta Middle School	Multipurpose Room	Daikin	RPS030	30.0	1
Sparta Middle School	Cafetorium	Daikin	RPS030	30.0	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 2D SPLIT SYSTEM REPLACEMENT

The key benefits of this ECM include:

Energy savings from increased equipment efficiency.

Equipment longevity due to more efficient and less wasteful equipment utilization.

Operational savings from less frequent need to repair or replace key HVAC equipment

The table below highlights facilities for consideration within the ESP for this ECM.

ECM Description	Sparta High School	Sparta Middle School	Alpine Elementary School	Helen Morgan School	Mohawk Avenue School
2D Split System Replacements					■

Existing Conditions

Honeywell identified some condensing units as being inefficient and 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.

Split Units – Mohawk ES

Split Units – Mohawk ES

Existing Split Systems to be Replaced:

Building	Area Served	Manufacturer	Model	Tons	Qty
Mohawk Avenue School	Transportation Office Area	Sanyo	C3622	3	1
Mohawk Avenue School	Nurse's Office Room 3	York	AC024M1021CG	2	1

Proposed Solution

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

Proposed Split Systems:

Building	Area Served	Manufacturer	Model	Tons	Qty
Mohawk Avenue School	Transportation Office Area	Trane	NTYSST36A/NTXWST36A	3	1
Mohawk Avenue School	Nurse's Office Room 3	Trane	4TTR3024H/GAF0A24S21SE	2	1

Scope of Work

The following outlines the scope of work to install the condensing units listed in the Proposed Split Systems table above.

Disconnect existing electric connections.
Disconnect piping from the unit.
Remove unit from the base.
Modify base for new unit if necessary.
Rig and set new unit at the base.
Inspect piping and air ducts before reconnecting them to the unit.
Reconnect piping and air ducts.
Repair duct and piping insulation.
Connect electric power.
Start up and commissioning of new unit.
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 split systems 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 condensing units scheduled for removal will be disposed of properly.
Environmental Regulations	No environmental impact is expected.

ECM 2E KITCHEN EQUIPMENT REPLACEMENTS

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.

The table below highlights facilities for consideration within the ESP for this ECM.

ECM Description	Sparta High School	Sparta Middle School	Alpine Elementary School	Helen Morgan School	Mohawk Avenue School
2E Kitchen Hood Controls	■	■	■	■	■

Existing Conditions

In several of the District's kitchens electric appliances are utilized to prepare student and staff meals during the school year.

Kitchen Equipment – Sparta MS

Kitchen Equipment – Sparta HS

Existing Kitchen Equipment to be replaced:

Building	Make	Model	Type	Replace Orifice	Fuel
Sparta High School	South Bend	E36DBBB	6 Burner Cook Top/Oven		Electric
Sparta High School	South Bend	SL-Series	Double Convection Oven		Electric
Sparta High School	South Bend	SL-Series	Double Convection Oven		Electric
Sparta High School	Cleveland	24CEA10	Double Steam Craft Ultra		Electric
Sparta High School	Cleveland	SEL40T1-	Tilting Skillet Braising Pan		Electric
Sparta High School	Wells	F-856	Counter Fryer		Electric
Sparta High School	Wells	G-136	Counter Flat Griddle		Electric
Sparta High School	Wells	B-406	Countertop Char Broiler		Electric
Mohawk Avenue School	Garland	-	2 Burner Stove	Y	Propane
Mohawk Avenue School	Cleveland	-	Steamer	Y	Propane
Mohawk Avenue School	Blodgett	-	Double Convection Oven	Y	Propane
Sparta Middle School	Garland	-	2 Burner Stove	Y	Propane
Sparta Middle School	Vulcan	-	2 Burner Stove	Y	Propane
Sparta Middle School	Garland	-	Double Convection Oven	Y	Propane
Sparta Middle School	Garland	-	Double Convection Oven	Y	Propane

Building	Make	Model	Type	Replace Orifice	Fuel
Sparta Middle School	Cleveland	22CGT	Steamer	Y	Propane
Alpine Elementary School	Garland	-	10 Burner Stove/Double Oven	Y	Propane
Alpine Elementary School	Blodgett	-	Double Convection Oven	Y	Propane
Helen Morgan School	South Bend	-	Convection Oven	Y	Propane
Helen Morgan School	Garland	-	8 Burner Cook Top	Y	Propane

Proposed Solution

Since natural gas will be brought to these schools, Honeywell recommends installing new gas burner appliances to replace the less efficient electric ones to perform the preparation of student and staff meals. In schools were propane exists, Honeywell plans to place orifices in the gas connections so Natural Gas can also be utilized.

Building	Make	Model	Type	Replace Orifice	Fuel
Sparta High School	Vulcan	GD-36G	10 Burner Cook Top/Oven		Natural Gas
Sparta High School	Vulcan	VC44GD	Double Convection Oven		Natural Gas
Sparta High School	Vulcan	VC44GD	Double Convection Oven		Natural Gas
Sparta High School	Vulcan	C24GA10	Convection Steamer (2)		Natural Gas
Sparta High School	Vulcan	VG40	Tilting Skillet Braising Pan		Natural Gas
Sparta High School	Vulcan	VCRG36-M	Counter Flat Griddle		Natural Gas
Sparta High School	Garland	GD-30RBFF	Countertop Char Broiler		Natural Gas
Sparta High School	Vulcan	GD-36G	10 Burner Cook Top/Oven		Natural Gas
Mohawk Avenue School	Garland	-	2 Burner Stove	Y	Natural Gas
Mohawk Avenue School	Cleveland	-	Steamer	Y	Natural Gas
Mohawk Avenue School	Blodgett	-	Double Convection Oven	Y	Natural Gas
Sparta Middle School	Garland	-	2 Burner Stove	Y	Natural Gas
Sparta Middle School	Vulcan	-	2 Burner Stove	Y	Natural Gas
Sparta Middle School	Garland	-	Double Convection Oven	Y	Natural Gas
Sparta Middle School	Garland	-	Double Convection Oven	Y	Natural Gas
Sparta Middle School	Cleveland	22CGT	Steamer	Y	Natural Gas
Alpine Elementary School	Garland	-	10 Burner Stove/Double Oven	Y	Natural Gas
Alpine Elementary School	Blodgett	-	Double Convection Oven	Y	Natural Gas
Helen Morgan School	South Bend	-	Convection Oven	Y	Natural Gas
Helen Morgan School	Garland	-	8 Burner Cook Top	Y	Natural Gas

Scope of Work

1. Remove existing electric appliances
2. Run and install new natural gas lines and connections.
3. Install new natural gas fired appliances and connect.
4. Install new natural gas orifices to propane appliances
5. Commission, test and providing training to kitchen staff

Energy Savings Methodology and Results

The savings is based on conversion from electric to natural gas appliances

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

Natural gas lines will be brought into each kitchen.

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 2F PREMIUM EFFICIENCY MOTORS AND VFDS

The key benefits of this ECM include:

Energy savings from reduced run hours and reduced motor speeds.

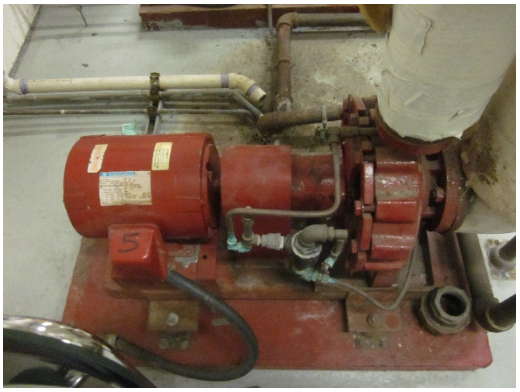
Equipment longevity due to more efficient and less wasteful equipment utilization and reduced startup wear.

The table below highlights facilities for consideration within the ESP for this ECM.

ECM Description	Sparta High School	Sparta Middle School	Alpine Elementary School	Helen Morgan School	Mohawk Avenue School
2F Premium Efficiency Motors and VFDs	■				

Existing Conditions

Variable Frequency Drives (VFDs) allow motors to run at specified speeds rather than just on or off while allowing systems to more accurately move heat. Honeywell recommends this ECM due to the significant savings potential given the relationship between energy consumption and motor speed.



200 Wing Hot Water Pump – Sparta HS

200 Wing Cooling Tower Pump - Sparta HS

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. The motors that were identified in the buildings are listed as follows.

Existing Motors:

Building	Equipment Description	Qty	Motor HP	Replace Motor Y/N	Add VFD Y/N
Sparta High School	SH-HWP-7	1	5.0	Y	Y
Sparta High School	SH-HWP-8	1	5.0	Y	Y
Sparta High School	SH-CHWP-7	1	10.0	Y	Y
Sparta High School	SH-CHWP-8	1	10.0	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 terminal units 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).

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.

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 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 byproducts. Old motors shall be disposed of in accordance with all federal, state, and local codes.
Environmental Regulations	No environmental impact is expected.

ECM 2G CHILLER 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.

The table below highlights facilities for consideration within the ESP for this ECM.

ECM Description	Sparta High School	Sparta Middle School	Alpine Elementary School	Helen Morgan School	Mohawk Avenue School
2G Chiller Replacements		■			

Existing Conditions

Chiller 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.

Chiller – Sparta MS

Nellie K. Parker School

Existing Chiller Units:

Building	Manufacturer	Model	Tons	Qty
Sparta Middle School	McQuay	ACR070AS27	70.0	1

Proposed Solution

Honeywell proposes replacing the existing chiller 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.

Proposed Chiller Replacements:

Building	Manufacturer	Model	Tons	Qty
Sparta Middle School	Daikin	AGZ076E	75.3	1

Scope of Work

The following outlines the scope of work to install the chiller unit listed in the table above.

Disconnect existing electric connections.

Disconnect piping from the unit.

Remove existing unit.

Rig and set new unit.

Inspect piping before reconnecting them to the unit.

Reconnect piping.

Repair piping insulation.

Connect electric power.

Start up and commissioning of new unit.

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 chillers 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 units scheduled for removal will be disposed of properly.
Environmental Regulations	No environmental impact is expected.

ECM 2H UNIT VENTILATOR UPGRADES

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.

The table below highlights facilities for consideration within the ESP for this ECM.

ECM Description	Sparta High School	Sparta Middle School	Alpine Elementary School	Helen Morgan School	Mohawk Avenue School
2H Unit Ventilator Replacement					■

Existing Conditions

Honeywell observed that the existing unit ventilators are beyond the useful life with many being inoperable or unrepairable.

Unit Ventilator – Mohawk ES

Unit Ventlitator – Mohawk ES

Existing Unit Ventilators:

Building		Make	Model	Qty
Mohawk Avenue School	RM-8	Trane	TUVA07VSVS11TN12012	1
Mohawk Avenue School	RM-10	Trane		1
Mohawk Avenue School	RM-11	Trane	TUVA07VSVS11TN12012	1
Mohawk Avenue School	RM-12	Trane	TUVA07VSVS11TN12012	1
Mohawk Avenue School	RM-13	Herman Nelson		1
Mohawk Avenue School	RM-14	Herman Nelson		1
Mohawk Avenue School	RM-15	Herman Nelson		1
Mohawk Avenue School	RM-16	Herman Nelson		1
Mohawk Avenue School	RM-17	Herman Nelson		1
Mohawk Avenue School	RM-18	Herman Nelson		1
Mohawk Avenue School	RM-19	Herman Nelson		1
Mohawk Avenue School	RM-20	Herman Nelson		1
Mohawk Avenue School	RM-21	Herman Nelson		1
Mohawk Avenue School	RM-22	Herman Nelson		1

Proposed Solution

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

Proposed Unit Ventilators:

Building		Make	Model	Qty
Mohawk Avenue School	RM-8	Daikin	UAVV9S10CG78A	1
Mohawk Avenue School	RM-10	Daikin	UAVV9S13CG78A	1
Mohawk Avenue School	RM-11	Daikin	UAVV9S10CG78A	1
Mohawk Avenue School	RM-12	Daikin	UAVV9S10CG78A	1
Mohawk Avenue School	RM-13	Daikin	UAVV9S10CG78A	1
Mohawk Avenue School	RM-14	Daikin	UAVV9S10CG78A	1
Mohawk Avenue School	RM-15	Daikin	UAVV9S10CG78A	1
Mohawk Avenue School	RM-16	Daikin	UAVV9S10CG78A	1
Mohawk Avenue School	RM-17	Daikin	UAVV9S10CG78A	1
Mohawk Avenue School	RM-18	Daikin	UAVV9S10CG78A	1
Mohawk Avenue School	RM-19	Daikin	UAVV9S10CG78A	1
Mohawk Avenue School	RM-20	Daikin	UAVV9S10CG78A	1
Mohawk Avenue School	RM-21	Daikin	UAVV9S10CG78A	1
Mohawk Avenue School	RM-22	Daikin	UAVV9S10CG78A	1

Scope of Work

The following outlines the unit ventilator replacements:

1. Disconnect electrical and steam from existing units.
2. Install new univents and reconnect, steam and electric.
3. 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 Univent Efficiency = Heat Input x Existing Efficiency

Proposed Univent Efficiency = Heat Input x New Efficiency

Energy Savings $ = Heating Production (Proposed Efficiency – Existing Efficiency)

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 unit ventilators will be installed and programmed in the locations listed above; in addition, training for maintenance personnel will be required as well as on-going, annual preventive maintenance.

O&M Impact

The new unit ventilators will decrease the O&M cost for maintaining the equipment.

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	Minor support will be required for the interruption of utilities for brief tie-in periods. Continuity of service must be maintained for the customer.
Waste Production	Existing units scheduled for removal will be disposed of properly.
Environmental Regulations	Minor support will be required for the interruption of utilities for brief tie-in periods. Continuity of service must be maintained for the customer.

ECM 2I ADDITION OF COOLING SYSTEMS

The key benefits of this ECM include:

- **Energy savings** from increased equipment efficiency.
- **Equipment longevity** due to more efficient and less wasteful equipment utilization.

The table below highlights facilities for consideration within the ESP for this ECM.

ECM Description	Sparta High School	Sparta Middle School	Alpine Elementary School	Helen Morgan School	Mohawk Avenue School
2I Addition of Cooling Systems					■

Existing Conditions

Honeywell and the Sparta Township Public Schools have identified several locations where the addition of cooling is desirable. Although adding cooling increases the energy use of the building, the addition of cooling makes a better learning environment for students by increasing comfort during warmer school days.

Cafeteria – Mohawk ES

Removed Cafeteria AHU – Mohawk ES

Proposed Solution

Honeywell proposes installing high efficiency ground mounted gas fired units to add cooling to spaces listed below.

Proposed Cooling Systems:

Building	Area Served	Manufacturer	Model	Tons	Qty
Mohawk Avenue School	Cafeteria	Daikin	DX11TA09303/DAT09043	7.5	2

Scope of Work

The following outlines the scope of work to install the additional cooling units listed in the Proposed Cooling Systems table above.

1. Rig and set new unit at the base.
2. Connect electric power.
3. Connect Gas piping

4. Start up and commissioning of new unit.
5. Maintenance operator(s) training.

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 units will be installed and programmed in the locations listed above; 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	A slight increase in electrical energy is resultant from the operation of the new units.
Waste Production	Proper disposal of any waste generated.
Environmental Regulations	No environmental impact is expected.

ECM 2J STEAM TRAPS

The key benefits of this ECM include:

- **Energy savings** from reducing heating losses caused by old, inefficient steam traps
- **Equipment longevity** due to more efficient and less wasteful equipment utilization.
- **Operational savings** from less frequent need to repair or replace key heating equipment.

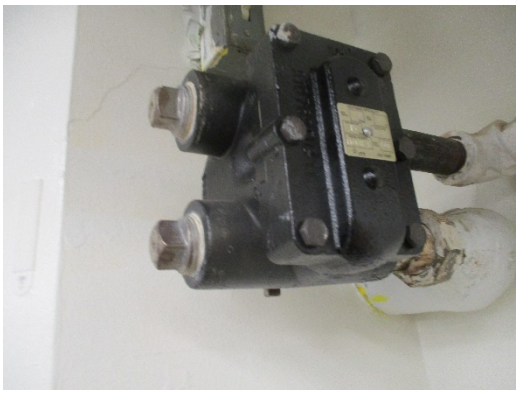
The table below highlights facilities for consideration within the ESP for this ECM.

ECM Description	Sparta High School	Sparta Middle School	Alpine Elementary School	Helen Morgan School	Mohawk Avenue School
2J Steam Traps					■

Existing Conditions

When steam heats the building and transfers heat throughout the building, it condenses back to water. The condensate must be trapped and sent back to the boiler. When steam traps fail, the steam does not condense, which reduces the heat transfer, causing unnecessary heat losses. The repair or replacement of the steam traps will reduce unnecessary losses.

Traps are designed to drain only the condensate, and prevent live steam from entering the condensate return piping. As the distribution system ages, the moving parts in the trap tend to get sluggish or fail altogether. This failure results in live steam entering the condensate return piping. The cumulative effect of this is to return the condensate above the flash point, resulting in steam and hence valuable heating energy loss at the boiler. This loss of energy can be minimized by a thorough survey to identify leaking traps by use of infrared temperature sensing instruments.



Mohawk Avenue School-Steam Trap

Mohawk Avenue School Steam System

Building	Trap Size	Steam Traps
Mohawk Avenue School	½" Thermo.	25
Mohawk Avenue School	¾" Thermo.	13
Mohawk Avenue School	¾" F&T	3

Building	Trap Size	Steam Traps
Mohawk Avenue School	1" F&T	2
Mohawk Avenue School	1-1/4" F&T	2
Mohawk Avenue School	Control Valves	6
TOTAL		**52**

Steam Trap Table

Proposed Solution

Honeywell recommends retrofitting the traps per the following scope of work. During construction, Honeywell will provide all materials, fittings, labor and supervision for the timely completion of the project. All existing strainers, isolation valves, check valves, and fittings in good repair will be reused.

Energy Savings Methodology and Results

All mechanical steam traps lose some live steam, either through normal cycling, leaking through a closed trap, or failing in the open position. Various sources have stated that the loss through a properly operational trap may exceed ten lbs./hour, while the failed steam trap population ranges between 20-50% at any given time.

We have estimated the steam losses based on a conservative figure of 10% leaking. Failure rates are based on sample testing of the steam trap population. In determining steam losses, the trap orifices and steam pressures have been grouped and averaged to create a simpler statistical basis.

Equipment Information

Material and Type	Equipment selection will be determined in conjunction with the District.
Material Identification	Specific material selection will be provided for your review and approval.

Customer Support and Coordination with Utilities

Coordination of the trap installation.

Environmental Issues

Resource Use	Energy savings will result the reduction of steam loss from malfunctioning traps resulting in lower fuel consumption. The equipment uses no other resources.
Waste Production	Existing steam traps scheduled for removal will be disposed of properly.
Environmental Regulations	Asbestos abatement may be required.

ECM 3A HEALTHY BUILDINGS-BUILDING CONTROLS

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.

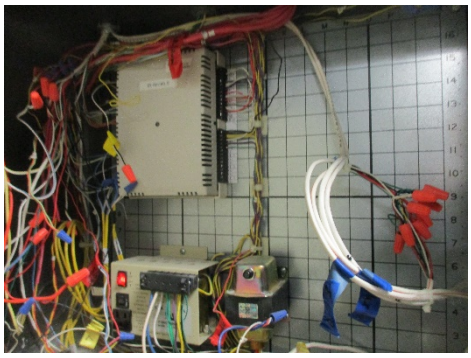
Occupancy comfort and productivity resulting from enhanced temperature and humidity control throughout your buildings.

The table below highlights facilities for consideration within the ESP for this ECM.

ECM Description	Sparta High School	Sparta Middle School	Alpine Elementary School	Helen Morgan School	Mohawk Avenue School
3A Building Controls	■	■			■

Proposed Solution

Pnuematic Controls – Mohawk ES



Control Panel – Sparta HS

1.0 DISTRICT BUILDING MANAGEMENT SYSTEM INFRASTRUCTURE

A. Provide modification of the existing BMS Archival Data Server.

B. Energy Usage Collection and archiving of the electrical usage and conditions.

C. Expansion of the Building Management System Centralized Scheduling, Alarming and Trending.

D. Expansion of the Building Management System Analytics Software, including programming and implementation of trending of control point inputs, outputs, and parameters in determination of out-of-spec conditions. This includes initiating alerts to district personnel for corrective actions to be performed. The analytic software application shall be programmed to analyze data produced by energy and equipment systems to identify faults, trends, anomalies and opportunities for improved performance and reduced energy use in the operation of building equipment systems.

E. Provide field support, technical assistance, and coordination with the Honeywell's

Measurement & Verification team.

1.1 SPARTA HIGH SCHOOL

A. One (1) Supervisory Network Controller (SNC) Main Building
1. Provide a new Honeywell Niagara 4 (WEBs) LON JACE(s) w/enclosure(s).
2. Provide new graphics and integration of the new and existing Honeywell DDC controls to the District's existing Honeywell Niagara Platform.
3. Migrate existing LON communications, power and device control wiring.

B. One (1) Chilled Water System (CHWS) Main Building
1. Remove the existing legacy DDC controller
2. Replace with (1) new Honeywell Niagara 4 (WEBs) DDC controller.
3. Migrate existing LON communications. power and device control wiring.
4. Retro-commission the existing control devices on the unit (i.e., control valves, relays, current switches, actuators).
5. Provide new system compatible temperature sensors, as required.

C. One (1) Condenser Water System (CWS) Main Building
1. Remove the existing legacy DDC controller
2. Replace with (1) new Honeywell Niagara 4 (WEBs) DDC controller.
3. Migrate existing LON communications. power and device control wiring.
4. Retro-commission the existing control devices on the unit (i.e., control valves, relays, current switches, actuators).
5. Provide new system compatible temperature sensors, as required.

D. One (1) Chilled Water System (CHWS) 200 Wing
1. Remove the existing legacy DDC controller
2. Replace with (1) new Honeywell Niagara 4 (WEBs) DDC controller.
3. Migrate existing LON communications. power and device control wiring.
4. Retro-commission the existing control devices on the unit (i.e., control valves, relays, current switches, actuators).
5. Provide new system compatible temperature sensors, as required.
6. Provide New pressure differential sensor for control of New Chilled Water Pump VFD I

E. One (1) Condenser Water System (CWS) 200 Wing
1. Remove the existing legacy DDC controller
2. Replace with (1) new Honeywell Niagara 4 (WEBs) DDC controller.
3. Migrate existing LON communications. power and device control wiring.
4. Retro-commission the existing control devices on the unit (i.e., control valves, relays, current switches, actuators).
5. Provide new system compatible temperature sensors, as required.

F. One (1) Hot Water System (HWS) Inside Boiler Room (New Hot Water Boilers (x3))
1. Remove the existing legacy DDC controller
2. Replace with (1) new Honeywell Niagara 4 (WEBs) DDC controller.
3. Migrate existing LON communications. power and device control wiring.
4. Retro-commission the existing control devices on the unit (i.e., control valves, relays, current switches, actuators).
5. Provide new system compatible temperature sensors, as required.

G. One (1) Hot Water System (HWS) Outside Boiler Rm (New Hot Water Boilers (x3))
1. Remove the existing legacy DDC controller
2. Replace with (1) new Honeywell Niagara 4 (WEBs) DDC controller.
3. Migrate existing LON communications. power and device control wiring.
4. Retro-commission the existing control devices on the unit (i.e., control valves, relays, current switches, actuators).

5. Provide new system compatible temperature sensors, as required.

H. One (1) Hot Water System (HWS) 200 Wing (New Hot Water Boilers (x3))
1. Remove the existing legacy DDC controller
2. Replace with (1) new Honeywell Niagara 4 (WEBs) DDC controller.
3. Migrate existing LON communications. power and device control wiring.
4. Retro-commission the existing control devices on the unit (i.e., control valves, relays, current switches, actuators).
5. Provide new system compatible temperature sensors, as required.
6. Provide New pressure differential sensor for control of New Hot Water Pump VFD I

1.2 SPARTA MIDDLE SCHOOL

A. One (1) Supervisory Network Controller (SNC) Main Building
1. Provide a new Honeywell Niagara 4 (WEBs) LON JACE(s) w/enclosure(s).
2. Provide new graphics and integration of the new and existing Honeywell DDC controls to the District's existing Honeywell Niagara Platform.
3. Migrate existing LON communications, power and device control wiring.

B. One (1) Chilled Water System (CHWS) (New Chiller) Main Building
1. Remove the existing legacy DDC controller
2. Replace with (1) new Honeywell Niagara 4 (WEBs) DDC controller.
3. Migrate existing LON communications. power and device control wiring.
4. Retro-commission the existing control devices on the unit (i.e., control valves, relays, current switches, actuators).
5. Provide new system compatible temperature sensors, as required.
6. Provide new interface communications to New Chiller

C. One (1) Hot Water System (HWS) Main Building (New Hot Water Boilers (x2))
1. Remove the existing legacy DDC controller
2. Replace with (1) new Honeywell Niagara 4 (WEBs) DDC controller.
3. Migrate existing LON communications. power and device control wiring.
4. Retro-commission the existing control devices on the unit (i.e., control valves, relays, current switches, actuators).
5. Provide new system compatible temperature sensors, as required.

1.3 MOHAWK AVE SCHOOL

A. One (1) Supervisory Network Controller Main Building
1. Provide a new Honeywell Niagara 4 (WEBs) LON JACE(s) w/enclosure(s).
2. Provide new graphics and integration of the new and existing Honeywell DDC controls to the District's existing Honeywell Niagara Platform.
3. Migrate existing LON communications, power and device control wiring.

B. One (1) Low Pressure Steam Heating System (LPS) Main Building
1. Remove the existing legacy DDC controller
2. Replace with (1) new Honeywell Niagara 4 (WEBs) DDC controller.
3. Migrate existing LON communications. power and device control wiring.
4. Retro-commission the existing control devices on the unit (i.e., control valves, relays, current switches, actuators).

A. One (1) Supervisory Network Controller Main Building
1. Provide a new Honeywell Niagara 4 (WEBs) LON JACE(s) w/enclosure(s).
2. Integrate the existing Building Management System to the District's existing Honeywell Niagara Platform.

B. One (1) Low Pressure Steam Heating System (LPS) Main Building MA-B-1, MA-B-2
1. Remove the existing legacy DDC controller
2. Replace with (1) new Honeywell Niagara 4 (WEBs) DDC controller.
3. Migrate existing LON communications. power and device control wiring.
4. Retro-commission the existing control devices on the unit
(i.e., control valves, relays, current switches, actuators).

C. Two (2) Air Handling Unit (AHU) Auditorium MA-AHU-1, MA-AHU-2
1. Provide (1) new Honeywell Niagara 4 (WEBs) DDC controller.
2. Provide new LON communications. power and device control wiring.
3. Provide new control devices on the unit
(i.e., control valves, relays, current switches, temperature sensors, actuators).
4. Provide Demand Control Ventilation sequences and devices.

D. Eleven (11) Air Conditioning Unit (ACU) RM 5 / 6 / 8 / 32A / 32B / 36 / CST / Library (2) / Faculty / Training / Auditorium (2) MA-ACU-1 thru MA-ACU-11
1. Provide (1) new Honeywell Niagara 4 (WEBs) DDC controller.
2. Provide new LON communications. power and device control wiring.
3. Provide new control devices on the unit (i.e., relays, current switches, temperature sensors, actuators).
4. Provide Demand Control Ventilation sequences and devices.

E. Seventeen (17) Unit Ventilator (UV)(New UV (x14)) Room 8 (1) / 10 thru 24 (15) / 29 (1) MA-UV-1 thru MA-UV-17
1. Provide (1) new Honeywell Niagara 4 (WEBs) DDC controller.
2. Provide new LON communications. power and device control wiring.
3. Provide new control devices on the unit (i.e., control valves, relays, current switches, temperature sensors, actuators).
4. Provide Demand Control Ventilation sequences and devices.

F. Twelve (12) Heat Pump (HP) Room 32B (1) / 33A-B (2) / 34B (1) / 36A-F (6) / 37A-B (2) MA-HP-1 thru SM-ACU-11
1. Provide (1) new Honeywell Niagara 4 (WEBs) DDC controller.
2. Provide new LON communications. power and device control wiring.
3. Provide new control devices on the unit (i.e., relays, current switches, temperature sensors, actuators).
4. Provide Demand Control Ventilation sequences and devices.

G. Two (2) New Daikin Air Conditioning Units
1. Provide (1) new Honeywell Niagara 4 (WEBs) DDC controller.
2. Provide new LON communications. power and device control wiring.
3. Provide new control devices on the unit (i.e., relays, current switches, temperature sensors, actuators).
4. Provide Demand Control Ventilation sequences and devices.

H. Exhaust Fans (EF)
1. Provide new device control wiring.
2. Provide new control devices on the unit (i.e., relays, current switches, actuators).

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 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.

The table below highlights facilities for consideration within the ESP for this ECM.

ECM Description	Sparta High School	Sparta Middle School	Alpine Elementary School	Helen Morgan School	Mohawk Avenue 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.

Building Envelope – Mohawk ES

Building Envelope – Sparta MS

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

Roof-Wall Joints

Existing – Buildings throughout the Sparta Township Public 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 Penetrations

Existing - There are many roof top exhaust fans that require damper cleaning, lubrication, and inspection for proper operation and to seal the roof deck to prevent penetration. Some units may be deemed to be too oversized for this service. Some buildings have roof-top AHUs with ducts that may show air leak during an IGA.

Proposed – Honeywell recommends if there is leak, these duct penetrations will be sealed with two-component polyurethane foam. Skylights will also be sealed. Sealant will be injected behind the drip cap to eliminate airflow.

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.

Windows

Existing - The operable windows in most of your buildings could present air leak issues that require weather stripping with fuzz or gasket type materials.

Proposed – Honeywell recommends installing weather stripping and door sweeps to prevent air leak.

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.

Scope of Work

Task	Sparta High School	Sparta Middle School	Mohawk Avenue School	Alpine Elementary School	Helen Morgan School	Total Quantity
Attic Air Barrier Retrofit (SF)			440			440
Attic Air Barrier Retrofit (Units)			2			2
Attic Flat Insulation (SF)			8,856			8,856
Awning Window Weatherization (Units)				88		88
Caulking (LF)			105			105
Caulking (Units)				352		352
Door Weather Striping - Doubles (Units)	34	16	7	6	14	77
Door Weather Stripping - Singles (Units)	19	6	4	31	17	77
Hopper Window Weatherization (Units)				79		79
Overhang Air Sealing (LF)	115					115
Overhang Air Sealing (SF)	96			64		160
Penetration Air Sealing (Units)			6			6
Roof-Wall Intersection Air Sealing (LF)	807	410			208	1,425
Roof-Wall Intersection Air Sealing (SF)					586	586
Window Weatherization (Units)				88		88

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. 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

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 WINDOWS REPLACEMENTS

The key benefits of this ECM include:

Energy Savings from reducing outside air infiltration that requires greater HVAC system utilization to overcompensate

Occupancy comfort and productivity by way of enhanced temperature control

Enhanced security from replacement of windows that provide for easier access to buildings

The table below highlights facilities for consideration within the ESP for this ECM.

ECM Description	Sparta High School	Sparta Middle School	Alpine Elementary School	Helen Morgan School	Mohawk Avenue School
4B Window Replacements					■

Existing Conditions

Some of the windows in the Sparta Township Public Schools are single pane acrylic with aluminum frame. Due to age, construction type, and condition, the windows incur excess air infiltration and provide average thermal resistance to heat transfer.

Windows – Mohawk ES

Windows – Mohawk ES

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

Windows. Honeywell proposes the installation of new energy efficient, double-paned windows to reduce infiltration, infrared and conductive losses. Overall, through the implementation of this measure, the Sparta Township Public Schools will reduce its heating fuel usage and cooling costs each year. The upgrade will result in savings and improved comfort to students and teachers which in turn will foster a better learning environment.

Building	Area (SF / LF)	U-Factor/R-Factor Existing Window	U-Factor/R-Factor Proposed Window
Mohawk Avenue School	10,008	1.1	.35

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 windows will limit conditioned air infiltration and exfiltration. Less infiltration and exfiltration means less heating and cooling required. Following approach is used to determine savings for this specific measure:

Existing Window Efficiency = 1/Existing R + Existing Infiltration Rate

Proposed Window Efficiency = /Proposed R + Proposed Infiltration Rate

Energy Savings $ = Audit*Hours/boiler efficiency +((Existing Airflow – proposed airflow) x 1.08 (OA Avg. Temp – Inside Avg. Temp)/(boiler efficiency) x (fuel cost)

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 windows will be installed.

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 windows will be removed and disposed of properly.
Environmental Regulations	No environmental impact is expected.

ECM 4C ROOF REPLACEMENTS

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.

The table below highlights facilities for consideration within the ESP for this ECM.

ECM Description	Sparta High School	Sparta Middle School	Alpine Elementary School	Helen Morgan School	Mohawk Avenue School
4C Roof Replacement	■	■			

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 replaced to the extent needed to meet the maximum permissible solar installation.

Roof – Sparta Middle School

Roof – Sparta High School

Proposed Solution

Honeywell proposes the installation of a new build up roof for the existing roofs in order to renew the roof warranty, provide resistance to water intrusion, UV exposure and natural weathering.

Building	Approximate Roof Square Footage
Sparta High School	100,000
Sparta Middle School	63,318
Total	163,318

Energy Savings Methodology

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 (Btu) = 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 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 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.

The table below highlights facilities for consideration within the ESP for this ECM.

ECM Description	Sparta High School	Sparta Middle School	Alpine Elementary School	Helen Morgan School	Mohawk Avenue School
5A Transformer Replacements	■	■			■

Existing Conditions

The transformers in locations within the electrical distribution systems in the District 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.

Transformer – Sparta MS

Transformer – Sparta HS

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:

Building	Location	Transformer Designation	Tag Number	kVA	Qty
Sparta High School	Assistant Principal 656	RB	78280	45.0	1
Sparta High School	Electric Rm by 253	RP2	78281	112.5	1
Sparta High School	Electric 281	RA	78282	75.0	1
Sparta High School	Electric 281	HVA	78283	30.0	1
Mohawk Avenue School	Kitchen Electric	T1	78294	45.0	1
Sparta Middle School	Main Electric	T1	78284	300.0	1
Sparta Middle School	Main Electric	CLL	78285	45.0	1
Sparta Middle School	Mech 170	LME	78286	75.0	1
Sparta Middle School	Mech 170	CMLE	78287	75.0	1
Sparta Middle School	Mech 129	CMLW	78288	75.0	1
Sparta Middle School	Mech 129	LMW	78289	75.0	1
Sparta Middle School	Mech 228	RUW	78290	75.0	1
Sparta Middle School	Mech 228	HUW	78291	75.0	1
Sparta Middle School	Mech 244	CULE	78292	75.0	1
Sparta Middle School	Mech 244	RUE	78293	75.0	1
Totals					**15**

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 old transformers and install new E-saver transformers.

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 transformers and parts will be disposed of properly.
Environmental Regulations	No environmental impact is expected.

ECM 6A COMBINED HEAT & POWER (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.

The table below highlights facilities for consideration within the ESP for this ECM.

ECM Description	Sparta High School	Sparta Middle School	Alpine Elementary School	Helen Morgan School	Mohawk Avenue School
6A CHP (Cogeneration)	■				

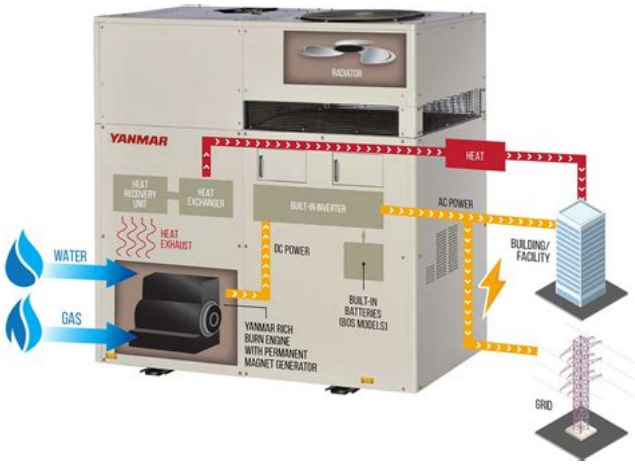
Existing Conditions

No Combined Heat and Power (i.e. cogeneration) units are currently located within the Sparta Township Public Schools

Proposed Solution

Honeywell recommends the installation of one Yanmar 35 kW CHP generating unit that will generate electric power and produce thermal energy that can supplement heating loads. This system will be appropriate to this site given the year-round operational needs of this facility and leverage healthy state rebates to help pay for it. Since the unit is a synchronous generator it does not require any excitation energy to produce electricity and therefore may be used for emergency back-up power.

Yanmar Unit. Yanmar Low Emissions CHP Module takes the many benefits of modular cogeneration. Modules come fully pre-packaged from the factory, including engine, generator, oil/ jacket/ exhaust heat recovery, controls, electrical switchgear, emissions controls, and modem for remote monitoring and data-logging. This allows for standardization and minimizes installation cost and complexity in the field. Also, the comprehensive third-party (ETL/IEEE/NYSIR/UL) certifications provide streamlined interconnection permitting with the local electric utility and are NJDEP Air Permit Exempt.



Scope of Work

Recommended Cogeneration Units:

Building	Manufacturer	Model	Qty
Sparta High School	Yanmar	CP-35	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: Yanmar-CP35, Electrical Output 35 kW, Thermal Output 203,000 Btu/hr, or approved equal.

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 7A SOLAR POWER PURCHASE AGREEMENT (PPA)

The key benefits of this ECM include:

Reduced utility costs.

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 Sparta Township Public Schools 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.

The table below highlights facilities for consideration within the ESP for this ECM.

ECM Description	Sparta High School	Sparta Middle School	Alpine Elementary School	Helen Morgan School	Mohawk Avenue School
7A Solar PPA	■	■			■

Existing Conditions

For the Sparta Township School District to provide a sustainable future for its students and fight the effects of human caused climate change, Honeywell recommends that the Sparta Township School District further assess the feasibility of a solar photovoltaic system on Sparta Township School District owned roofs to generate on-site renewable electricity. This could be provided at no upfront cost via a 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.

Potential Roof Solar – Sparta HS

Existing Solar – Sparta MS

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.

Proposed Solar Arrays:

Building	Solar kW-DC
Sparta High School	1,317.9
Sparta Middle School	557.2
Mohawk Avenue School	153.6
Total	2,028.7

**Net Zero limitation will determine the actual size of the solar energy systems at the schools. Net zero limitation is the maximum solar size as determined by the amount of solar capacity that will generate solar electricity that equals 100% of the schools' annual projected electricity usage.

Energy Savings Methodology and Results

Savings are based on the difference in kWh price between the PPA and the Sparta Township Public Schools current electrical supplier.

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

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	Any removed parts will be disposed of properly.
Environmental Regulations	Aside from the environmental benefits of increasing energy awareness no other environmental impact is expected.

ECM 8A ENERGY SOURCING / VIRTUAL SOLAR POWER PURCHASE AGREEMENT (PPA)

The key benefits of this ECM include:

- **Reduced utility costs**.
- **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 School Districts 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**.

The table below highlights facilities for consideration within the ESP for this ECM.

ECM Description	Sparta High School	Sparta Middle School	Alpine Elementary School	Helen Morgan School	Mohawk Avenue School
8A Energy Sourcing		■			

Existing Conditions

- Procuring, or purchasing, natural gas and electricity can be confusing and time-consuming as school administrators are faced with trying to sort through the overwhelming number of energy companies now offering electric and natural gas supply alternatives. A thorough understanding of the underlying wholesale markets, power generation, delivery factors, economic and political influences and their joint impact on prices are all vital.

Sparta MS – Roof Solar Array

Sparta HS Electrical Panel

Proposed Solution

Energy Sourcing

Energy Sourcing gives a school district the opportunity to proactively purchase electricity and natural gas supply in order to make strategic choices, in an effort to minimize energy costs. Honeywell shall guide the District's energy procurement efforts by leveraging our strong relationships with viable energy suppliers and strategic energy managers to obtain the most competitive pricing and provide you with an all-inclusive approach to best manage your energy costs.

Virtual (Solar) Power Purchase Agreement

With Honeywell's guidance a district can benefit from including renewable power in the sourcing process. A Virtual Power Purchase Agreement (VPPA) is a long-term contract structure in which a developer of renewable assets (such as solar installations) provides renewable energy from a remote location for a price to be determined through the sourcing process. In the discovery phase of the sourcing process, Honeywell determines if a VPPA will be more cost effective than a more traditional electricity supply agreement. Aside from the likelihood that a VPPA is less expensive than a traditional supply agreement, the longer term (15-25 years) and the fact that the escalation of the VPPA's rate is known over the course of the agreement provide budget stability against arbitrary tariff changes and volatile energy markets.

Sustainable Principles Across the Entire Utility Bill

Additionally, this will free up your older roof areas to be replaced while still maintaining a principle of sustainability. It will impact your overall utility rates and not be restricted to the 484.11 kW produced by the Solar Array.

Existing Solar Arrays:

Building	Solar kW-DC
Sparta Middle School	300
Total	**300**

Energy Savings Methodology and Results: Savings are based on the difference in kWh price between the VPPA and the Sparta Township Schools current electrical supplier.

Equipment Information: None

Changes in Infrastructure: None

Customer Support and Coordination with Utilities: None

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 PAY FOR PERFORMANCE INCENTIVES

The key benefits of this ECM include:

- **Increased Incentives for Performance**.
- **Additional savings** more energy savings greater the incentive.

The table below highlights facilities for consideration within the ESP for this ECM.

ECM Description	Sparta High School	Sparta Middle School	Alpine Elementary School	Helen Morgan School	Mohawk Avenue School
8A Energy Sourcing	■	■			

Existing Conditions

NJ PAY FOR PERFORMANCE PROGRAM (P4P)

Honeywell has been certified as a Pay for Performance (P4P) Program Partner to provide technical services under direct contract to you. Acting as your energy expert, Honeywell can develop an Energy Savings Plan for each project with a whole-building technical component of a traditional energy audit, a financial plan for funding the energy efficient measures and a construction schedule for installation. This supports your ability to take a comprehensive, whole-building approach to saving energy in your existing facilities and earn incentives that are directly linked to your savings.

NJ Pay for Perfomance Program

NJ Clean Energy

Proposed Solution

Pay for Performance Rebate Modeling and Implementation

Existing commercial, industrial and institutional buildings with a peak demand over 200 kW for any of the preceding twelve months are eligible to participate including hotels and casinos, large office buildings, multi-family buildings, supermarkets, manufacturing facilities, schools, shopping malls, and restaurants. Buildings that fall into the following five customer classes are not required to meet the 200kW demand to participate in the Program: hospitals, public colleges and universities, non-profits, affordable multifamily housing, and local governmental entities. Your Energy Savings Plan must define a comprehensive package of measures capable of reducing the existing energy consumption of your building by 15% or more to utilize the Pay for Performance Program.

Eligible Buildings:

Building	Building Square Footage
Sparta High School	255,000
Sparta Middle School	132,500
Total	**387,500**

Energy Savings Methodology and Results: Savings are based energy savings per conservation measure.

Equipment Information: None

Changes in Infrastructure: None

Customer Support and Coordination with Utilities: None

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.

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SECTION D
TECHNICAL AND FINANCIAL SUMMARY

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SECTION D — TECHNICAL AND FINANCIAL SUMMARY

Recommended ESIP Project

Recommended ESIP Project	
Value of Project	$8,688,678
Term of Repayment	15 Years
Projected Savings Over Term	$10,199,528
Projected NJ Rebates & Incentives	$277,048
Projected Interest Rate	1.9%

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Form II: Recommended Project — Energy Conservation Measures (ECMs) Summary Form

FORM II
ENERGY SAVINGS PLAN (ESP):
ENERGY CONSERVATION MEASUREs (ECMs) SUMMARY FORM
SPARTA TOWNSHIP PUBLIC SCHOOLS
ENERGY SAVING IMPROVEMENT PROGRAM

Proposed Preliminary Energy Savings Plan: ECMs (Base Project)	Estimated Installed Hard Costs [1] $	Estimated Annual Savings $	Estimated Simple Payback (years)
1A LED Lighting/Direct Install	$ 1,509,740	$ 201,726	7.48
2A Boiler Replacements	$ 1,411,127	$ 63,078	22.37
2B Domestic Hot Water Replacement	$ 82,329	$ 4,341	18.97
2E Kitchen Equipment Replacements	$ 211,872	$ 13,790	15.36
2F Premium Efficiency Motors and VFDs	$ 41,695	$ 4,015	10.38
2H Unit Ventilator Upgrades	$ 235,731	$ 735	320.84
3A Building Controls	$ 597,672	$ 58,047	10.30
4A Building Envelope Improvements	$ 149,107	$ 12,072	12.35
4C Roof Replacement	$ 2,040,610	$ 9,282	219.86
7A Solar PPA	$ 30,250	$ 246,407	0.12
9A Pay for Performance	$ 60,954	$ -	-
0	$ -	$ -	-
0	$ -	$ -	-
0	$ -	$ -	-
0	$ -	$ -	-
0	$ -	$ -	-
0	$ -	$ -	-
0	$ -	$ -	-
Add additional lines as needed* **Project Summary:**	$ 6,371,086	$ 613,494	10.38

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 Vending Misers	$ 9,968	$ 875	11.40
1C De-Stratification Fans w/ UV	$ 157,940	$ 12,068	13.09
2C Rooftop Unit Replacement	$ -	$ -	-
2D Split System Replacement	$ 42,989	$ 94	455.59
2G Chiller Replacements	$ 138,701	$ 1,583	87.64

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: Recommended Project — Projected Annual Energy Savings Data Form

FORM III
ESCO's PRELIMINARY ENERGY SAVINGS PLAN (ESP)
PROJECTED ANNUAL ENERGY SAVINGS DATA FORM
SPARTA TOWNSHIP PUBLIC SCHOOLS
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)	20,536	$126,974	1,594	$10,615
Electric Energy (KWH)	5,877,498	$789,846	4,009,178	$460,949
Natural Gas (therms)	23,675	$22,783	-99,148	-$93,058
Fuel Oil (Gal)	144,048	$276,021	105,083	$202,981
Steam (Pounds)				
Water (gallons)				
Other (Specify Units)				
Other (Specify Units)				
Avoided Emissions (1)	Provide in Pounds (Lbs)			
NOX	2,897			
SO2	8,860			
CO2	3,481,039			

(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".

Form IV: Recommended Project — Projected Annual Energy Savings Data Form in MMBTUs

FORM IV

ESCO's PRELIMINARY ENERGY SAVINGS PLAN (ESP):
PROJECTED ANNUAL ENERGY SAVINGS DATA FORM IN MMBTUs
SPARTA TOWNSHIP PUBLIC SCHOOLS
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)	20,054	13,679	
Natural Gas (MMBTUs)	2,368	(9,915)	
Fuel Oil (MMBTUs)	20,167	14,712	
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.

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Form VI: Recommended Project — District Preliminary Annual Cash Flow Analysis Form

FORM VI
ESCO's PRELIMINARY ENERGY SAVINGS PLAN (ESP):
ESCO's PRELIMINARY ANNUAL CASH FLOW ANALYSIS FORM
SPARTA TOWNSHIP PUBLIC SCHOOLS
ENERGY SAVING IMPROVEMENT PROGRAM

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:

Project Hard Cost:	$	6,371,086
Investment Grade Energy Audit	$	55,856
Design Engineering Fees	$	382,265
n Management & Project Administration	$	382,265
System Commissioning	$	95,566
Contingency	$	445,976
Overhead & Profit	$	955,663
Project Value:	$	8,688,678
Financed Value:	**$**	**8,688,678**

Interest Rate to Be Used for Proposal Purposes: **1.9%**

Year	Annual Energy Savings	Solar Savings	Annual Operational Savings	Energy Rebates/Incentives	Total Annual Savings	Annual Project Costs	Board Costs	Annual Service Costs [3]	Net Cash-Flow to Client	Cumulative Cash Flow
Installation	$ 100,524				$ 100,524	$ (100,524)	$ (100,524)	$ -	$ 0	$ 0
1	$ 335,080	$ 246,407	$ 32,006	$ 58,125	$ 671,619	$ (665,549)	$ (665,549)	$ -	$ 6,070	$ 6,070
2	$ 337,801	$ 251,828	$ 32,006	$ 196,031	$ 817,665	$ (811,595)	$ (811,595)	$ -	$ 6,070	$ 12,140
3	$ 340,576	$ 257,368	$ 32,006	$ 22,893	$ 652,843	$ (646,773)	$ (646,773)	$ -	$ 6,070	$ 18,210
4	$ 343,408	$ 263,030	$ 32,006	$ -	$ 638,444	$ (632,374)	$ (632,374)	$ -	$ 6,070	$ 24,280
5	$ 346,297	$ 268,817	$ 32,006	$ -	$ 647,120	$ (641,050)	$ (641,050)	$ -	$ 6,070	$ 30,350
6	$ 349,246	$ 274,731			$ 623,977	$ (617,907)	$ (617,907)	$ -	$ 6,070	$ 36,420
7	$ 352,254	$ 280,775			$ 633,029	$ (626,959)	$ (626,959)	$ -	$ 6,070	$ 42,490
8	$ 355,323	$ 286,952			$ 642,276	$ (636,206)	$ (636,206)	$ -	$ 6,070	$ 48,560
9	$ 358,455	$ 293,265			$ 651,720	$ (645,650)	$ (645,650)	$ -	$ 6,070	$ 54,630
10	$ 361,651	$ 299,717			$ 661,368	$ (655,298)	$ (655,298)	$ -	$ 6,070	$ 60,700
11	$ 364,911	$ 306,311			$ 671,222	$ (665,152)	$ (665,152)	$ -	$ 6,070	$ 66,770
12	$ 368,238	$ 313,050			$ 681,287	$ (675,217)	$ (675,217)	$ -	$ 6,070	$ 72,840
13	$ 371,632	$ 319,937			$ 691,568	$ (685,498)	$ (685,498)	$ -	$ 6,070	$ 78,910
14	$ 375,094	$ 326,975			$ 702,070	$ (696,000)	$ (696,000)	$ -	$ 6,070	$ 84,980
15	$ 378,628	$ 334,169			$ 712,796	$ (706,686)	$ (706,686)	$ -	$ 6,110	$ 91,090
Totals	$ 5,439,118	$ 4,323,332	$ 160,030	$ 277,048	$ 10,199,528	$ (10,108,438)	$ (10,108,438)	$ -	$ 91,090	$ 91,090

Additional 3rd P4P Incentive	$ 173,138
Total Cash Flow	$ 264,228

NOTES:
(1) Includes: Hard costs and project service fees defined in ESCO's PROPOSED "FORM V"
(2) No payments are made by SPARTA TOWNSHIP PUBLIC SCHOOLS 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.

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

Building & ECM	kWh Savings ($)	kW Savings ($)	Natural Gas Savings ($)	Fuel Oil Savings ($)	Annual Operational Savings ($)	Net Cost ($)	Simple Payback
Alpine Elementary School	**$ 822**	**$ 4**	**$ 1,732**	**$ -**	**$ 204**	**$ 42,070**	**14.2**
1A LED Lighting/Direct Install	$ 625	$ 4	$ (39)	$ -	$ 204	$ 7,745	7.8
4A Building Envelope Improvements	$ 197	$ -	$ 1,771	$ -	$ -	$ 34,325	17.4
Helen Morgan School	**$ 4,108**	**$ 25**	**$ -**	**$ 2,048**	**$ 4,548**	**$ 80,731**	**5.3**
1A LED Lighting/Direct Install	$ 3,890	$ 25	$ -	$ (374)	$ 4,548	$ 47,553	3.8
4A Building Envelope Improvements	$ 218	$ -	$ -	$ 2,422	$ -	$ 33,178	12.6
Mohawk Avenue School	**$ 20,784**	**$ 6**	**$ (14,782)**	**$ 34,654**	**$ 341**	**$ 713,686**	**17.3**
1A LED Lighting/Direct Install	$ 992	$ 6	$ -	$ (106)	$ 341	$ 10,983	7.0
2A Boiler Replacements	$ -	$ -	$ (13,667)	$ 23,981	$ -	$ 206,361	20.0
2B Domestic Hot Water Replacement	$ 2,058	$ -	$ (1,115)	$ 1,733	$ -	$ 34,012	12.7
2E Kitchen Equipment Replacements	$ -	$ -	$ -	$ -	$ -	$ 39,887	-
2H Unit Ventilator Upgrades	$ -	$ -	$ -	$ 735	$ -	$ 235,731	320.8
3A Building Controls	$ 1,070	$ -	$ -	$ 6,405	$ -	$ 149,057	19.9
4A Building Envelope Improvements	$ 287	$ -	$ -	$ 1,906	$ -	$ 31,605	14.4
7A Solar PPA	$ 16,376	$ -	$ -	$ -	$ -	$ 6,050	0.4
Sparta High School	**$ 317,485**	**$ 10,220**	**$ (32,442)**	**$ 67,069**	**$ 17,334**	**$ 3,322,492**	**8.4**
1A LED Lighting/Direct Install	$ 121,333	$ 567	$ -	$ (8,718)	$ 17,334	$ 951,955	6.4
2A Boiler Replacements	$ -	$ -	$ (30,740)	$ 48,909	$ -	$ 797,692	43.9
2E Kitchen Equipment Replacements	$ 5,898	$ 9,594	$ (1,702)	$ -	$ -	$ 171,985	12.5
2F Premium Efficiency Motors and VFDs	$ 3,956	$ 59	$ -	$ -	$ -	$ 41,695	10.4
3A Building Controls	$ 12,350	$ -	$ -	$ 18,755	$ -	$ 304,107	9.8
4A Building Envelope Improvements	$ 346	$ -	$ -	$ 3,234	$ -	$ 34,847	9.7
4C Roof Replacement	$ 628	$ -	$ -	$ 4,889	$ -	$ 968,000	175.5
7A Solar PPA	$ 172,973	$ -	$ -	$ -	$ -	$ 12,100	0.1
9A Pay for Performance	$ -	$ -	$ -	$ -	$ -	$ 40,112	-
Sparta Middle School	**$ 117,750**	**$ 360**	**$ (47,565)**	**$ 99,211**	**$ 9,579**	**$ 2,212,107**	**11.7**
1A LED Lighting/Direct Install	$ 56,479	$ 360	$ -	$ (5,325)	$ 9,579	$ 491,504	7.0
2A Boiler Replacements	$ -	$ -	$ (44,225)	$ 78,820	$ -	$ 407,074	11.8
2B Domestic Hot Water Replacement	$ 45	$ -	$ (3,340)	$ 4,961	$ -	$ 48,318	29.0
3A Building Controls	$ 3,724	$ -	$ -	$ 15,743	$ -	$ 144,508	7.4
4A Building Envelope Improvements	$ 107	$ -	$ -	$ 1,584	$ -	$ 15,152	9.0
4C Roof Replacement	$ 336	$ -	$ -	$ 3,429	$ -	$ 1,072,610	284.9
7A Solar PPA	$ 57,058	$ -	$ -	$ -	$ -	$ 12,100	0.2
9A Pay for Performance	$ -	$ -	$ -	$ -	$ -	$ 20,842	-
Project Total	**$ 460,949**	**$ 10,615**	**$ (93,058)**	**$ 202,981**	**$ 32,006**	**$ 6,371,086**	**9.9**

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2. Utility and Other Rebates and Incentives

NJ Pay-for-Performance Program (P4P)

Honeywell has been certified as a Pay for Performance Program Partner to provide technical services under direct contract to you. Acting as your energy expert, Honeywell will develop an Energy Reduction Plan for each project with a whole-building technical component of a traditional energy audit, a financial plan for funding the energy efficient measures and a construction schedule for installation. This supports your ability to take a comprehensive, whole-building approach to saving energy in your existing facilities and earn incentives that are directly linked to your savings.

Eligibility

Existing commercial, industrial and institutional buildings with a peak demand over 100 kW for any of the preceding twelve months are eligible to participate including hotels and casinos, large office buildings, multi-family buildings, supermarkets, manufacturing facilities, schools, shopping malls and restaurants. Buildings that fall into the following five customer classes are not required to meet the 100kW demand to participate in the Program: hospitals, public districts and universities, non-profits, affordable multifamily housing, and local governmental entities. Your Energy Reduction Plan must define a comprehensive package of measures capable of reducing the existing energy consumption of your building by 15% or more to utilize the Pay Performance Program.

ENERGY STAR Portfolio Manager

Pay for Performance takes advantage of 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.

Incentives

Incentives for the P4P program are based on the annual electric and natural gas savings produced by the Energy Conservation Measures. There are three incentives to the program; details are included in the follow page. The first incentive is distributed after a finalized project is selected and bid. This usually occurs shortly before construction starts or shortly thereafter. The second incentive is distributed a few months after construction is completed, while the third incentive is distributed usually thirteen to fourteen months after the second incentive – once a year of building usage, post-retrofit, is completed.

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 Pay for Performance and Cogeneration Incentives. A table of the incentive amounts on a per project basis is provided below.

NJ Customers	Rebate Amount
Hudson County (Projected)	$2,369,012
East Brunswick Public Schools (Projected)	$1,601,318
West Orange Board of Education	$1,399,747
City of Newark	$1,242,368
Passaic County (Projected)	$1,209,061
Old Bridge Board of Education	$1,085,614
Bridgewater-Raritan Regional District	$963,034
Elizabeth Schools	$934,209
Parsippany-Troy Hills Board of Education	$831,175
Camden County Technical Schools	$734,803
West Orange Board of Education	$644,744
Hillsborough Board of Education	$584,736
NH-Voorhees Regional HS District	$511,558
School District of the Chathams	$419,056
West Morris Regional High School (Projected)	$392,700
Phillipsburg School District	$274,278
Educational Services Commission of NJ	$260,603
Somerset County Vocational	$246,095
Robbinsville Public School District	$231,015
Bloomfield Board of Education	$225,868
Mountain Lakes Board of Education	$194,722
Lower Cape May Regional	$190,658
Verona School District	$171,015
Hanover Township School District	$169,882
City of Perth Amboy	$137,441
Town of Kearny	$84,147
Frankford School District	$30,743

Honeywell has determined that the Sparta School District is eligible for **$277,048** in estimated total incentives for the projects included in the P4P program. Please refer to the tables on below for a breakdown of Sparta School District incentive levels on a building by building basis for each type of incentive.

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P4P Incentives

	P4P Incentives			
Building	**First Incentive**	**Second Incentive**	**Third Incentive**	**Total Incentive**
Sparta High School	$38,250	$128,929	$12,893	$180,072
Sparta Middle School	$19,875	$67,101	$10,000	$96,976
TOTALS	**$58,125**	**$196,031**	**$22,893**	**$277,048**

Total Rebates and Incentives

Year	P4P Incentives	Total Incentives
Year 1	$58,125	$58,125
Year 2	$196,031	$196,031
Year 3	$22,893	$22,893
TOTALS	**$277,048**	**$277,048**

3. 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 Sparta School District may authorize a lease purchase agreement between the Sparta School District and a financier. Ownership of the equipment or improved facilities will pass to the Sparta 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 Sparta School 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 Sparta School District. Payments are typically scheduled to commence after the construction is complete and acceptance of the project has been received by the Sparta School District. Typically, payment terms are structured so there is no up-front capital expense to the Sparta 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.

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SECTION E
MEASUREMENT & VERIFICATION AND MAINTENANCE PLAN

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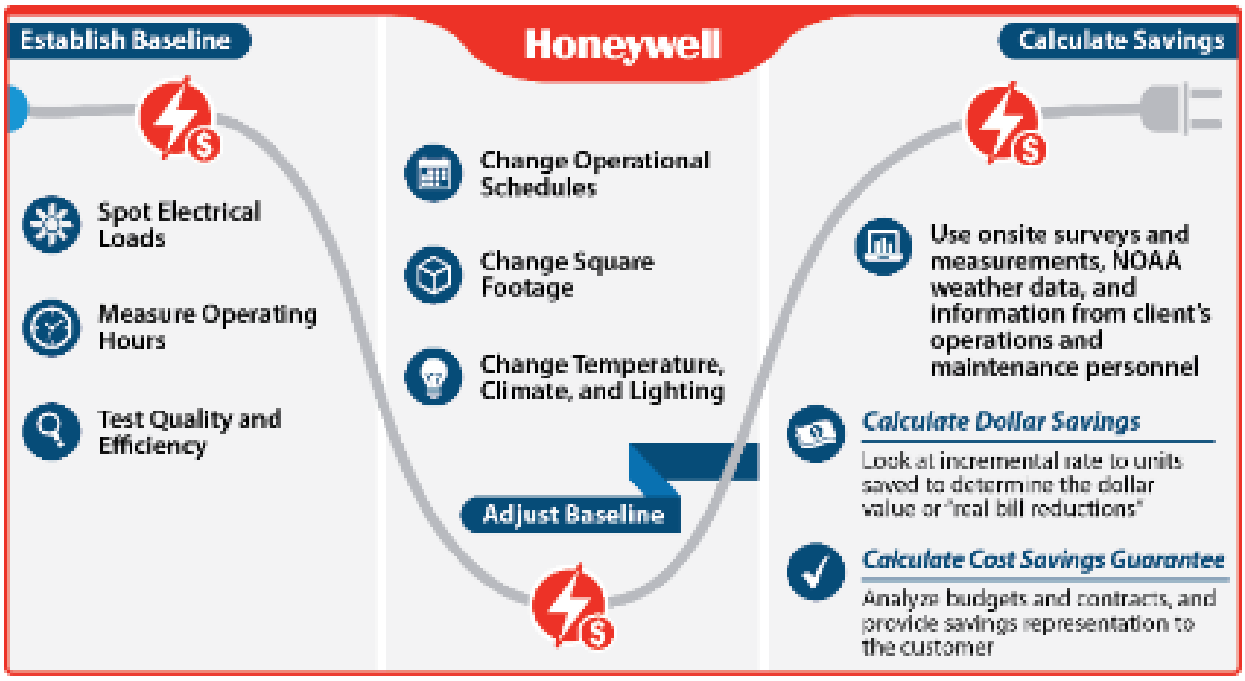
SECTION E — MEASUREMENT & VERIFICATION AND MAINTENANCE PLAN

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 calculated the baseline based on the systems and operating conditions as they currently exist prior to the pandemic. The baseline was established from 2/2019-2/2020 in accordance with BPU guidelines as being considered a pre-pandemic baseline. Baseline development is 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 was 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, auditors use the following equipment for their onsite measurements:

1) Recording and instantaneous power and harmonic analyzers.
2) Data loggers for pressures, temperatures, flow rates, humidity and CO_2.
3) Lighting level and recording profile/run-hour and occupancy meters.
4) Multimeters, handheld kW meters.
5) Combustion analyzers.
6) Ultrasonic flow meters.
7) 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 considered 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. The result is a coupled project where the final savings are equal to or greater than anticipated.

2. Adjustment to Baseline Methodology

The methodology[1] 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 Sparta School District requires and the needs of the Sparta 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 the installed ECMs. This creates the ability over the life of the contract to continue measuring only savings achieved by the ECM and leaves the Sparta 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, An M&V report should 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/ft^2 and Btu/ft^2 to calculate the energy consumption of the building and then add or subtract the energy usage to or from the baseline energy consumption.

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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 has established 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.

$$AnnualSavings(\$) = \sum_{m=1}^{12} \{(Rate_{kWh,Base} \times kWh_{Saved,m}) + (Rate_{fuel\ Oil,\ Base} \times Fuel\ Oil_{Saved,\ gal,\ m}) + (Rate_{Steam,\ Base} \times Steam_{Saved,\ klbs,\ m}) + (Rate_{NG} \times NG_{Saved,\ MCF,\ m})\} + Agreed(\$)$$

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*

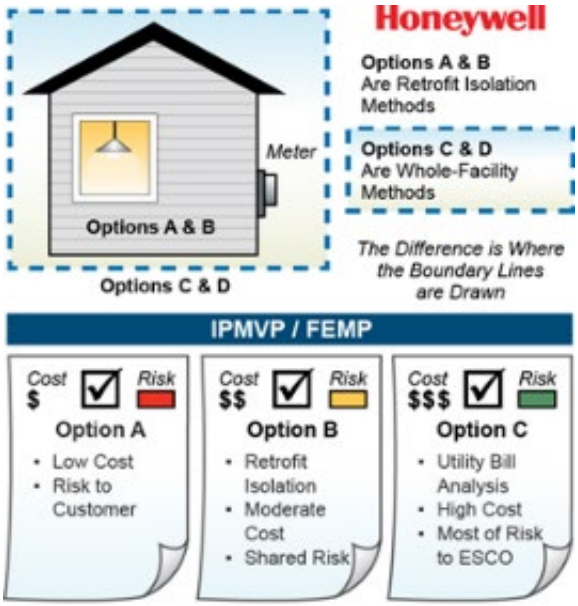
Agreed($)= Annual savings in dollars (water, sewer, maintenance, etc.)

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 Sparta School District or “real bill reductions”. As noted in the cash flow, energy escalation rates will be established in accordance with New Jersey Board of Public Utility guidelines.

Based on this, Honeywell has reviewed 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 Sparta School District’s budgets (labor & direct costs), maintenance contracts and operations (supplier) contracts. Honeywell has analyzed the information to provide a conservative savings representation for the Sparta School District’s 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 Sparta School 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)***[2]. 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 Sparta 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 allows the Sparta School District to adapt to the demands of future campus growth and changes without the need for the Sparta School District and Honeywell to negotiate energy baseline adjustments.

Our typical M&V plan will utilize broadband Internet access to the appropriate the Sparta School District's 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

[2] www.ipmvp.org.

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.

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.
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:

1. 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.
2. 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 Sparta 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:

$kW_{Saved} = (kW_{Base} – kW_{Spot\ Measured})$

kWh_{Saved} = Estimated operating hours during the interim period * kW_{Saved}

The total kWh savings is the sum of the kWh_{Saved} 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 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
1C De-Stratification Fans & w/UV	▪ 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
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 Domestic Water Heater Replacements	▪ Replace existing domestic hot water heaters with condensing natural gas domestic hot water heater	Option C ▪ Utility Bill Comparison for all fuel related measures	▪ Pre-M&V: Baseline annual fuel cost based on fuel billing data. ▪ Post M&V: Compare post installation M&V fuel cost based on fuel billing data.

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2C Roof Top Unit Replacements	▪ 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
2D Split System Replacements	▪ Replace select split systems 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 split system unit (EER) – verify the new equipment and controls are installed and commissioned as recommended by manufacturer
2E Kitchen Equipment	▪ 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
2F 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
2G Chiller Replacements	▪ Install new High Efficiency Chillers	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 chiller (kW/ton) – verify the new equipment and controls are installed and commissioned as recommended by manufacturer
2H Unit Ventilator Replacement	▪ Replace antiquated Unit Ventilators	Option A ▪ Engineering calculations based on nameplate and manufacturer supplied data for the existing and replacement units	▪ Pre-M&V: Baseline annual fuel cost based on fuel billing data and Metrix tuned to normalize to heating degree days ▪ Post M&V: Compare post installation M&V fuel cost based on fuel billing data and Metrix tuned to normalize to heating degree days

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2I Addition of Cooling	▪ Add Cooling to interior spaces of building which are not currently cooled.	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 chiller (kW/ton) – verify the new equipment and controls are installed and commissioned as recommended by manufacturer
2J Steam Traps	▪ Comprehensive replacement or internal repair of building steam traps	Option C ▪ Fuel Savings Utility Bill Comparison for all fuel related measures	▪ Fuel: Compare post installation M&V fuel cost based on fuel billing data and Metrix tuned to normalize to heating degree days
3A Building 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
4A Building Envelope Improvements	▪ Install weather stripping on doors, seal roof wall joints and roof penetrations	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.
4B Window Replacements	▪ Install new windows on select areas/buildings.	Option A ▪ Engineering calculations based on programmed parameters. Option C 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 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
4C Roof Replacement	▪ Install new roofs on select areas/buildings.	Option A ▪ Engineering calculations based on programmed parameters. Option C ▪ 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 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
5A Transformer Replacements	▪ 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 ▪ Post M&V: Measure input and output kW for new transformer (typical one for each size) ▪ Verify savings with engineering calculations

6A Combined Heat & Power (CHP Cogeneration)	▪ Install Cogeneration unit	Option A ▪ Engineering calculations based on nameplate and manufacturer supplied data for the new unit	▪ 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
7A Solar Power Purchase Agreement (PPA)	▪ Install solar panels on selected buildings and enter into a PPA with a third party vendor	N/A	▪ Pre-M&V: None ▪ Post M&V: None
8A Energy Sourcing/Virtual PPA	▪ Participate in Third Party Energy Sourcing and Virtual Power Purchase Agreement programs	N/A	▪ Pre-M&V: None ▪ Post M&V: None
9A Pay for Performance	▪ Participate in NJ Clean Energy Pay for Performance Program for Qualified Buildings	N/A	▪ Pre-M&V: None ▪ Post M&V: None

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6. Recommended Preventive Maintenance Services

Per the NJ ESIP program, all services are required to be bid by the Sparta School District for services as desired. Based on Honeywell's vast service organization, we are uniquely qualified to develop design specification for the public bidding per NJ Law.

Honeywell strongly believes that the long-term success of any conservation program is equally dependent upon the appropriate application of energy savings technologies, as well as solid fundamental maintenance and support. One of the primary contributors to energy waste and premature physical plant deterioration is the lack of operations, personnel training and equipment maintenance.

Honeywell recommends routine maintenance on the following systems throughout the Sparta School District for the duration of an energy guarantee of savings.

Maintenance, Repair and Retrofit Services:

- Mechanical Systems
- Building Automation Systems
- Temperature Control Systems
- Air Filtration

Honeywell will work with the Sparta School District to evaluate current maintenance practices and procedures. This information will be the basis of a preventive maintenance and performance management plan designed to maximize building operating efficiencies, extend the useful life of your equipment and support the designed Energy Savings Plan.

At a minimum, we recommend the following tasks be performed on a quarterly basis with the Sparta School District Wide Building Management System.

SYSTEM SUPPORT SERVICES

1. Review recent mechanical system operation and issues with customer primary contact, on a monthly basis.
2. Review online automation system operation and event history logs and provide summary status to the customer primary contact. Identify systemic or commonly re-occurring events.
3. Check with customer primary contact and logbook to verify that all software programs are operating correctly.
4. Identify issues and prioritize maintenance requests as required.
5. Provide technical support services for trouble shooting and problem solving as required during scheduled visits.
6. Provide ongoing system review and operations training support; including two semi-annual lunches and learn sessions.
7. Establish dedicated, site-specific emergency stock of spare parts to ensure prompt replacement of critical components. These will be stored in a secure location with controlled access.

CONFIGURATION MANAGEMENT

1. Update documentation and software archives with any minor changes to software made during maintenance work.
2. Verify and record operating systems and databases.
3. Record system software revisions and update levels.
4. Archive software in designated offsite Honeywell storage facility, on an annual basis.
5. Provide offline software imaging for disaster recovery procedures, updated on a regular basis.

FRONT END / PC SERVICE

1. Verify operation of personal computer and software:
2. Check for PC errors on boot up
3. Check for Windows errors on boot up
4. Check for software operations and performance, responsiveness of system, speed of software
5. Routinely backup system files, on an annual basis:
6. Trend data, alarm information and operator activity data
7. Custom graphics and other information
8. Ensure disaster recovery procedures are updated with current files
9. Clean drives and PC housing, on an annual basis:
10. Open PC and remove dust and dirt from fans and surfaces
11. Open PC interface assemblies and remove dust and dirt
12. Clean and verify operation of monitors.
13. Verify printer operation, check ribbon or ink.
14. Initiate and check log printing functions.
15. Verify modem operation (if applicable).
16. Review IVR schedule for alarms and review (if applicable).

TEMPERATURE CONTROLS

UNIT VENTS

Services Performed

Annual Inspection

1. Inspect motor and lubricate.
2. Lubricate fan bearings.
3. Inspect coil(s) for leaks.
4. Vacuum interior.
5. Test operation of unit controls.

PUMPS

Services Performed

Preseason Inspection

1. Tighten loose nuts and bolts.
2. Check motor mounts and vibration pads.
3. Inspect electrical connections and contactors.

Seasonal Start-up

1. Lubricate pump and motor bearings per manufacturer's recommendations.
2. Visually check pump alignment and coupling.
3. Check motor operating conditions.
4. Inspect mechanical seals or pump packing.
5. Check hand valves.

Mid-season Inspection

1. Lubricate pump and motor bearings as required.
2. Inspect mechanical seals or pump packing.
3. Ascertain proper functioning.

Seasonal Shut-down

1. Switch off pump.
2. Verify position of hand valves.
3. Note repairs required during shutdown.

PACKAGED AIR-CONDITIONING SYSTEMS

Services Performed

Preseason Inspection

1. Energize crankcase heater.
2. Lubricate fan and motor bearings per manufacturer's recommendations.
3. Check belts and sheaves. Adjust as required.
4. Lubricate and adjust dampers and linkages.
5. Check condensate pan.

Seasonal Start-up

1. Check crankcase heater operation.
2. Check compressor oil level.
3. Inspect electrical connections, contactors, relays, operating and safety controls.
4. Start compressor and check operating conditions. Adjust as required.
5. Check refrigerant charge.
6. Check motor operating conditions.
7. Inspect and calibrate temperature, safety and operational controls, as required.
8. Secure unit panels.
9. Pressure wash all evaporator and condenser coils (if applicable).

10. Log all operating data.

Mid-season Inspection

1. Lubricate fan and motor bearings per manufacturer's recommendations.
2. Check belts and sheaves. Adjust as required.
3. Check condensate pan and drain.
4. Check operating conditions. Adjust as required.
5. Log all operating data.

Seasonal Shut-down *

1. Shut down per manufacturer's recommendations.

* If no Shut-down is required then (2) Mid-season Inspections are performed

BOILERS

Services Performed

Preseason Inspection

1. Inspect fireside of boiler and record condition.
2. Brush and vacuum soot and dirt from flues (not chimneys) and combustion chamber.
3. Inspect firebrick and refractory for defects.
4. Visually inspect boiler pressure vessel for possible leaks and record condition.
5. Disassemble, inspect and clean low-water cutoff.
6. Check hand valves and automatic feed equipment. Repack and adjust as required.
7. Inspect, clean and lubricate the burner and combustion control equipment.
8. Reassemble boiler.
9. Check burner sequence of operation and combustion air equipment.
10. Check fuel piping for leaks and proper support.
11. Review manufacturer's recommendations for boiler and burner start-up.
12. Check fuel supply.
13. Check auxiliary equipment operation.

Seasonal Start-up

1. Inspect burner, boiler and controls prior to start-up.
2. Start burner and check operating controls.
3. Test safety controls and pressure relief valve.
4. Perform combustion analysis.
5. Make required control adjustments.
6. Log all operating conditions.
7. Review operating procedures and owner's log with boiler operator.

Mid-season Inspection

1. Review operator's log.
2. Check system operation.
3. Perform combustion analysis.
4. Make required control adjustments.
5. Log all operating conditions.
6. Review operating procedures and log with boiler operator.

Seasonal Shut-down

1. Review operator's log.
2. Note repairs required.

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APPENDICES

For appendices 1 - 3, please refer to the following files for their electronic version on the USB drive included along with this submission:

Appendix 1 — ECM CALCULATIONS.pdf
Appendix 2— EQUIPMENT CUTSHEETS.pdf
Appendix 3— LIGHTING DETAILS

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THE FUTURE IS WHAT WE MAKE IT

Power for Air Taxis

Real-time Data Makes Work More Efficient

Surveillance Cameras Foresee Buyer Behavior

Digital Twins Get Smart About Maintenance

Access to Quantum Computing

Fast Communication During Emergencies

Intelligent Hearing Protection

Virtual Engineering and Control

Robotic Cargo Unloading

Machine Learning to Fight Cyberattacks

Predictive Airplane Maintenance

Thank you for considering our proposal. We look forward to working with you in the future.

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