Honeywell

Honeywell Building Solutions

Great Meadows Regional School District
Energy Savings Plan

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ENERGY & ENVIRONMENTAL SOLUTIONS

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HONEYWELL PROPRIETARY

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SECTION A EXECUTIVE SUMMARY

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

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

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

The purpose of this document is to provide all the information required for the Great Meadows Regional 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 Great Meadows Regional School District. This is not meant to infer that all of the ECMs identified must be or, based upon legislative requirements, can be implemented at this time. However, as long as the ECM is part of this plan, it may be implemented at a later date as additional funding becomes available or technology changes in order to provide an improved financial return.

The next step in the NJ ESIP process is for the School District to review the information presented in this Energy Savings Plan, and in consideration with District priorities, select the ECMs which merit further development. The selections may include any combination of ECMs as long as the resulting overall project is self-funding in accordance with NJ PL2012, c.55. The school district shall authorize Honeywell through a board resolution to proceed with development of project design documents and solicitation of bids for the selected ECMs in accordance with New Jersey Public Contracts Law.

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

A. Executive Summary

B. Preliminary Utility Analysis – The Preliminary Utility Analysis (PUA) defines the utility baseline for the school buildings included in the Energy Savings Plan. It provides an overview of the current usage within the District and also a cost per square foot by school of utility expenses. The report also compares the District's utility consumption to that of other similar school districts in the same region on a per square foot basis.

C. Energy Conservation Measures – This section includes a detailed description of the ECMs we have selected and identified for your District. It is specific to your Schools 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 District are identified for the purposes of potential inclusion in the program. Final selected ECMs are to be determined by the School District in conjunction with Honeywell during the project development phase of the NJ ESIP process.

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

The following sample self funding project has been provided for the District's review and consideration:

	Recommended Project
Projected Value	$1,786,385
Term of Repayment	15 Year
Projected Savings Over Term	$2,233,382
Projected NJ Rebates & Incentives	$170,728
Projected Interest Rate	3.0%

ECM Description		Recommended Project
1A	Lighting Upgrades – LED Retrofit	✓
1B	Plug Load Management via Wi-Fi	✓
1C	De-Stratification Fans	✓
2A	Natural Gas Conversion	
2B	Boiler Upgrades	
2C	Steam to Hot Water Conversion	
2D	Domestic Hot Water Replacement	
2E	Cooling Tower Refurbishment	✓
2F	Condensing Unit Replacement	
2G	Heat Recovery Unit Retro-commissioning	✓
2H	Window AC Unit Replacement	✓
2I	Premium Efficiency Motors and VFDs	✓
2J	Walk-In Compressor Controllers	
2K	Kitchen Hood Controllers	
2L	Steam Trap Replacement	✓
3A	Building Management System Upgrades / Pneumatic to DDC Conversion	✓
3B	Demand Control Ventilation	✓
3C	Occupancy Controlled Air Handling Systems	✓
4A	Building Envelope Improvements	✓
4B	Window Replacement	
5A	High Efficiency Transformers	
6A	Computer Power Management	✓
6B	CRT to LCD Monitor Replacements	✓
7A	Demand Response - Permanent Load Shed Reduction	✓

E. Measurement & Verification and Maintenance Plan – This section identified 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 that may be included in this program. Consistent maintenance is essential to achieving the energy savings projected in this plan.

F. Design Approach – This section includes a summary of Honeywell's best practices for the successful implementation of a NJ ESIP project. It includes a project specific Safety Management Plan and provides an overview of our project

management procedure, construction management and a sample schedule for the overall completion of the project. Within the schedule, we clearly define the tasks directed towards compliance with architectural, engineering and bidding procedures in accordance with New Jersey Public Contracts Law.

G. Independent Energy Audit – This section includes, for reference, the independent energy audits as previously received by the District through the Local Government Energy Audit (LGEA) program. The audits, provided by Dome-Tech Inc., have been included on a compact disk marked as Appendix 1. A comparison can be made of the ECMs outlined in this investment grade energy audit to the additional ECMs described in the overall Energy Savings Plan.

H. Energy Calculations and Greenhouse Gas Reduction Summary – This section titled Appendix 2: ECM Calculations includes all the energy calculations required to ensure compliance with the law and to confirm the energy savings can, and will, be achieved. These calculations are subject to an independent 3rd party engineering firm review for verification.

A summary of all savings includes a reduction in 640,502 kWh (kilowatt hours of electricity), 15,332 Fuel Oil #2 gallons and 328,215 Pounds of Greenhouse Gas (GHG) emissions. It is the equivalent of removing 22 cars from the road for an entire year and is the same as planting 17.3 acres of forest.

I. Data Logger Plots – This section titled Appendix 3: Data logger Plots includes charts created from data logging equipment which recorded temperatures and lighting levels in the schools for a duration of about two weeks.

J. Equipment Cut-sheets – This section titled Appendix 4: Equipment Cut-sheets includes specification data for the equipment which shall be utilized as the Basis of Design for plans and specifications during the subsequent project development and NJ public bid phase.

K. Safety Management Plan – This section titled Appendix 5: Safety Management Plan establishes a plan for the implementation of Honeywell's Safe Operations Management (SOM) program. The document includes procedures and requirements specific to the Great Meadows Regional School District necessary to support a safe workplace for all stake holders. The Safety Management Plan is a living document, which will be updated and modified to maintain its relevance throughout the project as site conditions and circumstances change.

L. Mechanical Lists – This section titled Appendix 6: Mechanical List includes a list of all mechanical equipment in the district.

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

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

Sincerely,

Joseph J Coscia
Energy Account Executive

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SECTION B PRELIMINARY UTILITY ANALYSIS

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SECTION C ENERGY CONSERVATION MEASURES (ECMS)

Introduction

The information used to develop this Section was obtained through the independent energy audit, building surveys to collect equipment information, interviews with operators and end users, and an understanding of the components to the systems at the sites. The information obtained includes nameplate data, equipment age, condition, the system's design and actual load, operational practices and schedules, and operations and maintenance history.

Honeywell has performed a review of the Energy Conservation Measures (ECMs) which would provide energy and operational cost savings to the Great Meadows School District. This report aims to be an assessment of the feasibility and cost effectiveness of such measures, and an indication of the potential for their implementation. The ECMs listed below have been reviewed throughout your facilities for consideration within a complete Energy Savings Plan. What follows is a general description of the energy auditing process and a detailed description of the Energy Conservation Measures for your facilities.

ENERGY CONSERVATION MEASURES REVIEWED AND CONSIDERED

ECM Description		
1A	Lighting Upgrades – LED Retrofit	✓
1B	Plug Load Management via Wi-Fi	✓
1C	De-Stratification Fans	✓
2A	Natural Gas Conversion	✓
2B	Boiler Upgrades	✓
2C	Steam to Hot Water Conversion	✓
2D	Domestic Hot Water Replacement	✓
2E	Cooling Tower Refurbishment	✓
2F	Condensing Unit Replacement	✓
2G	Heat Recovery Unit Retro-commissioning	✓
2H	Window AC Unit Replacement	✓
2I	Premium Efficiency Motors and VFDs	✓
2J	Walk-In Compressor Controllers	✓
2K	Kitchen Hood Controllers	✓
2L	Steam Trap Replacement	✓
3A	Building Management System Upgrades / Pneumatic to DDC Conversion	✓
3B	Demand Control Ventilation	✓
3C	Occupancy Controlled Air Handling Systems	✓
4A	Building Envelope Improvements	✓
4B	Window Replacement	✓
5A	High Efficiency Transformers	✓
6A	Computer Power Management	✓
6B	CRT to LCD Monitor Replacements	✓
7A	Demand Response - Permanent Load Shed Reduction	✓

Note: To see which Energy Conservation Measures apply to which buildings, refer to the detailed Energy Conservation Measure below.

OVERVIEW

Honeywell has closely evaluated and audited the Great Meadows School District in order to develop the optimum mix of energy saving measures. These selected site-specific measures have been 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 District
- 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 school 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:

1. Optimized flow rates (steam, water, and air).
2. 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 School would reap from the mechanical portion of the measures:

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

Indoor Air Quality

Implementation of new energy-related standards and practices has contributed to a degradation of indoor air quality. In fact, the quality of indoor air has been found to exceed the Environmental Protection Agency (EPA) standards for outdoor air in many homes, businesses, and factories.

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. Honeywell has addressed this issue by focusing on the proper operation and replacement of the unit ventilators and air handler equipment which will assure indoor air quality standards are met.

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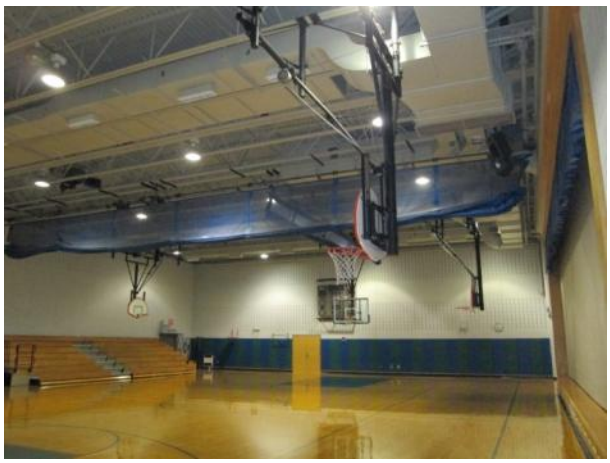
ECM 1A LIGHTING UPGRADES – LED RETROFIT

ECM	ECM Description	Great Meadows Middle School	Central Elementary School	Liberty Elementary School
1a	Lighting Upgrades - LED	✓	✓	✓

Existing Conditions

Lighting throughout the Central School and Liberty School is comprised of fluorescent tube lay-in fixtures with 34 watt T-12 lamps and magnetic ballasts. In these schools the large spaces, such as the multi-purpose rooms and gymnasiums, are served by metal halide lamps. The Middle School, being of more recent construction, contains previous generation fluorescent tube lay-in fixtures with 32 watt T-8 lamps, while its gymnasium contains 400 watt metal halides. Storage rooms and closets are lit with a mixture of incandescent lamps and fluorescent lamps.

The controls for the interior lights consist of manual switches. Exterior lights consist of a mix of wall pack fixtures with metal halide, and high pressure sodium. Incandescent bulbs are used in recessed can-type canopy lights. The light fixtures are powered by the building's electrical system.



Great Meadows Middle School Gymnasium

Central Elementary School Cafeteria

Building	34 Watt T-12	32 Watt t-8	Metal Halide	Incandescent
Great Meadows Middle School	-	792	50	20
Central Elementary School	11	474	8	24
Liberty School	3	539	16	21
Total	14	1805	74	65

Table 1A.1 – Lighting Fixture Counts

Scope of Work

The purpose of the IGA was to identify opportunities to improve the efficiency of the lighting system, while maintaining or where necessary, increasing the current light levels to code requirements. The proposed lighting system is based on converting the existing light fixtures to Light Emitting Diode (LED) technology bulbs and fixtures throughout the district. Detailed line by line work scopes can be found in the appendix as well as proposed product and fixture data and cut sheets.

Great Meadows School District will receive many benefits from the lighting system upgrade. They include the following:

- Long Life - Long life time stands out as the number one benefit of LED lights. LED bulbs and diodes have an outstanding operational life time 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.

- Energy Efficiency – 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. This means that about 80% of the electrical energy is converted to light, while 20% is lost and converted into other forms of energy such as heat. Traditional incandescent light bulbs operate at 20% energy efficiency only, 80% of the electricity is lost as heat.

- Ecologically Friendly - LED lights are free of toxic chemicals. Most conventional fluorescent lighting bulbs contain a multitude of materials like mercury that are dangerous for the environment. LED lights contain no toxic materials and are 100% recyclable, and will help to reduce carbon footprint by up to a third. The long operational life time span mentioned above means also that one LED light bulb can save material and production of 25 incandescent light bulbs. A big step towards a greener future!

- Durable Quality - LEDs are extremely durable and built with sturdy components that are highly rugged and can withstand even the roughest conditions. Because LED lights are resistant to shock, vibrations and external impacts, they make great outdoor lighting systems for rough conditions and exposure to weather, wind, rain or even external vandalism, traffic related public exposure and athletic areas.

- Zero UV Emissions - LED illumination produces little infrared light and close to no UV emissions. Because of this, LED lighting is highly suitable not only for goods and materials that are sensitive to heat due to the benefit of little radiated heat emission, but also for illumination of UV sensitive objects or materials.

- Design Flexibility - LEDs can be combined in any shape to produce highly efficient illumination. Individual LEDs can be dimmed, resulting in a dynamic control of light, color and distribution. Well-designed LED illumination systems can achieve fantastic lighting effects, not only for the eye but also for the mood and the mind: LED mood illumination is already being used in airplanes, classrooms and many more locations and we can expect to see a lot more LED mood illumination in our daily lives within the next few years.

- Operational in Extremely Cold or Hot Temperatures - LEDs are ideal for operation under cold and low outdoor temperature settings. For fluorescent lamps, low temperatures may affect operation and present a challenge, but LED illumination operates well also in cold settings, such as for outdoor winter settings, freezer rooms etc.

- Light Disbursement – LEDs are designed to focus light and can be directed to a specific location without the use of an external reflector, achieving higher application efficiency than conventional lighting. Well-designed LED illumination systems are able to deliver light more efficiently to the desired location.

- Instant Lighting & Frequent Switching - LED lights brighten up immediately and when powered on, which has great advantages for infrastructure projects such as traffic and signal lights. Also, LED lights can be switched off and on frequently and without affecting the LED's lifetime or light emission. In contrast, traditional lighting may take several seconds to reach full brightness, and frequent on/off switching does drastically reduce operational life expectancy.

- Low-Voltage - A low-voltage power supply is sufficient for LED illumination. This makes it easy to use LED lighting also in outdoor settings, by connecting an external solar-energy source and is a big advantage when it comes to using LED technology in remote or rural areas.

Scope of Work Outdoor Lighting

The exterior wall-packs and pole-mounted shoebox fixtures are currently high wattage metal halide and incandescent lamps. These will be replaced with lower wattage LED fixtures. They will be replaced with 78 and 52 watt 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.

To retrofit these lights with energy efficient LEDs, the existing ballasts that are located in the space behind the light will be removed. Once removed, replace them with LED drivers which will use approximately 24V and will not need the existing ballast. The existing lamps are removed and new energy efficient LED lamps are installed in their place. Replacements or maintenance is not required on these type fixtures for up to 100,000 hours or 15-20 years depending on usage time.

Changes in Infrastructure

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

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.

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ECM 1B PLUG LOAD MANAGEMENT VIA WI-FI

ECM	ECM Description	Great Meadows Middle School	Central Elementary School	Liberty Elementary School
1b	Plug Load Management via Wi-Fi	✓	✓	✓

Existing Conditions

A byproduct of the electronic devices such as printers, projectors, televisions, window air conditioning units, and vending machines is their phantom load. Phantom load refers to energy that is used when a device is off. This includes energy used by TV's when they're in standby mode (i.e. when they can be turned on with a remote), and energy used by chargers or a laptop's AC adapter. Studies estimate that phantom load now accounts for 6% of all energy use.

With the increasing number of devices, many facilities managers must rely on people to remember to turn out the lights, or unplug their printers when not in use. Typical electrical draws for when devices are off are as follows:

Device	Wattage
Cold Beverage Machine	384
Snack Machine	60
Large Copier	30
Small Printer / Copier	20
Laptop Charging Cart	35
Projectors	21
Water Fountains	6
Hot / Cold Water Machine	60

Table 1D.1 – Electrical Draw per Typical Device

Proposed Solution

Home automation and control technologies have been around for years, and have the potential to reduce the energy used by a wide variety of devices. Plug load management via Wi-Fi provides a simple solution to the device control dilemma, by using an existing Wi-Fi network to program BERT® electrical plugs to a set schedule defined by the end user. These plugs are in essence a switch that stops all electrical power to the device, turning off equipment and eliminating phantom loads.

The Enterprise Application Program (EAP) is installed on one computer on the network, and is used to set schedules, group devices, and monitor activity. On/Off requests are sent through the existing network router using Wi-Fi. Each BERT plug contains a microchip and antenna that communicates with the enterprise application program on a periodic basis. The BERT enterprise application program uses SNMP (Simple Network Management Protocol) to monitor the activity of connected devices (plugs). When a BERT plug receives an "off" command, the module turns off all power supplied to the plug.

The benefits are energy savings and extended bulb life for the white board projectors. It is estimated that one (1) less bulb replacement will be required per year for each projector.

Energy Savings Methodology and Results

Installation of the outlet strips will reduce the operating hours of the connected peripheral devices reducing electrical consumption.

Changes in Infrastructure

Computers and peripherals will be connected to new BERT plugs permitting peripheral operation to be coordinated with the computer to which they are connected.

Customer Support and Coordination

None.

Environmental Issues

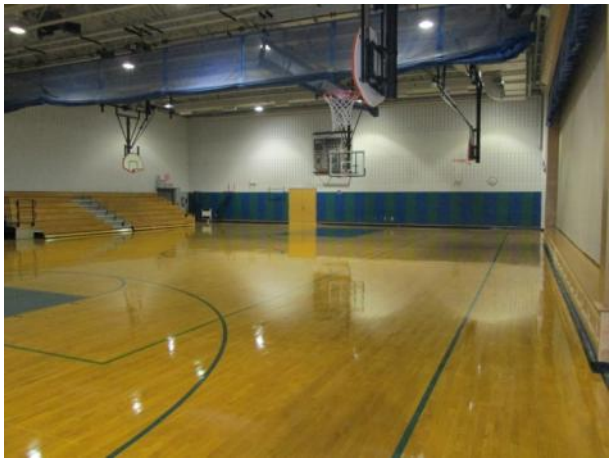
Resource Use	Annual savings for student computers are based wattage difference between the two monitor types.
Waste Production	None
Environmental Regulations	No environmental impact is expected.

ECM 1C DESTRATIFICATION FANS

ECM	ECM Description	Great Meadows Middle School	Central Elementary School	Liberty Elementary School
1c	Destratification Fans	✓		

Existing Conditions

In high ceiling areas such as in a gymnasium and/or cafeteria, warm air stratifies close to the ceiling. Elevated levels of heat transfer through the high walls and roof causes substantial heat loss.



Great Meadows Middle School Gymnasium

Proposed Solution

In the school gyms with 20+-foot ceilings, there is approximately a 15°F+ temperature difference between the floor and the ceiling. With higher ceilings it is even more. 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 de-stratify the air to a 0-3 deg F differential from floor to ceiling and wall to wall. This will allow HVAC systems to have less running time 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 aerodynamically and quietly forces a column of hot air from the ceiling area to the cooler air on the 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 that it mixes with near the floor increasing the temperature of the air and floor. Through a natural law of physics, this torus will continue to re-circulate air through the de-stratification fan suspended near the ceiling and continue 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.

Based on preliminary site investigation conducted by our staff, we propose to install the following as indicated in the table below:

School	Location	Qty	Model
Great Meadows Middle School	Gymnasium	5	Air Pear 65

Table 1C.1 – Proposed De-stratification Fans

Scope of Work

Per Destratification 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.

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 increase run time of the fan motors.
Waste Production	None.
Environmental Regulations	No environmental impact is expected.

ECM 2A NATURAL GAS CONVERSION

ECM	ECM Description	Great Meadows Middle School	Central Elementary School	Liberty Elementary School
2a	Natural Gas Conversion	✓	✓	

Existing Conditions

All three schools in Great Meadows Regional School district do not have natural gas connections and rely on fuel oil as their heating fuel type. Both Central and Liberty School contain a 10,000 gallon oil storage tank, while Great Meadows Middle School contains a 4,000 gallon oil storage tank. Currently, most existing boiler burners are dual fuel compatible, while most domestic hot water heaters are equipped with just fuel oil burners.

It is understood with interviews from staff and Elizabethtown Gas that there have been previous discussions to bring natural gas to the schools. A natural gas pipeline is about 3/10^{ths} of a mile away from Central School and Great Meadows Middle School, but connection is impeded by a creek. The creek hinders natural gas connectivity due to the environmental regulations associated with running fuel around an environmentally protected area. Due to this there is a cost of natural gas connectivity to the Central School and Great Meadows Middle School. Liberty School is miles away from any natural gas pipeline and availability is not possible in the near future.

Proposed Solution

Honeywell initiated conversions with Elizabethtown Gas to determine feasibility and cost to bring natural gas to the Great Meadows School District. Liberty School was immediately taken off the table as there is no gas availability within a few miles of the school – the cost to deliver natural gas would probably be well over one million ($1,000,000) dollars. Currently an engineering study for the natural gas line is being conducted for the Central School and Great Meadows Middle School. Elizabethtown Gas has been on site and has a good idea of where the natural gas line will go. Further coordination is required as there might be permitting issues to bring the natural gas line within school grounds. At this moment we do not have a cost estimate of bringing natural gas to the schools. It is expected that Elizabethtown Gas will finalize their numbers by the beginning of July 2014.

Natural Gas to Central School and Great Meadows Middle School would reduce heating costs significantly, as natural gas is of less cost than fuel oil. In addition, it would allow more efficient boilers and domestic hot water heaters, in the form of condensing boilers and condensing domestic hot water heaters - refer to ECM 2b & 2d for details. Cost within this proposal includes gas connectivity to the heating equipment and replacement of any fuel oil only burners to dual fuel burners and the gas train in Great Meadows Middle School.

Energy Savings Methodology and Results

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

Energy Savings $	= Existing $ per MMBTU / Proposed $ per MMBTU

Changes in Infrastructure

Natural gas line runs will be determined. Natural gas trains and dual fuel burners will be installed on respective boilers and domestic hot water heaters.

O&M Impact

None.

Customer Support and Coordination with Utilities

Constant support and constant coordination will be required with the utility through the entire process of bringing natural gas to the buildings.

Environmental Issues

Resource Use	Energy savings can result from greater combustion efficiency due to condensing equipment now possible
Waste Production	Handled by utility.
Environmental Regulations	Environmental permits are expected; all regulations will be adhered to in accordance with EPA and local code requirements.

ECM 2B BOILER UPGRADES

ECM	ECM Description	Great Meadows Middle School	Central Elementary School	Liberty Elementary School
2b	Boiler Upgrades		✓	

Existing Conditions

In general, the boilers at the Great Meadows School District have been well maintained which has resulted in additional years of operation. Great Meadows Middle School has one Cleaver Brooks boiler from 1998. Central elementary school has one Weil McLain and one HB Smith steam boilers from the 1961 and 1968 and Liberty Elementary School has two Weil McLain hot water boilers.

Central E.S. – Weil McLain and HB Smith Steam Boilers

School	Manufacturer	Model	Qty	Input (Each)	Fuel
Central Elementary School	Weil McLain	HB-44-15 Series 2	1	2733	Fuel Oil #2
Central Elementary School	HB Smith	450 Mills	1	2710	Fuel Oil #2

Table 2B.1 – Existing Equipment

Proposed Solution

It is recommended that the HB Smith boiler be removed for a higher efficiency steam boiler. Furthermore, this boiler contains asbestos around the jacket and piping behind the boiler. New steam boilers have thermal efficiencies that range from 84 – 86% depending on the return hot water temperature from the heating loop. With proper design, it is typical to see thermal efficiencies of around 85%. Thermal efficiency is only one part of the equation that makes up the seasonal efficiency of a boiler. The existing boilers to be replaced suffer from jacket losses (radiation losses) that exist in smaller proportions, in the newer steam boilers.

The proposed boilers are sized based on heat load calculations done for each school. In general, this region of the country requires a maximum 40 btu/sq ft for a school for the coldest days. With the proposed energy efficiency project this general rule of thumb will lower as the buildings become tighter and more operationally efficient. However, Honeywell still sizes the boilers on the more conservative end of the spectrum and size each boiler, in the case of two boilers serving the building, to handle the entire building load by itself.

School	Manufacturer	Model	Qty	Input (Each)	Fuel	Burner
Central Elementary School	Weil McLain	Existing Boiler to Remain				
Central Elementary School	HB Smith	28HE-S-15	1	2,942	Fuel Oil #2	Powerflame C3-G0-25B w/ Modulation

Table 2B.2 – Proposed Boiler Equipment

Scope of Work

The following outlines the boiler replacement:

- Disconnect gas back to shutoff valve and electric back to source panel-board.
- Remove existing boilers
- Connect gas and heating hot water appurtenances to new boilers.
- Terminate and power new boiler electric circuiting.
- 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 boiler will be installed in itemized locations; in addition, training for maintenance personnel will be required as well as on-going, annual preventive maintenance.

O&M Impact

The new boilers will decrease the O&M cost significantly 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	Energy 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.

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ECM 2C STEAM TO HOT WATER CONVERSION

ECM	ECM Description	Great Meadows Middle School	Central Elementary School	Liberty Elementary School
2c	Steam to hot water conversion		✓	

Existing Conditions

The heating plant for Central Elementary School consists of one (1) Weil McLain and one (1) HB Smith steam boilers with a heat exchanger for the hot water sections of the building. The school contains five main sections, the original 1918 steam section, the 1938 steam section, the 1960 steam section, the 1968 hot water section, and the 2008 hot water section. Steam piping for the original section of the building is run through accessible tunnels directly underneath one side of classrooms, with piping going directly up to the unit ventilators.

Central E.S. – Condensate Tank and Heat Exchanger

According to site surveys and discussions during walkthroughs, a little more than a 1/2th of the building is served by steam, making a conversion to hot water difficult and costly. Steam is a very inefficient medium to heat a building. Steam is rarely installed anymore except in large central plants with long piping runs or in manufacturing plants where the steam is used in process productions. Along with a steam systems inefficiencies are the greater maintenance needed to maintain the system compared to a hot water system.

Steam systems suffer from greater heat loss because of their higher temperatures, greater leaks throughout the system caused by their higher pressures, and steam trap failures. In addition, steam boilers undergo greater maintenance as they need to be consistently blown down to prevent tube fouling. Every facility is different, but it blow down is usually down once a day. Hot water boilers too can suffer from tube fouling, but this is minimized when proper water treatment takes place. All of the above factors lead to steam having much lower system efficiency. Replacing a steam system with a hot water system reduces fuel consumption and eliminates many maintenance issues.

School	Manufacturer	Model	Qty	Input (Each)	Fuel
Central Elementary School	Weil McLain	HB-44-15 Series 2	1	2733	Fuel Oil #2
Central Elementary School	HB Smith	450 Mills	1	2710	Fuel Oil #2

Table 2C.1 – Existing Steam Boilers

School	Equipment Type	Qty	Notes
Central Elementary School	Unit Ventilator	19	Classrooms
Central Elementary School	Radiators	6	Hallways

School	Equipment Type	Qty	Notes
Central Elementary School	Convectors	7	Hallways/Bathrooms
Central Elementary School	Fan Coil Units	2	Entranceway

Table 2C.2 – Existing Steam Equipment

Proposed Solution

Honeywell proposes replacing the steam system with a hot water system. Since the existing boilers are near the end of their useful life and are inefficient, by today's standards, replacement is recommended. Replacing the boilers would be the best time to consider replacement of the steam system in the building, and interconnecting the two different loops together (if possible). This would save on the initial equipment investment, instead of buying two separate sets of boilers for two different heating loops.

The existing steam boilers will be replaced with efficient, condensing hot water boilers, of same capacity. Since this will be newly designed and constructed it is possible to see thermal efficiencies of new condensing hot water boilers at around 92%. There are three efficiency gains with the conversion to hot water: Increase in boiler efficiency, increase in system efficiency, and avoided thermal consumption by steam trap removal. These estimated savings for the system are 16%, 4% and 4% respectively.

Conversion to hot water requires removal of existing steam piping, steam coils, boilers, and other associated pieces of equipment. Essentially, an entire new boiler room would be needed to do the conversion as many existing pieces of equipment would need to be replaced.

School	*Manufacturer*	*Model*	*Qty*	*Input (Each)*	*Fuel*
Central Elementary School	Aerco	Benchmark 2.0	2	2,000 MBH	Gas

Table 2C.3 – Proposed Boilers

Scope of Work

The following outlines the boiler replacement:

- Disconnect gas back to shutoff valve and electric back to source panel-board.
- Remove existing boilers
- Connect gas and heating hot water appurtenances to new boilers.
- Remove and replace existing steam lines and coils with hot water piping and coils
- Re-insulate new hot water piping
- Install hot water pumps in a led/lag configuration
- Terminate and power new boiler electric circuiting.
- 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 boiler will be installed in itemized locations; in addition, training for maintenance personnel will be required as well as on-going, annual preventive maintenance. New piping will be installed in similar location except for where size does not allow. New hot water pumps will be installed in the respective boiler plants; training for maintenance personnel will be required.

O&M Impact

The new boilers will decrease the O&M cost significantly 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	Energy 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.

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ECM 2D DOMESTIC HOT WATER REPLACEMENTS

ECM	ECM Description	Great Meadows Middle School	Central Elementary School	Liberty Elementary School
2d	Domestic Hot Water Replacements	✓		

Existing Conditions

The domestic water heater at Great Meadows Middle School is oil fired and is inefficient compared to condensing models. Furthermore, these domestic hot water heaters are grossly oversized for the building, contributing to poor thermal efficiencies when heating.

Great Meadows Middle School – 1998 DWH

School	Qty	Mfg / Model	Existing MBH	Existing Fuel
Great Meadows Middle School	1	A/B-WGO-9	257	Fuel Oil #2

Table 2D.1 – Existing Equipment

Possible Solution

Honeywell proposes replacing the existing DHW system at Great Meadows High School and Briarcliff Middle School with highly efficient condensing DHW heaters. New condensing DHW heaters have efficiencies between 92% - 94%. They provide better control with capabilities as night setback, temperature adjustments and demand control hot water.

School	Qty	Mfg / Model	Proposed MBH	Proposed Fuel
Great Meadows Middle School	1	AO Smith / BTH-199	199	Gas

Table 2D.2 – Proposed Equipment

Scope of Work

The following outlines the domestic hot water heater replacement:

- Install new dual fuel domestic hot water heater as specified in table above
- Install all required piping, controls, and breeching
- Install mixing valve
- Install circulators for building use and kitchen supply

- 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)

Changes in Infrastructure

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

Equipment Information

Manufacturer and Type	Several quality and cost effective manufacturers are available. The following is an example of equipment that may be utilized. Honeywell and the Customer will determine final selections.
Equipment Identification	As part of the measure design and approval process, specific product selection will be provided for your review and approval.

Customer Support and Coordination with Utilities

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

Environmental Issues

Resource Use	Energy savings will result from improved thermal efficiency.
Waste Production	This ECM will produce no waste by-products.
Environmental Regulations	No environmental impact is expected.

Utility Interruptions

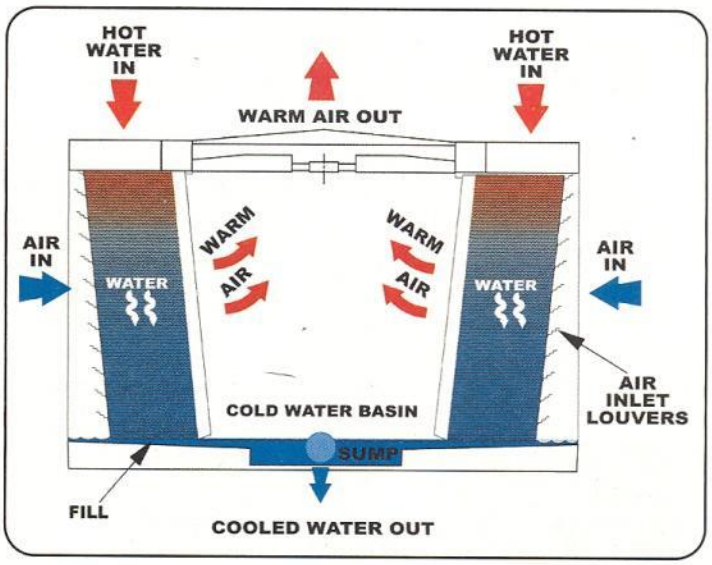
Proper phasing procedures will minimize gas interruptions.

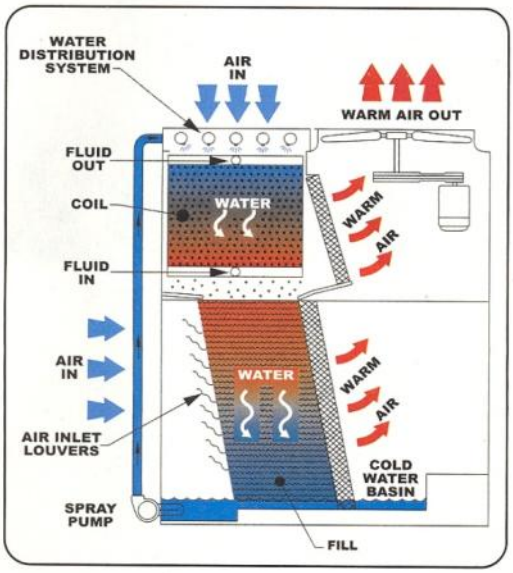
ECM 2E COOLING TOWER REFURBISHMENT

ECM	ECM Description	Great Meadows Middle School	Central Elementary School	Liberty Elementary School
2e	Cooling Tower Refurbishment	✓		

Existing Conditions

A cooling tower is a counter-flow or cross-flow heat exchanger that removes heat from water and transfers it to air. Cooling towers come in many configurations. An induced-draft cooling tower, which is common in HVAC and industrial applications, is shown in Figure 1a. As warm water from the process falls through the tower, some of it evaporates, which cools the remaining water. The cooled water collects at the bottom of the cooling tower and is returned to the plant. The figure below shows an evaporative condenser, which is common in industrial refrigeration applications. Water is circulated from the bottom to the top of the tower, to cool a fluid (typically a refrigerant) which passes through a closed heat exchanger.





Existing						
School	Qty.	Make	Model	Location Served	Unit Tonnage	VFD
Central School	1	Tower Tech	NC2011	Water Source Heat Pump Loop	200	N

Table 2E.1 – Existing Cooling Towers

Great Meadows Middle School currently has a cooling tower which appears to have damaged fill grades. Damaged fill grades can result in a poor distribution of water within the cooling tower, resulting in lower efficiencies. In order to function properly, water and air must flow freely through the cooling tower to extract the heat from the incoming water.

Proposed Solution

Honeywell recommends refurbishment of the existing cooling tower at Great Meadows Middle School. Refurbishment will optimize the existing cooling tower, by replacing necessary parts such as the fill and grading inside the unit. Replacing the cooling tower would be cost prohibitive considering the same result can be achieved at a fraction of the cost. During site surveys we brought the cooling tower manufacturer who verified that refurbishment was the recommended approach with the desired results.

Energy Savings Methodology and Results

The savings approach is based on the energy efficiency between the pre and post refurbish unit. The savings are generally calculated as:

Electric Energy Savings	Existing unit energy consumption (kWh) – proposed unit energy consumption (kWh)

Changes in Infrastructure

None

Customer Support and Coordination with Utilities

None

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

ECM 2F CONDENSING UNIT REPLACEMENT

ECM	ECM Description	Great Meadows Middle School	Central Elementary School	Liberty Elementary School
2f	Condensing Unit Replacement		✓	✓

Existing Conditions

Some condensing units serving Central and Liberty Elementary Schools are inefficient and have exceeded their expected useful service 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 units in operation.

Liberty Elementary School – Condensing Units

School	Make	Model	Location Served	Qty.	Tons	EER
Central Elementary School	Trane	TTB718A100A0	CS-AHU-1	1	1.5	8.0
Central Elementary School	Trane	TTA042A300B0	Room 105	1	2.0	8.0
Liberty Elementary School	Carrier	RCS1003000C00A	LS-AHU-1	1	5.0	8.0
Liberty Elementary School	Trane	BTD730A100B0	LS-AHU-7	1	2.5	8.0
Liberty Elementary School	Trane	BTD724A100C1	LS-AHU-8	1	2.0	8.0
Liberty Elementary School	Trane	BTD730A100B0	Nurse Station	1	2.5	8.0

Table 2F.1 – Existing Condensing Units to be Replaced

** EER is estimated.*

Proposed Solution

Honeywell proposes replacing the existing condensing units in Table 2F.1. 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 unit will be equipped with factory-installed microprocessor controls that improve unit efficiency. The unit will also communicate with the existing building management system. This new unit will also be direct fired, giving the district to heat the space unlike previously. Although, Honeywell expects the unit never to be in heating mode, it is recommended that any new unit be equipped with a direct fired natural gas burner.

School	Make	Model	Location Served	Qty.	Tons	EER
Central Elementary School	Lennox	SSB018H4	CS-AHU-1	1	1.5	8.0
Central Elementary School	Lennox	SSB024H4	Room 105	1	2.0	8.0
Liberty Elementary School	Lennox	SSB060H4	LS-AHU-1	1	5.0	8.0

School	Make	Model	Location Served	Qty.	Tons	EER
Liberty Elementary School	Lennox	SSB030H4	LS-AHU-7	1	2.5	8.0
Liberty Elementary School	Lennox	SSB024H4	LS-AHU-8	1	2.0	8.0
Liberty Elementary School	Lennox	SSB030H4	Nurse Station	1	2.5	8.0

Table 2F.2 – Proposed Condensing Units

Scope of Work

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

- Disconnect existing RTU electric connections.
- Disconnect piping and air ducts from the unit.
- Remove unit from the base.
- Modify base for new unit if necessary.
- Run new gas line for gas fired heater.
- Rigging and setting 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 School District will determine final selections.
Equipment Identification	Product cut sheets and specifications are available upon request. As part of the measure, design and approval process, specific product selection will be provided for your review and approval.

Customer Support and Coordination with Utilities

Coordination of the electrical tie-in will be required.

Environmental Issues

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

ECM 2G HEAT RECOVERY UNIT RETRO-COMMISSIONING

ECM	ECM Description	Great Meadows Middle School	Central Elementary School	Liberty Elementary School
2g	Heat Recovery Unit Retro-Commissioning	✓		

Existing Conditions

There are three (3) existing heat recovery units at the Great Meadows Middle School. The heat recovery units supply pre-conditioned outdoor air to the spaces by using passing conditioned exhaust air through a heat exchanger which transfers some of its heat to the outdoor air. By doing this, the previously unconditioned outdoor air becomes preconditioned and then distributed through the heating/cooling system.

Currently, two (2) out of the three (3) heat recovery units do not operate. The heat recovery units serving the Gymnasium and Cafeteria have not been in operation for some time. The unit serving the gymnasium has not worked in several years and has undergone several diagnostic tests to determine the cause of its non-functionality, but nothing conclusive has been found.

Great Meadows Middle School – Gymnasium and Cafeteria Heat Recovery Units

School	Make	Model	Location Served	Qty.	Supply CFM
Great Meadows Middle School	HeatEx	5000-1C	Cafeteria	1	6,365
Great Meadows Middle School	HeatEx	RHXC-1C-27	Gymnasium	1	22,435

Table 2G.1 – Existing Heat Recovery Ventilators

Proposed Solution

Honeywell proposes a complete retro-commissioning of the heat recovery units. This includes a complete testing of individual parts to determine functionality and replace where needed. Electrical systems, fans, motors, control panels, control wiring and programming are examples of items that will be retro-commissioned inside the units.

Scope of Work

The following outlines the scope of work to retro-commission the heat recovery units stated in the above table:

- Repair or replace mechanical and electrical components where necessary for unit functionality
- Repair or replace existing controls in units
- Reprogram unit to operate as manufacturer intended
- 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) + additional gas consumption.

Equipment Information

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

Customer Support and Coordination with Utilities

None.

Environmental Issues

Resource Use	Energy savings will result from functional units.
Waste Production	None.
Environmental Regulations	No environmental impact is expected.

ECM 2H WINDOW AC UNIT REPLACEMENT

ECM	ECM Description	Great Meadows Middle School	Central Elementary School	Liberty Elementary School
2h	Window AC Unit Replacement		✓	

Existing Conditions

During walkthrough five (5) window air conditioning were indentified within various offices and break rooms in Central School. These units have 1 to 1.5 tons of capacity each. Tonnage of these units is based on space size they serve. The existing window air conditioning units range in condition from good to poor, and have an average Estimated Efficiency Ratio of 8.5. There is also limited temperature/occupancy control of these units, resulting in inefficient operation.

Building	Location Served	Make	Qty	Cooling BTU	EER
Central School	Offices/Teachers Lounge	Quesar	5	12,000 – 18,000	10.0

Table 2H.1 – Existing Window AC Units to be Replaced

Proposed Solution

Honeywell is proposing to replace the existing window air conditioners with new energy efficient units (EER >= 12) that will provide reliable service for many years to come. The new units will be high efficiency units installed in place of existing window units. The new units will be sized to provide cooling for the areas that are currently air conditioned, thus eliminating improper sizing and malfunction. The new units will save on operational costs, as well as, reduce energy consumption.

Building	Location Served	Make	Qty	Cooling BTU	EER
Central School	Offices/Teachers Lounge	Lennox	5	12,000 – 18,000	12.0

Table 2H.2 – Proposed Window AC Units

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	Product cut sheets and specifications are available upon request. As part of the measure, design and approval process, specific product selection will be provided for your review and approval.

Customer Support and Coordination with Utilities

None.

Environmental Issues

Resource Use	Energy savings will result from higher efficiency units.
Environmental Regulations	No environmental impact is expected.

ECM 2I PREMIUM EFFICIENCY MOTORS AND VFDS

ECM	ECM Description	Great Meadows Middle School	Central Elementary School	Liberty Elementary School
2i	Premium Efficiency Motors and VFDs	✓		

Existing Conditions

Honeywell has indentified standard efficiency electric motors on hot water pumps. Energy savings can be obtained by replacing the standard efficiency motors with premium efficiency motors as well as by installing Variable Frequency Drives on systems that have two way control valves.

Great Meadows MS – WSHP Pumps and non functional VFD

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

School	Equipment Description	Motor	Qty	Motor HP	Replace Motor Y/N	Add VFD Y/N
Great Meadows Middle School	MS-WSL-1,2	Baldor	2	40.0	Y	Y

Table 2I.1 – Existing Motors and Replacements

Proposed Solution

Honeywell proposes replacing of all above-mentioned single speed standard efficiency motors (that do not have VFDs) with new premium efficiency motors, installing new couplings where applicable. In addition, Honeywell recommends installing VFDs on these pumps.

Scope of Work

1. Remove and dispose of the old standard efficiency motors.
2. Inspect all couplings and replace as needed.
3. Install new motors on the existing pumps designated.
4. Align the couplings to EASA standards.
5. Install VFDs on the pumps.
6. Install wiring and controls on the new VFDs.
7. Measure and verify the pre and post-retrofit voltage, amperage, and RPM.

Energy Savings Methodology and Results

The energy consumed by electric motors varies inversely with the cube of the motor speed. Variable speed 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. The following is an example of equipment being utilized. Honeywell and Great Meadows School District will determine final selections.
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

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 2J WALK-IN COMPRESSOR CONTROLLERS

ECM	ECM Description	Great Meadows Middle School	Central Elementary School	Liberty Elementary School
2j	Walk-In Compressor Controllers	✓	✓	✓

Existing Conditions

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

Great Meadows M.S. – Walk-In Refrigerator and Freezer

Liberty E.S. – Walk-In Refrigerator and Freezer

School	Location	Walk-In Refrigerators	Walk-In Freezers
Great Meadows Middle School	Kitchen	1	1
Central Elementary School	Kitchen	-	1
Liberty Elementary School	Kitchen	1	1
Total		2	3

Table 2J.1 – Existing Walk-In Refrigerators/Freezers to Receive Controllers

Proposed Solution

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

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

Intellidyne Sensor Features

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

Intellidyne Sensor Benefits

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

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

Energy Savings Methodology and Results

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

Changes in Infrastructure

None

Customer Support and Coordination with Utilities

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

Environmental Issues

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

ECM 2K KITCHEN HOOD CONTROLLERS

ECM	ECM Description	Great Meadows Middle School	Central Elementary School	Liberty Elementary School
2k	Kitchen Hood Controllers	✓		

Existing Conditions

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

Great Meadows Middle School – Kitchen Hood

Possible Solution

Honeywell does not recommend installing an automated DDC control system to control the hood exhaust fan due to the long payback challenges of this potential solution.

School	Number of Hoods
Great Meadows Middle School	1

Table 2I.1 – Existing Kitchen Hoods to be installed with Controllers

Scope of Work

1. Install a variable speed drive in a NEMA approved enclosure for the kitchen hood exhaust fan.
2. Reconfigure existing power wiring through the variable speed drives.
3. Provide a motion sensor and an optical sensor at the kitchen exhaust hood to determine use.
4. Provide variable speed drive control points for start/stop, speed and alarm.
5. Provide control logic and software to accomplish sequences and incorporate into DDC system.
6. Commission control components and sequences, and calibrate control loops.

Energy Savings Methodology and Results

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

Changes in Infrastructure

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

Customer Support and Coordination with Utilities

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

Environmental Issues

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

ECM 2L STEAM TRAP REPLACEMENT

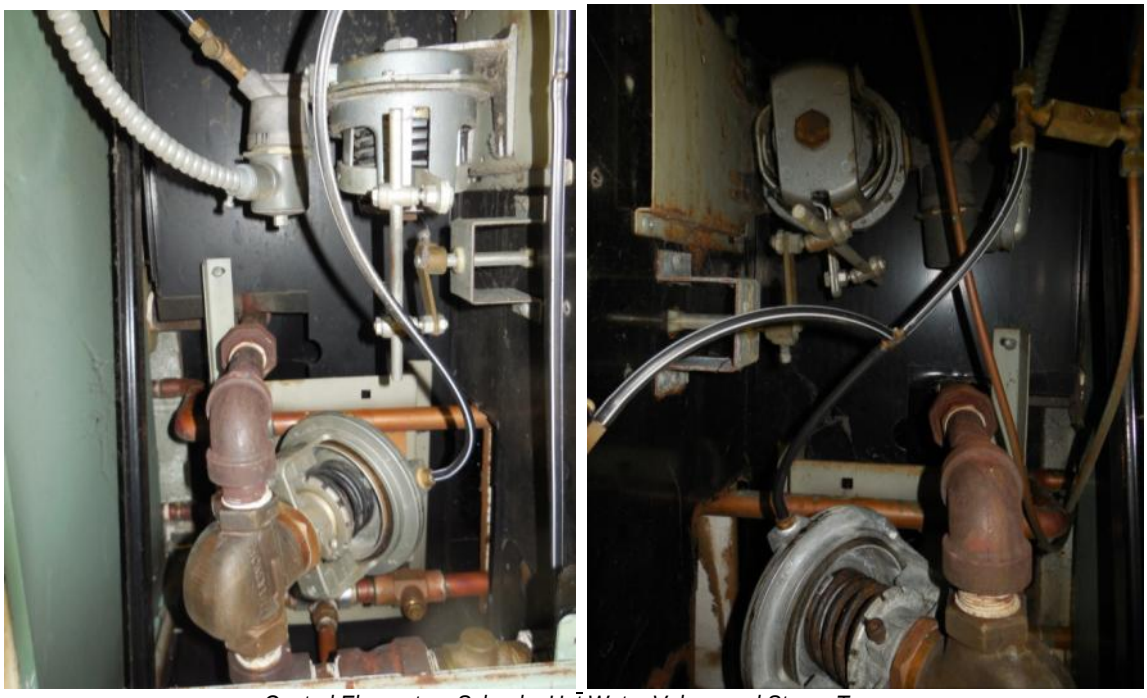
ECM	ECM Description	Great Meadows Middle School	Central Elementary School	Liberty Elementary School
2l	Steam Trap Replacement		✓	

Existing Conditions

Central Elementary School uses steam for space heating within their older sections. Steam trap counts are in Table 2I.1 below. In general, the steam traps surveyed during site vistis are in fair to poor condition.

When steam heats the building and transfers its heat throughout the building, it condenses back to water. Therefore, at each of these end uses, 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 inspection and correction 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.



Central Elementary School – Hot Water Valves and Steam Trap

Building	Steam Traps
Central Elementary School	30
Total	30

Table 2I.1 – Existing Steam Traps

Proposed Solution

Honeywell recommends retrofitting the traps per the following scope of work. The steam trap retrofit includes surveying all of the existing steam traps and engineering appropriate replacements. During construction, Honeywell will provide all materials, fittings, labor and supervision for the timely completion of the project. Schedule 80 fittings will be used to re-pipe steam traps only when necessary. All existing strainers, isolation valves, check valves, and fittings in good repair will be reused.

Scope of Work

1. Replace 28 thermostatic steam traps.
    a. Steam traps will be replaced with new steam traps manufactured by Barnes and Jones Inc.
2. Replace 2 float & thermostatic (F&T) steam traps.
    a. Steam traps will be replaced with new steam traps manufactured by Barnes and Jones Inc of like size and capacity.
3. Where possible, reuse existing isolation valves, unions, and strainers. Replace only when necessary during the steam trap installation.

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 20% 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	Steam Trap selection will be determined in conjunction with Great Meadows School 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 BUILDING MANAGEMENT SYSTEM UPGRADES / PNEUMATIC TO DDC CONVERSION

ECM	ECM Description	Great Meadows Middle School	Central Elementary School	Liberty Elementary School
3a	Building Management System Upgrades / Pneumatic to DDC	✓	✓	✓

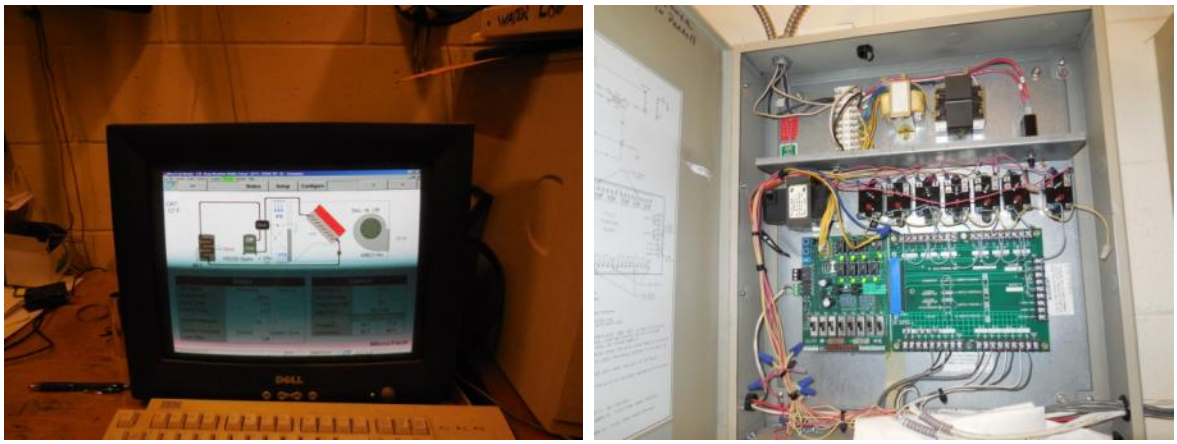
Introduction

Honeywell shall provide all equipment, materials, and labor to implement the building management systems upgrades in accordance with the scope outlined below.

Comfort Point Scope of Work

Scope of Work

1. Furnish and install one (1) Enterprise Building Integrator (EBI) to be located at the Great Meadows Middle School, Great Meadows, NJ.
2. Great Meadows School District shall be responsible to ensure all school buildings are connected on school LAN for communication with the Enterprise Building Integrator (EBI).
3. Mountain Lakes School District shall be responsible to provide and terminate new LAN connections in each school building which will be used to connect a new controller for integration to the Enterprise Building Integrator (EBI).
4. Great Meadows School District shall provide VPN access to Honeywell for remote access of the school Enterprise Building Integrator (EBI) for M&V and service functions.
5. Training for the new Building Management System includes 16 hours total of on-site training that will be led by Honeywell and will provide appropriate learning material
6. There is no new work associated with fire alarm or duct detectors or fan shutdown. Any existing shutdown circuits will remain.
7. UPS backup for controllers is not included.
8. All low voltage wiring to be plenum rated cable (no conduit), including drops to thermostats, except in mechanical rooms, which will be in EMT conduit.
9. Cutting, painting and patching is excluded
10. Valve installations by mechanical contractor
11. Existing equipment that is to be reused is assumed to be in good working condition, any repairs required are not included.



Great Meadows Middle School – Front End and Microtech DDC Panel

Building Scope of Work

Enterprise Building Integrator (EBI) at Great Meadows Middle School

A workstation PC and software with flat screen Monitor and printer will be installed at the Middle school providing access for monitoring, viewing and service of Great Meadows Middle School, Central School and Liberty School via VPN access provided by the school district.

Great Meadows Middle School

Honeywell will integrate the existing Network 8000 and McQuay systems into a New Enterprise Building Integrator (EBI) System and Operator Workstation for monitoring, viewing and service of existing equipment functions.

Central School UV's

Provide and install new Honeywell DDC controllers for the twenty-nine (29) unit ventilators at Central School to implement night set back and accurate temperature control.

Central School Unit Ventilators w/RA&OAD	AI	AO	DI	DO
Outside & Return Air Damper Signal		29		
Low limit Thermostat			29	
Discharge Air Temperature	29			
Room Sensor Temperature	29			
Room Sensor Setpoint	29			
Fan Enable				29
Fan Status			29	
Reheat Steam Valve Signal		25		
Reheat Hot Water Valve Signal		11		

NOTE: Low limit thermostats will be hardwired to safety circuit.

Honeywell shall implement:

- Occupied/Unoccupied Schedules
- Room temperature control
- Integrate all new unit ventilator controllers into Enterprise Building Integrator (EBI).
- Graphics for all unit ventilators showing proper points and associating alarm points with their respected graphic pages.

Central Elementary School – Pneumatic Panel and Time Clock

Central Schools AHU's

Provide and install new Honeywell DDC controllers for AHU's with DX cooling to implement night set back and Monitoring and control. This work includes reusing existing wiring, valves, and actuators where applicable.

Central School AHU w/ DX Cooling	AI	AO	DI	DO
Outdoor, Mixed & Exhaust Air Dampers (3 dampers per RTU)		2		
Mixed Air Temp	2			
Freeze stat alarm			2	
Supply Fan Enable				2
Supply Fan Status			2	
DX Cooling (2-stages)				8
Heat Coil valve (1"NPT)		2		
Discharge Air Temp	2			
Room Sensor Temperature	2			
Room Set point	2			

Honeywell shall implement:

- Room temperature control
- Occupied/Unoccupied Schedules
- Graphics for all AHU's showing proper points and associating alarm points with their respected graphic pages in the Enterprise Building Integrator (EBI).

Central Schools Boilers Systems

Provide and install new Honeywell DDC controllers for Boiler Rooms with Boilers, steam to hot water converters and hot water zone valves as designated below. This work includes reusing existing wiring, valves, and actuators where applicable.

Central Boiler Systems	AI	AO	DI	DO
Outdoor Air Sensor	1			
Converter Supply Hot Water Header Temperature	2			
Converter Return Hot Water Header Temperature	2			
Hot water converter steam valve		2		
3 Way Hot Water Valve Discharge Temp	2			
3 Way Hot Water zone Valves (2)		2		
Supply Header Steam Pressure Boiler 1	2			
Supply Header Steam Pressure Boiler 2	2			
Steam Blr 1 Enable				1
Steam Blr 1 Status			1	
Steam Blr 1 Alarm			1	
Steam Blr 2 Enable				1
Steam Blr 2 Status			1	
Steam Blr 2 Alarm			1	
Pump Start/Stop Status			4	4
Differential Bypass valve		1		
Differential Pressure sensor		1		

NOTE: The existing boilers will remain. Honeywell shall provide DDC boiler controls which are to be furnished, installed, wired, programmed and checked-out.

Honeywell shall implement:

- Boiler Enable/Disable
- Boiler Status/Alarm
- Converter Temperature reset Control
- Zone valve control
- Graphics for Boilers showing proper points and associating alarm points with their respective graphic page(s) in the Enterprise Building Integrator (EBI).

Liberty School UV's

Provide and install new Honeywell DDC controllers for the nineteen (19) classroom unit ventilators and four (4) ceiling hung at liberty school to implement night set back and accurate temperature control.

Liberty School Unit Ventilators w/RA&OAD	AI	AO	DI	DO
Outside & Return Air Damper Signal		23		
Low limit Thermostat			23	
Discharge Air Temperature	23			
Room Sensor Temperature	23			
Room Sensor Setpoint	23			
Fan Enable				23
Fan Status			23	
Reheat Hot Water Valve Signal		48		

NOTE: Low limit thermostats will be hardwired to safety circuit.

Honeywell shall implement:

- Occupied/Unoccupied Schedules
- Room temperature control
- Integrate all new unit ventilator controllers into Enterprise Building Integrator (EBI).
- Graphics for all unit ventilators showing proper points and associating alarm points with their respected graphic pages.

Liberty Elementary School – Boiler DDC Panel and Building Pneumatic Panel

Liberty Schools AHU's

Provide and install new Honeywell DDC controllers for AHU's with DX cooling to implement night set back and Monitoring and control. This work includes reusing existing wiring, valves, and actuators where applicable.

Liberty School AHU w/ DX Cooling	AI	AO	DI	DO
Outdoor, Mixed & Exhaust Air Dampers (3 dampers per RTU)		4		
Mixed Air Temp	4			
Freeze stat alarm			4	
Supply Fan Enable				4
Supply Fan Status			4	
DX Cooling				4
Heat Coil valve (1 1/2"NPT)		4		

Discharge Air Temp	4			
Room Sensor Temperature	4			
Room Set point	4			

Honeywell shall implement:

- Room temperature control
- Occupied/Unoccupied Schedules
- Graphics for all AHU's showing proper points and associating alarm points with their respected graphic pages in the Enterprise Building Integrator (EBI).

Liberty School H&V Units & Exh Fans

Provide and install new Honeywell DDC controllers for two (2) Exhaust Fans and Four (4) H&V Units with outside air cooling to implement night set back. This work includes reusing existing wiring, valves, and actuators where applicable.

Liberty School H&V's w/ Outside Air Cooling (Typical of 4) Exh. Fans (Typical of 2)	AI	AO	DI	DO
Outdoor, Mixed & Exhaust Air Dampers (3 dampers per AHU)		8		
Mixed Air Temp	4			
Freeze stat alarm			4	
Supply Fan Enable				4
Supply Fan Status			4	
Room Co2 sensor	4			
Heat Coil valve (2"NPT)		4		
Discharge Air Temp	4			
Room Sensor	4			
Room Set point	4			
Exhaust Fan stop/start				2
Exhaust Fan Status			2	

Honeywell shall implement:

- Room temperature control
- Occupied/Unoccupied Schedules
- Graphics for all AHU's showing proper points and associating alarm points with their respected graphic pages in the Enterprise Building Integrator (EBI).

Liberty Schools Boilers Systems

Provide and install new Honeywell DDC controllers for Boiler Rooms with Boilers, and hot water zone and differential valves as designated below. This work includes reusing existing wiring, valves, and actuators where applicable.

Liberty School Boiler Systems	AI	AO	DI	DO
Outdoor Air Sensor	1			
Supply Hot Water Header Temperature	1			
Return Hot Water Header Temperature	1			
3 Way Hot Water Valve Discharge Temp	2			
3 Way Hot Water zone Valves (2)		2		
Supply Header Steam Pressure Boiler 1	1			
Supply Header Steam Pressure Boiler 2	1			
Hot Water Blr 1 Enable				1
Hot Water Blr 1 Status			1	

Liberty School Boiler Systems	AI	AO	DI	DO
Hot Water Blr 1 Alarm			1	
Hot Water Blr 2 Enable				1
Hot Water Blr 2 Status			1	
Hot Water Blr 2 Alarm			1	
Pump Start/Stop Status			6	6
Differential Bypass valve		2		
Differential Pressure sensor		2		

NOTE: The existing boilers will remain. Honeywell shall provide DDC boiler controls which are to be furnished, installed, wired, programmed and checked-out.

Honeywell shall implement:

- Boiler Enable/Disable
- Boiler Status/Alarm
- Converter Temperature reset Control
- Zone valve control
- Graphics for Boilers showing proper points and associating alarm points with their respective graphic page(s) in the Enterprise Building Integrator (EBI).

Provide and install a new thermostatic valve for the seven (7) radiation zones that are not controlled (no valve or thermostat).

Honeywell shall furnish at a minimum but not limited to the following:

Self Contained Radiation & Convectors (Typical of 7)	
Thermostatic Steam valve	7

Note: Currently these units do not have any valves installed; these will need new thermostatic valves installed. Honeywell responsible for maintaining the current setup (adding new valves) these units will be standalone and will not tie into DDC system. Honeywell shall furnish and mechanical contractor will install new thermostatic valves for control of the existing steam radiation.

Honeywell shall implement:

- Install new valve bodies and self contained thermostatic actuators.

Energy Savings Methodology and Results

The energy savings for this ECM is realized in the buildings' HVAC equipment due to better control of the HVAC system, night set-back and set-up temperatures, start/stop etc.

Customer Support and Coordination with Utilities

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

Environmental Issues

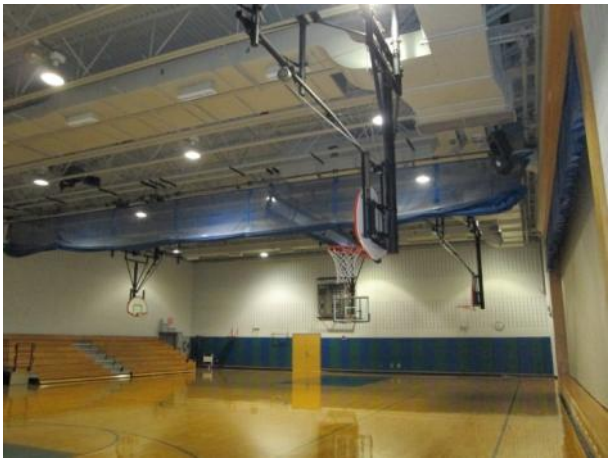
Resource Use	Energy savings will result from reduced electric energy usage and better occupant comfort.
Waste Production	This measure will produce no waste by-products.
Environmental Regulations	No environmental impact is expected.

ECM 3B DEMAND CONTROL VENTILATION

ECM	ECM Description	Great Meadows Middle School	Central Elementary School	Liberty Elementary School
3b	Demand Controls Ventilation	✓		✓

Existing Conditions

The roof top and air handling units serving large one zone spaces such as auditoriums, gymnasiums and cafeterias are often designed for peak occupancy conditions to supply outside air to the space with return air from space being exhausted. Most of the time these spaces are not fully occupied, which increase energy demand for heating and cooling of excessive amount of outside air.



Great Meadows M.S. – Gymnasium DCV Opportunity

Liberty E.S. – Multipurpose Room DCV Opportunity

Proposed Solution

Honeywell will install CO_2 sensors at the below Great Meadows School District (see table below for the locations). The CO_2 sensor will provide the control signal for the air handlers to optimize the quantity of fresh air that is required. The installation of a CO_2 sensor will read the levels of CO_2 in the space and ensure that only the required outside air is supplied and heated to meet the minimum outdoor air requirements. This control strategy will reduce amount of outside air intake and thus reduce the heating energy used by the air handling units and electric energy used by the motors. Based on this fact, there is a reduced requirement for outside air to this space

School	Area Served	Number of Units	CFM Total
Liberty Elementary School	Multipurpose Room	4	14,000
Great Meadows Middle School	Cafeteria	1	6,365
Great Meadows Middle School	Gymnasium	1	22,345
Great Meadows Middle School	Child Study	1	2,530

Table 3B.1 – Existing AHUs to be installed with CO_2 sensors

Energy Savings Methodology and Results

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

Existing Heating BTU & Cost per BTU	= Metered Data from Existing meter readings
Cost of Existing Heating	= Average Site Data $/CCF or $/Gallon

Reduction in Heating/Cooling BTU Cost of Proposed Heating/Cooling Energy Savings $	= Reduction in Outside air cfm x 1.08 x Delta T x Hours the fan is = Existing BTU x Cost per BTU = Existing Heating Costs – Proposed Heating Costs

The baseline adjustment calculations are included with the energy calculations.

Changes in Infrastructure

None.

Customer Support and Coordination with Utilities

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

Environmental Issues

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

ECM 3C OCCUPANCY CONTROLLED AIR HANDLING SYSTEMS

ECM	ECM Description	Great Meadows Middle School	Central Elementary School	Liberty Elementary School
3c	Occupancy Controlled Air Handling Systems		✓	✓

Existing Conditions

Currently the majority of the classrooms ventilation systems operate in the occupied mode regardless of occupancy. This amounts to conditioning spaces which are often times unoccupied, contributing to energy waste.

Central E.S. –Unit Ventilator

Liberty E.S. – Ceiling Unit Ventilator

Proposed Solution

Smart unit ventilators will incorporate monitoring of the CO_2 levels to determine room occupancy. A CO_2 sensor will be installed in the respective classroom and be tied into the existing/proposed unit ventilator. The sensor controls the outside air damper and results in energy savings when ventilation is not needed and CO_2 levels are at healthy levels. Honeywell proposes to integrate and program these devices so that the units daily schedule will be overridden based upon actual room occupancy.

School	Equipment Type	Qty
Central Elementary School	Unit Ventilators	30
Liberty Elementary School	Unit Ventilators	23
Total		53

Table 3C.1 – Existing Unit Ventilators to be integrated with occupancy sensors

Energy Savings Methodology and Results

The savings approach is based upon reducing the amount of energy used by setting back temperatures in a room when it is unoccupied.

Changes in Infrastructure

Occupancy sensor will be installed and wiring will be run for each unit controller.

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

ECM	ECM Description	Great Meadows Middle School	Central Elementary School	Liberty Elementary School
4a	Building Envelope Improvements	✓	✓	✓

Existing Conditions

Typically, many schools have problems associated with the design and construction of their buildings. Your buildings avoid some of the inefficiency issues associated with more modern construction buildings. Plus, long-term stewardship of your buildings has helped avoid most of the problems often associated with maintenance issues. But there are several significant building envelope retrofit opportunities, which will provide cost savings and comfort improvements to your building occupants.

Great Meadows School District buildings surveyed are masonry in construction. So the areas of concern deal with the openings in the "skin" that are mostly "built-in" during the original construction, created during a "retrofit period" and/or have deteriorated. Air leakage is defined as the "uncontrolled migration of conditioned air through the building envelope" caused by pressure differences due to wind, chimney (or stack) effect, and mechanical systems. It 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 leakage in schools.

Central E.S. – Building Exterior

Beyond representing significant energy savings potential, uncontrolled air leakage can affect occupancy comfort, air quality, the imbalance of mechanical systems, and the potential for compromised structural integrity of the building envelope from moisture migration. Control of air leakage involves the sealing of gaps, cracks and holes, using appropriate materials and systems to help create a continuous plane of "air-tightness" to completely encompass the building envelope. Part of this process also incorporates the need to "decouple" floor-to-floor, and to "compartmentalize" components of the building in order to equalize pressure differences. The buildings were inspected visually to identify both the location and severity of air leakage is detailed in the scope of work below. Floor plans will be used to mark locations of air sealing measures when completed.

Proposed Solution

Roof-Wall joint

The buildings were found to require roof-wall joint air sealing. To address these problems we recommend 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.

Windows and Doors

Most of your building doors require weather stripping and the installation of door sweeps to prevent air leakage. The operable windows in most of your buildings could present air leakage issues that require weather stripping with fuzz or gasket type materials.

Roof Penetrations

There are a number of 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. The fan final count by the inspector will indicate how many units could be easily serviced without requiring lifting equipment.

Some buildings have roof-top AHUs (air handling units) with ducts that may show air leakage during an investment grade audit. If there is leakage, 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.

Benefits

The sealing of your school buildings will allow for more efficient operation of the buildings by reducing heating and cooling losses throughout the year. In addition, the draftiness of the buildings, along with hot and cold spots, will be reduced as a result of this measure. A reduction in air infiltration will also minimize potential concerns for dirt infiltration or indoor air quality concerns.

Scope of Work

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.

Changes in Infrastructure

Building envelopes 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 WINDOW REPLACEMENT

ECM	ECM Description	Great Meadows Middle School	Central Elementary School	Liberty Elementary School
4b	Window Replacement		✓	

Existing Conditions

The windows installed at Central School are double casement windows with metal frames. Each window is single pane glass with no emissivity coating. There is a large gap between the two windows which creates an air barrier, improving the insulation characteristics of this setup. However, there is slight air leakage around the frames causing energy loss. The overall insulation characteristics of this window can be improved upon with new double pane low emissivity coated windows, which will also provide greater visibility and functionality.

Central E.S. Windows

Proposed System

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 District will reduce its heating fuel usage and cooling costs each year. The upgrade will result in substantial savings and improved comfort to students and teachers which in turn will foster a better learning environment.

School	Window Area	U-Factor Existing	U-Factor New Window	Type
Central School	492	0.75	0.50	Double Pane Low E

Table 4B.1 Window Replacements

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.

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

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

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 5A HIGH EFFICIENCY TRANSFORMERS

ECM	ECM Description	Great Meadows Middle School	Central Elementary School	Liberty Elementary School
5a	High Efficiency Transformers	✓		

Existing Conditions

The transformers within the electrical distribution systems at the Great Meadows Middle School 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.

Great Meadows M.S. Transformers

Systems Evaluation and Selection

Typical transformers are not designed to handle harmonic loads of today's modern facilities, and suffer significant losses as a result, 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 three (3) transformers that we propose to replace with energy efficient replacements at a size matching the existing loads as indicated in the table below:

School	Manufacturer	kVA	Qty
Great Meadows Middle School	General Electric	75	4
Great Meadows Middle School	General Electric	45	3
Great Meadows Middle School	General Electric	30	1

Table 5A.1 – Existing Transformers to be Replaced

Possible Solution

Honeywell surveyed the Great Meadows Middle School and determined that the replacement of the transformers is not cost effective. As such Honeywell does not recommend this ECM.

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

1. Remove and install four (4) new E-saver-C3L-75-480-208/120
2. Remove and install three (3) new E-saver-C3L-40-480-208/120
3. Remove and install one (1) new E-saver-C3L-30-480-208/120

Per Transformer Unit:

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

Energy Savings Methodology and Results

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

Changes in Infrastructure

New transformers where indicated.

Customer Support and Coordination with Utilities

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

Environmental Issues

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

ECM 6A COMPUTER POWER MANAGEMENT

ECM	ECM Description	Great Meadows Middle School	Central Elementary School	Liberty Elementary School
6a	Computer Power Management	✓	✓	✓

Existing Conditions

Information Technology (IT) is a major consumer of energy in school buildings and campuses. At more than 25 percent of total energy consumption, energy efficient IT becomes less of a nice-to-have and more of a necessity. IT energy management can no longer be ignored as energy rates continue to rise and as IT demands continue to grow.

Central Elementary School - Computers throughout the building

Proposed Solution

Honeywell proposes computer power management software *Surveyor* by Verdiem to manage PC consumption from phantom power, providing a detailed breakdown of usage by IT device type so as to allow energy managers to better plan, manage and optimize an organization's overall power consumption. Energy consumption of distributed IT devices can be reduced by up to 60%. Verdiem helps IT departments to accurately measure IT device energy consumption, enforce policies for greater energy efficiency, and optimize savings.

Verdiem allows a school to accelerate time-to-value with turnkey IT energy management solution VBOX. VBOX is a fully integrated software and hardware appliance for an easy and rapid roll-out. In many schools, it can take months to get a server purchased or a virtual machine provisioned to support a new software solution. Within days, a Verdiem VBOX can be implemented and deployed. Based on a standard 1u server, VBOX is pre-packaged and configured with all necessary components including Verdiem's best-in-class IT energy management solution.

Scope of Work

School	Qty Desktops
Great Meadows Middle School	108
Central Elementary School	89
Liberty Elementary School	71
Total	268*

Table 6A.1 – Approximate School Computer Counts

**Computer counts are estimated based on audit and square footage of the building*

Energy Savings Methodology and Results

Annual savings for administrative and student computers are based on previous logging results for computers with similar usage types.

Changes in Infrastructure

VBOX server will be integrated into current IT network.

Customer Support and Coordination with Software

Support will be required for software deployment by IT department.

Environmental Issues

Resource Use	Annual savings for administrative and student computers are based on previous logging results for computers with similar usage types.
Waste Production	None.
Environmental Regulations	No environmental impact is expected.

ECM 6B CRT TO LCD MONITOR REPLACEMENTS

ECM	ECM Description	Great Meadows Middle School	Central Elementary School	Liberty Elementary School
6b	CRT to LCD Monitor Replacements	✓	✓	✓

Existing Conditions

Cathode Ray Tube (CRT) monitors are not only bulkier than their newer Liquid Crystal Display (LCD) counterpart, they are much larger consumers of electricity. Monitors account for about 15 percent of the energy usage of a computer. The older CRT monitors make up an even larger percentage of energy usage, on average 35 percent.

Cathode Ray Tube Monitors in the District

Proposed Solution

Honeywell recommends replacing the existing CRT monitors with new 17" Liquid Crystal Display (LCD) monitors that consume, on average, approximately one-third the amount of energy presently being consumed by the CRT's. Beyond the energy savings, the installation of new monitors will enhance the school's working and learning environments by improving brightness and focus. Additionally, the new monitors will eliminate any current monitor flicker. Honeywell shall remove and properly dispose of the existing CRT monitors with the installation of the new LCD monitors.

Scope of Work

School	CRT Monitors (Approximate)
Central School	76
Great Meadows Middle School	47
Liberty	31
Total	154

Table 6B.1 – Approximate School Computer Counts

Energy Savings Methodology and Results

Annual savings for student computers are based wattage difference between the two monitor types.

Changes in Infrastructure

None.

Customer Support and Coordination with Software

None.

Environmental Issues

Resource Use	Annual savings for student computers are based wattage difference between the two monitor types.
Waste Production	This measure will result in disposal of existing CRT monitors.
Environmental Regulations	No environmental impact is expected.

ECM 7A DEMAND RESPONSE – PERMANENT LOAD SHED REDUCTION PROGRAM

ECM	ECM Description	Great Meadows Middle School	Central Elementary School	Liberty Elementary School
8a	Demand Response – Permanent Load Shed Reduction Program	✓	✓	✓

Existing Conditions

Electricity customers in the Pennsylvania, Jersey, Maryland (PJM) Independent System Operator territory (all or parts of Delaware, Illinois, Indiana, Kentucky, Maryland, Michigan, New Jersey, North Carolina, Ohio, Pennsylvania, Tennessee, Virginia, West Virginia and the District of Columbia) are starting to feel the effect of Federal Energy Regulatory Commission (FERC) Order No. 1000 issued on July 18, 2013.

The Order impacts the calculation of two of the components that comprise customers' transmission costs: Network Integration Transmission Service (NITS) and Regional Transmission Expansion Plan (RTEP). There are four components to the electricity grid: generation, transmission, distribution and load. In simplest terms:

- Generation can be thought of as the facilities that produce electricity
- Transmission as the long distance lines that connect generation and distribution
- Distribution as the lines that run along the streets and into homes and businesses
- Load as the electricity usage of those homes and businesses.

NITS and RTEP are costs associated with building, maintaining and managing those long distance, or transmission lines. NITS and RTEP costs are assessed to customers based on their contribution to the peak load recorded for the transmission system. Customers whose load is less during the system peak load will pay less for transmission service. It is important to note that everyone pays the same rate, but that the rate is applied to a smaller transmission obligation thus resulting in a lesser total cost.

Proposed Solution

Permanent load (usage) reduction typically entails replacing equipment with more energy efficient equipment. Now is particularly a good time to consider installing energy efficient equipment as there are many state rebate, loan and tax incentive programs to assist customers. Temporary usage reduction typically entails a change in behavior for a relatively short period of time. Examples of load reductions include changing thermostat settings through a BMS, reducing lighting load through retrofits and decreasing. The Great Meadows School District can take control of how much, as well as when they use electricity, can achieve significant reductions not just in their transmission costs, but also in their generation and distribution costs.

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SECTION D TECHNICAL AND FINANCIAL SUMMARY

Recommended Project

	Recommended Project
Projected Value	$1,786,385
Term of Repayment	15 Year
Projected Savings Over Term	$2,233,382
Projected NJ Rebates & Incentives	$170,728
Projected Interest Rate	3.0%

This recommended project for this Energy Savings Plan presents a scenario using a 15 year term and 3.0% interest rate. Among many other energy conservation measures, highlights of the scope of work for this project include LED Lighting technology and Building Automation System upgrades in both Central and Liberty Schools. Please refer to Scope of Work Matrix for a detailed listing of included energy conservation measures.

Recommended Project Technical and Financial Summary Documents

Scope of Work Matrix:
Form II-1: Energy Conservation Measures (ECMs) Summary Form
Form III-1: Projected Annual Energy Savings Data Form
Form IV-1: Projected Annual Energy Savings Data Form in MMBTUs
Form V-1: ESCOs Proposed Final Project Cost Form
Form VI-1: ESCOs Preliminary Annual Cash Flow Analysis Form

Building By Building Simple Payback Summary (Hard Costs Only)

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A. Recommended Project

SCOPE OF WORK MATRIX

ECM Description		Recommended Project
1A	Lighting Upgrades – LED Retrofit	✓
1B	Plug Load Management via Wi-Fi	✓
1C	De-Stratification Fans	✓
2A	Natural Gas Conversion	
2B	Boiler Upgrades	
2C	Steam to Hot Water Conversion	
2D	Domestic Hot Water Replacement	
2E	Cooling Tower Refurbishment	✓
2F	Condensing Unit Replacement	
2G	Heat Recovery Unit Retro-commissioning	✓
2H	Window AC Unit Replacement	✓
2I	Premium Efficiency Motors and VFDs	✓
2J	Walk-In Compressor Controllers	
2K	Kitchen Hood Controllers	
2L	Steam Trap Replacement	✓
3A	Building Management System Upgrades / Pneumatic to DDC Conversion	✓
3B	Demand Control Ventilation	✓
3C	Occupancy Controlled Air Handling Systems	✓
4A	Building Envelope Improvements	✓
4B	Window Replacement	
5A	High Efficiency Transformers	
6A	Computer Power Management	✓
6B	CRT to LCD Monitor Replacements	✓
7A	Demand Response - Permanent Load Shed Reduction	✓

FORM II ENERGY CONSERVATION MEASURES (ECMs) SUMMARY FORM

FORM II
ESCO's PRELIMINARY ENERGY SAVINGS PLAN (ESP):
ENERGY CONSERVATION MEASUREs (ECMs) SUMMARY FORM
GREAT MEADOWS SCHOOL DISTRICT
ENERGY SAVING IMPROVEMENT PROGRAM

ESCO Name: Honeywell International

Proposed Preliminary Energy Savings Plan: ECMs (Base Project)	Estimated Installed Hard Costs [1] $	Estimated Annual Savings $	Estimated Simple Payback (years)
1A Lighting Upgrades - LED Retrofit	$ 531,824	$ 42,144	12.62
1B Plug Load Management Via Wifi	$ 19,126	$ 4,099	4.67
1C De-stratification Fans	$ 6,037	$ 2,818	2.14
2E Cooling Tower Refurbishment with VFD Retrofit	$ 43,117	$ 2,000	21.56
2G Heat Recovery Unit Retro-commissioning	$ 25,968	$ 3,640	7.13
2H Window AC Unit Replacement	$ 3,019	$ 119	25.37
2I Premium Efficiency Motors and VFDs	$ 49,431	$ 10,664	4.64
2L Steam Trap Replacement	$ 12,678	$ 2,523	5.03
3A BMS Upgrades - DDC Conversion / Unit Ventilator Retro-commissioning	$ 422,604	$ 33,485	12.62
3B Demand Control Ventilation	$ 33,808	$ 9,003	3.76
3C Occupancy Controlled Air Handling Systems	$ 63,994	$ 9,870	6.48
4A Building Envelope Improvement	$ 138,429	$ 13,872	9.98
6A Computer Power Management	$ 5,663	$ 2,844	1.99
6B CRT to LCD Monitor Replacements	$ 15,805	$ 964	16.39
7A Demand Response - Permanent Load Shed Reduction	$ -	$ -	-
	$ -	$ -	-
Add additional lines as needed* **Project Summary:**	$ 1,371,505	$ 138,045	9.94

Optional ECMs Considered, but not included with base project at this time	Estimated Installed Hard Costs [1] $	Estimated Annual Savings $	Estimated Simple Payback (years)
2A Natural Gas Conversion	$ 482,977	$ 33,959	14.22
2B Boiler Replacement	$ 163,366	$ 10,094	16.18
2C Steam to Hot Water Conversion w/ Condensing Boiler	$ 1,162,672	$ 8,401	138.40
2D Domestic Hot Water Replacement	$ 28,062	$ 1,091	25.72
2F Condensing Unit Replacement	$ 149,723	$ 8,418	17.79

Add additional lines as needed*

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

FORM III PROJECTED ANNUAL ENERGY SAVINGS DATA FORM

FORM III
ESCO's PRELIMINARY ENERGY SAVINGS PLAN (ESP)
PROJECTED ANNUAL ENERGY SAVINGS DATA FORM
GREAT MEADOWS SCHOOL DISTRICT
ENERGY SAVING IMPROVEMENT PROGRAM

ESCO Name: **Honeywell International**

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

Energy/Water	ESCO Developed Baseline (Units)	ESCO Developed Baseline (Costs $)	Proposed Annual Savings (Units)	Proposed Annual Savings (Costs $)
Electric Demand (KW)	5,272	$30,053	1,338	$7,531
Electric Energy (KWH)	1,401,930	$168,239	647,037	$63,579
Natural Gas (therms)	0	$0	0	$0
Fuel Oil (Gal)	44,665	$151,634	15,148	$51,435
Steam (Pounds)				
Water (gallons)				
Other (Specify Units)				
Other (Specify Units)				
Avoided Emissions (1)	Provide in Pounds (Lbs)			
NOX	867			
SO2	1,269			
CO2	325,985			

(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 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
GREAT MEADOWS SCHOOL DISTRICT
ENERGY SAVING IMPROVEMENT PROGRAM

ESCO Name: **Honeywell International**

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

ENERGY	ESCO Developed Baseline	ESCO Proposed Savings Annual	Comments
Electric Energy (MMBTUs)	4,783	2,208	
Natural Gas (MMBTUs)	0	0	
Fuel Oil (MMBTUs)	6,253	2,121	
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.

FORM V PROPOSED FINAL PROJECT COST FORM

FORM V

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

ESCO Name: **HONEYWELL INTERNATIONAL**

PROPOSED CONSTRUCTION FEES

Fee Category	Fees [1] Dollar ($) Value	Percentage of Hard Costs
Estimated Value of Hard Costs [2]:	$1,371,505.00	
Project Service Fees		
Investment Grade Energy Audit	$20,572.58	1.50%
Design Engineering Fees	$96,005.35	7.00%
Construction Management & Project Administration	$54,860.20	4.00%
System Commissioning	$17,143.81	1.25%
Equipment Initial Training Fees	$6,857.53	0.50%
ESCO Overhead	$150,865.55	11.00%
ESCO Profit	$68,575.25	5.00%
Project Service Fees Sub Total	$195,439.46	14.25%
TOTAL FINANCED PROJECT COSTS:	$1,786,385.26	30.25%
ESCO Termination Fee (To be paid only if the Board decides not to proceed beyond the ESP)	$0.00	0.00%

PROPOSED ANNUAL SERVICE FEES

First Year Annual Service Fees	Fees [1] Dollar ($) Value	Percentage of Hard Costs
SAVINGS GUARANTEE (OPTION)	$0.00	0.00%
Measurement and Verification (Associated w/ Savings Guarantee Option)	$9,500.00	Flat Fee
ENERGY STAR™ Services (optional)	Included	0.00%
Post Construction Services (If applicable)	N/A	-
Performance Monitoring	Included	-
On-going Training Services	N/A	-
Verification Reports	Included	-
TOTAL FIRST YEAR ANNUAL SERVICES	$9,500.00	Flat Fee

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

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

*Annual Service only applies if customer accepts energy guarantee.

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FORM VI ANNUAL CASH FLOW ANALYSIS FORM

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

ESCO Name: **Honeywell International**

Note: Proposers must use the following assumptions in all financial calculations:
(a) The cost of all types of energy should be assumed to inflate at: **2.4%** gas, **2.2%** electric per year and
(b) If it is necessary to inflate any other costs, these costs should also be assumed to inflate at: **2.4%** per year (this general inflation factor should NOT include increases in energy costs reflected above in (a), and should be noted if used in any calculation).

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

Project Cost [1]: **$ 1,786,385** Interest Rate to Be Used for Proposal Purpc **3.0%**

Year	Annual Energy 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			$ 16,449	$ 16,449	$ -	$ -	$ -	$ 16,449	$ 16,449
1	$ 122,545	$ 15,500	$ 74,157	$ 212,202	$ (203,002)	$ (150,108)	$ (9,500)	$ 9,200	$ 25,649
2	$ 125,343	$ 15,872	$ 74,157	$ 215,372	$ (206,172)	$ (150,108)	$ -	$ 9,200	$ 34,849
3	$ 128,206	$ 14,285	$ 2,983	$ 145,474	$ (136,274)	$ (150,108)	$ -	$ 9,200	$ 44,049
4	$ 131,135	$ 12,856	$ 2,983	$ 146,974	$ (137,774)	$ (150,108)	$ -	$ 9,200	$ 53,249
5	$ 134,130	$ 11,571	$ -	$ 145,701	$ (136,501)	$ (150,108)	$ -	$ 9,200	$ 62,449
6	$ 137,194	$ -	$ -	$ 137,194	$ (127,994)	$ (150,108)	$ -	$ 9,200	$ 71,649
7	$ 140,328	$ -	$ -	$ 140,328	$ (131,128)	$ (150,108)	$ -	$ 9,200	$ 80,849
8	$ 143,534	$ -	$ -	$ 143,534	$ (134,334)	$ (150,108)	$ -	$ 9,200	$ 90,049
9	$ 146,813	$ -	$ -	$ 146,813	$ (137,613)	$ (150,108)	$ -	$ 9,200	$ 99,249
10	$ 150,168	$ -	$ -	$ 150,168	$ (140,968)	$ (150,108)	$ -	$ 9,200	$ 108,449
11	$ 153,599	$ -	$ -	$ 153,599	$ (144,399)	$ (150,108)	$ -	$ 9,200	$ 117,649
12	$ 157,108	$ -	$ -	$ 157,108	$ (147,908)	$ (150,108)	$ -	$ 9,200	$ 126,849
13	$ 160,698	$ -	$ -	$ 160,698	$ (151,498)	$ (150,108)	$ -	$ 9,200	$ 136,049
14	$ 164,370	$ -	$ -	$ 164,370	$ (155,170)	$ (150,108)	$ -	$ 9,200	$ 145,249
15	$ 168,126	$ -	$ -	$ 168,126	$ (160,608)	$ (150,108)	$ -	$ 7,518	$ 152,767
Totals	$ 2,163,298	$ 70,084	$ 170,728	$ 2,404,110	$ (2,251,343)	$ (2,251,621)	$ (9,500)	$ 152,767	$ 152,767

NOTES:
(1) Includes: Hard costs and project service fees defined in ESCO's PROPOSED "FORM V"
(2) No payments are made by GREAT MEADOWS SCHOOL DISTRICT during the construction period.
(3) This figure should equal the value indicated on the ESCO's PROPOSED "FORM V". DO NOT include in the Financed Project Costs.

***Annual Service only applies if customer accepts energy guarantee.**

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C. Building By Building Simple Payback Summary (Hard Costs Only)

Building & ECM	kW Savings ($)	kWh Savings ($)	Fuel Oil Savings ($)	Annual Energy Cost Savings ($)	Hard Cost ($)	Simple Payback (yr)
Central School	**$ 1,859**	**$ 12,993**	**$ 27,434**	**$ 57,287**	**$ 681,941**	
1A - Lighting Upgrades - LED Retrofit	$ 1,859	$ 9,338	$ (1,471)	$ 14,726	$ 202,217	10.25
1B - Plug Load Management Via Wifi	$ -	$ 1,491	$ -	$ 1,491	$ 5,406	3.63
2B - Boiler Replacement	$ -	$ -	$ 1,086	$ 11,086	$ 160,415	7.61
2H - Window AC Unit Replacement	$ -	$ 118	$ -	$ 118	$ 2,964	25.16
2L - Steam Trap Replacement	$ -	$ -	$ 2,497	$ 2,497	$ 12,449	4.99
3A - BMS Upgrades - DDC Conversion / Unit Ventilator Retro-commissioning	$ -	$ -	$ 12,937	$ 12,937	$ 208,671	16.13
3C - Occupancy Controlled Air Handling Systems	$ -	$ 240	$ 5,975	$ 6,215	$ 35,569	5.72
4A - Building Envelope Improvement	$ -	$ 550	$ 6,411	$ 6,961	$ 47,665	6.85
6A - Computer Power Management	$ -	$ 956	$ -	$ 956	$ 1,847	1.93
6B - CRT to LCD Monitor Replacements	$ -	$ 300	$ -	$ 300	$ 4,737	15.80
Great Meadows Middle School	**$ 3,259**	**$ 33,985**	**$ 10,611**	**$ 54,855**	**$ 413,793**	
1A - Lighting Upgrades - LED Retrofit	$ 3,259	$ 14,207	$ (2,253)	$ 20,213	$ 176,455	7.00
1B - Plug Load Management Via Wifi	$ -	$ 1,183	$ -	$ 1,183	$ 7,778	6.57
1C - De-stratification Fans	$ -	$ (276)	$ 3,065	$ 2,789	$ 5,928	2.13
2G - Heat Recovery Unit Retro-commissioning	$ -	$ (178)	$ 3,780	$ 3,603	$ 25,499	7.08
2I - Premium Efficiency Motors and VFDs	$ -	$ 10,556	$ -	$ 10,556	$ 48,539	4.60
3A - BMS Upgrades - DDC Conversion / Unit Ventilator Retro-commissioning	$ -	$ 3,390	$ 1,905	$ 5,295	$ 35,569	6.72
3B - Demand Control Ventilation	$ -	$ 3,387	$ 2,190	$ 5,577	$ 14,228	2.55
4A - Building Envelope Improvement	$ -	$ 172	$ 1,924	$ 2,095	$ 47,560	22.70
6A - Computer Power Management	$ -	$ 1,089	$ -	$ 1,089	$ 2,241	2.06
6B - CRT to LCD Monitor Replacements	$ -	$ 455	$ -	$ 455	$ 7,659	16.83
2E - Cooling Tower Refurbishment with VFD Retrofit	$ -	$ 0	$ -	$ 2,000	$ 42,338	10.58
Liberty School	**$ 2,336**	**$ 15,960**	**$ 14,010**	**$ 47,306**	**$ 411,414**	
1A - Lighting Upgrades - LED Retrofit	$ 2,336	$ 12,994	$ (2,014)	$ 18,316	$ 143,546	6.16
1B - Plug Load Management Via Wifi	$ -	$ 1,383	$ -	$ 1,383	$ 5,596	4.05
3A - BMS Upgrades - DDC Conversion / Unit Ventilator Retro-commissioning	$ -	$ -	$ 5,077	$ 15,077	$ 170,731	6.81
3B - Demand Control Ventilation	$ -	$ 61	$ 3,273	$ 3,334	$ 18,970	5.69
3C - Occupancy Controlled Air Handling Systems	$ -	$ 139	$ 3,414	$ 3,553	$ 27,270	7.67
4A - Building Envelope Improvement	$ -	$ 412	$ 4,260	$ 4,672	$ 40,705	8.71
6A - Computer Power Management	$ -	$ 770	$ -	$ 770	$ 1,473	1.91
6B - CRT to LCD Monitor Replacements	$ -	$ 200	$ -	$ 200	$ 3,124	15.64
Project Total	**$ 7,455**	**$ 62,937**	**$ 52,056**	**$ 159,448**	**$ 1,507,148**	

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D. 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 in order to participate in the Program: hospitals, public colleges and universities, nonprofits, 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 of 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 for over $5.7M 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.

Building	Rebate Amount
Bridgewater-Raritan Regional District	$1,313,470
Camden County Technical Schools	$1,210,370
Elizabeth Schools	$934,209
NH-Voorhees Regional HS District	$771,063
Robbinsville Public School District	$529,092
Phillipsburg School District	$496,005
Hanover Township School District	$343,139
Town of Kearny	$145,002

In regard to the Great Meadows Regional School District Base Project, Honeywell has determined that the District is eligible for $157,359 from P4P and $13,369 from PJM for a total of $170,728 in incentives, rebates and grants.

Base Project

	First Incentive	Second Incentive	Third Incentive	Total Incentive
Central School	$ 6,449	$ 39,248	$ 39,248	$ 84,944
Great Meadows Middle School	$ 5,000	$ 14,083	$ 14,083	$ 33,165
Liberty School	$ 5,000	$ 17,125	$ 17,125	$ 39,250
TOTALS	$ 16,449	$ 70,455	$ 70,455	$ 157,359

**Please note that fuel oil is not incentivized in the Pay for Performance program, no fuel oil incentives are included in these numbers.

E. 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, 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.

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

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

Repayment of the lease payments is tailored to meet the requirements of the Great Meadows Regional School District. Payments are typically scheduled to commence after the construction is complete and acceptance of the project has been received by the District. Typically, payment terms are structured so there is no up-front capital expense to the 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

A. 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 effected by variable weather conditions, a baseline for heating and cooling systems is typically dependent on degree-days or outside temperature. A baseline also needs to incorporate changes in facility use, such as a change in hours of operation or increased levels of outside air. Once again, if these changes would have occurred in the absence of the energy project, they should be incorporated into the project's baseline.

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

1. Spot measurements of electrical loads such as lighting, fan and pump motors, chillers, electric heat, etc.
2. Measurement of equipment operating hours using electric data recorders.
3. Measurement of existing operating conditions using data recorders for space temperature and humidity, air handler temperatures (mixed, return, cooling and heating coil discharges), and space occupancy using lighting loggers.
4. Spot measurement for boiler efficiencies, water use.
5. Running measurements of chiller operation, including simultaneous measurement of input kWh or steam flow, and chilled water supply and return temperatures and flow (gpm).
6. Records of operating conditions from building management systems and utility-grade meters.

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

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

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

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, hand held 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 the Honeywell finds to be very accurate and cost-effective.

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

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

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

B. Adjustment to Baseline Methodology[1]

Honeywell's methodology 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 Great Meadows Regional School District requires and the needs of the District for future changes in facility use.

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

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

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

Examples of situations where the baseline needs to be adjusted are: i) changes in the amount of space being air conditioned, ii) changes in auxiliary systems (towers, pumps, etc.) and iii) changes in occupancy or schedule. If the baseline conditions for these factors are not well documented it becomes difficult, if not impossible, to properly adjust them when they change and require changes to payment calculations. To compensate for any addition and deletion of buildings and impact on the baseline model, Honeywell will use sound technical methodologies to adjust the baseline. An example would be to add or delete building energy impact via the calculated cooling load in tons as a percentage of the existing campus tonnage baseline or use indices like W/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.

C. 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:

[1] The energy baseline modifications shall use commonly accepted energy engineering methods that are mutually agreeable to both Honeywell and customer. Should agreement on these methods, including the climate adjustments, not be reached between Honeywell and customer, both parties could appeal to an independent engineering.

1. Local weather data.
2. Utility bills and sub-metered consumption trends.
3. Utility rate structure.
4. Facility use and occupancy data.
5. Internal equipment loads.
6. Interviews of operations and maintenance staff and management.
7. Building construction, age, use and layout.
8. Schematics of energy and water distribution systems.
9. Identification and inventory of HVAC equipment.
10. Identification and inventory of process equipment.
11. Design, configuration and operating characteristics of HVAC systems.
12. Design, configuration and operating characteristics of process systems.
13. Control strategies and sequences of operation for HVAC and other process equipment.
14. Identification and count of all lighting fixtures and determination of power consumption for each type.
15. Identification and inventory of lighting control methods.
16. Measurement of foot-candle levels at sample locations.
17. Power quality and harmonics, power factor.
18. Indoor air quality issues.

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

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

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

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 Great Meadows Regional School District or “real bill reductions”. As noted in the RFP energy escalation rates will be established in accordance with New Jersey Board of Public Utility guidelines.

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

The O&M savings is typically a function of existing Great Meadows Regional School District’s budgets (labor & direct costs), maintenance contracts and operations (supplier) contracts. Honeywell will analyze the information to provide a conservative savings

representation for Great Meadows Regional School District's review and acceptance. The information will include all calculations and assumptions.

D. 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 Great Meadows Regional 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 Great Meadows Regional 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 District to adapt to the demands of future campus growth and changes without the need for Great Meadows Regional School District and Honeywell to negotiate energy baseline adjustments.

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

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

The following table lists the information concerning typical M&V equipment used:

Instrument	Make
Power Multimeter	Fluke 39
Light Meter	Osram or Phillips
Portable Temperature/Humidity Multimeter	TSI
Retractable Insertion Vortex Flow meter	Hydro-Flow Model 3100
BTU Meter	Hydro-Flow BTU-121 BTU/Energy Measurement System
KW/KWH Transducers	Veris Industries (H6000 SERIES)

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.

[2] www.ipmvp.org.

General Approach to M&V

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

M&V Options

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

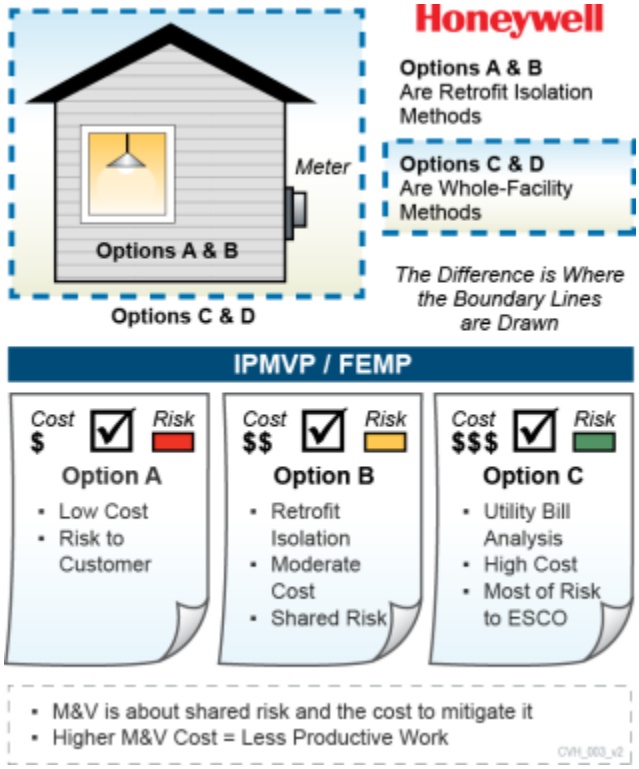
M&V Option	Performance Verification Techniques
Option A Verifying that the measure has the potential to perform and to generate savings.	Engineering calculations before and after installation spot measurements and use of EMS data points with stipulated values.
Option B Verifying that the measure has the potential to perform and verifying actual performance by end use.	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.)	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	Calibrated energy simulation/modeling; calibrated with hourly or monthly utility billing data and/or end-use metering.

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.

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.

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.

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.



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 Great Meadows Regional 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.

E. Site Specific M&V Plan

ECM # and Name	Summary of ECM	Measurement and Verification Methodology / Recommendation	Description of M&V – Pre and Post Process
ECM 1A - Lighting Upgrades	Upgrade Lighting systems: Relamp- Reballast T-12, T-8 32 W, and Incandescent to new LED Fixtures	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
ECM 1B - Plug Load Management via WiFi	Provide wifi enabled programmed electrical outlet strips to shut down computer peripherals and various plug loads when building is not occupied	Option A: Engineering calculations based on comparison of existing operations and post installation operation	Pre M&V: Verify parameters used in the calculations based on data provided by Data loggers on selected pieces of equipment Post M&V: Verify that the control equipment is installed and programmed as specified. Data log to verify reduced hours of operation
ECM 1C - De-Stratification Fans	Install De-Stratification fans in Gymnasiums , Cafeterias and Auditoriums to minimize stratification of hot air and maintain hot air flow below the fan level	Option C: Fuel Savings Utility Bill Comparison for all fuel related measures	Pre M&V: Verify parameters used in engineering calculations with equipment name plate data and savings assumptions Post M&V: Fuel: Compare post installation M&V fuel cost based on fuel billing data and Metrix tuned to normalize to heating degree days
ECM 2A - Natural Gas Conversion	Bring natural gas to Central School and Great Meadows Middle School. Retrofit and connect proposed/existing equipment to use natural gas	Option A: Stipulated Savings based on existing fuel oil rates and proposed natural gas rates	Pre M&V: None Post M&V: Savings stipulated based on rates agreed to by customer
ECM 2B –	Replace boilers in select	Option C:	Pre M&V:

ECM # and Name	Summary of ECM	Measurement and Verification Methodology / Recommendation	Description of M&V – Pre and Post Process
Boiler Upgrades	locations in kind to handle base load	Utility Bill Comparison for all fuel related measures	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 insure operating conditions are maintained
ECM 2C - Steam to Hot Water System Conversion	Replace existing steam boilers, steam piping, and steam coils and all other associated steam equipment with hydronic hot water equipment including condensing hot water boilers	Option C: Fuel Savings 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 insure operating conditions are maintained
ECM 2D – Domestic Hot Water Replacement	Replace existing domestic hot water heater 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 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 insure operating conditions are maintained
ECM 2E – Cooling Tower Refurbishment	Refurbish the existing cooling tower at the Great Meadows Middle School	Option A: Cooling Tower: Engineering calculations based on nameplate and manufacturer supplied data for the existing and replacement Cooling Tower	Pre M&V: Cooling Tower: Verify manufacturer provided data for the pump performance data and motor efficiencies. Post M&V: Cooling Tower: Verify manufacturer provided data for new cooling tower (SEER) – verify the new equipment and controls are installed and commissioned as recommended by manufacturer
ECM 2F - Condensing Unit Replacements	Replace antiquated Condensing Units with new high efficiency models	Option A: Engineering calculations based on nameplate and manufacturer supplied data for the existing and replacement CU	Pre M&V: Verify manufacturer provided data for existing unit efficiency (SEER) Post M&V: Verify manufacturer provided data for new condensing unit (SEER) – verify the new equipment and controls are installed and commissioned as recommended by

ECM # and Name	Summary of ECM	Measurement and Verification Methodology / Recommendation	Description of M&V – Pre and Post Process
			manufacturer
ECM 2G – Heat Recovery Unit Retro-Commissioning	Retro-commission the two (2) non-functional heat exchangers	Option A: Stipulated Engineering calculations based on pre and post heating/cooling loads of the respective spaces	Pre M&V: Verify existing operating parameters match the baseline calculation assumptions Baseline annual fuel cost based on fuel billing data and Metrix tuned to normalize to heating degree days Post M&V: Electric Energy: Verify savings based on verified 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
ECM 2H – Window AC Unit Replacements	Replace antiquated Window AC Units with new high efficiency models	Option A: Engineering calculations based on nameplate and manufacturer supplied data for the existing and replacement Window Unit	Pre M&V: Verify manufacturer provided data for existing unit efficiency (SEER) Post M&V: Verify manufacturer provided data for new window AC unit (SEER) – verify the new equipment and controls are installed and commissioned as recommended by manufacturer
ECM 2I - Premium Efficiency Motors and VFDs	Install Variable Frequency Drives on hot water and chilled water pumps to operate the pump motors in response to the system load. Replace antiquated motors with new premium efficiency motors	Option A: Engineering calculations for variable frequency drives 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
ECM 2J – Walk-In Freezer/Cooler Controllers	Install control device on walk-in freezer and refrigerator evaporators to shut down the fan motor when the compressor is off on duty cycle	Option A: Stipulated Engineering calculations based on case studies for the Intellidyne control	Pre M&V: None Post M&V: Savings stipulated based on engineering calculations for the term of contract
ECM 2K – Kitchen Hood Controller	Install control device on kitchen hood	Option A: Engineering calculations for variable frequency drives following fan affinity laws.	Pre M&V: Verify manufacturer provided data for the VFD performance data and motor efficiencies. Post M&V: Electric:

ECM # and Name	Summary of ECM	Measurement and Verification Methodology / Recommendation	Description of M&V – Pre and Post Process
		Engineering calculations based on nameplate and manufacturer supplied data for the existing and replacement motors	Verify efficiency of new motors and proper VFD operation to verify baseline calculation assumptions on system loads Fuel: Compare post installation M&V fuel cost based on fuel billing data and Metrix tuned to normalize to heating degree days
ECM 2L – Steam Trap Replacement	Replace failed steam traps throughout Central School	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 Post M&V: Compare post installation M&V fuel cost based on fuel billing data and Metrix tuned to normalize to heating degree days
ECM 3A - Building Management System/Control Upgrade	Upgrade Building Management System to integrate all systems to a central platform such that the systems may be monitored and controlled as programmed to maintain global settings such as night set back , optimum stop-start etc	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
ECM 3B - Demand Control Ventilation	Install Demand Control Ventilations System with Carbon Di Oxide sensors installed to modulate the outdoor air intake for air handling system based on space occupancy variations	Option A: Electric energy savings - Engineering calculations based on industry standards Option C: Fuel Savings Utility Bill Comparison for all fuel related measures	Pre M&V: Verify parameters used in engineering calculations with equipment name plate data and savings 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 verified 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

ECM # and Name	Summary of ECM	Measurement and Verification Methodology / Recommendation	Description of M&V – Pre and Post Process
ECM 3C - Occupancy Controlled Air Handling Systems	Use of lighting sensors to control air handling units to set back on temperature during days when rooms are in occupied mode but not occupied.	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
ECM 4A - Building Envelope Improvements/ Lintel Replacements	Install weather stripping on doors, seal roof wall joints and roof penetrations	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 parameters used in engineering calculations with site conditions Post M&V: Fuel: Compare post installation M&V fuel cost based on fuel billing data and Metrix tuned to normalize to heating degree days
ECM 4B - Window Replacements	Replace single pane windows with energy efficient low-e windows	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 parameters used in engineering calculations with site conditions Post M&V: Fuel: Compare post installation M&V fuel cost based on fuel billing data and Metrix tuned to normalize to heating degree days
ECM 5A - Transformer Replacement	Replace existing secondary transformers with high efficiency equivalents	Option A: Engineering calculations based on increase in transformer efficiency	Pre M&V: Measure typical existing transformer (typical one for each size) input and output KW to establish transformer losses Post M&V: Measure input and output KW for new transformer (typical one for each size) Verify savings with engineering calculations
ECM 6A - Computer Power Management	Install computer management software to decrease power consumption	Option A: Engineering calculations based on decreased consumption	Pre M&V: Measure typical computer usage Post M&V: Measure typical computer usage once software is installed Verify savings with engineering calculations

ECM # and Name	Summary of ECM	Measurement and Verification Methodology / Recommendation	Description of M&V – Pre and Post Process
ECM 6B – CRT to LCD Monitor Replacements	Replace existing CRT monitors with energy efficient LCD monitors	Option A: Engineering calculations based kW difference between the CRT and LCD monitor	Pre M&V: Measure typical CRT kW Post M&V: Measure new LCD kW Verify savings with engineering calculations
ECM 7A - Demand Response	Participate in utility demand response program	Option A : Stipulated Savings based on incentives offered by Utility (ISO)	Pre M&V: None Post M&V: Savings stipulated based on incentives offered by Utility (ISO)

F. Guarantee of Savings

The approach that Honeywell utilizes in this asset management program includes two key components: a *performance guarantee* and *financial savings*. Honeywell guarantees the District that all installations and work performed are subject to final inspection and the District's acceptance. This procedure ensures all work will be to the level of quality the District expects.

Honeywell also guarantees it will meet the objectives mutually defined with the District. Honeywell takes its commitment to partner with Great Meadows Regional School District for the life of the contract seriously, and looks forward to a successful, long-term partnership.

Honeywell considers the guarantee to be the cornerstone of our service to you. To be considered a *performance contract* an energy guarantee is an optional component under the New Jersey Energy Savings Improvement Program (ESIP) legislation. The basis of an energy performance contract is that the majority of risk is shifted from the District to the ESCO. The strength of the Guarantee is only as good as the Company backing it and their financial solvency. With over $37 Billion in assets, Honeywell has the financial strength and background to support the District for the long term.

Savings Guarantee: With the understanding that Great Meadows Regional School District must maintain fiscal health and accountability, Honeywell can financially guarantee the results of its programs and clearly support this obligation with the commitment to regular review of program results and reconciliation. Honeywell's financial strength and stability give it the ability to extend a FIRST-PARTY GUARANTEE to Great Meadows Regional School District. A first party guarantee eliminates the risk on the District and places it directly onto Honeywell. This differs from some other ESCO's who provide a third-party guarantee, which insulates them from the owner through the use of insurance instruments.

If at the end of any year the program has not met or exceeded the guaranteed savings for that year, Honeywell will refund the difference between the guaranteed amount and what was actually saved.

For all equipment covered by the Energy Savings Guarantee, Great Meadows Regional School District shall be responsible for on-going maintenance and component replacement in accordance with manufacturer's standards. The customer will also be responsible for operating the equipment in accordance with manufacturer's specifications.

Honeywell will develop savings methodologies that follow current industry practice, such as outlined by the New Jersey Board of Public Utilities (BPU) and Federal Energy Management Program's (FEMP) M&V Guidelines: Measurement and Verification for Federal Energy Projects. References to M&V protocols from the International Performance Measurement and Verification Protocol (IPMVP), ASHRAE Guideline 14 and the Air-Conditioning Refrigeration Institute (ARI) are used to further qualify the M&V plan.

As stated above, under the New Jersey ESIP legislation acceptance of a performance guarantee is optional at Great Meadows Regional School District's sole discretion. In the same way, the duration of the guarantee is also optional. Several of Honeywell's New Jersey customers have elected to keep the guarantee in force for less than the total performance periods, i.e. three (3) to five (5) years. Others have elected to accept a one (1) year guarantee, while reserving the option to renew for additional years after they have had the opportunity to review the track record of actual savings results. Obviously, this a very customer specific decision based on the risk management culture of each unique organization. The key point is that Honeywell is flexible with regard to the structure and duration of the guarantee. The final terms will be discussed and defined as part of our co-authored ESIP project.

Solely for informational purposes, it is worth noting that if the District does elect to accept a guarantee, New Jersey ESIP law requires that the District contract with a third-party independent firm to verify that the energy savings are realized. In order to preserve the independent status of this contractor these costs are required to be incurred directly by the District.

The RFP requires that the cost of the guarantee be identified during this response phase. Honeywell develops and implements every project with the same high level of detail and confidence and therefore will always provide a Savings Guarantee at no additional cost. However, if the District opts to accept the Savings Guarantee, the annual cost of one-half of one percent (0.5%) of Hard Costs will be applicable to account for on-going Honeywell service costs incurred during the measurement and verification of the savings.

All guarantees require that the owner maintain the system in accordance with the manufacturer's specifications. Regardless of guarantee acceptance, ongoing maintenance as recommended by the BPU, Honeywell and / or manufacturer specifications is required to achieve the projected energy savings. Maintenance should also include a periodic verification of the system to make sure the maintenance is properly conducted and the system is meeting the original specifications and design.

G. Recommended Preventive Maintenance Services

A Comprehensive Portfolio, a Customized Approach.

Honeywell offers a uniquely comprehensive portfolio of services – one of the most extensive in the industry. As part of the Energy Savings Plan, we recommend the following services for consideration to ensure achievement of the Enrgy Savings outlined in this plam

According to the NJ ESIP program, all services are required to be bid by the 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 according to 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 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 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 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 shut-down.

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.

SECTION F DESIGN APPROACH

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

A. Safety Management Plan

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

Honeywell's Safety Management Plan is provided in Appendix 4.

B. Project Management Process

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

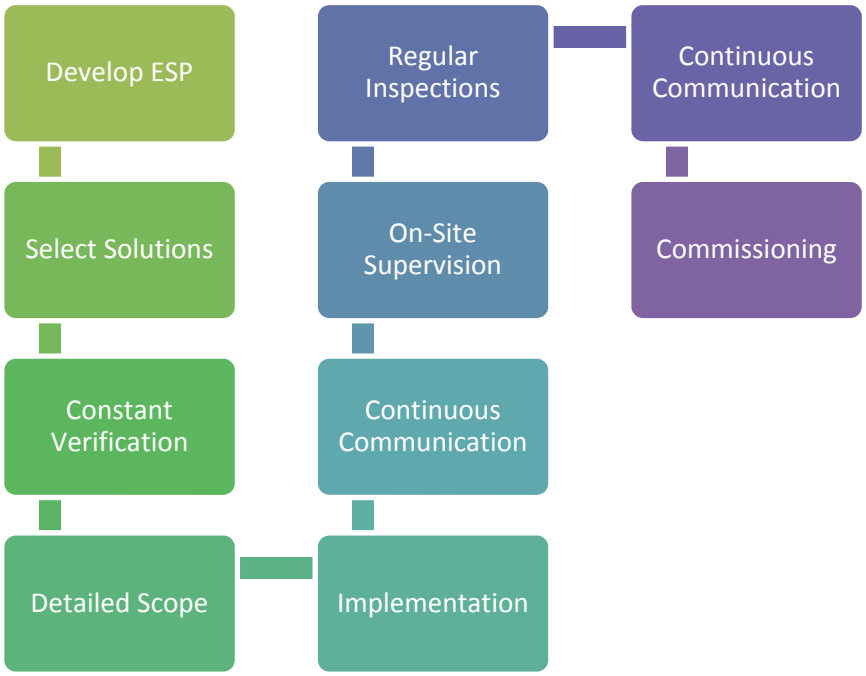
Each project and each customer's requirements are unique. At Honeywell we address customer needs through a formal communication process. This begins by designating one of our project managers to be responsible for keeping the customer abreast of the status of the project.

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

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

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

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



C. Construction Management

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

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

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

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

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

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

- Local Presence in the Community (Customer Recommendations)
- Firm's Qualifications and WBE/MBE Status
- Firm's Financial Stability
- Ability to perform the work within the project timeline

- Price
- Ability to provide service on the equipment or materials installed over a long period of time.

Approval of subcontractors that Honeywell proposes to use lies with the Great Meadows Regional School District.

D. Commissioning

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

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

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

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

E. Installation Standards

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

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

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

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

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

Heating and Cooling Standards

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

Lighting Standards

Recommended Light Levels	
Task Area	Foot-candles
Corridors/Stairways/Restrooms	10-20
Storage Rooms	10-50
Conference Rooms	50-55
General Offices	50-100
Drafting/Accounting	70
Areas with VDTs	75
Classrooms	50-55
Cafeterias	50
Gymnasiums	30-50

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

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

Hazardous Waste Disposal or Recycling

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

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

F. Implementation Schedule

Attached please find a sample schedule for construction and completion.

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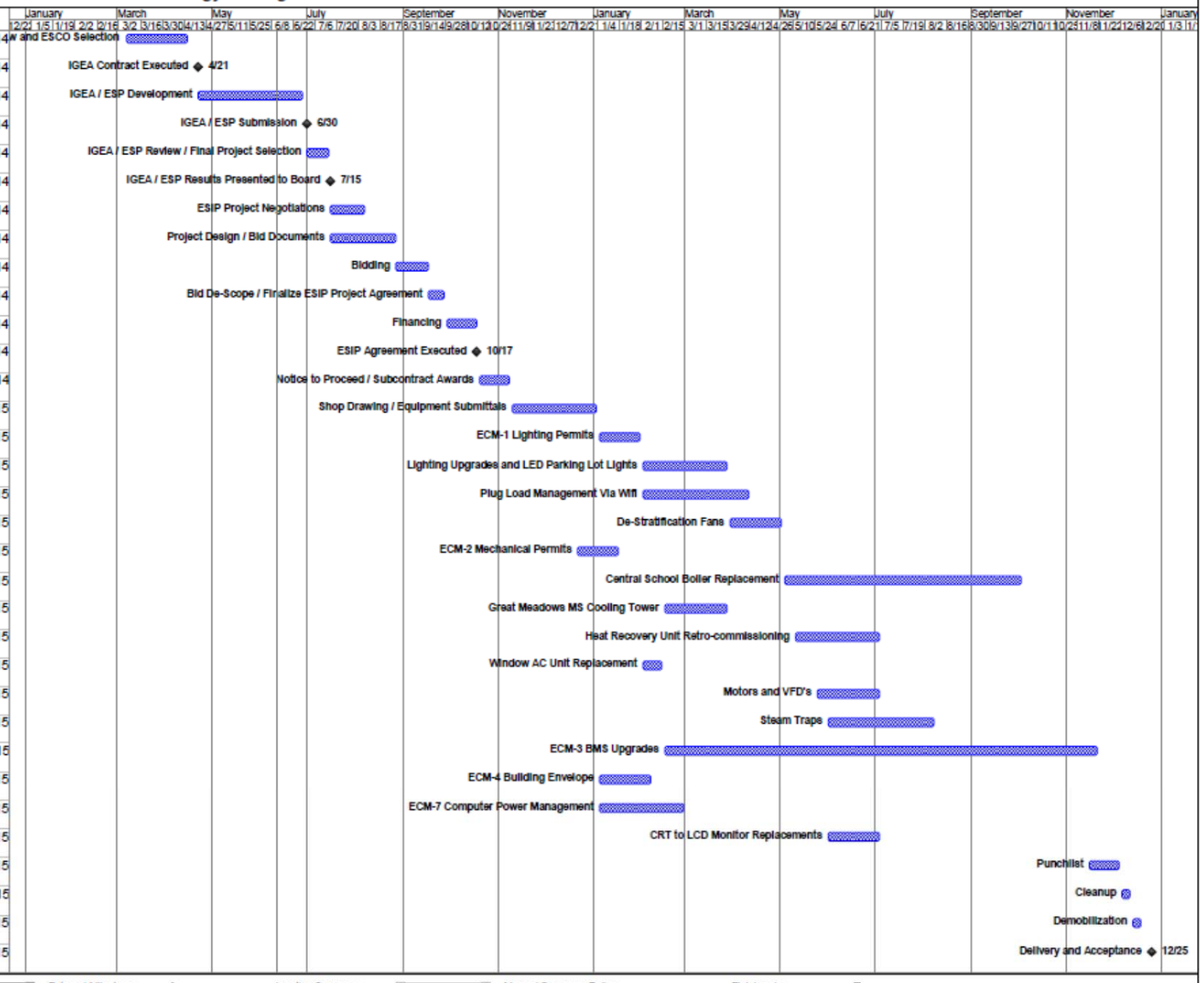
Great Meadows School District
Honeywell Energy Project
Energy Savings Plan Schedule

ID	Task Name	Duration	Start	Finish
1	RFP Review and ESCO Selection	27 days	Fri 3/7/14	Mon 4/14/14
2	IGEA Contract Executed	0 days	Mon 4/21/14	Mon 4/21/14
3	IGEA / ESP Development	49 days	Tue 4/22/14	Fri 6/27/14
4	**IGEA / ESP Submission**	0 days	Mon 6/30/14	Mon 6/30/14
5	IGEA / ESP Review / Final Project Selection	10 days	Tue 7/1/14	Mon 7/14/14
6	IGEA / ESP Results Presented to Board	0 days	Tue 7/15/14	Tue 7/15/14
7	ESIP Project Negotiations	16 days	Wed 7/16/14	Wed 8/6/14
8	Project Design / Bid Documents	6 wks	Wed 7/16/14	Tue 8/26/14
9	Bidding	3 wks	Wed 8/27/14	Tue 9/16/14
10	Bid De-Scope / Finalize ESIP Project Agreement	8 days	Wed 9/17/14	Fri 9/26/14
11	Financing	3 wks	Mon 9/29/14	Fri 10/17/14
12	ESIP Agreement Executed	0 days	Fri 10/17/14	Fri 10/17/14
13	Notice to Proceed / Subcontract Awards	3 wks	Mon 10/20/14	Fri 11/7/14
14	Shop Drawing / Equipment Submittals	8 wks	Mon 11/10/14	Fri 1/2/15
15	**ECM-1 Lighting Permits**	4 wks	Mon 1/5/15	Fri 1/30/15
16	Lighting Upgrades and LED Parking Lot Lights	8 wks	Mon 2/2/15	Fri 3/27/15
17	Plug Load Management Via Wifi	10 wks	Mon 2/2/15	Fri 4/10/15
18	De-Stratification Fans	5 wks	Mon 3/30/15	Fri 5/1/15
19	**ECM-2 Mechanical Permits**	4 wks	Mon 12/22/14	Fri 1/16/15
20	Central School Boiler Replacement	22 wks	Mon 5/4/15	Fri 10/2/15
21	Great Meadows MS Cooling Tower	6 wks	Mon 2/16/15	Fri 3/27/15
22	Heat Recovery Unit Retro-commissioning	8 wks	Mon 5/11/15	Fri 7/3/15
23	Window AC Unit Replacement	2 wks	Mon 2/2/15	Fri 2/13/15
24	Motors and VFD's	6 wks	Mon 5/25/15	Fri 7/3/15
25	Steam Traps	10 wks	Mon 6/1/15	Fri 8/7/15
26	**ECM-3 BMS Upgrades**	40 wks	Mon 2/16/15	Fri 11/20/15
27	**ECM-4 Building Envelope**	5 wks	Mon 1/5/15	Fri 2/6/15
28	**ECM-7 Computer Power Management**	8 wks	Mon 1/5/15	Fri 2/27/15
29	CRT to LCD Monitor Replacements	5 wks	Mon 6/1/15	Fri 7/3/15
30	**Punchlist**	3 wks	Mon 11/16/15	Fri 12/4/15
31	**Cleanup**	5 days	Mon 12/7/15	Fri 12/11/15
32	**Demobilization**	5 days	Mon 12/14/15	Fri 12/18/15
33	**Delivery and Acceptance**	0 days	Fri 12/25/15	Fri 12/25/15



Project: Great Meadows SD
Date: Thu 6/12/14

Task | Split | Milestone | Summary | Project Summary | External Tasks | External Milestone | Inactive Task | Inactive Milestone | Inactive Summary | Manual Task | Duration-only | Manual Summary Rollup | Manual Summary | Start-only | Finish-only | Progress | Deadline

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Great Meadows ESP Schedule 6-12-2014

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APPENDIX 1 INDEPENDENT ENERGY AUDITS

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APPENDIX 2 ECM CALCULATIONS

Category		Energy Savings	Operational Savings	Reason for Savings
			Operational Savings have been detailed and agreed to with the West Morris School District -	**Back Up Data is available through the Business Administrator.**
Eletrical and Thermal Savings		$122,545		ECM's detailed within / Energy Calculation Details Follow
LED Lighting			$3,500	Based on Bulb Life of 100000 hours, bulb replacement on an annual basis will be almost non-existent. No ballast is required for LED and therefore none will need to be replaced. Back Up Data is available through the Business Administrator.
Controls /Building Management System Replacement			$10,000	Actual Bills from an outside vendor were reviewed and identified to be on average $11,300 per year in cost. The systems in both Central and Liberty Schools are antiquated and costs will only rise in the future control repairs will be reduced to a minimum. Back Up Data is available through the Business Administrator.
Boiler Replacement and Cooling Tower Repairs			$2,000	Actual Bills from an outside vendor were reviewed and identified to be on average $15,000 per year in cost. Savings are based on repairs of $2,000 for the cooling tower at the middle school. Back Up Data is available through the Business Administrator.
Total		**$122,545**	**$15,500**	**$138,045**

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APPENDIX 3 DATA LOGGER PLOTS

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APPENDIX 4 CUTSHEETS

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APPENDIX 5 SAFETY MANAGEMENT PLAN

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APPENDIX 6 MECHANICAL LIST

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