NEWTON BOARD OF EDUCATION

District-Wide Energy Savings Plan

February 21, 2020

Honeywell

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District-Wide Energy Savings Plan

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SECTION A EXECUTIVE SUMMARY

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

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

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

The purpose of this document is to provide all the information required for the Newton BOE 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 Newton BOE. This is not meant to infer that all the ECMs identified can be implemented. However, if the ECM is part of this plan, it may be implemented later as additional funding becomes available or technology changes to provide for an improved financial return.

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

A. Executive Summary (This Section)

B. Preliminary Utility Analysis – The Preliminary Utility Analysis (PUA) defines the utility baseline for the Newton BOE buildings included in the Energy Savings Plan. It provides an overview of the current usage and a cost per square foot by building of utility expenses. The report also compares the Newton BOE's utility consumption to that of other 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 School District. It is specific to your facilities in scope, savings methodology and environmental impact. It is intended to provide a basis of design for each measure in narrative form. It is not intended to be a detailed specification for construction. ALL potential ECMs for the Newton BOE are identified for the purposes of potential inclusion in the program. Final selected ECMs are to be determined by the Newton BOE 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 VI: Annual Cash Flow Analysis provides a “rolled-up” view of the overall project financials, inclusive of financing costs, on an annual basis as well as over the entire 15-year term of the agreement.

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

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

G. Independent Energy Audit – This section includes, for reference, the independent energy audits as previously received by the Newton BOE through the Local Government Energy Audit (LGEA) program. The audits provided by TRC have been included on a USB drive as Appendix 1. A comparison can be made between the ECMs outlined in this Independent Energy Audit and 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.

I. Equipment Cut-sheets – This section titled Appendix 3: 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.

J. Safety Management Plan – This section titled Appendix 4: 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 Newton BOE 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.

Benefits

The measures investigated in this Energy Savings Plan could result in an annual utility savings of 495,873 kWh of electricity and save 39,060 therms of natural gas. The total utility cost savings is $2,291,456 over the life of the project (15 years). Additionally, these energy savings will result in a net reduction of greenhouse gases and will reduce the school district's carbon footprint by 1,031,888 pounds of CO_2 annually. All these savings are achieved while improving the classroom environment and renewing many items that have been in service beyond useful life expectancy.

In accordance with the NJ ESIP process, the next step in the project development phase is for Honeywell to provide our recommendations and for the Newton BOE to select the desired content of the project based upon the Newton BOE's unique goals and objectives. The selections will consider the projected costs, projected energy and operational savings, available financing options at the time of the agreement, interest rates, length of term and Newton BOE 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-year term as outlined in the legislation.

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

Sincerely,

Caroline Jackson
Energy Account Executive

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SECTION B PRELIMINARY UTILITY ANALYSIS

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SECTION C ENERGY CONSERVATION MEASURES

Introduction

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

Honeywell has done a review of the ECMs which would provide energy and cost savings to the Newton BOE. This report aims to be an assessment of the feasibility and cost effectiveness of such measures, and an indication of the potential for their implementation. The ECMs listed below have been reviewed throughout your facilities for consideration within a complete Energy Savings Plan. What follows is a general description of the energy auditing process and the detailed descriptions of the ECMs for your facilities.

ENERGY CONSERVATION MEASURES

ECM Description	Newton BOE Office	Merriam Avenue Elementary School	Halsted Middle School	Newton High School
1A LED Lighting	●	●	●	●
1B Lighting Controls	●	●	●	●
1C Exterior Pole Lighting		●	●	●
1D Vending Misers			●	●
1E Destratification Fans		●		●
1F Plug Load Management via Wi-Fi	●	●	●	●
2A Boiler Replacements			●	
2B Boiler Controlinks		●	●	●
2C Rooftop Unit Replacement		●		
2D Split System Replacements	●	●	●	
2E Unit Heater Replacement	●			
2F Premium Efficiency Motors and VFDs			●	●
2G Kitchen Equipment Conversion		●		
2H Walk In Compressor Controls				●
2I Kitchen Hood Controls				●
2J Piping Insulation	●		●	●
2K Replace Unit Ventilators		●		●
3A Building Management Control System		●	●	●
3B Demand Control Ventilation		●		●
4A Building Envelope Improvements			●	●
4B Window Replacements				●
4C Exterior Door Replacements				●

ECM Description	Newton BOE Office	Merriam Avenue Elementary School	Halsted Middle School	Newton High School
4D Roof Sealing			●	●
5A Computer Power Management	●	●	●	●
6A Permanent Load Reduction	●	●	●	●
7A Solar PPA			●	●
8A Retro-Commissioning		●	●	●
9A Energy Education		●	●	●
10A Transformer Replacement				●

OVERVIEW

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

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

Reject and Accept Measures Based On

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

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

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

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

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

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

Demand Sensitive Operation

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

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

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ECM 1A LED LIGHTING

The key benefits of this ECM include:

- **Energy Savings** from reducing total energy consumption with more efficient, state of the art technology. Today's most efficient way of illumination and lighting has an estimated energy efficiency of 80%-90% when compared to traditional lighting and conventional light bulbs.
- **Improved teacher and student performance** from enhanced lighting quality that translates to an enhanced working and learning environment.
- **Improved equipment longevity** by reducing amount of light usage and extending the useful life of your lighting system. LED bulbs and diodes have an outstanding operational 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.
- **Reduced maintenance and operational costs** by modernizing your lighting system and providing for longer lasting and technologically advanced lights, without the need to address deficient or bad ballasts.
- **Ecologically Friendly** - LED lights are free of toxic chemicals. Most conventional fluorescent lighting bulbs contain a multitude of materials like mercury that are dangerous for the environment. LED lights contain no toxic materials and are 100% recyclable and will help to reduce carbon footprint by up to a third. The long operational 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!

ECM Description	Newton BOE Office	Merriam Avenue Elementary School	Halsted Middle School	Newton High School
1A LED Lighting	●	●	●	●

Existing Conditions

Indoor lighting predominantly consists of T-8s, some T-5s, CFLs, and a few incandescent bulbs. In general, lighting is operated on switches.

Examples of existing interior lighting

Scope of Work

The proposed lighting system is based on the recent investment grade lighting system audit where existing lighting systems were analyzed and inventoried. Honeywell proposes to retrofit all existing T-8 fixtures with high efficiency Light Emitting Diode (LED) lamps.

To retrofit these lights with energy efficient LEDs, the existing ballasts that are in the space behind the light will be removed. Once removed, we will 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.

Customer Support and Coordination with Utilities

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

Environmental Issues

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

ECM 1B LIGHTING CONTROLS

The key benefits of this ECM include:

- **Energy savings** from reducing total energy consumption with more efficient, state of the art technology. Lighting controls keep lighting off when no occupancy is detected, reducing electrical energy consumption.
- **Reduced maintenance and operational costs** by reducing the runtime of lighting system and components.

ECM Description	Newton BOE Office	Merriam Avenue Elementary School	Halsted Middle School	Newton High School
1B Lighting Controls	●	●	●	●

Existing Conditions

Educational institutions, such as K-12 districts, are focused on providing classrooms and campuses for their teachers and students that are safe, healthy, energy-efficient, and provide the best environment for learning, and they are also chartered with reducing the costs of building operations.

Solution

Honeywell proposes the installation of occupancy-based lighting controls for interior spaces, for lighting fixtures where none are currently installed. These controls will automatically control lighting systems based on occupancy.

Examples of existing lighting to be retrofitted with controls

Example of interior lighting sensor

Scope of Work

A Lighting Control system can lower energy costs:
Lighting controls lower cost by adjusting light levels by occupancy, turning lights off when not needed.

Changes in Infrastructure

New lighting control devices 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 electric energy usage. A slight increase in heating energy is resultant from the reduced heat output lighting that is turned off.
Waste Production	Any waste generated will be properly disposed.
Environmental Regulations	No environmental impact is expected.

ECM 1C EXTERIOR POLE LIGHTING

The key benefits of this ECM include:

- **Energy Savings** from reducing total energy consumption with more efficient, state of the art technology. Today's most efficient way of illumination and lighting has an estimated energy efficiency of 80%-90% when compared to traditional lighting and conventional light bulbs.
- **Improved equipment longevity** by reducing amount of light usage and extending the useful life of your lighting system. LED bulbs and diodes have an outstanding operational 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.
- **Reduced operational costs** by no longer renting the bulbs from Jersey Central Power & Lighting (JCP&L).
- **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!

ECM Description	Newton BOE Office	Merriam Avenue Elementary School	Halsted Middle School	Newton High School
1C Exterior Pole Lighting		●	●	●

Existing Conditions

The district exterior pole lighting consists of metal halide flood and pole light fixtures, which are not as efficient as modern LED types. Parking lot exterior lights consist of pole mounted metal halide fixtures. These fixtures are currently being rented from JCP&L.

Scope of Work

Outdoor Lighting

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

LED Parking Lot Lighting Upgrades

Changes in Infrastructure

New LED lamps will be installed as part of this ECM. Existing poles will be utilized.

Customer Support and Coordination with Utilities

Coordination efforts will be needed with JCP&L 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 that are removed will be properly disposed.
Environmental Regulations	No environmental impact is expected.

ECM 1D VENDING MISERS

The key benefits of this ECM include:

- **Energy savings** by better managing the power consumption of electrical equipment.
- **Longer equipment life** thanks to reduced usage.

ECM Description	Newton BOE Office	Merriam Avenue Elementary School	Halsted Middle School	Newton High School
1D Vending Misers			●	●

Multiple vending machines were observed at Halsted Middle School and Newton High School. As such, Honeywell has investigated the use of plug controllers for these areas.

Existing Conditions

Vending machines are located throughout the schools offering soft drinks to the occupants. A typical cold drink machine consumes over 5,000 kWh annually.

Vending Machines to be retrofitted with controls

Building	Type	Location	Qty
Halsted Middle School	Cold Beverage	Cafeteria	1
Newton High School	Cold Beverage	Cafeteria/Gymnasium	2
Newton High School	Snack	Cafeteria/Gymnasium	2

Proposed Vending Machines for Vending Miser Controls

Proposed Solution

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

The VMOC also monitors electrical current used by the vending machine. This ensures that the unit will never power down a vending machine while the compressor is running, so a high head pressure start never occurs. In addition, the current sensor ensures that every time the vending machine is powered up,

the cooling cycle is run to completion before again powering down the vending machine. The Coca Cola Company and Pepsi Corporation approve the proposed controller for use on their machines.

Interface with Existing Equipment

All the VMOC devices are easily installed. The vending machine controllers are installed separately from the machine, and implementation will occur during working hours. A period of three (3) weeks will be required to verify proper calibration of the sensors.

With respect to the vending machines in the Newton schools, Honeywell has estimated the number and types of vending machines based on our site tour. During the implementation phase, Honeywell will check with the vendor about the type and specification of the vending machines as it relates to any internal time clocks which may exist inside the machine. Should this be the case, the savings and cost will be adjusted accordingly.

Changes in Infrastructure

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

Customer Support and Coordination with Utilities

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

Environmental Issues

Resource Use	Energy savings will result from reduced electric energy usage.
Waste Production	Any waste generated will be properly disposed.
Environmental Regulations	No environmental impact is expected.

ECM 1E DE-STRATIFICATION FANS

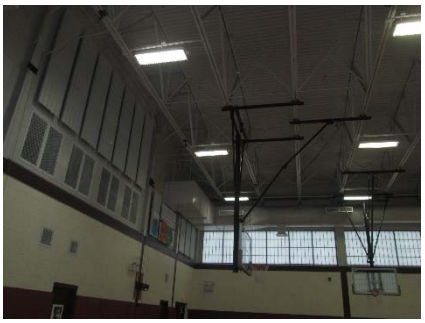
The key benefits of this ECM include:

- **Improved efficiency and energy savings** through more equal distribution of conditioned air space.
- **Equipment longevity** due to lower utilization of equipment to condition air.
- **Increased comfort** of students and teachers.

ECM Description	Newton BOE Office	Merriam Avenue Elementary School	Halsted Middle School	Newton High School
1E Destratification Fans		●		●

Existing Conditions

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

Examples of Spaces for Destratification Fans

Proposed Solution

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

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

Systems Evaluation and Selection

An energy-efficient motor drives a near-silent fan that forces a column of hotter air from the ceiling to the cooler floor below. As this column of warm air nears the floor, it begins to flare out in a circular pattern and rise again creating a torus. While doing so, it warms the cooler air and mixes with air near the floor, increasing the temperature and comfort of occupants. Through a natural law of physics, this torus will continue to re-circulate air, mixing warmer air from the ceiling with cooler air near the floor until the ceiling and air temperatures are nearly equal. As this happens, it will require less and less energy to comfortably

heat the work area, allowing thermostats to be lowered and energy savings to be realized. Once started, the entire process of “thermal equalization” will take on average less than 24 hours.

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

School	Location	Qty	Type
Merriam Avenue Elementary School	Multipurpose Room	4	Air Pear 45
Merriam Avenue Elementary School	Gymnasium	6	Air Pear 45
Newton High School	Gymnasium	6	Air Pear 25
Newton High School	Weight Room	3	Air Pear 15
Total		**19**	

Proposed De-Stratification Fans

Scope of Work

Per De-Stratification Fan:

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

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	Any waste generated will be properly disposed.
Environmental Regulations	No environmental impact is expected.

ECM 1F PLUG LOAD MANAGEMENT VIA WIFI

The key benefits of this ECM include:

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

ECM Description	Newton BOE Office	Merriam Avenue Elementary School	Halsted Middle School	Newton High School
1F Plug Load Management via Wi-Fi	●	●	●	●

Existing Conditions

The schools are equipped with a host of equipment and devices. A byproduct of the electronic devices such as printers, projectors, televisions, and window air conditioning units is their phantom load. Phantom load refers to energy that is used when a device is off. This includes energy used by TVs and copiers 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. This measure will address energy waste due to phantom loads in your buildings.

Typical electrical draws for when devices are off are as follows:

Plug Load Management Applications

Device	Wattage
Projectors	21
Charging Cart	35
Printer/Copier	30

Electrical Draw per Typical Device

Proposed Solution

Honeywell proposes to install plug load management devices to provide a comprehensive solution to the device control dilemma, by using an existing Wi-Fi network. This computer-based system is designed to

allow you to program or control your devices with a customizable schedule. These plugs are a switch that stops all electrical power to the device, turning off equipment and eliminating phantom loads, and are a proven technology with a high degree of reliability and security.

The Plug Load Controller enables energy savings by controlling plug loads through occupancy or schedule-based on/off control of receptacles on a circuit. The device is paired with a sensor or a group of sensors in the network to enable occupancy-based control. The controller features two sets of wires to separately power controlled and uncontrolled outlets, so that energy consumption on both uncontrolled and controlled circuits are separately measured.

Energy Savings Methodology and Results

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

Changes in Infrastructure

None.

Customer Support and Coordination

None.

Environmental Issues

Resource Use	Annual savings for reduced electrical consumption.
Waste Production	Any waste generated will be properly disposed of.
Environmental Regulations	No environmental impact is expected.

ECM 2A BOILER REPLACEMENTS

The key benefits of this ECM include:

- **Reduced energy usage** from improved boiler efficiency thanks to replacement of older equipment.
- **Lower operational costs** by using less natural gas through less frequent maintenance and operational issues.

ECM Description	Newton BOE Office	Merriam Avenue Elementary School	Halsted Middle School	Newton High School
2A Boiler Replacements			●	

Existing Conditions

The boilers in the schools are near or past the end of their useful life and are not as efficient as condensing boilers. These boilers cost more to operate than non-condensing boilers.

Existing Boilers to be Replaced

Building	Manufacturer	Model	Qty	Capacity (MBH)	Fuel
Merriam Avenue Elementary School	Weil McLain	2194	1	5,810	Natural Gas
Merriam Avenue Elementary School	Cleaver Brooks	CB810-150	1	4,706	Natural Gas
Halsted Middle School	HB Smith	4500 Mills	1	5,869	Natural Gas
Halsted Middle School	Burnham	V1121	1	4,174	Natural Gas
Newton High School	Cleaver Brooks	CB100-125	2	4,185	Natural Gas

Existing Boilers

Proposed Solution

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

equation that makes up the seasonal efficiency of a boiler. Compared to the existing boilers in these schools, the new boilers will provide an increase in boiler efficiency of anywhere between 15% to 20%.

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

Building	Manufacturer	Model	Qty	Input (MBH)	Fuel
Merriam Avenue Elementary School*	Aerco	BMK2000	2	2,000	Natural Gas
Halsted Middle School	Aerco	BMK1500	3	1,500	Natural Gas
Newton High School*	Aerco	BMK5000	2	5,000	Natural Gas

Proposed Boiler Equipment

- *Not included in the project at this time.

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.
- Install new boilers.
- Run new gas piping from new gas service to the new 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 boilers will be installed in itemized locations; in addition, training for maintenance personnel will be required, as well as on-going, annual preventive maintenance. New gas piping will need to be run from the new gas service/meter to the equipment.

O&M Impact

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

Customer Support and Coordination with Utilities

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

Environmental Issues

Resource Use	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 2B BOILER CONTROLINKS

The key benefits of this ECM include:

- **Reduced energy usage** from improved boiler efficiency thanks to replacement of older burner controls.
- **Lower operational costs** by using less natural gas through less frequent maintenance and operational issues.

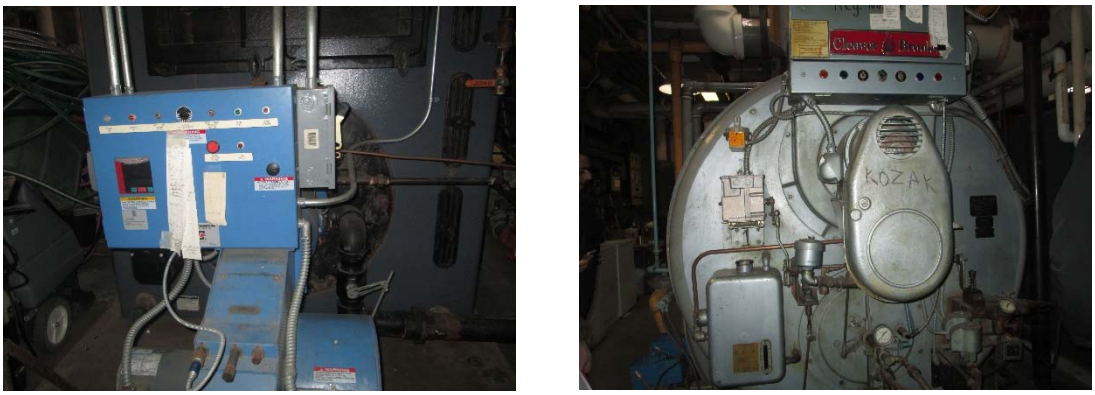
ECM Description	Newton BOE Office	Merriam Avenue Elementary School	Halsted Middle School	Newton High School
2B Boiler Controlinks		●	●	●

Existing Conditions

Honeywell observed that the existing boiler burners have limited fuel / air ratio controls in place, which reduces your ability to optimize your combustion efficiency and system reliability. The below table indicates which systems Honeywell recommends installation of new burner controls, which will utilize advanced combustion controls to decrease costs and increase efficiency.

Building	Manufacturer	Model	Qty	Output (MBH Each)	Type
Merriam Avenue Elementary School	Weil McLain	2194	1	5,810	Hot Water
Merriam Avenue Elementary School	Cleaver Brooks	CB810-150	1	4,706	Hot Water
Halsted Middle School	HB Smith	4500 Mills	1	5,869	Hot Water
Newton High School	Cleaver Brooks	CB100-125	1	4,185	Hot Water

Existing Boilers for Burner Replacements



Boilers in Need of Burner Controls

Proposed Solution

Typically, boilers are sized to accommodate the coldest days (approximately 5% of the year). During these periods of maximum demand, the burner is constantly on and operating at maximum capacity. The

burner cycles on and off, maintaining temperature or pressure in the boiler. It is during these periods of lesser demand, that the controller will monitor the boiler make up rate, and efficiently manage the firing of the boiler.

The length of the burner's off-cycle is the best measure of total heating demand or load. In other words, the load is directly related to the time it takes for water (or steam) in the boiler to drop from its high-limit temperature (or pressure) to its low-limit or "call" setting. When demand is high, these off-cycles are short and the on-cycles are longer. When demand is lower, off-cycles are longer and on-cycles are reduced.

The device, which is a microprocessor based computer, constantly monitors the demand on the boiler by assimilating all factors affecting a building's heating requirements, including occupancy, climate, wind chill, solar gain, type of building, and many others.

Honeywell ControLinks™

Honeywell ControLinks™ will integrate to the existing Burner Management Flame Safe Guard Controller (FSG) to monitor and control the burner fuel and air ratios to maintain proper combustion. The single actuator will be replaced with separate Direct Coupled Actuators (DCA) for air and fuel(s) and will be connected to the existing burner control.

This upgrade will provide a combustion curve and light-off points including minimum/maximum firing rate points resulting in a precise firing rate control over the entire firing rate of the burner. Combustion efficiency will be maximized throughout the combustion curve and will provide a fuel curve to achieve maximum efficiency.

Modulating Burner Control

The Modulating Burners integrates flame safeguard control, fuel-air ratio control, O_2 Trim, VFD control, and proportional integral derivative (pID) control into a single, integrated, user-friendly system.
The features integrated into the burner provide energy savings, reduced emissions, reduced installation costs and enhanced safety.

Fuel Metering

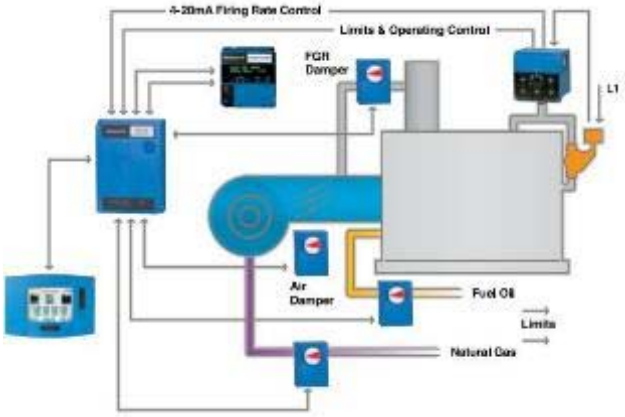
- Reduced fuel use.
- Increased burner efficiency.
- Greenhouse gas emissions reduction.

Easy Access Panels

- Total access to components.
- Easy Maintenance.

Graphic Burner Management System

- Graphic annunciation of critical burner functions.



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 burner controls for each boiler will be installed and programmed 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 boiler controls 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 boiler load control, reduced maintenance costs control and setback.
Waste Production	Any removed parts will be disposed of properly.
Environmental Regulations	No environmental impact is expected; all regulations will be adhered to in accordance with EPA and local code requirements.

ECM 2C ROOFTOP UNIT (RTU) REPLACEMENTS

The key benefits of this ECM include:

- **Reduced energy usage** from improved efficiency thanks to replacement of older equipment.
- **Lower operational costs** through less frequent maintenance and operational issues.

ECM Description	Newton BOE Office	Merriam Avenue Elementary School	Halsted Middle School	Newton High School
2C Rooftop Unit Replacements		●		

Existing Conditions

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

Existing Rooftop Units to be Replaced

Building	Make	Model	Location Served	Qty.	Tons
Merriam Avenue Elementary School	Trane	YCC024F1L0BH	Staff Room	1	2.0
Merriam Avenue Elementary School	Trane	YCC024F1L0BH	Sm Rms (Near 121)	1	2.0

Existing Rooftop Units to be Replaced

Proposed Solution

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

Building	Make	Model	Location Served	Qty.	Tons
Merriam Avenue Elementary School	Lennox	13 GEP24050ALP	Staff Room	1	2.0
Merriam Avenue Elementary School	Lennox	13 GEP24050ALP	Sm Rms (Near 121)	1	2.0

Proposed Rooftop Units

** Additional units may be added during IGA.*

Scope of Work

The following outlines the scope of work to install the rooftop 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.
- Rig and set new unit at the base.
- Inspect piping and air ducts before reconnecting them to the unit.
- Reconnect piping and air ducts.
- Repair duct and piping insulation.
- Connect electric power.
- Start up and commissioning of new unit.
- Maintenance operator(s) training.

Energy Savings Methodology and Results

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

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

Equipment Information

Manufacturer and Type	Several quality and cost effective manufacturers are available. Honeywell and the customer will determine final selections.
Equipment Identification	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 unit scheduled for removal will be disposed of properly.
Environmental Regulations	No environmental impact is expected.

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ECM 2D SPLIT SYSTEM REPLACEMENTS

The key benefits of this ECM include:

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

ECM Description	Newton BOE Office	Merriam Avenue Elementary School	Halsted Middle School	Newton High School
2D Split System Replacements	●	●	●	

Existing Conditions

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

Split System Condensing Units

Building	Make	Model	Location Served	Qty.	Tons
Newton BOE Office	Lennox	TSA090S4SN1Y	1st Floor Conf Room	1	7.5
Merriam Avenue Elementary School	Mitsubishi Electric	MUY-GA24NA	IT Room	1	2.0
Halsted Middle School	Trane	2TTR2018	Guidance Offices	1	1.5
Halsted Middle School	Trane	2TTR2018	Child Study Office	1	1.5

Existing Split System Units to be Replaced

Proposed Solution

Honeywell proposes replacing the existing condensing units in the table above. The new units will be installed in the same location as the existing units. Existing electrical power supply will be reconnected to

the new motors. The new units will be equipped with factory-installed microprocessor controls that improve unit efficiency. The units will also communicate with the existing or enhanced building management system.

Building	Make	Model	Location Served	Qty.	Tons
Newton BOE Office	Lennox	SL18XC1-036	1st Floor Conf Rm	1	3.0
Merriam Avenue Elementary School	Daikin	RK24NMYJU	IT Room	1	2.0
Halsted Middle School	Lennox	SL18XC1-024	Guidance Offices	1	2.0
Halsted Middle School	Lennox	SL18XC1-024	Child Study Office	1	2.0

Proposed Split Systems

Scope of Work

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

- Disconnect existing electric connections.
- Disconnect piping from the unit.
- Remove unit from the base.
- Modify base for new unit if necessary.
- Rig and set new unit at the base.
- Inspect piping and air ducts before reconnecting them to the unit.
- Reconnect piping and air ducts.
- Repair duct and piping insulation.
- Connect electric power.
- Start up and commissioning of new unit.
- Maintenance operator(s) training.

Energy Savings Methodology and Results

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

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

Equipment Information

Manufacturer and Type	Several quality and cost effective manufacturers are available. Honeywell and the customer will determine final selections.
Equipment Identification	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 split system unit scheduled for removal will be disposed of properly.
Environmental Regulations	No environmental impact is expected.

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ECM 2E UNIT HEATER REPLACEMENT

The key benefits of this ECM include:

- Improved efficiency and energy savings from increased equipment efficiency.
- Equipment longevity due to more efficient and less wasteful equipment utilization.
- Operational savings from less frequent need to repair or replace equipment.
- Improved Environment for staff from quieter operation of equipment.

ECM Description	Newton BOE Office	Merriam Avenue Elementary School	Halsted Middle School	Newton High School
2E Unit Heater Replacement	●			

Existing Conditions

There is one unit heater in the Newton Board of Education Office which heats the air in the basement. This unit is reported to be loud and disruptive to the occupants.

Typical Unit Heater

Proposed Solution

For this application, Honeywell intends to install a new freestanding radiator or ceiling cassette to provide heating to the basement.

Building	No. of UHs to Replace
Newton Board of Education Office	1

Proposed Unit Heater

Scope of Work

- Replace Unit Heater systems as listed above.
- Provide natural gas and electrical power for the new equipment.
- 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 of new equipment. The savings are generally calculated as:

Thermal Energy Savings	Existing unit energy consumption (therms) – reduced unit energy consumption (therms).

Equipment Information

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

Customer Support and Coordination with Utilities

Coordination of the installation and electrical tie-in will be required.

Environmental Issues

Resource Use	Energy savings will result from new energy efficient equipment.
Waste Production	None.
Environmental Regulations	No environmental impact is expected.

ECM 2F PREMIUM EFFICIENCY MOTORS AND VFDS

The key benefits of this ECM include:

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

ECM Description	Newton BOE Office	Merriam Avenue Elementary School	Halsted Middle School	Newton High School
2F Premium Efficiency Motors and VFDs			●	●

ECM Overview

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

Existing Motors

Existing Conditions

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

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

Building	Equipment Description	Qty	Motor HP	Replace Motor Y/N	Add VFD Y/N
Halsted Middle School	Heating Hot Water Pumps	2	3.0	Y	Y
Newton High School	Heating Hot Water Pumps	2	15.0	Y	Y
Newton High School	Gymnasium Supply Fans	2	3.0	Y	Y

Existing Motors

Proposed Solution

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

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

Honeywell also recommends installing VFDs on the heating hot water pumps to better match pumping output to system requirements and reduce energy waste. Each motor will be equipped with new selector relays that will allow one drive to operate per pump with the VFD drive. Honeywell also recommends installation of new differential pressure sensors and tying them to the control system to allow you to regulate the speed of the pump according to load requirements.

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.
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 2G KITCHEN EQUIPMENT CONVERSION

The key benefits of this ECM include:

- **Lower operational costs** through less expensive utility rates for heating fuel.

ECM Description	Newton BOE Office	Merriam Avenue Elementary School	Halsted Middle School	Newton High School
2G Kitchen Equipment Conversion		●		

Existing Conditions

The existing kitchen dishwasher booster heater utilize electricity to generate heat. Electrical heating is a much more expensive way to power heating/cleaning equipment than natural gas.

Kitchen Equipment to be Converted

Proposed Solution

Honeywell recommends replacing existing kitchen cleaning equipment with natural gas-fired units. This new equipment will last much longer than the old electrical equipment would have, and reduce operating costs due to the price difference between electricity and natural gas.

Building	Equipment Type	Quantity
Merriam Avenue Elementary School	Dishwasher Booster Heater	1
Merriam Avenue Elementary School	Electric Convection Ovens	3

Existing Kitchen Equipment to be Replaced

Scope of Work

- Disconnect and remove select existing electrically-heated kitchen equipment.
- Run new gas line to the kitchen.
- Install and connect new gas-fired kitchen equipment.
- Start-up and test new units.

Energy Savings Methodology and Results

The savings approach is based upon the difference in energy use and cost between the existing and new kitchen equipment.

Changes in Infrastructure

New gas piping will need to be run to the kitchen.

Customer Support and Coordination with Utilities

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

Environmental Issues

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

ECM 2H WALK-IN COMPRESSOR CONTROLS

The key benefits of this ECM include:

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

ECM Description	Newton BOE Office	Merriam Avenue Elementary School	Halsted Middle School	Newton High School
2H Walk-in Compressor Controls				●

Existing Conditions

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

Typical Walk-In Freezer and Refrigerators

Building	Location	Walk-In Refrigerators	Walk-In Freezers
Newton High School	Flower Room/ Outside	4	2

Existing Walk-In Refrigerator/Freezers to receive Controls

Proposed Solution

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

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

Intellidyne Sensor Features

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

Intellidyne Sensor Benefits

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

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

Energy Savings Methodology and Results

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

Changes in Infrastructure

None.

Customer Support and Coordination with Utilities

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

Environmental Issues

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

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ECM 2I KITCHEN HOOD CONTROLS

The key benefits of this ECM include:

- **Reduced energy usage** from improved equipment control and reduced exhaust of conditioned air.
- **Lower operational costs** through less frequent maintenance and operational issues.

ECM Description	Newton BOE Office	Merriam Avenue Elementary School	Halsted Middle School	Newton High School
2I Kitchen Hood Controls				●

Existing Conditions

Honeywell observed that the kitchen utilizes 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.

Existing Kitchen Hood

Proposed Solution

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

Building	Number of Hoods
Newton High School	1

Existing Kitchen Hoods to receive Controls

Scope of Work

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

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

Energy Savings Methodology and Results

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

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 2J PIPING INSULATION

The key benefits of this ECM include:

- **Energy savings** from reducing heat losses from uninsulated pipes.

ECM Description	Newton BOE Office	Merriam Avenue Elementary School	Halsted Middle School	Newton High School
2J Piping Insulation	●		●	●

Existing Conditions

Heat losses result from uninsulated hot piping giving off heat to the space around it. This measure will insulate these surfaces, resulting in energy savings and improved comfort of those areas in or near occupied spaces.

During the site visits, it was noticed that some hot water piping and valves were not insulated. The un-insulated piping and valves waste energy and also pose a danger of getting injured with exposed hot piping. In addition, the boiler has to work harder to make up for the wasted energy.

Examples of Uninsulated Piping

Proposed Solution

Honeywell proposes insulating these pipes and valves with appropriately sized fiberglass insulation. The following table lists the recommended insulation thickness.

Building	Pipe Diameter	Linear Feat
Newton BOE Office	1”	40
Newton BOE Office	1.25”	110
Newton BOE Office	1.5”	40
Halsted Middle School	2”	30
Halsted Middle School	3”	200
Halsted Middle School	4”	130
Halsted Middle School	5”	70

Building	Pipe Diameter	Linear Feat
Halsted Middle School	8”	3
Halsted Middle School	14”	20
Newton High School	1”	10
Newton High School	2”	30
Newton High School	3”	20
Newton High School	6”	20
Newton High School	8”	20

Uninsulated Pipe Sizes

Energy Savings Methodology and Results

Energy savings results from significantly reducing the heat lost to the atmosphere from the piping and valve surfaces. In general, Honeywell uses the following approach to determine savings for this specific measure:

Energy Savings $	= ((Heat Loss Rate per foot of Uninsulated Pipe – Heat Loss Rate per foot of Insulated Pipe) x (Length of Pipe x Hours of Operation) x Cost/btu)/(Boiler Efficiency))

Reference is made to the ASHRAE 1989 Fundamentals text page 22.19, Table 9A “Heat Loss from Bare Steel Pipe to Still Air at 80 degrees F, Btu/hr-ft” for losses from un-insulated lines, and Table 11 “Recommended Thickness for Pipe and Equipment Insulation”.

Changes in Infrastructure

The insulation of hot piping can happen anytime without impact on building operation. In areas were asbestos is present; precautions will be required. Areas that are dangerously hot may require coordination with a normally occurring shutdown of that portion of the system.

Customer Support and Coordination with Utilities

The service to the specific lines may require interruption to allow for the repair or replacement. Coordination with site personnel will be required to minimize interruption to the buildings affected.

Environmental Issues

Resource Use	Energy savings will result from higher efficiency units.
Waste Production	Any waste generated will be properly disposed of.
Environmental Regulations	No environmental impact is expected.

ECM 2K REPLACE UNIT VENTILATORS

The key benefits of this ECM include:

- **Occupancy comfort and productivity** by way of installing air conditioning throughout the buildings
- **Lower operational costs** through less frequent maintenance and operational issues with new equipment

ECM Description	Newton BOE Office	Merriam Avenue Elementary School	Halsted Middle School	Newton High School
2K Replace Unit Ventilators		●		●

Existing Conditions

Currently, there are academic areas in each school which are not air conditioned. The District has requested to add cooling to several classrooms at both schools.

Existing Spaces Which Do Not Have Cooling and Requested by District

Proposed Solution

NJ ESIP allows the addition of non-energy savings measures to be included in the overall solution. Honeywell proposes to add cooling to various classrooms based on need through use of replacing unit ventilators and adding split system condensers and coils.

Building	Make/Model	Location	Qty	Tons
Merriam Avenue Elementary School	Lennox / SSB036H4	Classrooms K100, K101, K103, 105, 107, 109	7	3
Newton High School	Lennox / SSB036H4	Lower E and C Levels (E6-E16, Library, C1-C5)	19	3

Proposed Units

Scope of Work

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

- Modify base for new unit if necessary.
- Rigging and setting new unit ventilators and condensing units.
- Inspect heating hot water piping before reconnecting to the unit ventilators.
- Running new refrigerant piping from condensing units to unit ventilators.
- Connect electric power.
- Start up and commissioning of new units.
- 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	Customer and Honeywell shall choose final product. Currently Lennox is chosen as basis of design.
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	No energy savings will result from the addition of air conditioning.
Waste Production	Existing unit scheduled for removal will be disposed of properly.
Environmental Regulations	No environmental impact is expected.

ECM 3A BUILDING MANAGEMENT SYSTEM (BMS) UPGRADES

The key benefits of this ECM include:

- **Operational efficiency** thanks to better control and system-wide visibility.
- **Energy savings** from reducing total energy consumption with more efficient, state of the art technology.
- **Occupancy comfort and productivity** by way of enhanced temperature and relative humidity control throughout your buildings.

ECM Description	Newton BOE Office	Merriam Avenue Elementary School	Halsted Middle School	Newton High School
3A Building Management System Upgrades		●	●	●

Honeywell assessed the existing building management systems (BMS) of Newton School District. Upon inspection, it was noted that many the buildings are controlled by pneumatic systems and have no existing DDC controls. The youngest building is over 55 years old with original boilers. It is worth noting that the pneumatic system at Newton High School is in good working conditions.

Buildings and Location:

Building Name	Address
Newton Board of Education	57 Trinity Street, Newton, NJ 07860
Newton High School	44 Ryerson Avenue, Newton, NJ 07860
Halsted Middle School	59 Halsted Street, Newton, NJ 07860
Merriam Avenue Elementary School	81 Merriam Avenue, Newton, NJ 07860

Existing Conditions:

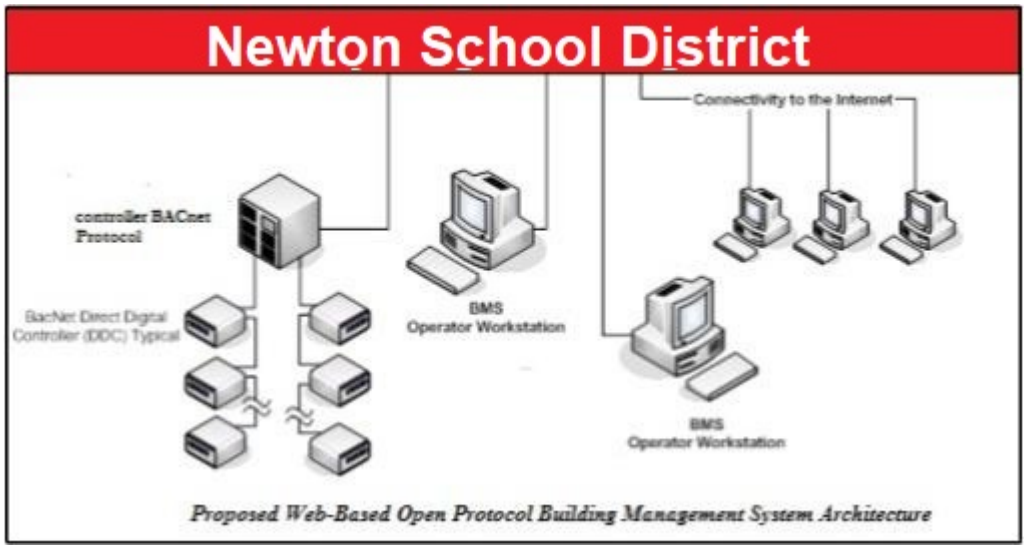
The schools currently have little or no controls. The mechanical systems consist of a mixture of roof top units, air handling units, unit ventilators, AC splits, boilers, and exhaust fans. Most are standalone, pneumatically controlled, or manually controlled via breakers.

There is a very old system controlling the different zones of the buildings through a Honeywell remote monitoring system. This has been in place for over 20 years and needs updating. There is also part of one of the schools controlled by another building management system and that has been unreliable and due to age often must be “reset”.

Proposed Conditions

Honeywell proposes to establish a web-enabled building management system (BMS) for Newton School District that will utilize the latest technology in building automation. The BMS shall communicate over the School District local area network (LAN) via the industry standard BACnet open protocol. Honeywell will

leverage the pneumatic system at the Newton High School. Other pneumatic and standalone controls shall be upgraded to the latest Honeywell BACnet direct digital controllers. In addition, three dimensional (3-D) graphical representations of all connected heating, ventilating and air conditioning equipment shall be provided to allow for intuitive control, monitoring, and scheduling of all systems. Operators shall be capable of system control and/or monitoring from any local computer or smart devices via a standard internet connection. Honeywell BMS control suite provides and delivers smarter buildings and enterprise systems through the integration of things. The Result will be Improved business efficiency, greater control, and faster decision making.



Newton School District – Typical Local BMS Network Topology

The new Building Management System will control and provide status of the unit ventilator zones, air handlers, and heating systems.

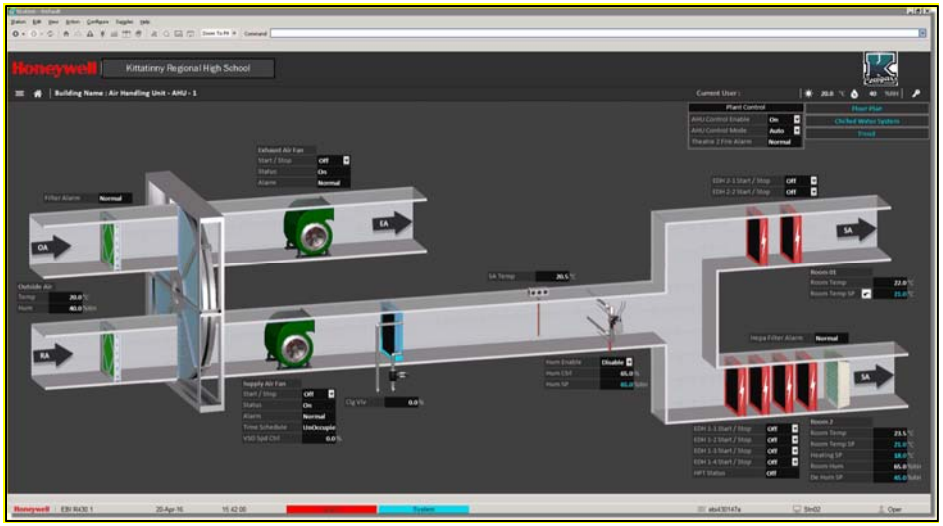
School	Description Function	Location Point Description
Newton High School (11 Zones) Individual room unit ventilator controls will remain and will be controlled with zone controls through BMS. Controls assessed as part of Retro Commissioning ECM	Day/Night Temperature Indication Day/Night Temperature Indication Enable/Disable Temperature Indication Enable/Disable Temperature Indication Enable/Disable Enable/Disable Temperature Indication Flame Failure/Gas Leak Alarm	Gym Gym Auditorium Auditorium Classrooms E, G & Shops Classrooms E, G& Shops Classroom B, Café & Admin Classrooms B, C, D, F & Admin Classrooms C&D Classroom F Outside Air Boiler
Halsted Middle School Individual room unit ventilator controls will remain and will be	Start/Stop/Status Temperature Indication Start/Stop/Status Temperature Indication Start/Stop/Status	Small Gym Small Gym Big Gym Big Gym Academic Zone 1

School	Description Function	Location Point Description
controlled with zone controls through BMS Controls assessed as part of Retro-Commissioning ECM	Temperature Indication Start/Stop/Status Temperature Indication Start/Stop/Status Temperature Indication	Academic Zone 1 Academic Zone 2 Academic Zone 2 Auditorium Zone 3 Auditorium Zone 3
Merriam Avenue Elementary School Individual room unit ventilator controls will remain and will be controlled with zone controls through BMS Controls assessed as part of Retro Commissioning ECM	Start/Stop/Status Temperature Indication Start/Stop/Status Temperature Indication Start/Stop/Status Temperature Indication Start/Stop/Status Temperature Indication Start/Stop/Status Temperature Indication Trane System replaced and Install BACnet controls Start Stop	Administration Administration Multipurpose Room Multipurpose Room Hallways Hallways Classroom/Library Classroom/Library Classrooms Classrooms 7 Roof Top Units Exhaust fans (4)

Operational and Maintenance Impact

Upgrading and consolidating all HVAC controls under one system will result in the following benefits to Newton School District.

1. Minimize time for the maintenance department to troubleshoot problems by allowing operators to investigate and resolve facility issues at any computer connected either locally or remotely (from home) to the IT network.
2. Ensure a comfortable and productive learning environment for patrons and staff by improving the HVAC controls through technology enhancements and repairs.
3. Minimize unexpected disruptions to the buildings by notifying operators of problematic and/or inefficient system operation prior to irrevocable equipment failures.
4. Eliminate unnecessary energy consumption by individually scheduling equipment operation based on real-time space occupancy status, holiday and summer schedules.
5. Reduce building heating, ventilating and air conditioning repair costs by providing operators with direct access to information used in the troubleshooting process.
6. Identify opportunities for improvement and prioritize repairs based on energy benchmarking data available through advanced reporting and trending capabilities.
7. Mobile access to approve personnel on and off campus to the systems.



Potential Control Programs with BMS Upgrades

Night Setback & Setup

Design and implementation of a more aggressive setback and setup schedule will help to further eliminate energy waste in each of your buildings by utilizing an optimal start/stop schedule.

Set Point Optimization

Honeywell will help deliver temperature uniformity by calibrating thermostats to the same set point, thereby achieving optimum comfort for your occupants by reducing the occurrence of hot and cold spots. We will also help you to reduce energy waste caused when adjacent areas cause your systems to overcompensate due to running in different operating modes.

Heating/Cooling Mode Selection

A modern, state of the art building management system can make real time decisions about the heating and cooling needs of any of your buildings. Honeywell will help you establish optimal system configurations to ensure that your buildings are always in optimal settings to deliver a more comfortable space and reduce energy waste.

Optimal Start/Stop

Honeywell understands that equipment start times are typically set to run earlier than normal to ensure optimal comfort is maintained during hot and cold weather seasons. We will work with staff to ensure that optimal start and stop features are fully utilized to optimize occupancy comfort and eliminate energy waste.

Remote Access

Facility managers will be able to login in to their BMS system from anywhere via their smartphone or iPad/Tablet or other internet enable devices. This added granular view will allow them to verify existing conditions and effectively manage their alarms and critical conditions and take steps to remediate the situation

Scope of Work

1. Newton High School

1.1 Air Handler Unit (Typical of 6)

1.1.1 Existing State:

a. AHU units are standalone and controlled by pneumatic system.

1.1.2 Proposed State:

a. Install new Honeywell BACnet controllers to control the AHU.
b. Replace existing pneumatic damper actuators with electronic actuators.
c. Replace existing pneumatic valves and valves actuators.
d. Replace temperature sensors with Honeywell duct temperature sensors.
e. Establish connectivity between the AHU controllers and the CPO-6A network controller.
f. Generate a 3-dimensional graphical representation of the equipment allowing building operators to monitor and adjust operating parameters of the AHU.
g. Establish an equipment run schedule based upon the actual building usage.

1.2 Heating Systems (Typical of 1).

1.2.1 Existing State:

a. Hot water boilers are controlled by pneumatic system.
b. There are 11 pneumatic zone connected to the control panel.

1.2.2 Proposed State:

c. Install new Honeywell BACnet controller to control and monitor the two boilers.
d. Control and monitor system start/stop and status of all the boilers.
e. Control and monitor all 4 pumps and program for lead/lag operation.
f. Install new outdoor air temperature sensor.
g. Provide points for remote monitoring and control.
h. Generate 3-D graphical representation of the system to monitor and control the unit.
i. Create equipment schedule based on the building's hours of operation.

1.3 Classroom Unit vents (Typical of 45).

1.3.1 Existing State:

a. Unit vents are controlled by a pneumatic system.

1.3.2 Proposed State

a. The existing zone temperatures, on off and time of day will be controlled to maintain temperatures in the classrooms.
b. Zone controls will be picked up in boiler room by the new building management system
c. Controls in unit ventilators have been replaced and/or maintained over time.

2. Halsted Middle School

2.1 Air Handler Unit Package AC (Typical of 4)

2.1.1 Existing State:

a. AHU units are standalone and controlled by thermostats.

2.1.2 Proposed State:

a. Install new Honeywell BACnet controllers or Honeywell BACnet Controller to control the AHU.
b. Establish connectivity between the AHU controller and the CPO-6A network controller.
c. Generate a 3-dimensional graphical representation of the equipment allowing building operators to monitor and adjust operating parameters of the AHU.
d. Establish an equipment run schedule based upon the actual building usage.
e. Installation of new thermostat for each in place of existing thermostats.
f. Communications bus from Jace in boiler room as per systems architecture.

2.2 Air Handler Unit (Typical of 1)-Auditorium Unit Not Included

2.2.1 Existing State:

a. AHU units are standalone and controlled by pneumatic system.

2.2.2 Proposed State:

a. Install new Honeywell BACnet controllers to control the AHU.
b. Replace existing pneumatic damper actuators with electronic actuators.
c. Replace temperature sensors with Honeywell duct temperature sensors.
d. Establish connectivity between the AHU controllers and the CPO-6A network controller.
e. Generate a 3-dimensional graphical representation of the equipment allowing building operators to monitor and adjust operating parameters of the AHU.
f. Establish an equipment run schedule based upon the actual building usage.

2.3 Heating Systems.

2.3.1 Existing State:

a. Boilers are controlled by an XL-10 controller.
b. There are 2 pneumatic zone connected to the control panel.
c. Lead/Lag operation of the pumps are controlled manually.

2.3.2 Proposed State:

a. Install new Honeywell BACnet controller to control and monitor the two boilers.
b. Control and monitor system start/stop and status of all the boilers.
c. Control and monitor the 2 pumps and program for lead/lag operation.
d. Install new outdoor air temperature sensor.
e. Provide points for remote monitoring and control.
f. Generate 3-D graphical representation of the system to monitor and control the unit.
g. Create equipment schedule based on the building's hours of operation.

2.4 Classroom Unit vents (Typical of 38).

2.4.1 Existing State:

a. Unit vents are controlled by a pneumatic system.

2.4.2 Proposed State

a. The existing zone temperatures, on off and time of day will be controlled to maintain temperatures in the classrooms.
b. Zone controls will be picked up in boiler room by the new building management system.
c. Controls in unit ventilators will be replaced as per scope described in ECM-8A: Retro-Commissioning.

3. Merriam Elementary School

3.1 Air Handler Unit (Typical of 2)

3.1.1 Existing State:

a. AHU units are controlled by a Trane Tracer Controller.

3.1.2 Proposed State:

a. Integrate the existing Trane Tracer system to the new Honeywell BMS.

3.2 Air Handler Unit (Typical of 2)

3.2.1 Existing State:

a. AHU units are standalone and controlled by pneumatic system.

3.2.2 Proposed State:

a. Install new Honeywell BACnet controllers to control the AHU.
b. Replace existing pneumatic damper actuators with electronic actuators.
c. Replace temperature sensors with Honeywell duct temperature sensors.
d. Establish connectivity between the AHU controllers and the CPO-6A network controller.
e. Generate a 3-dimensional graphical representation of the equipment allowing building operators to monitor and adjust operating parameters of the AHU.
f. Establish an equipment run schedule based upon the actual building usage.

3.3 Roof Top Unit (Typical of 7)

3.3.1 Existing State:

a. Trane RTUs controlled by Trane thermostats.

3.3.2 Proposed State:

a. Install new BACnet controllers to control the RTUs.
b. Establish connectivity between the RTU controllers and the CPO-6A network controller.
c. Generate a 3-dimensional graphical representation of the equipment allowing building operators to monitor and adjust operating parameters of the AHU.

d. Establish an equipment run schedule based on the actual building usage.

3.4 Classroom Unit vents (Typical of 48).

3.4.1 Existing State:

a. Unit vents are controlled by a pneumatic system.

3.4.2 Proposed State

a. The existing zone temperatures, on off and time of day will be controlled to maintain temperatures in the classrooms.
b. Zone controls will be picked up in boiler room by the new building management system.
c. Controls in unit ventilators will be replaced as per scope described in ECM-8A: Retro-Commissioning

Benefits:

a. Operational Impact: Improve maintenance response times by automatically notifying building operators of system deficiencies on a real-time basis via the district-wide building automation system.
b. Electrical Impact: Reduce electrical consumption by de-energizing the fan when the space served is unoccupied.
c. Operational Impact: Improve maintenance response times by automatically notifying building operators of system deficiencies on a real-time basis via the Network-wide building management system.

ECM 3B DEMAND CONTROL VENTILATION

The key benefits of this ECM include:

- **Operational efficiency** thanks to better control and reduced outside air.
- **Energy Savings** from reducing total energy consumption with more efficient, state of the art technology.
- **Equipment longevity** due to more efficient and less wasteful equipment utilization.
- **Occupancy comfort and productivity** by way of enhanced temperature and relative humidity control throughout your buildings.

ECM Description	Newton BOE Office	Merriam Avenue Elementary School	Halsted Middle School	Newton High School
3B Demand Control Ventilation		●		●

Existing Conditions

HVAC equipment serving large one-zone spaces such as gyms, auditoriums and multi-purpose rooms 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.

Typical Units for Demand Control Ventilation

Proposed Solution

Honeywell will install CO_2 sensors at the below locations. The CO_2 sensors will provide the control signal for the HVAC equipment to optimize the quantity of fresh air required. The installation of CO_2 sensors 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 the amount of outside air intake and thus reduce the heating energy used by the HVAC units and electric energy used by the motors. Based on this fact, there are reduced requirements for outside air to the spaces.

Building	Area Served	Number of Units	CFM Total (each unit) (est.)
Merriam Avenue Elementary School	Gymnasium	2	7,500
Merriam Avenue Elementary School	Multipurpose Room	2	5,000
Merriam Avenue Elementary School	Media Center & Classrooms	1	5,000
Newton High School	Gymnasium	2	5,000

Existing Units 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	= Reduction in outside air CFM x 1.08 x Delta T x Operating Hours
	= Reduced BTU x Cost per BTU
Cost of Proposed Heating/Cooling	= Existing Costs – Proposed Costs
Energy Savings $	

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 4A BUILDING ENVELOPE IMPROVEMENTS

The key benefits of this ECM include:

- **Energy savings** from reducing unwanted outside air infiltration.
- **Equipment longevity** due to more efficient and less wasteful equipment utilization.
- **Occupancy comfort and productivity** by way of enhanced temperature and humidity control throughout your buildings.
- **Improved building envelope** from addressing building gaps that allow unconditioned air penetration.

ECM Description	Newton BOE Office	Merriam Avenue Elementary School	Halsted Middle School	Newton High School
4A Building Envelope Improvements			●	●

Existing Conditions

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

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

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

Building Envelope Opportunities

Proposed Solution

Buck Frame Air Sealing

Existing – The rough opening where window framing meets structural components above drop ceilings is left unfinished due to the “ugly” components being hidden above the drop ceiling.

Proposed – Honeywell recommends installing sealing at windows to complete air barriers within the buildings.

Windows

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

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

Doors

Existing – Doors in this facility need full weather stripping replacement and/or door sweeps.

Proposed – Honeywell recommends new weather stripping and door sweeps to be installed where needed.

Benefits

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

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 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.

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ECM 4B WINDOW REPLACMENTS

The key benefits of this ECM include:

- **Energy savings** from reducing unwanted outside air infiltration.
- **Equipment longevity** due to more efficient and less wasteful equipment utilization.
- **Occupancy comfort and productivity** by way of enhanced temperature and relative humidity control throughout your buildings.
- **Improved building envelope** from addressing building gaps that allow unconditioned air penetration.

ECM Description	Newton BOE Office	Merriam Avenue Elementary School	Halsted Middle School	Newton High School
4B Window Replacements				●

Existing Conditions

The windows in Newton High School were found to be single pane with aluminum frame with interior storm windows installed in most locations. The windows are in poor condition. Due to age, construction type, and condition, the windows incur excess air infiltration and provide average thermal resistance to heat transfer.

Window Replacement Opportunities

Proposed Solution

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

Building	Square Footage	U-Factor Existing Windows	U-Factor New Windows
Newton High School	29,357	1.20	0.29

Window Replacement Opportunities

Energy Savings Methodology and Results

The energy savings for this ECM are realized at the buildings' HVAC equipment. The improved windows will limit conditioned air infiltration and exfiltration. Less infiltration and exfiltration means less heating and cooling required.

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

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

New windows will be installed.

Customer Support and Coordination with Utilities

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

Environmental Issues

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

ECM 4C EXTERIOR DOOR REPLACEMENTS

The key benefits of this ECM include:

- **Energy Savings** from reducing unwanted outside air infiltration.
- **Occupancy comfort and productivity** by way of enhanced temperature and relative humidity control throughout your buildings.
- **Improved building envelope** from addressing building gaps that allow unconditioned air penetration.

ECM Description	Newton BOE Office	Merriam Avenue Elementary School	Halsted Middle School	Newton High School
4C Exterior Door Replacements				●

Existing Conditions

The District has expressed concern over many aging exterior doors prone to maintenance and infiltration issues. New doors will provide better sealing against unwanted outdoor air and moisture infiltration, and better prevent heat-loss from the building. The table below outlines an approximate count of doors that need replacement.

Building	No. of Doors	R-Factor Existing Doors	R-Factor New Doors
Newton High School	106	2	4

Door Replacement Opportunities

Proposed Solution

Honeywell proposes replacing the oldest and most energy inefficient doors with new, better insulated units. The new doors will provide better air-sealing and decrease unwanted heat loss/gain from the building.

Energy Savings Methodology

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

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

Interface with Building

The doors will be replaced like-for-like, in existing locations.

Energy Savings Methodology

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

Changes in Infrastructure

Select doors will be replaced.

Support and Coordination with Utilities

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

Environmental Issues

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

ECM 4D ROOF SEALING

The key benefits of this ECM include:

- **Energy savings** from reducing unwanted outside air infiltration.
- **Equipment longevity** due to more efficient and less wasteful equipment utilization.
- **Occupancy comfort and productivity** by way of enhanced temperature and humidity control throughout your buildings.
- **Improved building envelope** from addressing building gaps that allow unconditioned air penetration.

ECM Description	Newton BOE Office	Merriam Avenue Elementary School	Halsted Middle School	Newton High School
4D Roof Sealing			●	●

Existing Conditions

The existing roof warranties on Halsted Middle School and Newton High School District are due to expire in 2022. The heat loss and heat gains occurring due to low R-value of the existing roof insulation can be improved through sealing. Additionally, roofs in poor condition can lead to water migration and future building envelope problems.

Building	Square Footage
Halsted Middle School	16,931
Newton High School	46,320

Roof Sealing Opportunities

Proposed Solution

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

Energy Savings Methodology

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

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

Interface with Building

The new roof sealing will match existing, maintaining contours of the existing buildings.

Energy Savings Methodology

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

Changes in Infrastructure

The portion of the roof without existing solar panels will be sealed at Newton High School. The entire roof at Halsted Middle School will be sealed.

Support and Coordination with Utilities

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

Environmental Issues

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

ECM 5A COMPUTER POWER MANAGEMENT

The key benefits of this ECM include:

- **Guaranteed energy savings** by better managing the power consumption of computer equipment.
- **Longer equipment life** thanks to reduced usage.
- **Security protection** because external access can't occur when the computer system is shut down after hours.
- **Virus protection** from the ability to shot down the computers before viruses reach the network.

ECM Description	Newton BOE Office	Merriam Avenue Elementary School	Halsted Middle School	Newton High School
5A 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. This ECM implements a power management system for all of your LAN based computers, printers and copiers throughout the building. The software system will automatically shut down your IT equipment at scheduled times to prevent unnecessary energy consumption during unoccupied hours.

Computer Power Management Opportunities

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 to allow energy managers to better plan, manage and optimize an organization's overall power consumption. This ECM will also provide for enhanced staff productivity. 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.

Building	# of Computers (est.)
Newton BOE Office	11
Merriam Avenue Elementary School	68
Halsted Middle School	52
Newton High School	38

Proposed Equipment for Computer Power Management

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

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 6A PERMANENT LOAD REDUCTION PROGRAM

The key benefits of this ECM include:

- **Energy Savings** from permanently reducing energy loads.
- **Equipment longevity** due to more efficient and less wasteful equipment utilization.
- **Revenue generation** from participation in the PJM permanent load reduction program.

ECM Description	Newton BOE Office	Merriam Avenue Elementary School	Halsted Middle School	Newton High School
6A Permanent Load Reduction	●	●	●	●

Proposed Solution

Honeywell proposed to facilitate the District's participation in the PJM Energy Efficiency Program. This program is offered through the PJM Regional Transmission Organization (RTO), and Independent System Operator (ISO). The energy efficiency program pays PJM customers for implementing ECMs that result in permanent load reductions during defined hours.

Existing Electrical Meters

PJM Permanent Load Reduction

PJM offers incentives to customers who install energy-efficient equipment that permanently reduces the use of electricity during peak times. Documentation of the type of new energy-efficient equipment installed, when it was installed, and how it is being used is required. PJM also requires a measurement of electricity usage during the peak summer periods to verify whether or not a building is actually using less energy. Also, as a cooperative, PJM relies on its members to combine projects together to make sure the volume is significant enough to impact their system. The table below outlines the anticipated kW reduction that will be incentivized by PJM.

Building	Permanent Load Reduction (KW)
Newton BOE Office	6
Merriam Avenue Elementary School	56
Halsted Middle School	34
Newton High School	88

Proposed Permanent Load Reduction

Energy Savings Methodology and Results

Revenue is generated through participation in the PJM program.

Changes in Infrastructure

None.

Customer Support and Coordination with Utilities

Initiation of demand response curtailment will be required.

Environmental Issues

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

ECM 7A SOLAR POWER PURCHASE AGREEMENT (PPA)

The key benefits of this ECM include:

- Reduced utility costs.
- Guaranteed utility rates for 15 years to provide a valuable hedge against future price volatility and deliver greater budgetary certainty utilizing clean electricity.
- Additional savings from solar can provide the District with more potential ESIP funding to expand the overall project scope and include additional projects.
- Educational asset to provide additional tools for teachers to engage students on sustainability and the environment.
- Low risk given that maintenance is provided by the 3rd party system owner.
- No upfront costs.

ECM Description	Newton BOE Office	Merriam Avenue Elementary School	Halsted Middle School	Newton High School
7A Solar PPA			●	●

ECM Overview

Honeywell recommends that the District further assess the feasibility of a solar photovoltaic system on District owned land to generate on-site renewable electricity. This could be provided at no upfront cost via a power purchase agreement (PPA). A PPA is a public-private partnership financial arrangement in which a third-party solar company owns, operates, and maintains your photovoltaic system, while the host customer agrees to provide the site for the system on its property. The solar system's power production is purchased by you for a predetermined price ($/kWh) and for a predetermined period. This stable price for electricity will be lower than the utilities and third-party suppliers, thereby allowing you to benefit from cheaper electricity prices, on-site renewable energy generation, a reduction in greenhouse gas emissions and a powerful educational tool for your teachers and students. Meanwhile, the system will not add any additional maintenance costs since it is owned by the third-party solar company.

One of the more significant benefits of this potential ECM is that it will provide for a rate change, helping to deliver greater savings within your ESIP project to help fund other measures.

Potential for Solar PV Arrays

Honeywell will oversee the design and construction and help with the operations and maintenance of the system. In conjunction with your technical consultant and legal team, we will help to provide RFP development, solicitation, and oversight of the installation of a solar photovoltaic system.

Proposed Solution

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

Location	Rating kW-DC
Halsted Middle School	146
Newton High School	204

Proposed Solar Arrays

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

Energy Savings Methodology and Results

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

Changes in Infrastructure

The proposed solar array would be roof-mounted.

Customer Support and Coordination with Utilities

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

Environmental Issues

Resource Use	None.
Waste Production	Any removed parts will be disposed of properly.
Environmental Regulations	Aside from the environmental benefits of increasing energy awareness no other environmental impact is expected.

ECM 8A RETRO-COMMISSIONING

The key benefits of this ECM include:

- **Operational efficiency** thanks to better control of mechanical equipment.
- **Energy savings** from reducing total energy consumption with more efficient, state of the art technology.
- **Occupancy comfort and productivity** by way of enhanced temperature and relative humidity control throughout your buildings.

ECM Description	Newton BOE Office	Merriam Avenue Elementary School	Halsted Middle School	Newton High School
8A Retro-Commissioning				
Unit Ventilators		●	●	
Selected Air Handling Units				●

ECM Overview

During the detailed investment grade audit, Honeywell performed the following key activities related to retro-commissioning.

Key Activities:

- Review the original design documents for original system design
- Conduct detailed surveys to establish actual state, condition and operating procedures of mechanical systems, especially the unit ventilators
- Interview facility personnel to understand how the buildings are used and how the building systems perform
- Compared original design and current conditions
- Develop a list of corrective actions required for the HVAC equipment

Retro-Commissioning Opportunities

Proposed Solution

Once the new building management system is installed, a collaborated integration effort between the design professionals, mechanical installation contractor and the controls vendor will be necessary. Honeywell recommends retro-commissioning the heating, ventilation and air-conditioning systems and related controls to create energy benefits as well as revealing the sources of space condition difficulties and mediating the consequences. Honeywell recommends coupling this effort with ongoing and vigilant monitoring.

Performance of a retro-commissioning effort is a means to correct this deficiency. Retro-Commissioning verifies that the systems were installed as designed and are configured as intended. It further functionally tests each operating component and the overall system operation.

Scope of Work

The retro-commissioning scope recommended to be completed as part of this project correlates and directly compliments the scope in the ECM 3A Building Management System. For the building management system to be most effective the individual unit ventilator and air handling unit controls must be in full operation. Newton High School unit ventilators have had a systematic repair and replacement over the last few years and has benefited from reduced complains and emergency repairs. We recommend continuing this in the Hallstead and Merriam Avenue Schools. The air handling units in the High School need attention and will also be addressed as part of the retro-commissioning

Working with the district facilities and maintenance personnel we have prioritized the following retro commissioning projects for this energy savings plan:

1. High School Air Handling Unit Retro-Commissioning (6)

Area		Quantity
Gymnasium	Heating Only	2
Gymnasium Locker Room	Heating Only	2
Auditorium Mezzanine	Heating Only	2

Existing units are pneumatic. Replace with direct digital controls to have control with new building management system. For each air handling unit re-pipe the pneumatic line, supply and install the following:

1- One EP replay
1- One low limit sensor
1-One thermostat
1- One larger valve
1-One restrictor
1- One Honeywell actuator

2. Halsted Middle School Unit Ventilator Retro-Commissioning (38)

Complete a full repair and replacement of all controls in every classroom unit ventilator. Complete the retro-commissioning in 38 classroom unit ventilators for each unit ventilator re-pipe the pneumatic line, supply and install the following:

1- One EP replay
1- One low limit sensor
1-One thermostat
1- One valve
1-One restrictor
1- One Honeywell actuator

3. Merriam Elementary School Unit Ventilator Retro-Commissioning (48)

There are 48 unit ventilators with pneumatic controls in Merriam Elementary School. For each unit ventilator re-pipe the pneumatic line, supply and install the following:

1- One EP replay
1- One low limit sensor
1-One thermostat
1- One valve
1-One restrictor
1- One Honeywell actuator

Changes in Infrastructure

New controls in each unit as identified.

Customer Support and Coordination with Utilities

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

Environmental Issues

Resource Use	Savings will result from retro-commissioning of the existing HVAC systems.
Waste Production	Any removed parts 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 9A ENERGY EDUCATION

The key benefits of this ECM include:

- **Educational asset** to provide additional tools for teachers to engage students on sustainability and the environment.
- **Environmental education** through instructional opportunities during and after the project.

ECM Description	Newton BOE Office	Merriam Avenue Elementary School	Halsted Middle School	Newton High School
9A Energy Education		●	●	●

ECM Overview

Proposed Programs

Studies show that significant energy savings can be achieved simply by increasing the energy awareness of building occupants. To accomplish this Honeywell proposes a multipronged educational and vocational learning approach, which will reduce energy consumption and enhance the educational experience for the faculty staff and students.

Energy Awareness Lobby Signage

Honeywell may install a 42in. flat screen Energy Awareness Lobby Signage package in the lobby of a Newton Board of Education. The display will dynamically present to all students, staff and parents entering the school the actual results achieved by the District through its energy conservation and greenhouse gas reduction initiatives.

- Uses Honeywell BMS and data already tracked by facilities
- Animation captures the audience; ideal for high traffic areas
- Information is customized and building specific
- Qualifies for points towards many energy program certifications

Additional Benefits to Newton Board of Education:

- Identifies your organization as forward thinking and environmentally aware
- Demonstrates how your organization is a good corporate citizen
- Stimulates building occupants to be more efficient in their own use of resources
- Builds community support

Student Vocational Training – Controls Lab Course

Honeywell shall provide the course materials and equipment necessary for the District to conduct a Controls Lab vocational learning opportunity. The course materials will teach students the fundamentals of building management system operation and control theory. Initially, students will work with a "Controls Lab" demonstration board, which will be equipped with direct digital controller, switches, dials, lights and fans used to simulate a real-world control system.

By following a series of instructions laid out in a step-by-step learning module, the students will learn about different types of control signals, the basics of cause and effect program algorithms and basic proportional-integral-derivative (PID) control loop tuning. Additionally, if desired by the District, the students will be given the opportunity to log into the school's actual building management system in a secure "view-only" mode, allowing them to familiarize themselves with mechanical equipment functionality and control methodologies. Additional learning modules will guide the students through the building management system and require them to collect system information further re-enforcing the purposes of individual pieces of mechanical equipment and the mechanical systems as a whole.

Controls Lab
Demonstration Board

Green Boot Camp

Green Boot Camp is part of Honeywell's commitment to supporting science technology, engineering and math (STEM) education worldwide. The Green Boot Camp is an interactive sustainability workshop that will provide your educators with the information experience and resources to bring lessons on energy efficiency sustainability and the environment back to their classrooms.

This training enables your educators to become familiar with the latest methods of instruction on teaching green and sustainable topics, methods, lessons, and concepts to students at their respective schools. The educators discover, examine, and identify the roots of green technology, sustainable living and environmental consciousness. Your teachers will discover new concepts by using interactive exploratory projects.

Honeywell's Green Boot Camp program will be a five-consecutive Saturdays workshop for teachers. The teachers learn about environmentally friendly topics ranging from renewable energy technologies to green building materials.

All of this will enable your District to support teachers in preparing your students to pursue college degrees in computer science, mathematics and software engineering in addition to STEM careers, as well as inspires the students interests around STEM.

Energy Optimization Intern Program ("Project Tag Along")

The Energy Optimization Intern Program, also referred to as "Project Tag Along" is a Honeywell program which enables up to two junior or senior level students, who have an interest in engineering or environmental studies, the opportunity to safely participate in the development of the Energy Savings Plan for the Newton Board of Education. Typically, students will compete for the positions through an essay contest. The winning participants will accompany the Honeywell Engineering Team during the development of the plan. As a result of their successful participation, each student will receive a letter of recommendation from a Senior Honeywell Executive in recognition of their participation in our internship program.

Energy Savings Methodology and Results

Savings are based on increased energy awareness of building occupants.

Changes in Infrastructure

None.

Customer Support and Coordination with Utilities

None.

Environmental Issues

Resource Use	None.
Waste Production	This measure will produce no waste by-products.
Environmental Regulations	Aside from the environmental benefits of increasing energy awareness no other environmental impact is expected.

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ECM 10A TRANSFORMER REPLACEMENT

The key benefits of this ECM include:

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

ECM Description	Newton BOE Office	Merriam Avenue Elementary School	Halsted Middle School	Newton High School
10A Transformer Replacement				●

ECM Overview

Existing Conditions

Distribution transformers are installed in Newton High School Electrical Room and Stage Area 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.

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 the following transformer that we propose to install an energy efficient replacement at a size matching the existing load as indicated in the table below:

Building	Location	kVA	Qty
Newton High School	Stage	75	1

Existing Transformers to be Considered for Replacement

It was determined that the 45 kVA and 75 kVA transformers in the Electrical Room Vault and Stage Area are already energy efficient and should not be replaced.

Proposed Solution

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

Scope of Work

Remove and install new E-saver transformer.

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

A new transformer will be installed 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.

SECTION D TECHNICAL AND FINANCIAL SUMMARY

1. Recommended ESIP Project

Recommended ESIP Project	
Value of Project	$2,160,316
Term of Repayment	15 Years
Projected Savings Over Term	$2,781,811
Projected NJ Rebates & Incentives	$258,441
Projected Interest Rate	3.0%

Recommended Project Technical and Financial Summary Documents

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

Building by Building Simple Payback Summary

A simple payback summary broken down by building by ECM has been provided for the Newton BOE's use in reviewing available scope combinations and options.

Building by Building Simple Payback Summary (Hard Costs Only)

FORM II: RECOMMENDED PROJECT - ENERGY CONSERVATION MEASURES (ECMS) SUMMARY FORM

FORM II-2

ESCO's PRELIMINARY ENERGY SAVINGS PLAN (ESP):
ENERGY CONSERVATION MEASUREs (ECMs) SUMMARY FORM
NEWTON BOARD OF EDUCATION
ENERGY SAVING IMPROVEMENT PROGRAM

ESCO Name: Honeywell International

Proposed Preliminary Energy Savings Plan: ECMs (Base Project)	Estimated Installed Hard Costs [1] $	Estimated Annual Savings $	Estimated Simple Payback (years)
1A LED Lighting	$ 777,320	$ 98,551	7.89
1C Exterior Pole Lighting	$ 22,451	$ 5,492	4.09
1D Vending Misers	$ 1,875	$ 374	5.01
2J Piping Insulation	$ 10,206	$ 3,394	3.01
3A Building Management System Upgrades	$ 304,945	$ 30,709	9.93
4A Building Envelope Improvements	$ 41,540	$ 4,862	8.54
4D Roof Sealing	$ 313,395	$ 8,181	38.31
6A Permanent Load Reduction	$ -	$ -	-
7A Solar PPA	$ -	$ 20,592	-
8A Retro-Commissioning	$ 194,166	$ 2,133	91.03
9A Energy Education	$ -	$ -	-
Design Allowance	$ 50,000	$ -	-
Add additional lines as needed* **Project Summary:**	$ 1,715,898	$ 174,288	9.85

Optional ECMs Considered, but not included with base project at this time	Estimated Installed Hard Costs [1] $	Estimated Annual Savings $	Estimated Simple Payback (years)
1B Lighting Controls	$ 35,742	$ 2,204	16.21
1E Destratification Fans	$ 59,375	$ 2,412	24.62
1F Plug Load Management	$ 84,750	$ 6,976	12.15
2A Boiler Replacements	$ 453,125	$ 4,878	92.89
2B Boiler Controlinks	$ 93,750	$ 5,087	18.43
2C Rooftop Unit Replacements	$ 21,500	$ 138	155.37
2D Split System Replacements	$ 99,375	$ 229	433.34
2E Unit Heater Replacement	$ 10,000	$ 95	105.24
2F Premium Efficiency Motors and VFDs	$ 71,723	$ 3,205	22.38
2G Kitchen Equipment Conversion	$ 131,875	$ 3,936	33.50
2H Walk-in Compressor Controls	$ 15,000	$ 746	20.10
2I Kitchen Hood Controls	$ 31,250	$ 1,047	29.86
2K Replace Unit Ventilators	$ 1,111,500	$ (1,448)	(767.38)
3B Demand Control Ventilation	$ 21,875	$ 780	28.03
4B Window Replacements	$ 4,953,994	$ 34,663	142.92
4C Exterior Door Replacements	$ 768,500	$ 1,045	735.53
5A Computer Power Management	$ 3,697	$ 2,063	1.79
10A Transformer Replacement	$ 10,625	$ 655	16.22

Add additional lines as needed*

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

FORM III: RECOMMENDED PROJECT - PROJECTED ANNUAL ENERGY SAVINGS DATA FORM

FORM III-2

ESCO's PRELIMINARY ENERGY SAVINGS PLAN (ESP)
PROJECTED ANNUAL ENERGY SAVINGS DATA FORM
NEWTON BOARD OF EDUCATION
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)	5,122	$27,196	2,158	$11,476
Electric Energy (KWH)	957,082	$141,543	495,873	$81,620
Natural Gas (therms)	159,003	$142,466	39,060	$34,809
Fuel Oil (Gal)	0	$0	0	$0
Steam (Pounds)				
Water (gallons)				
Other (Specify Units)				
Other (Specify Units)				
Avoided Emissions (1)	Provide in Pounds (Lbs)			
NOX	830			
SO2	1,096			
CO2	1,031,888			

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

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

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

FORM IV: RECOMMENDED PROJECT - PROJECTED ANNUAL ENERGY SAVINGS DATA FORM IN MMBTUS

FORM IV-2

ESCO's PRELIMINARY ENERGY SAVINGS PLAN (ESP):
PROJECTED ANNUAL ENERGY SAVINGS DATA FORM IN MMBTUs
NEWTON BOARD OF EDUCATION
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)	3,266	1,692	
Natural Gas (MMBTUs)	15,900	3,906	
Fuel Oil (MMBTUs)	0	0	
Steam (MMBTUs)			
Other (Specify) (MMBTUs)			
Other (Specify)			

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

FORM V: RECOMMENDED PROJECT ESCO'S PROPOSAL PROJECT COST FORM

FORM V-2

ESCO's PRELIMINARY ENERGY SAVINGS PLAN (ESP):
ESCOs PROPOSED FINAL PROJECT COST FORM FOR BASE CASE PROJECT
NEWTON BOARD OF EDUCATION
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]:	$1,715,898	
Project Service Fees		
Investment Grade Energy Audit	$18,875	1.10%
Design Engineering Fees	$85,795	5.00%
Construction Management & Project Administration	$85,795	5.00%
System Commissioning	$6,864	0.40%
Equipment Initial Training Fees	$6,864	0.40%
ESCO Overhead	$163,010	9.50%
ESCO Profit	$77,215	4.50%
Project Service Fees Sub Total	$204,192	11.90%
TOTAL FINANCED PROJECT COSTS:	$2,160,316	25.90%
ESCO Termination Fee (To be paid only if the Board decides not to proceed beyond the ESP)	$0	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)	$30,000.00	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	$30,000.00	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 PROPOSAL PURPOSES

*Annual Service only applies if customer accepts energy guarantee.

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FORM VI: RECOMMENDED PROJECT ESCO'S PRELIMINARY ANNUAL CASH FLOW ANALYSIS FORM

FORM VI
ESCO's PRELIMINARY ENERGY SAVINGS PLAN (ESP):
ESCO's PRELIMINARY ANNUAL CASH FLOW ANALYSIS FORM
NEWTON BOARD OF EDUCATION

ESCO Name: **Honeywell International**

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

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

Project Cost [1]: **$ 2,160,316** Interest Rate to Be Used for Proposal Purposes: **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	$ 38,372		$ 8,924	$47,295	$ -	$ -	$ -	$ 47,295	$ 47,295
1	$ 127,905	$ 46,383	$ 144,157	$318,445	$ (314,845)	$ (344,845)	$ (30,000)	$ 3,600	$ 50,895
2	$ 130,789	$ 46,383	$ 93,985	$271,157	$ (267,557)	$ (267,557)	$ -	$ 3,600	$ 54,495
3	$ 133,737	$ 46,383	$ 5,687	$185,808	$ (182,208)	$ (182,208)	$ -	$ 3,600	$ 58,095
4	$ 136,752	$ 46,383	$ 5,687	$188,823	$ (185,223)	$ (185,223)	$ -	$ 3,600	$ 61,695
5	$ 139,836	$ 46,383	$ -	$186,219	$ (182,619)	$ (182,619)	$ -	$ 3,600	$ 65,295
6	$ 142,989		$ -	$142,989	$ (139,389)	$ (139,389)	$ -	$ 3,600	$ 68,895
7	$ 146,213		$ -	$146,213	$ (142,613)	$ (142,613)	$ -	$ 3,600	$ 72,495
8	$ 149,510		$ -	$149,510	$ (145,910)	$ (145,910)	$ -	$ 3,600	$ 76,095
9	$ 152,881		$ -	$152,881	$ (149,281)	$ (149,281)	$ -	$ 3,600	$ 79,695
10	$ 156,329		$ -	$156,329	$ (152,729)	$ (152,729)	$ -	$ 3,600	$ 83,295
11	$ 159,854		$ -	$159,854	$ (156,254)	$ (156,254)	$ -	$ 3,600	$ 86,895
12	$ 163,459		$ -	$163,459	$ (159,859)	$ (159,859)	$ -	$ 3,600	$ 90,495
13	$ 167,146		$ -	$167,146	$ (163,546)	$ (163,546)	$ -	$ 3,600	$ 94,095
14	$ 170,915		$ -	$170,915	$ (167,315)	$ (167,315)	$ -	$ 3,600	$ 97,695
15	$ 174,770		$ -	$174,770	$ (171,300)	$ (171,300)	$ -	$ 3,470	$ 101,165
Totals	$ 2,291,456	$ 231,915	$ 258,441	$2,781,811	$ (2,680,645)	$ (2,710,645)	$ (30,000)	$ 101,165	$ 101,165

NOTES:
(1) Includes: Hard costs and project service fees defined in ESCO's PROPOSED "FORM V"
(2) No payments are made by NEWTON BOARD OF EDUCATION 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.**

HONEYWELL IS NOT ACTING AS A MUNICIPAL ADVISOR OR FIDUCIARY ON YOUR BEHALF. ANY MUNICIPAL SECURITIES OR FINANCIAL PRODUCTS INFORMATION PROVIDED IS FOR GENERAL INFORMATIONAL AND EDUCATIONAL PURPOSES ONLY AND YOU SHOULD OBTAIN THE ADVICE OF A LICENSED AND QUALIFIED FINANCIAL ADVISOR REGARDING SUCH INFORMATION.

Note: To see the source of named ranges, use the dropdown menu to the left of the formula bar.

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BUILDING BY BUILDING SIMPLE PAYBACK SUMMARY (HARD COSTS ONLY)

Building & ECM	kWh Savings ($)	kW Savings ($)	Natural Gas Savings ($)	Annual Energy and Operational Cost Savings ($)	Annual Operational Savings ($)	Net Cost ($)	Simple Payback
Halsted MS	**$ 18,034**	**$ 2,174**	**$ 11,650**	**$ 43,017**	**$ 11,158**	**$ 436,409**	**10.1**
1A LED Lighting	$ 9,442	$ 2,174	$ (573)	$ 17,926	$ 6,882	$ 170,607	9.5
1C Exterior Pole Lighting	$ 296	$ -	$ -	$ 858	$ 562	$ 4,490	5.2
1D Vending Misers	$ 110	$ -	$ -	$ 110	$ -	$ 375	3.4
2J Piping Insulation	$ -	$ -	$ 2,797	$ 2,797	$ -	$ 8,381	3.0
3A Building Management System Upgrades	$ -	$ -	$ 5,569	$ 9,283	$ 3,714	$ 85,777	9.2
4A Building Envelope Improvements	$ 194	$ -	$ 1,005	$ 1,199	$ -	$ 9,253	7.7
4D Roof Sealing	$ -	$ -	$ 2,259	$ 2,259	$ -	$ 88,804	39.3
7A Solar PPA	$ 7,992	$ -	$ -	$ 7,992	$ -	$ -	-
8A Retro-Commissioning	$ -	$ -	$ 593	$ 593	$ -	$ 68,723	115.8
Merriam Avenue ES	**$ 15,390**	**$ 3,646**	**$ 6,358**	**$ 39,074**	**$ 13,680**	**$ 411,804**	**10.5**
1A LED Lighting	$ 15,033	$ 3,646	$ (653)	$ 27,643	$ 9,617	$ 231,438	8.4
1C Exterior Pole Lighting	$ 357	$ -	$ -	$ 1,253	$ 897	$ 3,368	2.7
3A Building Management System Upgrades	$ -	$ -	$ 6,167	$ 9,333	$ 3,166	$ 88,829	9.5
8A Retro-Commissioning	$ -	$ -	$ 843	$ 843	$ -	$ 88,170	104.5
Newton BOE Office	**$ 1,924**	**$ 189**	**$ (105)**	**$ 3,099**	**$ 1,091**	**$ 27,035**	**8.7**
1A LED Lighting	$ 1,924	$ 189	$ (105)	$ 3,099	$ 1,091	$ 27,035	8.7
Newton HS	**$ 46,272**	**$ 5,466**	**$ 16,905**	**$ 89,098**	**$ 20,455**	**$ 790,650**	**8.9**
1A LED Lighting	$ 31,625	$ 5,466	$ (1,751)	$ 49,883	$ 14,542	$ 348,241	7.0
1C Exterior Pole Lighting	$ 1,182	$ -	$ -	$ 3,380	$ 2,198	$ 14,593	4.3
1D Vending Misers	$ 264	$ -	$ -	$ 264	$ -	$ 1,500	5.7
2J Piping Insulation	$ -	$ -	$ 597	$ 597	$ -	$ 1,825	3.1
3A Building Management System Upgrades	$ -	$ -	$ 8,379	$ 12,093	$ 3,714	$ 130,339	10.8
4A Building Envelope Improvements	$ 601	$ -	$ 3,062	$ 3,663	$ -	$ 32,288	8.8
4D Roof Sealing	$ -	$ -	$ 5,922	$ 5,922	$ -	$ 224,591	37.9
7A Solar PPA	$ 12,600	$ -	$ -	$ 12,600	$ -	$ -	-
8A Retro-Commissioning	$ -	$ -	$ 696	$ 696	$ -	$ 37,274	53.5
Project Total	**$ 81,620**	**$ 11,476**	**$ 34,809**	**$ 174,288**	**$ 46,383**	**$ 1,665,898**	**9.6**

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2. Utility and Other Rebates and Incentives

NJ Pay-for-Performance Program (P4P)

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

Eligibility

Existing commercial, industrial and institutional buildings with a peak demand over 100 kW for any of the preceding twelve months are eligible to participate including hotels and casinos, large office buildings, multi-family buildings, supermarkets, manufacturing facilities, schools, shopping malls and restaurants. Buildings that fall into the following five customer classes are not required to meet the 100kW demand to participate in the Program: hospitals, public districts and universities, 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 their buildings. The tool provides the opportunity to load in the characteristics and energy usage of your buildings and determine an energy performance benchmark score. You can then assess energy management goals over time, identify strategic opportunities for savings, and receive EPA recognition for superior energy performance.

Incentives

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

Incentives, Rebates and Grants Summary

Honeywell has a great deal of experience in applying for, and successfully securing, all available incentives, rebates and grants for our clients. We have been approved and allocated for over $9M of incentives on behalf of our New Jersey customers alone since the introduction of the Energy Savings

Improvement Program legislation in 2009. The New Jersey programs employed included primarily the Office of Clean Energy's Pay for Performance and Cogeneration Incentives. A table of the incentive amounts on a per project basis is provided below.

Building	Rebate Amount
Elizabeth Schools	$934,209
Phillipsburg School District	$274,278
NH-Voorhees Regional HS District	$511,558
Bridgewater-Raritan Regional District	$963,034
Hanover Township School District	$169,882
Robbinsville Public School District	$231,015
Camden County Technical Schools	$734,803
Town of Kearny	$84,147
Frankford School District	$30,743

Regarding Newton BOE 3.0% Interest Base Project

Honeywell has determined that the Newton BOE is eligible for **$258,750** in estimated total incentives for the projects. This includes **$185,828** for the P4P program, **$50,172** for prescriptive lighting and **$22,750** Permanent Load Reduction Incentives.

Please refer to the tables on below for a breakdown of Newton BOE incentive levels on a building by building basis for each type of incentive.

P4P Incentives

	P4P Incentives			
Building	**First Incentive**	**Second Incentive**	**Third Incentive**	**Total Incentive**
Newton High School	$8,924	$88,298	$88,298	$185,519

Permanent Load Reduction Incentives

	Permanent Load Reduction Incentives			
Description	**1st Year Incentive**	**2nd Year Incentive**	**3rd Year Incentive**	**4th Year Incentive**
Permanent Load Reduction Incentives	$5,687	$5,687	$5,687	$5,687

Prescriptive Lighting Incentives

Description	Prescriptive Lighting Incentives Total Lighting Incentives
Newton BOE Office	$3,302
Merriam Avenue Elementary School	$29,078
Halsted Middle School	$17,792
TOTALS	$50,172

Total Rebates and Incentives

Year	Total Rebates and Incentives P4P Incentives	Prescriptive Lighting Incentives	Permanent Load Reduction Incentives	Total Incentives
Installation	$8,924			$8,924
Year 1	$88,298	$50,172	$5,687	$144,157
Year 2	$88,298		$5,687	$93,985
Year 3			$5,687	$5,687
Year 4			$5,687	$5,687
TOTALS	$185,519	$50,172	$22,750	$258,750

3. Financing the ESIP

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

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

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

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

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

DEBT ISSUANCE

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

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

TAX-EXEMPT LEASE PURCHASE FINANCING

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

Under the New Jersey Energy Savings Improvement Program (ESIP), the Newton BOE may authorize a lease purchase agreement between the Newton BOE and a financier. Ownership of the equipment or improved facilities will pass to the Newton BOE 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 Newton BOE 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 Newton BOE. Payments are typically scheduled to commence after the construction is complete and acceptance of the project has been received by the Newton BOE. Typically, payment terms are structured so there is no up-front capital expense to the Newton BOE 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.

4. Operational Savings

The ESIP law defines “energy savings” as “a measured reduction in fuel, energy operating or maintenance costs resulting from the implementation of one or more energy conservation measures when compared with an established baseline of previous fuel, energy, **operating or maintenance costs**, including, but not limited to, future capital replacement expenditures avoided because of equipment installed or services performed as part of an energy savings plan.

The operational savings calculations for this project are related to the JCP&L fixture charges for the Exterior Pole Lighting, the Service Net service agreement and associated phone lines for the Building Management System and replacing the existing tubes, bulbs and ballasts with a significantly longer life span. Please see the following overview of savings for each school as follows:

Building	Annual JCP&L Fixture Charges	Annual Service Net / Phone Line Charges
Merriam Avenue Elementary School	$837	$3,166
Halsted Middle School	$482	$3,714
Newton High School	$1,938	$3,714

Section D-4 Operational Savings Estimate Calculations - Newton BOE Office Lighting

ESTIMATED ANNUAL MAINTENANCE COSTS

*Default maintenance assume a tube will last 3 yrs at a cost of $5 making the annual material cost (5÷3=1.66).
*Default maintenance assume a ballast will last 5 yrs at a cost of $25 making the annual material cost (25÷5=5).
*Default labor for maintenance defaults to zero, however you may include it and simply recalculate.

MAINTENANCE FOR LINEAR FIXTURES

Maint for 301 tube(s) @ $1.66 per tube (mat)+(install) lab cost of: $0.00 = $499.66

Maint for 113 ballast(s) @ $5.00 per ballast (mat)+(install) lab cost of: $0.00 = $565.00

Estimated Maintenance for Linear Fixtures: $1,064.66

*Default maintenance assume a lamp will last 5 yrs at a cost of $25 making the annual material cost (25÷5=5).
*Default maintenance assume a ballast will last 5 yrs at a cost of $75 making the annual material cost (75÷5=15).
*Default labor for maintenance defaults to zero, however you may include it and simply recalculate.

MAINTENANCE FOR METAL HALIDE - HPS - MERCURY VAPOR

Maint for 1 lamp(s) @ $5.00 per lamp (material) + (install) labor cost of: $0.00 = $5.00

Maint for 1 ballast(s) @ $15.00 per ballast (material) + (install) labor cost of: $0.00 = $15.00

Estimated Maintenance for Metal Halide, HPS, Mercury Vapor: $20.00

*Default maintenance assume a lamp will last 2 yrs at a cost of $10 making the annual material cost (10÷2=5).
*Default labor for maintenance defaults to zero, however you may include it and simply recalculate.

MAINTENANCE FOR PAR's and BR's

Maint for 1 bulbs @ $5.00 **(material) + (labor) cost of:** $0.00 = $5.00

*Default maintenance assume a lamp will last 2 yrs at a cost of $2.00 making the annual material cost (2÷2=1).
*Default labor for maintenance defaults to zero, however you may include it and simply recalculate.

MAINTENANCE FOR INCANDESCENT, CFL, MR & EXIT SIGNS

Maint for 1 bulbs @ $1.00 **(material) + (labor cost of :** $0.00 = $1.00

TOTAL ESTIMATED MAINTENANCE: $1,090.66

Copy the total maint cost above, close the popup window and paste into the maint cost textbox.

*NOTE - This is an estimated maintenance based on the numbers above. There are often other other associated costs that may be applicable. Other costs can include lift charges for high hanging lights and any other related maintenance costs for your particular project.

hanging lights and any other related maintenance costs for your particular project.

Section D-4 Operational Savings Estimate Calculations - Merriam Avenue Elementary School Lighting

ESTIMATED ANNUAL MAINTENANCE COSTS

*Default maintenance assume a tube will last 3 yrs at a cost of $5 making the annual material cost (5÷3=1.66).
*Default maintenance assume a ballast will last 5 yrs at a cost of $25 making the annual material cost (25÷5=5).
*Default labor for maintenance defaults to zero, however you may include it and simply recalculate.

MAINTENANCE FOR LINEAR FIXTURES

Maint for 2347 tube(s) @ $1.66 per tube (mat)+(install) lab cost of: $0.00 = $3,896.02

Maint for 963 ballast(s) @ $5.00 per ballast (mat)+(install) lab cost of: $0.00 = $4,815.00

Estimated Maintenance for Linear Fixtures: $8,711.02

*Default maintenance assume a lamp will last 5 yrs at a cost of $25 making the annual material cost (25÷5=5).
*Default maintenance assume a ballast will last 5 yrs at a cost of $75 making the annual material cost (75÷5=15).
*Default labor for maintenance defaults to zero, however you may include it and simply recalculate.

MAINTENANCE FOR METAL HALIDE - HPS - MERCURY VAPOR

Maint for 39 lamp(s) @ $5.00 per lamp (material) + (install) labor cost of: $0.00 = $195.00

Maint for 39 ballast(s) @ $15.00 per ballast (material) + (install) labor cost of: $0.00 = $585.00

Estimated Maintenance for Metal Halide, HPS, Mercury Vapor: $780.00

*Default maintenance assume a lamp will last 2 yrs at a cost of $10 making the annual material cost (10÷2=5).
*Default labor for maintenance defaults to zero, however you may include it and simply recalculate.

MAINTENANCE FOR PAR's and BR's

Maint for 2 bulbs @ $5.00 **(material) + (labor) cost of:** $0.00 = $10.00

*Default maintenance assume a lamp will last 2 yrs at a cost of $2.00 making the annual material cost (2÷2=1).
*Default labor for maintenance defaults to zero, however you may include it and simply recalculate.

MAINTENANCE FOR INCANDESCENT, CFL, MR & EXIT SIGNS

Maint for 116 bulbs @ $1.00 **(material) + (labor cost of :** $0.00 = $116.00

TOTAL ESTIMATED MAINTENANCE: $9,617.02

Copy the total maint cost above, close the popup window and paste into the maint cost textbox.

*NOTE - This is an estimated maintenance based on the numbers above. There are often other other associated costs that may be applicable. Other costs can include lift charges for high hanging lights and any other related maintenance costs for your particular project.

Section D-4 Operational Savings Estimate Calculations - Halsted Middle School Lighting

ESTIMATED ANNUAL MAINTENANCE COSTS

*Default maintenance assume a tube will last 3 yrs at a cost of $5 making the annual material cost (5÷3=1.66).
*Default maintenance assume a ballast will last 5 yrs at a cost of $25 making the annual material cost (25÷5=5).
*Default labor for maintenance defaults to zero, however you may include it and simply recalculate.

MAINTENANCE FOR LINEAR FIXTURES

Maint for 1626 tube(s) @ $1.66 per tube (mat)+(install) lab cost of: $0.00 = $2,699.16

Maint for 727 ballast(s) @ $5.00 per ballast (mat)+(install) lab cost of: $0.00 = $3,635.00

Estimated Maintenance for Linear Fixtures: $6,334.16

*Default maintenance assume a lamp will last 5 yrs at a cost of $25 making the annual material cost (25÷5=5).
*Default maintenance assume a ballast will last 5 yrs at a cost of $75 making the annual material cost (75÷5=15).
*Default labor for maintenance defaults to zero, however you may include it and simply recalculate.

MAINTENANCE FOR METAL HALIDE - HPS - MERCURY VAPOR

Maint for 25 lamp(s) @ $5.00 per lamp (material) + (install) labor cost of: $0.00 = $125.00

Maint for 25 ballast(s) @ $15.00 per ballast (material) + (install) labor cost of: $0.00 = $375.00

Estimated Maintenance for Metal Halide, HPS, Mercury Vapor: $500.00

MAINTENANCE FOR PAR's and BR's

You DO NOT currently have any existing PAR or BR lamps in this audit!

Maint for 0 bulbs @ $0.00 (material) + (labor) cost of: $0.00 = $0.00

*Default maintenance assume a lamp will last 2 yrs at a cost of $2.00 making the annual material cost (2÷2=1).
*Default labor for maintenance defaults to zero, however you may include it and simply recalculate.

MAINTENANCE FOR INCANDESCENT, CFL, MR & EXIT SIGNS

Maint for 48 bulbs @ $1.00 (material) + (labor cost of : $0.00 = $48.00

TOTAL ESTIMATED MAINTENANCE: $6,882.16

Copy the total maint cost above, close the popup window and paste into the maint cost textbox.

*NOTE - This is an estimated maintenance based on the numbers above. There are often other other associated costs that may be applicable. Other costs can include lift charges for high hanging lights and any other related maintenance costs for your particular project.

Section D-4 Operational Savings Estimate Calculations - Newton High School Lighting

ESTIMATED ANNUAL MAINTENANCE COSTS

*Default maintenance assume a tube will last 3 yrs at a cost of $5 making the annual material cost (5÷3=1.66).
*Default maintenance assume a ballast will last 5 yrs at a cost of $25 making the annual material cost (25÷5=5).
*Default labor for maintenance defaults to zero, however you may include it and simply recalculate.

MAINTENANCE FOR LINEAR FIXTURES

Maint for 3843 tube(s) @ $1.66 per tube (mat)+(install) lab cost of: $0.00 = $6,379.38

Maint for 1486 ballast(s) @ $5.00 per ballast (mat)+(install) lab cost of: $0.00 = $7,430.00

Estimated Maintenance for Linear Fixtures: $13,809.38

*Default maintenance assume a lamp will last 5 yrs at a cost of $25 making the annual material cost (25÷5=5).
*Default maintenance assume a ballast will last 5 yrs at a cost of $75 making the annual material cost (75÷5=15).
*Default labor for maintenance defaults to zero, however you may include it and simply recalculate.

MAINTENANCE FOR METAL HALIDE - HPS - MERCURY VAPOR

Maint for 20 lamp(s) @ $5.00 per lamp (material) + (install) labor cost of: $0.00 = $100.00

Maint for 20 ballast(s) @ $15.00 per ballast (material) + (install) labor cost of: $0.00 = $300.00

Estimated Maintenance for Metal Halide, HPS, Mercury Vapor: $400.00

*Default maintenance assume a lamp will last 2 yrs at a cost of $10 making the annual material cost (10÷2=5).
*Default labor for maintenance defaults to zero, however you may include it and simply recalculate.

MAINTENANCE FOR PAR's and BR's

Maint for 17 bulbs @ $5.00 **(material) + (labor) cost of:** $0.00 = $85.00

*Default maintenance assume a lamp will last 2 yrs at a cost of $2.00 making the annual material cost (2÷2=1).
*Default labor for maintenance defaults to zero, however you may include it and simply recalculate.

MAINTENANCE FOR INCANDESCENT, CFL, MR & EXIT SIGNS

Maint for 248 bulbs @ $1.00 **(material) + (labor cost of :** $0.00 = $248.00

TOTAL ESTIMATED MAINTENANCE: $14,542.38

Copy the total maint cost above, close the popup window and paste into the maint cost textbox.

*NOTE - This is an estimated maintenance based on the numbers above. There are often other other associated costs that may be applicable. Other costs can include lift charges for high hanging lights and any other related maintenance costs for your particular project.

Section D-4: Operational Savings Estimate Calculations-Street Lighting

ESTIMATED ANNUAL MAINTENANCE COSTS

MAINTENANCE FOR LINEAR FIXTURES

Maint for 0 tube(s) @ $1.66 per tube (mat)+(install) lab cost of: $0.00 = $0.00

Maint for 0 ballast(s) @ $5.00 per ballast (mat)+(install) lab cost of: $0.00 = $0.00

You DO NOT currently have any existing linear fixtures in this audit!

Estimated Maintenance for Linear Fixtures: $0.00

*Default maintenance assume a lamp will last 5 yrs at a cost of $25 making the annual material cost (25÷5=5).
*Default maintenance assume a ballast will last 5 yrs at a cost of $75 making the annual material cost (75÷5=15).
*Default labor for maintenance defaults to zero, however you may include it and simply recalculate.

MAINTENANCE FOR METAL HALIDE - HPS - MERCURY VAPOR

Maint for 20 lamp(s) @ $5.00 per lamp (material) + (install) labor cost of: $0.00 = $100.00

Maint for 20 ballast(s) @ $15.00 per ballast (material) + (install) labor cost of: $0.00 = $300.00

Estimated Maintenance for Metal Halide, HPS, Mercury Vapor: $400.00

MAINTENANCE FOR PAR's and BR's

You DO NOT currently have any existing PAR or BR lamps in this audit!

Maint for 0 bulbs @ $0.00 (material) + (labor) cost of: $0.00 = $0.00

MAINTENANCE FOR INCANDESCENT, CFL, MR & EXIT SIGNS

You DO NOT currently have any existing Incandscent,CFL,MR or Exit Signs in this audit!

Maint for 0 bulbs @ $0.00 (material) + (labor cost of : $0.00 = $0.00

TOTAL ESTIMATED MAINTENANCE: $400.00

Copy the total maint cost above, close the popup window and paste into the maint cost textbox.

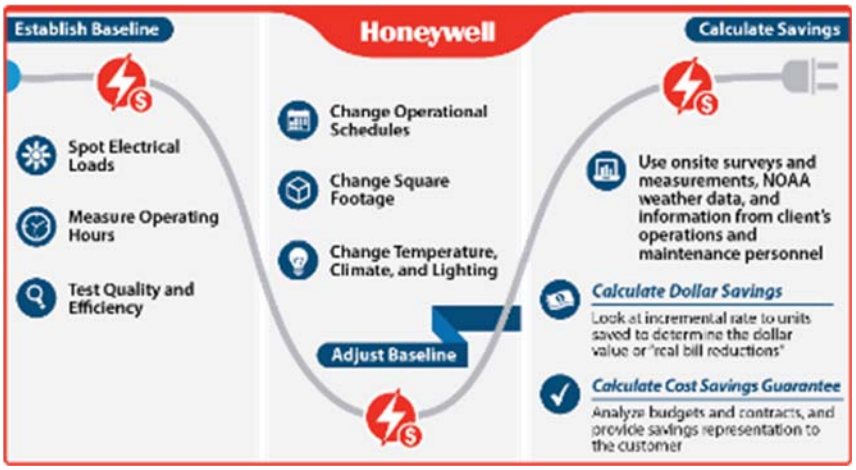
*NOTE - This is an estimated maintenance based on the numbers above. There are often other other associated costs that may be applicable. Other costs can include lift charges for high hanging lights and any other related maintenance costs for your particular project.

SECTION E MEASUREMENT & VERIFICATION AND MAINTENANCE PLAN

1. Baseline

The purpose for establishing a baseline for an energy performance project is to accurately predict what the energy consumption and costs would have been as if the energy project was never completed. The baseline can then be used to measure the improvement in efficiency and determine the overall energy savings of the project. Since the energy consumption of all facilities is somewhat 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 result is a coupled project where the final savings are equal to or greater than anticipated.

Calculating the units of energy saved is a critical measure of energy efficiency improvements, but it does not indicate the actual dollars saved. To do this, Honeywell and the Newton BOE 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.

2. 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 the Newton BOE requires and the needs of the Newton BOE for future changes in facility use.

The purpose of this flexible approach is to make the most accurate possible measurement of the changes in energy uses that are specifically attributable to Honeywell installed ECMs. This creates the ability over the life of the contract to continue measuring only savings achieved by Honeywell and leaves the Newton BOE 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.

3. Energy Savings Calculations

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

1. Local weather data.
2. Utility bills and sub-metered consumption trends.
3. Utility rate structure.

[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.

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 the Newton BOE 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 the Newton BOE or “real bill reductions”. As noted in the RFP energy escalation rates will be established in accordance with New Jersey Board of Public Utility guidelines.

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

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

4. Measurement & Verification

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

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

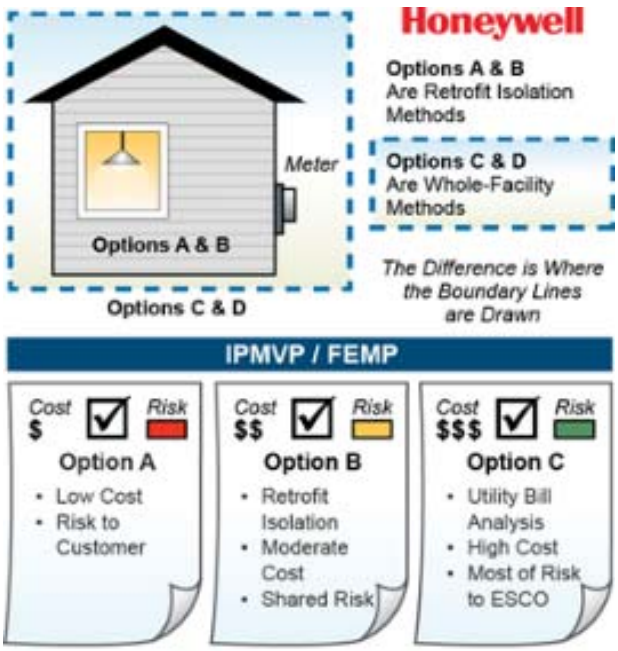
The plan for monitoring and verifying energy savings for the proposed ECMs is based on the methods described in the ***International Performance Measurement and Verification Protocol (IPMVP)***[2]. Our approach to M&V is directly consistent with, and in compliance with, the IPMVP. This protocol provides a framework for the most widely accepted and used M&V methods by the industry.

Engineering calculations of energy and cost savings for the project are based on operating parameters (such as weather, temperature settings, run hours, occupancy patterns, and space usage) and equipment performance characteristics. The M&V plan uses the operating parameters established in the baseline for all savings calculations during the term of the project. The intent of the M&V plan is to verify that the ECMs installed by Honeywell will provide the expected energy savings. Therefore, Honeywell will collect data and relative information during the post-retrofit period to demonstrate that the installed equipment is performing at expected levels. It is assumed that the Newton BOE 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 Newton BOE to adapt to the demands of future campus growth and changes without the need for the Newton BOE and Honeywell to negotiate energy baseline adjustments.

Our typical M&V plan will utilize broadband Internet access to the appropriate the Newton BOE's control interfaces to both confirm operating status and to download trend data to verify proper equipment maintenance.

[2] www.ipmvp.org.

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



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

General Approach to M&V

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

M&V Options

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

M&V Option	Performance Verification Techniques
Option A Verifying that the measure has the potential to perform and to generate savings.	**Option A** is appropriate for ECMs that have energy use that can be readily quantified, such as the use of high efficiency lighting fixtures, high efficiency constant speed motors, and other standard engineering calculations. Engineering calculations before and after installation spot measurements and use of EMS data points with stipulated values.
Option B Verifying that the measure has the potential to perform and verifying actual performance by end use.	**Option B** is appropriate for ECMs that require periodic or on-going measurements to quantify energy use; such as the use of variable frequency drives on pump or fan motors. Engineering calculations with metering and monitoring strategy throughout term of the contract.

M&V Option	Performance Verification Techniques
Option C Verifying that the measure has the potential to perform and verifying actual performance (whole building analysis.)	**Option C** is used for ECMs for which the energy use or energy savings cannot be measured directly, such as building envelope modifications. Option C is based on the use of utility meters to quantify building energy use. Utility meter billing analysis-using techniques from simple comparison to multivariable regression analysis.
Option D Verifying actual performance and savings through simulation of facility components and/or the whole facility	**Option D** is used for ECMs for which the energy use or energy savings cannot be measured directly, or savings for individual ECMs are heavily interdependent. Calibrated building simulation is used to separate the energy savings attributable to each ECM. Calibrated energy simulation/modeling; calibrated with hourly or monthly utility billing data and/or end-use metering.

In general,

ECM Energy Savings = Baseline Energy Use - Post-Installation Energy Use

And
Energy Cost savings ($) = Total Energy Savings x Contractual Energy Rates

Exceptions to this simple equation are as follows:

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

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

Post-Retrofit M&V Activities

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

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

Verifying the Potential to Generate Savings

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

- Documentation of ECM or system design assumptions

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

Post-Installation Verification

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

Regular Interval Post-Installation Verification

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

Computation of Energy Savings

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

According to the New Jersey Board of Public Utilities' New Jersey Statewide Energy-Efficiency Programs Measure Lives Used in Cost-Effectiveness Screening, the equipment life for the recommended measures are shown in the Appendix. All recommended measures have a minimum measure life of 15 years.

Construction/Interim Savings

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

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.

5. 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 – LED Lighting	Upgrade Lighting systems: Re-lamp/Re-ballast T8 to LED, Incandescent to LED Metal Halide and High Pressure Sodium to LEDs	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 – Lighting Controls/	Install lighting control devices	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 change Energy Savings: Update Line by Line scope with measured kW and usage hours and compare to pre retrofit calculated savings
ECM 1C – Exterior Pole Lighting	Upgrade Lighting systems: Re-lamp to LED,	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 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 Energy Savings: Update Line by Line scope with measured kW and usage hours and compare to pre-retrofit calculated savings

ECM # and Name	Summary of ECM	Measurement and Verification Methodology / Recommendation	Description of M&V – Pre and Post Process
ECM 1D – Vending Misers	Install vending machine energy management devices	Option A: Pre and Post measurements Line by Line scope and engineering calculations	Pre M&V: Measurement of kW for 5% sample machines in each category Data log usage hours Data Log occupancy schedules Update Line by Line scope with measured kW and usage hours Post M&V: Measurement of kW for 5% sample machines in each category Usage Hours to remain same Energy Savings scope with measured kW and usage hours and compare to pre-retrofit calculated savings
ECM 1E - De-Stratification Fans	Install De-Stratification fans in Gymnasiums and Multipurpose Rooms to minimize stratification of hot air and maintain hot air flow below the fan level	Option A: Engineering calculations based on nameplate and manufacturer supplied data for the existing and replacement units	Pre M&V: Verify parameters used in engineering calculations with equipment name plate data and savings assumptions
ECM 1F - Plug Load Management	Provide Wi-Fi enabled programmed electrical control devices to shut down 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 2A – Boiler Upgrades	Replace boilers in select locations to handle base load	Option C: Thermal energy savings based on utility data	Pre M&V: Verify parameters used in engineering calculations with equipment name plate data and savings assumptions
ECM 2B – Boiler Controlinks	Install new burner controls on existing boilers	Option C: Thermal energy savings based on utility data	Pre M&V: Verify parameters used in engineering calculations with equipment name plate data and savings assumptions
ECM 2C - Rooftop Unit Replacement	Replace antiquated Rooftop Units with new high efficiency Rooftop Units	Option A: Engineering calculations based on nameplate and manufacturer supplied data for the existing and replacement units	Pre M&V: Verify manufacturer provided data for existing unit efficiency (SEER) Post M&V: Verify manufacturer provided data for new unit (SEER) – verify the new equipment and controls are installed and commissioned as recommended by manufacturer

ECM # and Name	Summary of ECM	Measurement and Verification Methodology / Recommendation	Description of M&V – Pre and Post Process
ECM 2D– Split System Replacements	Replace select split systems with new high efficiency units	Option A: Engineering calculations based on nameplate and manufacturer supplied data for the existing and replacement Units	Pre M&V: Verify manufacturer provided data for existing units efficiency (SEER) Post M&V: Verify manufacturer provided data for new units (SEER) – verify the new equipment and controls are installed and commissioned as recommended by manufacturer
ECM 2E - Unit Heater Replacement	Replace loud Unit Heater	Option A: Engineering calculations based on nameplate and manufacturer supplied data for the existing and replacement Units	Pre M&V: Verify manufacturer provided data for existing unit efficiency Post M&V: Verify manufacturer provided data for new units – verify the new equipment and controls are installed and commissioned as recommended by manufacturer
ECM 2F - Motors and VFD Replacements	Install VFDs on select pumps and fans to operate the motors in response to the system load. Replace antiquated motors with new premium efficiency motors	Option A: Engineering calculations for VFDs following 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 performance data and motor efficiencies. Post M&V: Obtain trend data for VFD operation from the BMS system to verify baseline calculation assumptions on system loads Verify efficiency of new motors Verify manufacturer provided data for new VFDs – verify the new equipment and controls are installed and commissioned as recommended by manufacturer
ECM 2G - Kitchen Equipment Conversion	Convert Electric Kitchen Equipment to Gas	Option A: Engineering calculations based on nameplate and manufacturer supplied data for the existing and replacement kitchen equipment	Pre-M&V: Verify manufacturer provided data for existing unit kW. Post M&V: Verify manufacturer provided data for new unit capacity (MBH) – verify the new equipment and controls are installed and commissioned as recommended by manufacturer
ECM 2H – Walk-In Compressor Controls	Install control device on walk-in freezer and refrigerator evaporators to shut down the fan motor when the compressor is off on duty cycle	Option A: Stipulated Engineering calculations based on case studies for the Intellidyne control	Pre M&V: None Post M&V: Savings stipulated based on engineering calculations for the term of contract
ECM 2I - Kitchen Hood Controls	Install control devices on the Kitchen hoods to control exhaust air in response to the cooking	Option A: Engineering calculations for VFDs following affinity laws.	Pre M&V: Verify manufacturer provided data for the motor 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

ECM # and Name	Summary of ECM	Measurement and Verification Methodology / Recommendation	Description of M&V – Pre and Post Process
	load. Replace fan motors with new premium efficiency motors and VFD drives	Engineering calculations based on nameplate, manufacturer supplied data and operating hours for the existing and replacement motors	Verify efficiency of new motors
ECM 2J - Piping Insulation	Insulate piping sizes and runs to prevent thermal losses.	Option A: Engineering calculations based on existing and proposed conditions.	Pre M&V: Verify parameters used in engineering calculations and savings assumptions Post M&V: Ensure post installation site conditions agree with engineering calculations and savings assumptions.
ECM 2K – Unit Ventilator Replacements	Install new high efficiency heating and cooling unit ventilators	Option A: Engineering calculations based on existing and proposed conditions.	Pre M&V: Verify parameters used in engineering calculations and savings assumptions Post M&V: Ensure post installation site conditions agree with engineering calculations and savings assumptions.
ECM 3A - Building Management System Upgrades	Upgrade Building Management Systems to DDC and 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: Engineering calculations based on programmed parameters.	Pre-M&V: Verify existing operating parameters match the baseline calculation assumptions Post M&V: Verify that systems are installed as specified and controls are programmed to match the savings assumptions
ECM 3B – Demand Control Ventilation	Installing Demand Control Ventilation Controls to minimize conditioning outside air.	Option A: Engineering calculations based on programmed parameters.	Pre-M&V: Verify existing operating parameters match the baseline calculation assumptions Post M&V: Verify that systems are installed as specified and controls are programmed to match the savings assumptions

ECM # and Name	Summary of ECM	Measurement and Verification Methodology / Recommendation	Description of M&V – Pre and Post Process
ECM 4A - Building Envelope Improvements	Install weather stripping on doors, seal roof wall joints and roof penetrations	Option A: Engineering calculations based on programmed parameters.	Pre M&V: None Post M&V: Savings stipulated based on engineering calculations for the term of contract
ECM 4B – Window Replacement	Install new energy efficient windows in select locations	Option A: Engineering calculations based on manufacturer supplied data for the existing and replacement windows	Pre M&V: Verify parameters used in engineering calculations Post M&V: Ensure post installation site conditions agree with engineering calculations and savings assumptions.
ECM 4C - Exterior Door Replacements	Install new energy efficient doors in select locations	Option A: Engineering calculations based on manufacturer supplied data for the existing and replacement doors	Pre M&V: Verify parameters used in engineering calculations Post M&V: Ensure post installation site conditions agree with engineering calculations and savings assumptions.
ECM 4D -Roof Sealing	Install new roof sealing in select locations	Option A: Engineering calculations based on manufacturer supplied data for the existing roof	Pre M&V: Verify parameters used in engineering calculations Post M&V: Ensure post installation site conditions agree with engineering calculations and savings assumptions.
ECM 5A – Computer Power Management	Install control software to ensure computers revert to sleep mode when not being used.	Option A: Stipulated Engineering calculations based on computer power management Manuf. Software information.	Pre M&V: None Post M&V: Savings stipulated based on engineering calculations for the term of contract
ECM 6A – Permanent Load Reduction	Savings from permanent load (kW) reduction	N/A	Pre M&V: N/A Post M&V: N/A
ECM 7A – Solar PPA	Install solar PV arrays as part of Power Purchase Agreement	N/A	Pre-M&V: Utilize baseline kWh consumption to determine kWh produced Post M&V: Measure and provide a report of the kWh generated
ECM 8A – Retro-Commissioning	Optimize the existing controls and mechanical systems.	Option A: Engineering calculations based on programmed parameters.	Pre-M&V: Verify existing operating parameters match the baseline calculation assumptions Post M&V: Verify that systems are installed as specified and controls are programmed to match the savings assumptions

ECM # and Name	Summary of ECM	Measurement and Verification Methodology / Recommendation	Description of M&V – Pre and Post Process
ECM 9A – Energy Education	Implement Energy Education Program for students and staff	N/A	Pre M&V: N/A Post M&V: N/A
ECM 10A – Transformer Replacement	Replace existing secondary transformer with high efficiency equivalent	Option A: Engineering calculations based on increase in transformer efficiency	Pre-M&V: Measure 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.

6. 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 Newton BOE that all installations and work performed are subject to final inspection and the Newton BOE's acceptance. This procedure ensures all work will be to the level of quality the Newton BOE expects.

Honeywell also guarantees it will meet the objectives mutually defined with the Newton BOE. Honeywell takes its commitment to partner with the Newton BOE 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 Newton BOE to the ESCO. The strength of the Guarantee is only as good as the Company backing it and their financial solvency. With over $40.5 Billion in assets, Honeywell has the financial strength and background to support the Newton BOE for the long term.

Savings Guarantee: With the understanding that the Newton BOE 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 the Newton BOE. A first party guarantee eliminates the risk on the Newton BOE 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, the Newton BOE 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 the Newton BOE sole discretion. In the same way, the duration of the guarantee is also optional. Many 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 regarding 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 Newton BOE does elect to accept a guarantee, New Jersey ESIP law requires that the Newton BOE contract with a third-party independent firm to verify that the energy savings are realized. To preserve the independent status of this contractor these costs are required to be incurred directly by the Newton BOE.

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 Newton BOE opts to accept the Savings Guarantee, the fee indicated on Form V in Section H-1 will be applicable to account for on-going Honeywell service costs incurred during the measurement and verification of the savings as indicated in Form V of our RFP response.

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.

7. Recommended Preventive Maintenance Services

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

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

Honeywell recommends routine maintenance on the following systems throughout the Newton BOE 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 Newton BOE 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 Newton BOE 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 the Newton BOE and Honeywell will determine the energy conservation measures (ECM's) to be implemented. The services of a NJ Licensed Engineering firm and / or Architectural firm shall then be secured to properly comply with local building codes, compliance issues and NJ Public contracts law. Specifications will be designed and developed to exact standards as recommended by Honeywell to achieve all savings outlined in this Energy Savings Plan (ESP). Once specifications are completed, Honeywell will publicly solicit contractors capable of meeting the requirements of the specification for each trade. However, even before the completion of the bidding process, Honeywell project management will be engaged to maintain the overall project schedule and ensure the Newton BOE's expectations are met. An overview of these activities and functions are detailed below.

1. Safety Management Plan

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

Honeywell's Safety Management Plan is provided in Appendix 5.

2. Project Management Process

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

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

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

- Phase 1: Investment Grade Energy Audit (IGEA)
- Phase 2: Project Implementation

- Phase 3: Commissioning and Training
- Phase 4: Energy Savings Guarantee Period

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

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

Step 1 Discovery

The first step of your IGEA is to gain a thorough comprehension of the Newton BOE's key priorities and requirements. Honeywell will work with you to identify what your key needs and goals include and investigate your buildings and systems with that in mind during this step.

Honeywell will initiate your IGEA shortly after formal selection with a kickoff meeting involving all key project decision makers of the Newton BOE and Honeywell. The purpose of this meeting is to establish preliminary project expectations and define key next steps of the process to inform the IGEA.

Honeywell will develop a customized plan for developing an efficient, cost effective and solutions based project including schedule, finance, performance requirements and scheduling activities.

Honeywell will schedule site visits to commence at the earliest convenience. Utility data is a key component used for establishing your energy baseline to project potential energy savings. Building plans and operating schedules will assist Honeywell to focus our time during the site visits and serve to provide the means for our engineers to complete their calculations. Data required for this step includes 24 months of electric, thermal, water/sewer data, original and renovation drawings, equipment lists, equipment operating schedules, occupancy data and maintenance records and repair costs.

Our goal for the site surveys is to understand your systems in each facility and to identify potential energy conservation measures (ECMs) for inclusion in your final project scope. This step allows Honeywell to determine needed improvements by evaluating each building and its systems in terms of condition, performance and age, including lighting and HVAC systems, Building Automation Systems, building envelopes, electrical distribution, domestic water and heating systems, et cetera.

Step 2 Identify and Develop Project

Honeywell will take the findings of our earlier diagnostic phase to develop solutions that address your priorities and key needs as ascertained in Step 1. Our collaborative, solutions based approach will allow you to maximize savings to invest more into modernizing buildings and generate maximum rebates to help deliver the most positive cash flow available.

Our primary objective is to ensure quality control and on time delivery throughout your project. Your project will have a dedicated team consisting of project management and engineering who have helped deliver similarly sized project under ESIP in recent past.

Honeywell will create an exhaustive ECM list following the completion of the site survey process. Each opportunity is then analyzed individually to determine both economic and construction feasibility. Input from the Newton BOE is critical to determine how each ECM fits within your overall project priorities. Honeywell's ECM Opportunity Funnel will help further narrow down the list of potential ECMs to your final ESIP project scope, by analyzing all aspects of your energy consumption to deliver an optimal project scope based on realistic savings potential. Our unique collaborative approach ensures that we deliver on your expectations while providing for turnkey solutions that are cost effective.

Step 3 Cost and Savings Forecasting

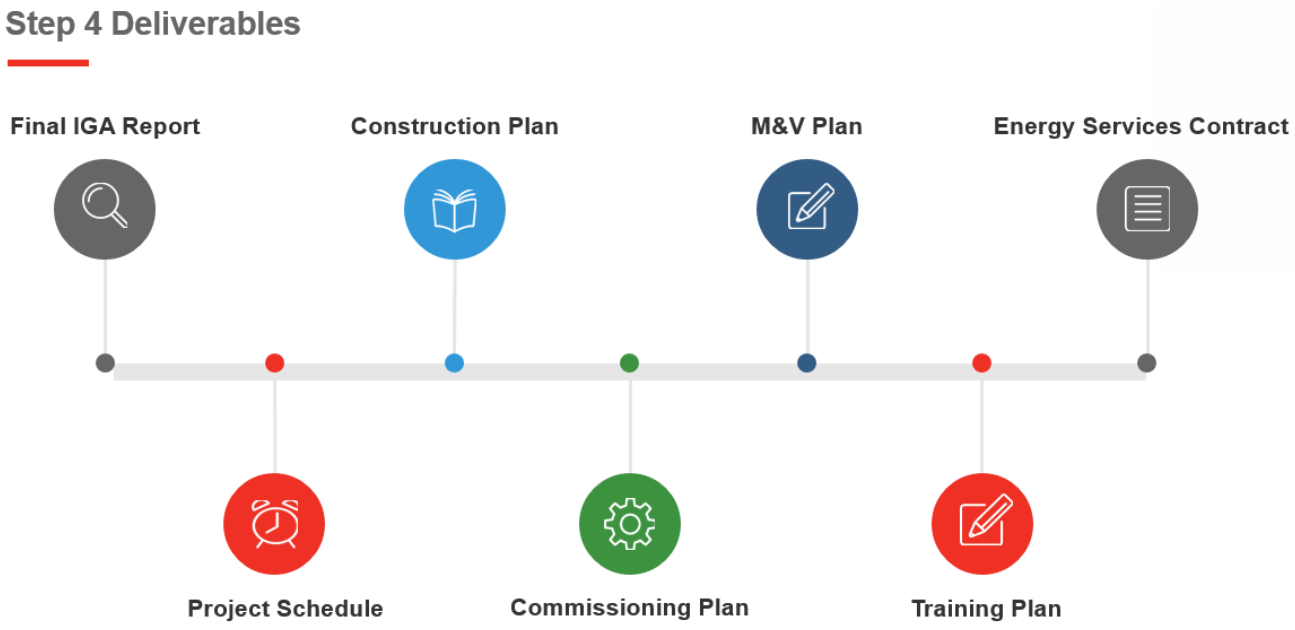
Honeywell will then move on to analyze and quantify your unique savings guarantee utilizing the Newton BOE's dedicated ESIP Team. During this step, we will quantify energy savings by identifying the scope of work and its impact on your facilities and systems. We will measure individual ECMs based on how they will impact

future performance of the building as a whole. This will help to ensure that the ECM savings are accounted for only once. Results are then subject to peer reviews to verify accurate modeling and savings forecasts based on the proposed scope of work. Honeywell's unique approach to engineering is why we often exceed the savings guarantee of our contracts.

Step 4 Deliver Solution

Honeywell will leverage our experience delivering more than two dozen NJ ESIP projects since 2009 to help the Newton BOE complete a successful project on time that maximizes realistic savings, cash rebates and positive cash flow. We have learned through this unrivaled experience that what matters most is to meet your expectations and ensure your involvement in the decision-making process. REACT (Rebate Energy Analysis Constructability Tool) will provide for an interactive solution development experience designed to maximize New Jersey Office of Clean Energy rebates. Our No Change Orders policy (which helps distinguish Honeywell from the competition) will further reduce risk and enhance project results. And our in-house finance team (Honeywell Global Finance) will work to ensure that you secure the most competitive financial offering and interest rate available. No ESCO offers more value throughout the ESIP Process than Honeywell.

Our deliverables during this final phase will include:



A. HONEYWELL PERFORMANCE CONTRACTING

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

B. PROJECT MANAGEMENT POLICY - HONEYWELL'S COMMITMENT TO HEALTH, SAFETY & THE ENVIRONMENT

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

Our Safety Commitment to the Newton BOE

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

Our projects all begin with the following steps:

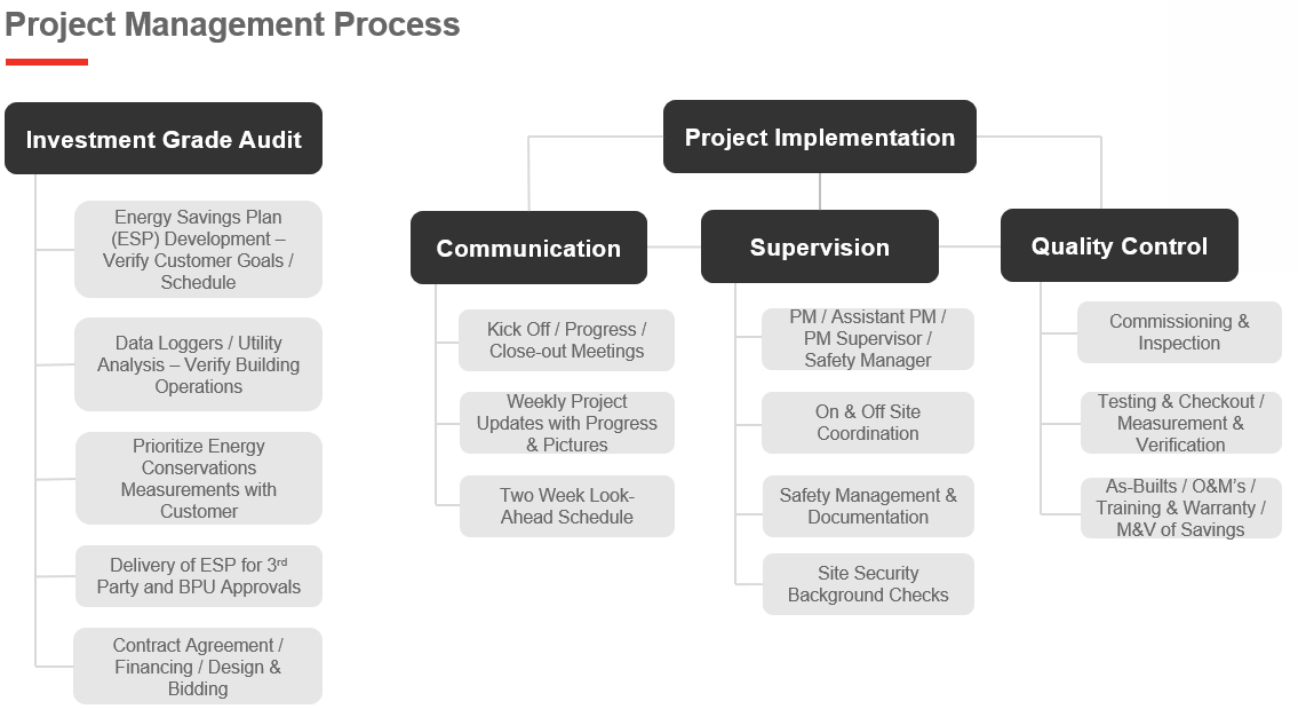
- Safety Training for Employee's and Sub-contractors
- Detailed Work Schedules around the day
- Detailed Background Checks of Personnel
- Detail Logs of Sub Contractor Personnel
- On-Site Logs of Time Sheets, Contact Information for All Personnel
- Clearly Displayed Identification Badges of All Construction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

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

- We actively promote and develop opportunities for expanding sustainable capacity by increasing fuel efficiency, improving security and safety, and reducing emissions of harmful pollutants.
- We are committed to compliance with all of our health, safety, environmental and legal requirements everywhere we operate
- Our commitment to health, safety and the environment is an integral aspect of our design of products, processes and services, and of the lifecycle management of our products.
- Our management systems apply a global standard that provides protection of both human health and the environment during normal and emergency situations
- We identify, control and endeavor to reduce emissions, waste and inefficient use of resources and energy.

- We abide by the company's own strict standards in cases where local laws are less stringent.
- Our senior leadership and individual employees are accountable for their role in meeting our commitments.
- We measure and periodically review our progress and strive for continuous improvement.
- These are our commitments to health, safety, and the environment, and to creating a safe, clean environment everywhere we operate.

C. PROJECT MANAGEMENT PROCESS



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

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

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

As the facilities improvements portion of the partnership begins, the Project Manager serves as a single focal point of responsibility for all aspects of the partnership. The Project Manager monitors labor, material, and project modifications related to the Newton BOE/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 Newton BOE and all other project participants to resolve issues and update project status.

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

3. Construction Management

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

Communication is the key success factor in any construction management plan, and our project manager will be the key focal point during the installation process.
Our team will prevent schedule slippages by continuously tracking the location of all equipment and components required for the project. We make sure all equipment and components will be delivered on time prior to the scheduled date of delivery. Our thorough survey, evaluation and analysis of existing conditions, performed prior to the commencement of construction, will also prevent schedule slippages.

Honeywell is required to subcontract various portions of our projects to contractors. Within the Newton BOE 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 Newton BOE.

4. Commissioning

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

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

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

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

5. Installation Standards

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

In the case of fluorescent lighting upgrades, we recommend that a group re-lamping of lamps be done approximately five years after the initial installation depending upon run times. Your building facility staff, on an

as needed basis, can complete normal routine maintenance of lamps and ballasts. This maintains the quality of the lighting levels, and color rendering qualities of the lamps.
Space temperatures will be set by the energy management system and local building controls, and will be maintained on an annual basis. Flexibility will be maintained to regulate space temperatures as required to accommodate building occupant needs.

Your facility staff and building personnel will operate the energy management system with ongoing training and support from Honeywell. Therefore, both the Newton BOE and Honeywell will maintain the standards of comfort. The comfort standards will be maintained throughout the life of the agreement through sound maintenance planning and services recommended as part of this ESP.
Regarding ventilation, Honeywell will upgrade ventilation to meet current standards in those areas where our scope of work involves upgrades to or replacement of systems providing building ventilation. We generally will not upgrade ventilation in those areas where our work doesn't involve the upgrade or replacement of systems or equipment providing ventilation to a building or facility.

Heating and Cooling Standards

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

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

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

Improvements	Honeywell	Subcontractor
Financial Responsibility for Energy Guarantees	●	

Hazardous Waste Disposal or Recycling

Honeywell disposes of all PCB ballasts or mercury containing materials removed as part of the project per EPA guidelines. Honeywell will complete all the required paperwork on behalf of the Newton BOE. Honeywell will work with the Newton BOE to review your hazardous material reports, and will identify the areas where work will be completed so that the Newton BOE 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 Newton BOE in working with the EPA under compliance management issues. We also develop and manufacture automated systems to track and report a wide variety of environmental factors.

6. Implementation Schedule

Attached please find a sample schedule for construction and completion of the Project.

APPENDIX 1 INDEPENDENT ENERGY AUDITS

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APPENDIX 2 ECM CALCULATIONS

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APPENDIX 3 CUTSHEETS

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APPENDIX 4 SAFETY MANAGEMENT PLAN

APPENDIX 5 NJ STATEWIDE ENERGY EFFICIENCY PROGRAMS MEASURE LIVES USED IN COST EFFECTIVENESS SCREENING

PROGRAM/Measure	Measure Life
Non-Residential Programs	
C&I Construction	
Commercial Lighting — New	15
Commercial Lighting — Remodel/Replacement	15
Commercial Lighting Controls — Remodel/Replacement	18
Commercial Custom — New	18
Commercial Chiller Optimization	18
Commercial Unitary HVAC — New - Tier 1	15
Commercial Unitary HVAC — Replacement - Tier 1	15
Commercial Unitary HVAC — New - Tier 2	15
Commercial Unitary HVAC — Replacement Tier 2	15
Commercial Chillers — New	25
Commercial Chillers — Replacement	25
Commercial Small Motors (1-10 HP) — New or Replacement	20
Commercial Medium Motors (11-75 HP) — New or Replacement	20
Commercial Large Motors (76-200 HP) — New or Replacement	20
Commercial VSDs — New	15
Commercial VSDs — Retrofit	15
Commercial Air Handlers Units	20
Commercial Heat Exchangers	24
Commercial Burner Replacement	20
Commercial Boilers	25
Commercial Controls (electric/electronic)	15
Commercial Controls (Pneumatic)	10
Commercial Comprehensive New Construction Design	18
Commercial Custom — Replacement	18
Small Commercial Gas Furnace — New or Replacement	20
Infrared Heating	17
Small Commercial Gas Boiler — New or Replacement	20
Small Commercial Gas DHW — New or Replacement	10
C&I Gas Absorption Chiller — New or Replacement	25
C&I Gas Custom — New or Replacement (Engine Driven Chiller)	25
C&I Gas Custom — New or Replacement (Gas Efficiency Measures)	18

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