WATCHUNG HILLS REGIONAL HIGH SCHOOL

DISTRICT-WIDE ENERGY SAVINGS PLAN

April 9, 2021

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DISTRICT-WIDE ENERGY SAVINGS PLAN

PREPARED FOR:

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Honeywell reserves the right, in its discretion, to increase the price(s) set forth in this Proposal in the event that tariffs (or similar governmental charges) imposed by the United States or other countries result in any increase in the costs that Honeywell used to determine such price(s).

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

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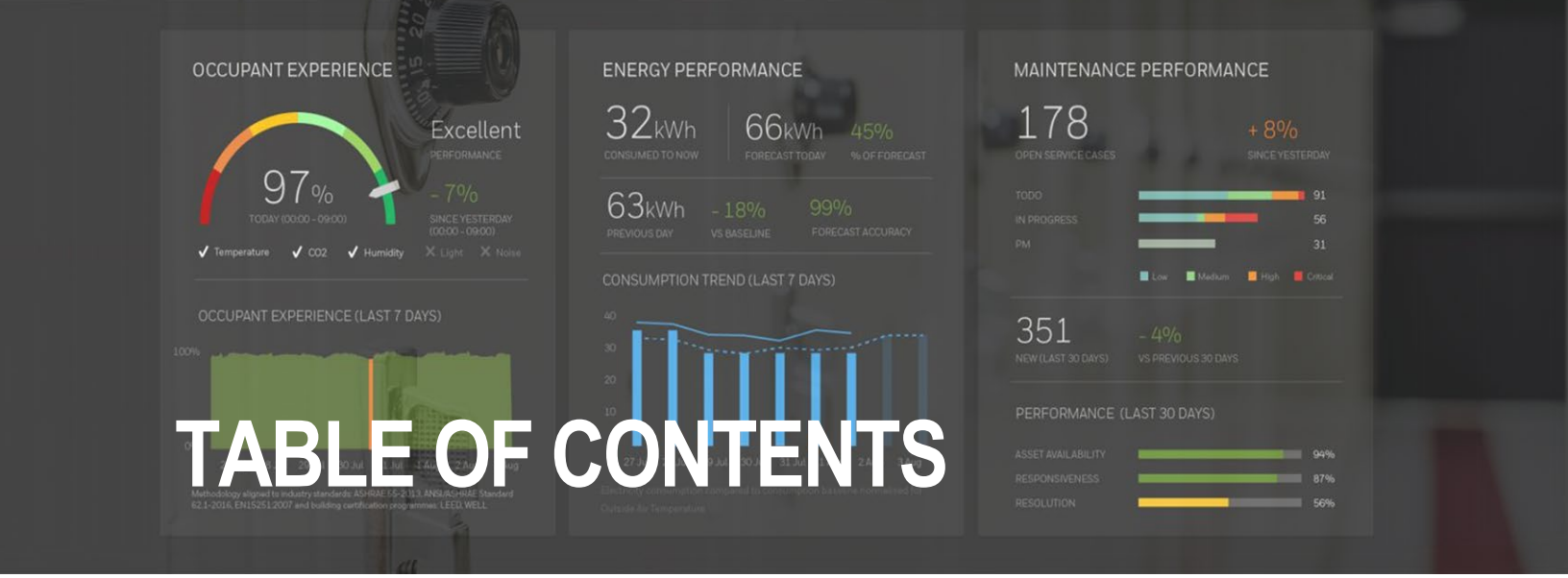

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SECTION A
EXECUTIVE SUMMARY

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SECTION A — EXECUTIVE SUMMARY

Honeywell is pleased to submit this Energy Savings Plan for the Watchung Hills Regional High School District (District). During the development of the Energy Savings Plan, Honeywell has completed a thorough investment grade energy audit of the Watchung Hills Regional High School District 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 the District's facility concerns and goals. Our Energy Savings Plan includes projects that achieve energy and operational efficiencies, create a more comfortable and productive environment and are actionable via the New Jersey Energy Savings Improvement Program (NJ ESIP) in accordance with NJ PL2012, c.55.

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

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

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

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

A. Executive Summary (This Section)

B. Preliminary Utility Analysis – The Preliminary Utility Analysis (PUA) defines the utility baseline for the Watchung Hills Regional High School District buildings included in the Energy Savings Plan. It provides an overview of the current usage and a cost per square foot by building of utility expenses. The report also compares the Watchung Hills Regional High School District'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 Watchung Hills Regional High School District are identified for the purposes of potential inclusion in the program. Final selected ECMs are to be determined by the Watchung Hills Regional High School District in conjunction with Honeywell during the project development phase of the NJ ESIP process.

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

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

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

G. Independent Energy Audit – This section includes, for reference, the independent energy audits as previously received by the Watchung Hills Regional High School District through the Local Government Energy Audit (LGEA) program. The audits provided by TRC Energy Services 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. For Appendices 1 to 5, please refer to the following files for their electronic version on the USB drive included along in the submission:

Honeywell – Appendix 1 — INDEPENDENT ENERGY AUDIT (Exhibit 1).pdf

Honeywell – Appendix 2 — ECM CALCULATIONS.pdf

Honeywell – Appendix 3 — SAFETY MANAGEMENT PLAN.pdf

Honeywell – Appendix 4 — EQUIPMENT CUTSHEETS.pdf

Honeywell – Appendix 5 --- WATCHUNG HILLS LIGHTING LINE BY LINE.pdf

Benefits

The measures investigated in this Energy Savings Plan could result in an annual utility savings of 4,072,279 kWh of electricity and save 9,924 therms of natural gas. Additionally, these energy savings will result in a net reduction of greenhouse gases and will reduce the school district's carbon footprint by 2,192 MTE of CO2 annually. This is equivalent to removing 462 cars from the road annually and /or 2,0764 forested acres per year. All these savings are achieved while improving the classroom environment and renewing many items that have been in service beyond useful life expectancy.

In accordance with the NJ ESIP process, the next step in the project development phase is for Honeywell to provide our recommendations and for the Watchung Hills Regional High School District to select the desired content of the project based upon the Watchung Hills Regional High School District'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 Watchung Hills Regional High School District priorities, which will all play a part in the final selection and cash flow of ECMs. The definitive requirement under NJ PL2012, c.55 is that the project is self-funding within the 15 or 20-year term as outlined in the legislation.

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

Sincerely,

Joseph Coscia
Senior Business Consultant

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SECTION B — PRELIMINARY UTILITY ANALYSIS

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Honeywell

Preliminary Utility Analysis

Watchung Hills Regional High School
Warren, NJ

Helping customers manage energy resources to improve financial performance

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Executive Summary

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

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

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

How does it work?

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

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

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

Why Honeywell?

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

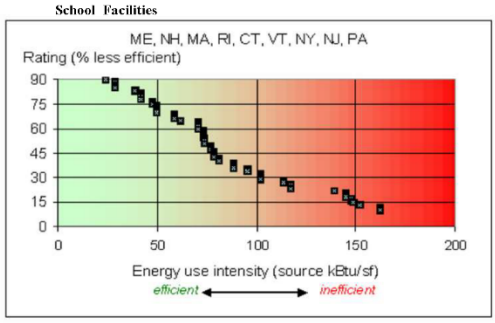
Energy Benchmarking

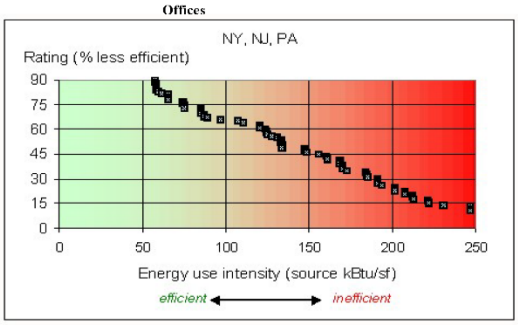
The calculation of EUI (Energy Use Intensity) is shown below. EUI, expressed in kBtu/sf, is normalized for floor area, the most dominant influence on energy use in most buildings. Its use usually provides a good approximation of how your building's energy performance compares to others. Site EUI indicates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

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

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

Site EUI Rank		Annual Total Electrical Use (kWh)	Annual Total Non-Electrical Fuel Use (Therms)	Building Gross Floor Area (sq-ft)	Site EUI Rating	Source EUI: Annual Total Source Energy Use per Sq-Ft (kBtu/sf)	Rating (Regional Source EUI Comparison)
1	Sparta High School	4,099,305	195,241	397,890	84	156	25%
		4,099,305					





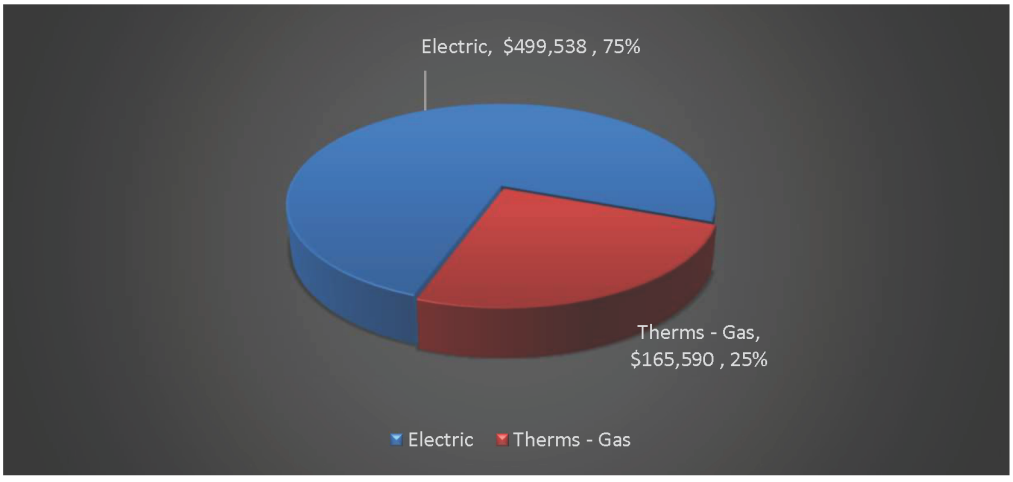
Historical Summary

Utility Analysis Period:
April 2018 - March 2019

	Electric	Therms - Gas
Utility Costs*	$499,538	$165,590
Utility Usage (kWh, Therms)	4,099,305	195,241
$ Cost/Unit (kWh, Therms)	$0.12186	$0.848
Annual Electric Demand (kW)	12,636	

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

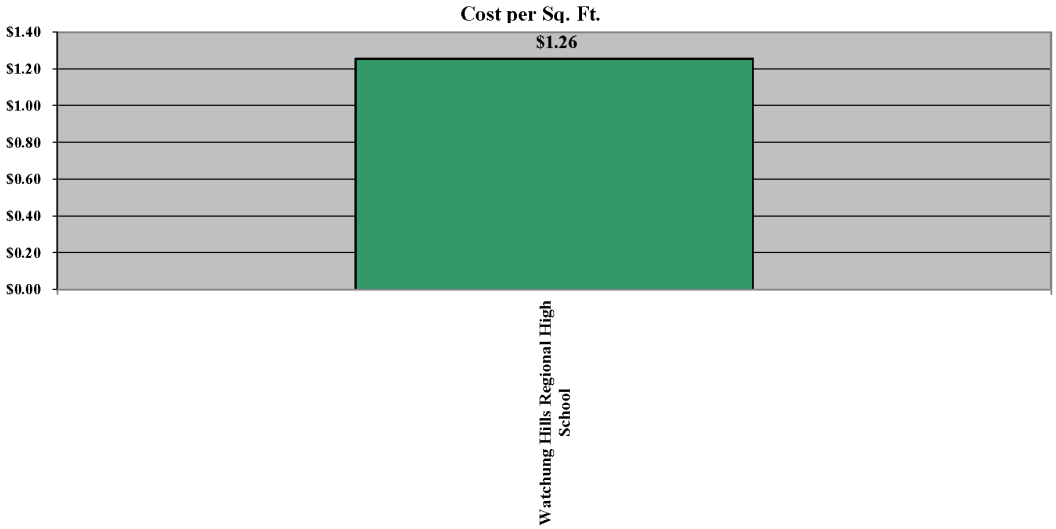
Actual Cost by Utility
April 2018 - March 2019

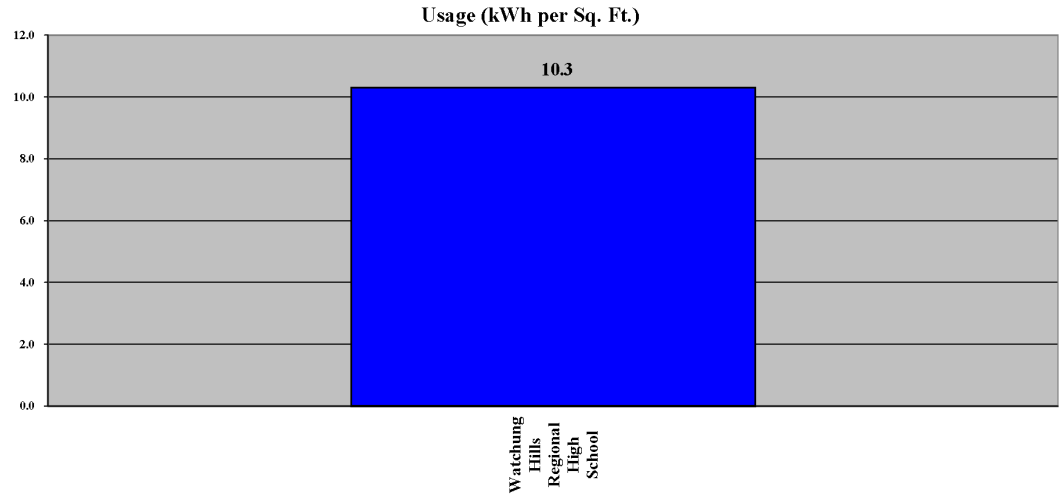


Total Cost
$665,128

Utility Analysis
Electric

Square Footage Analysis

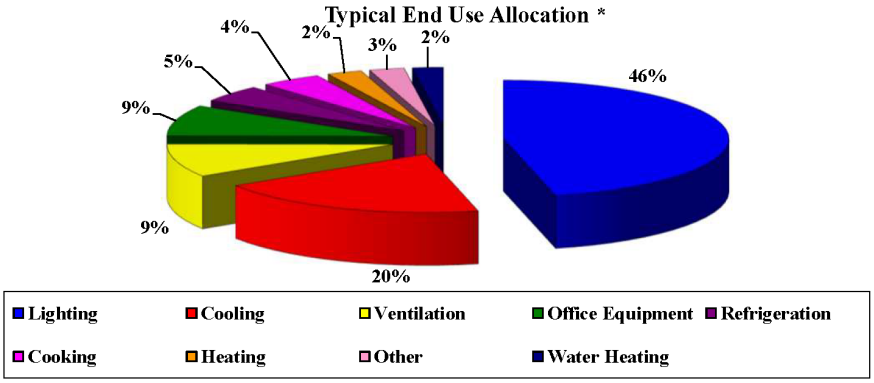




Note: Average kWh/SF for School buildings in this climate zone is 9.0

Utility Analysis
Electric

Sources of Electric Consumption



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

Typical Allocation Applied to Your Electric Cost**

	Lighting	$231,286
	Cooling	$97,909
	Ventilation	$45,957
	Office Equipment	$42,960
	Refrigeration	$23,478
	Cooking	$21,980
	Heating	$12,488
	Other	$12,488
	Water Heating	$10,990
Your Total Cost	**April 2018 - March 2019**	**$499,538**

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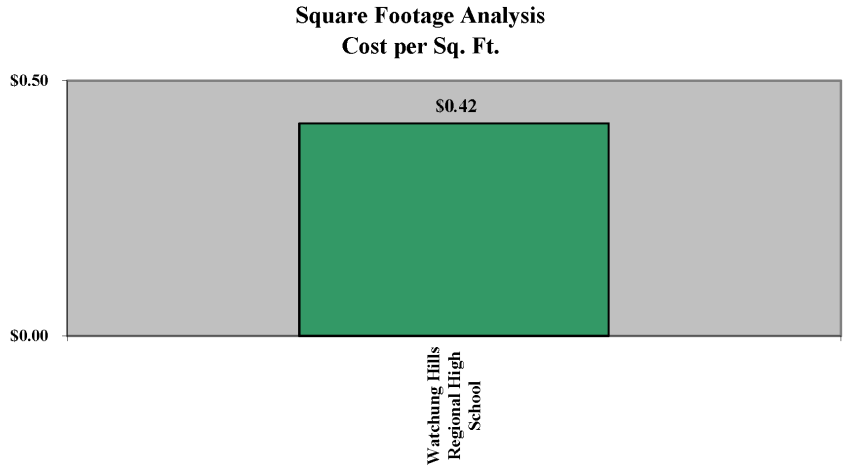
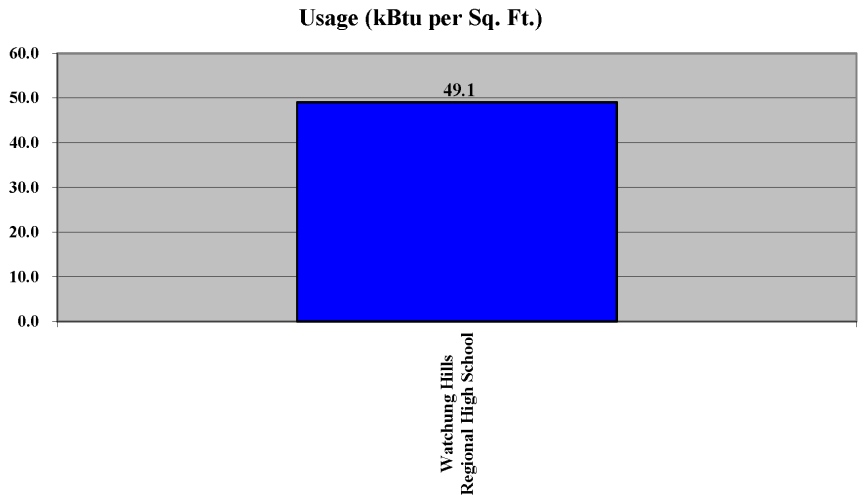
Utility Analysis
Therms - Gas



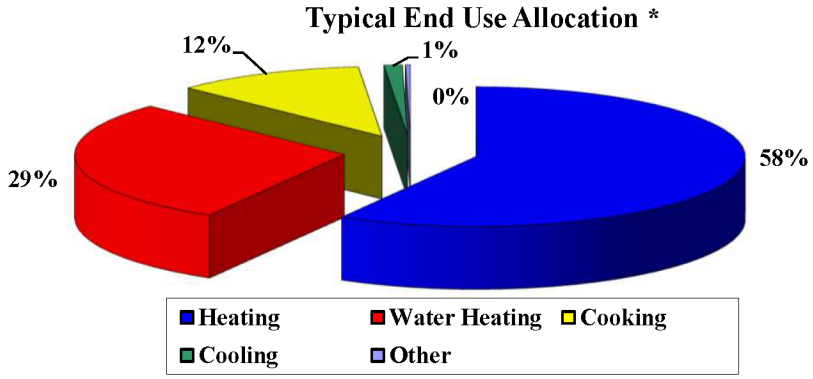


Note: Average kBTU/SF for School buildings in this climate zone is 46.1

There is a fairly direct correlation between your gas usage and heating degree days, indicating that the vast majority of your natural gas usage is for space heating.

Utility Analysis
Therms - Gas

Sources of Usage
Therms - Gas



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

Typical Allocation Applied to Your Cost**
Therms - Gas

	Heating	$96,539
	Water Heating	$47,856
	Cooking	$18,877
	Cooling	$1,821
	Other	$497
Your Total Cost	**April 2018 - March 2019**	**$165,590**

Watchung Hills Regional High School

April 2018 - March 2019

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

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

Total Annual Electric usage	4,099,305	kWh
Annual Natural Gas usage	195,241	Therms

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

Annual Greenhouse Gas Emissions (Metric tons of equivalent of CO2)		
eCO2 (Electric)	2,900	MT
eCO2 (Gas)	1,033	MT
Total eCO2	3,933.204	MT

This is equivalent to one of the following:	
845	No. of passenger vehicles - annual greenhouse gas emissions
5138	No. of acres of U.S. forests - carbon sequestered annually

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SECTION C
ENERGY CONSERVATION MEASURES

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SECTION C – ENERGY CONSERVATION MEASURES

Introduction

The information used to develop this Section was obtained through the independent energy audit building surveys to collect equipment information, interviews with operators and end users, and an understanding of the components to the systems at the sites. 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 District. This report aims to be an assessment of the feasibility and cost effectiveness of such measures, and an indication of the potential for their implementation. The ECMs listed below have been reviewed throughout your facilities for consideration within a complete Energy Savings Plan. What follows is a general description of the energy auditing process and the detailed descriptions of the available ECMs for your facilities.

ENERGY CONSERVATION MEASURES

ECM Description	Watchung Hills RHS
1A LED Lighting	●
1B De-Stratification Fans	●
2A High Efficiency Hot Water and Steam Boilers	●
2B Boiler Burner Controls	●
2C Domestic Hot Water Replacements	●
2D Addition of Cooling	●
2E McQuay and Nesbitt RTU Replacements	●
2F Kitchen Hood Controls	●
2G Walk In Compressor Controls	●
2H VFDs on Heating Water Pumps	●
2I Split System Replacement	●
2J High Efficiency Chillers	●
2K Exhaust Fan Retro-Commissioning	●
2L Install Pipe Insulation	●
2M Steam Trap and TRV Refurbishments	●
2N Replace Unit Ventilators -South Building	●
3A Healthy Buildings - Building Controls	●
3B Healthy Buildings - Environmental Optimization	●
3C Healthy Buildings - Plasma Ionization	●

ECM Description	Watchung Hills RHS
4A Building Envelope Improvements	●
4B Roof Sealing	●
5A Cogeneration CHP	●
6A Roof Mounted Solar PPA	●
7A 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 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.

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 learning working environment.
Improved equipment longevity by reducing amount of light usage and extending the useful life of your lighting system. Light Emitting Diode (LED) bulbs and diodes have an outstanding operational lifetime expectation of up to 100,000 hours. This is 11 years of continuous operation, or 22 years of 50% operation. Operational savings in terms of bulb and ballast replacement are significant based on this technology.
Reduced maintenance and operational costs by modernizing your lighting system and providing for longer lasting and technologically advanced lights, without the need to address deficient or bad ballasts.
Ecologically friendly LED lights are free of toxic chemicals. Most conventional fluorescent lighting bulbs contain a multitude of materials like mercury that are dangerous for the environment. LED lights contain no toxic materials and are 100% recyclable and will help to reduce carbon footprint by up to a third. The long operational lifetime span mentioned above means also that one LED light bulb can save material and production of 25 incandescent light bulbs. A big step towards a greener future!

ECM Description	Watchung Hills RHS
1A LED Lighting	●

Existing Conditions

Indoor lighting predominantly consists of T-12s and T-8s, some CFLs, and some incandescent bulbs. In general, lighting is operated on switches.

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

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

Existing Lighing at Weight Room 3-4

Existing Lighting Main Entrance

LED Outdoor Lighting Upgrades

Existing Conditions

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

Existing Outside Lighting

Existing Lighting Outdoor Fixtures

Scope of Work

Outdoor Lighting

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

Changes in Infrastructure

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

Customer Support and Coordination with Utilities

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

Environmental Issues

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

ECM 1B DE-STRATIFICATION FANS

The key benefits of this ECM include:

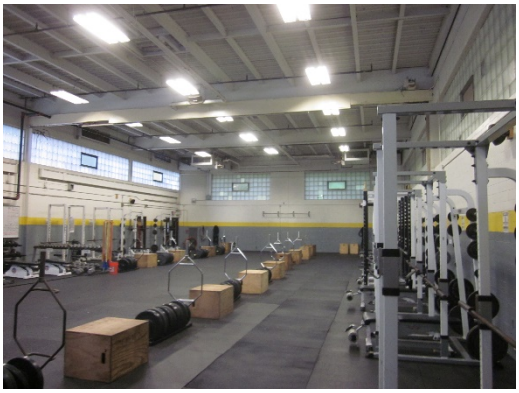
Improved efficiency and energy savings through more equal distribution of conditioned air space.
Equipment longevity due to lower utilization of equipment to condition air.
Increased comfort of students and teachers.

ECM Description	Watchung Hills RHS
1B De-Stratification 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.

Gym - 7/8



Weight Room 3/4

Proposed Solution

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

De-stratification fans even out the air temperature to a zero to 3°F differential from floor to ceiling and wall to wall.

This will allow HVAC systems to run for a shorter duration because of the absence of extreme temperatures to heat or cool, thus allowing the local thermostats to be satisfied for longer periods of time.

Systems Evaluation and Selection

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

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

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

School	Location	Qty	Type
Watchung Hills Regional HS	Gym 1-2	3	A-25-SP-STD-120-W
Watchung Hills Regional HS	Gym 1-2	3	A-25-SP-STD-120-W-PHI
Watchung Hills Regional HS	Gym 3-4	2	A-25-SP-STD-120-W
Watchung Hills Regional HS	Gym 3-4	2	A-25-SP-STD-120-W-PHI
Watchung Hills Regional HS	Weight Room 3-4	2	A-25-SP-STD-120-W
Watchung Hills Regional HS	Weight Room 3-4	2	A-25-SP-STD-120-W-PHI
Watchung Hills Regional HS	Gym 5-6	4	A-25-SP-STD-120-W
Watchung Hills Regional HS	Gym 5-6	5	A-25-SP-STD-120-W-PHI
Watchung Hills Regional HS	Weight Room 5-6	1	A-25-SP-STD-120-W
Watchung Hills Regional HS	Weight Room 5-6	1	A-25-SP-STD-120-W-PHI
Watchung Hills Regional HS	Gym 7-8	5	A-25-SP-STD-120-W
Watchung Hills Regional HS	Gym 7-8	4	A-25-SP-STD-120-W-PHI
Total		**34**	

Proposed De-Stratification Fans

Scope of Work

Per De-Stratification Fan:

1. Shut off the main electric power to the area in which the unit(s) will be installed.
2. Install new de-stratification fan and wiring.
3. Re-energize.
4. 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 operation of the fan motors.
Waste Production	Proper disposal of any waste generated.
Environmental Regulations	No environmental impact is expected.

ECM 2A HIGH EFFICIENCY HOT WATER AND STEAM BOILERS

The key benefits of this ECM include:

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

ECM Description	Watchung Hills RHS
2A High Efficiency Hot Water and Steam Boilers	●

Existing Conditions

Some boilers within the District are near or past the end of their useful life and are less efficient compared to new boilers. Some existing boilers can be replaced with high efficiency, condensing boilers or High Efficiency Steam Boilers.

North Boiler Room

South Boiler Room

Building	Type	Manufacturer	Model	Qty	Output (MBH)	Fuel
Watchung Hills Regional HS	Water	Cleaver Brooks	CB-700-100	3	3,348	NG
Watchung Hills Regional HS	Steam	Cleaver Brooks	CB-200-125	3	4,184	NG

Existing Boilers to be Replaced

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 this school, the new boilers will provide an increase in boiler efficiency of anywhere between 10% to 15%. Boilers which cannot be converted from steam will be replaced with new steam boilers, which will still operate at to 10% more efficient than the existing boilers.

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

Building	Type	Manufacturer	Model	Qty	Output (MBH)	Fuel
Watchung Hills Regional HS	Water	Aerco	BMK-3000	3	3,000	NG
Watchung Hills Regional HS	Steam	EASCO	FPS-125S	3	4,184	NG

Proposed Boiler Equipment

Scope of Work

The following outlines the boiler replacement:

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

Energy Savings Methodology and Results

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

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

Equipment Information

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

Changes in Infrastructure

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

O&M Impact

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

Customer Support and Coordination with Utilities

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

Environmental Issues

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

ECM 2B BOILER BURNER CONTROLS

The key benefits of this ECM include:

- **Reduced energy usage** from improved boiler efficiency resulting from replacement of older burner controls.
- **Lower operational costs** through less frequent maintenance and operational issues.

ECM Description	Watchung Hills RHS
2B Boiler Burner Controls	●

Existing Conditions

Honeywell observed that the existing boiler burners have limited fuel / air ratio controls in place, which reduces your ability to optimize combustion efficiency and system reliability. The below table indicates which systems Honeywell recommends installation of new advanced combustion controls to decrease costs and increase efficiency. In cases where burners cannot be retrofit with controls, new burners will be installed.

Burner Controls

Controls – CB Lance Type Burners

Building	Type	Manufacturer	Model	Qty	Output (MBH)	Fuel
Watchung Hills Regional HS	Water	Cleaver Brooks	CB-700-100	3	3,348	NG
Watchung Hills Regional HS	Steam	Cleaver Brooks	CB-200-125	3	4,184	NG

Existing Boilers for 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.

Proposed Systems and Scope of Work

Honeywell will replace the burners on the boilers listed above with new, natural gas-fired burners, utilizing advanced controls.

Honeywell Slate™

SLATE™ from Honeywell brings together configurable safety and programmable logic for the first time ever. It's one platform from one vendor that can easily be customized for almost any application – in less time with less complexity.

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 Burner 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.

Scope of Work

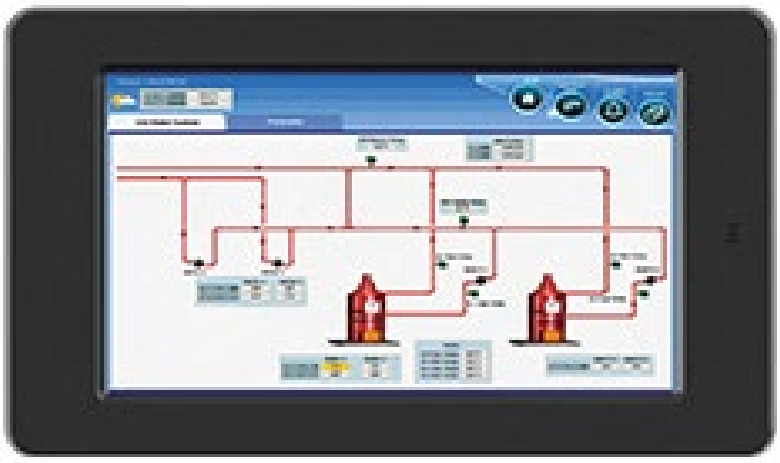
The following outlines the boiler burner controls:

1. Disconnect electrical and gas from existing boiler burner.
2. Install new burner controls on existing burner (where applicable).
3. Start up, commissioning and operator training.

Energy Savings Methodology and Results

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

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

O&M Impact

The new boiler controls 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 boiler load control, reduced maintenance costs control and setback.
Waste Production	Existing equipment scheduled for removal will be disposed of properly.
Environmental Regulations	No environmental impact is expected; all regulations will be adhered to in accordance with EPA and local code requirements.

ECM 2C DOMESTIC HOT WATER REPLACEMENTS

The key benefits of this ECM include:

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

ECM Description	Watchung Hills RHS
2C Domestic Hot Water Replacements	●

Existing Conditions

The existing Domestic Hot Water (DHW) heaters are generally in good condition but are not high-efficiency units. Some use electrical power to heat water, which is not cost effective.

Kitchen Water Heater

DHW - Kitchen Storage

Building	Qty	Manf.	Model	Capacity MBH	Storage (Gal)	Fuel
Watchung Hills Regional HS	1	Laars	PW0500 IN 09	405	238	NG

Existing Domestic Hot Water Heater Equipment

Proposed Solution

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

Building	Qty	Manf.	Model	Capacity MBH	Storage (Gal)	Fuel
Watchung Hills Regional HS	1	AO Smith	BTH-399	399	120	NG

Proposed Domestic Hot Water Heater Equipment

Scope of Work

The following outlines the domestic hot water heater replacement:

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

Energy Savings Methodology and Results
The savings are calculated from the domestic hot water heater efficiency differences.

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

Changes in Infrastructure

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

Equipment Information

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

Customer Support and Coordination with Utilities

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

Environmental Issues

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

Utility Interruptions

Proper phasing procedures will minimize gas interruptions.

ECM 2D ADDITION OF COOLING

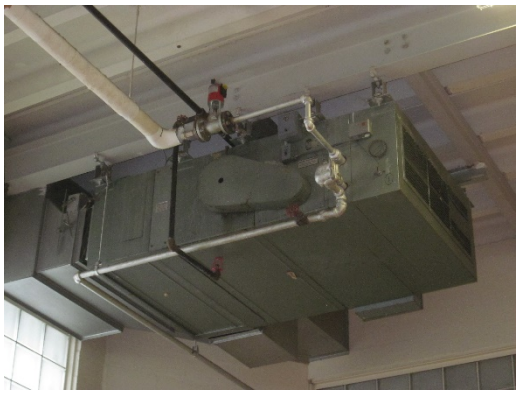
The key benefits of this ECM include:

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

ECM Description	Watchung Hills RHS
2D Addition of Cooling	●

Existing Conditions

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



AHU – GYM 3/4

Univent Weight Room 5/6

Locations for Additional Cooling

Proposed Solution

Honeywell proposes installing high efficiency units at this school to add cooling to spaces listed below.

Proposed Cooling Systems

Building	Make	Type	Area Served	QTY	Tons
Watchung Hills Regional HS	Trane	YCD-360B	Gym 3-4	1	30
Watchung Hills Regional HS	Trane	YCD-360B	Weight Room 3-4	1	30
Watchung Hills Regional HS	Trane	YCD-360B	Gym 5-6	2	30
Watchung Hills Regional HS	Trane	YSD-180R	Weight Room 5-6	1	15

Scope of Work

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

1. Rig and set new unit at the base.
2. Connect electric power.
3. Start up and commissioning of new unit.
4. Maintenance operator(s) training.

Equipment Information

Manufacturer and Type	Several quality and cost-effective manufacturers are available. Honeywell and the customer will determine final selections.
Equipment Identification	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.

ECM 2E MCQUAY AND NESBITT RTU REPLACEMENTS

The key benefits of this ECM include:

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

ECM Description	Watchung Hills RHS
2E McQuay and Nesbitt RTU Replacements	●

Existing Conditions

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

McQuay Roof Top Unit

Nesbitt Roof Top Unit

Existing Rooftop Units to be Replaced

Building	Make	Model	Location Served	Tons	Qty.
Watchung Hills Regional HS	McQuay	RPR040CLA	M4A-Performance Art Center (PAC)	40.0	1
Watchung Hills Regional HS	McQuay	RPR040CLA	M4B-Performance Art Center (PAC)	40.0	1
Watchung Hills Regional HS	McQuay	RPR040CLA	M5 - Stage @ PAC	40.0	1
Watchung Hills Regional HS	McQuay	RPR020CSA	M3 - Aux Gym/Boys/Girls Locker Rooms, Wrestling	20.0	1
Watchung Hills Regional HS	McQuay	RPR020CSA	M2A - Gym 1-2	20.0	1
Watchung Hills Regional HS	McQuay	RPR020CSA	M2B - Gym 1-2	20.0	1
Watchung Hills Regional HS	McQuay	RPR020CSA	M6B - Half Auditorium	20.0	1

Building	Make	Model	Location Served	Tons	Qty.
Watchung Hills Regional HS	McQuay	RPR020CSA	M6A - Half Auditorium	20.0	1
Watchung Hills Regional HS	McQuay	RPS018CSA	M8 - Room 13 & Offices	20.0	1
Watchung Hills Regional HS	Nesbitt	RMA100NG	Zones 5-1 thru 5-10 \ RMs 115, Hall-Facilities,114, Supt. Office, 118, 112, Conf. RM, 300, 302, 116	32.0	1
Watchung Hills Regional HS	Nesbitt	RMA100NG	Zones 4-1 thru 4-8 \ RMs 303,301,122,117,119,303,304,306	32.0	1
Watchung Hills Regional HS	Nesbitt	RMA100NG	Zones 3-1 thru 3-7 \ RMs 309,305,307,121,310,120,308	32.0	1
Watchung Hills Regional HS	Nesbitt	RMA100NG	Zones 2-1 thru 2-8 \ RMs 311,313,125,312 Hall,123,312,121 Hall, 124	32.0	1
Watchung Hills Regional HS	Nesbitt	RMA100NG	Zones 1-1 thru 1-8, \ RMs 126,126 Hall, 314,128,316,130,129,315	32.0	1
Watchung Hills Regional HS	Nesbitt	RMA100NG	Zones 8-1 thru 8-3 \ Cafeteria Hall, 106, Cafeteria	28.0	1
Watchung Hills Regional HS	Nesbitt	RMA100NG	Zones 7-1 thru 7-5 \ 107, Kitchen,109,111,104 Hall	15.0	1
Watchung Hills Regional HS	Carrier	50TFF008---511--	AC1-Science/Tech	6.0	1
Watchung Hills Regional HS	Lennox	LGC120S2BM2G	Room 4 Robotics	10.0	1

Proposed Solution

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

Building	Make	Model	Location Served	Tons	Qty.
Watchung Hills Regional HS	Trane	SFHL*404	M4A-Performance Art Center (PAC)	40.0	1
Watchung Hills Regional HS	Trane	SFHL*404	M4B-Performance Art Center (PAC)	40.0	1
Watchung Hills Regional HS	Trane	SFHL*404	M5 - Stage @ PAC	40.0	1
Watchung Hills Regional HS	Trane	SFHL*204	M3 - Aux Gym/Boys/Girls Locker Rooms, Wrestling	20.0	1
Watchung Hills Regional HS	Trane	SFHL*204	M2A - Gym 1-2	20.0	1
Watchung Hills Regional HS	Trane	SFHL*204	M2B - Gym 1-2	20.0	1
Watchung Hills Regional HS	Trane	SFHL*204	M6B - Half Auditorium	20.0	1
Watchung Hills Regional HS	Trane	SFHL*204	M6A - Half Auditorium	20.0	1
Watchung Hills Regional HS	Trane	SFHL*204	M8 - Room 13 & Offices	20.0	1

Building	Make	Model	Location Served	Tons	Qty.
Watchung Hills Regional HS	Trane	YCD420B4	Zones 5-1 thru 5-10 \ RMs 115, Hall-Facilities,114, Supt. Office, 118,112, Conf. RM,300,302,116	35.0	1
Watchung Hills Regional HS	Trane	YCD360B4	Zones 4-1 thru 4-8 \ RMs 303,301,122,117,119,303,304,306	30.0	1
Watchung Hills Regional HS	Trane	YCD360B4	Zones 3-1 thru 3-7 \ RMs 309,305,307,121,310,120,308	30.0	1
Watchung Hills Regional HS	Trane	YCD360B4	Zones 2-1 thru 2-8 \ RMs 311,313,125,312 Hall,123,312,121 Hall, 124	30.0	1
Watchung Hills Regional HS	Trane	YCD360B4	Zones 1-1 thru 1-8, \ RMs 126,126 Hall, 314,128,316,130,129,315	30.0	1
Watchung Hills Regional HS	Trane	YCD330B4	Zones 8-1 thru 8-3 \ Cafeteria Hall, 106, Cafeteria	27.5	1
Watchung Hills Regional HS	Trane	YHD180G4RVD	Zones 7-1 thru 7-5 \ 107, Kitchen,109,111,104 Hall	15.0	1
Watchung Hills Regional HS	Trane	THC072F4RCA	AC1-Science/Tech	6.0	1
Watchung Hills Regional HS	Trane	YHC120F4RHA	Room 4 Robotics	10.0	1

Proposed Rooftop Units

Scope of Work

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

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

Energy Savings Methodology and Results

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

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

Equipment Information

Manufacturer and Type	Several quality and cost-effective manufacturers are available. Honeywell and the customer will determine final selections.
Equipment Identification	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.

ECM 2F 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	Watchung Hills RHS
2F Kitchen Hood Controls	●

Existing Conditions

Honeywell observed that the kitchens 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 causes the wasting of both fan energy and heating energy. When the hood is not utilized, an opportunity exists to reduce airflow and conserve energy.

Kitchen Hood – North Kitchen

Kitchen Hood – South Kitchen

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	Location	Kitchen Hood Area (sq. ft.)
Watchung Hills RHS	North Kitchen	200
Watchung Hills RHS	South Kitchen	72

Existing Kitchen Hoods to Receive Controls

Scope of Work

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

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

Energy Savings Methodology and Results

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

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 2G 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	Watchung Hills RHS
2G 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.

Walk In Freezer/Refrigerator – North Kitchen

Walk In Refrigerator – South Kitchen

Building	Location	Walk-In Refrigerators	Walk-In Freezers
Watchung Hills RHS	North Kitchen	1	1
Watchung Hills RHS	South Kitchen	1	-
Total		**2**	**1**

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.

ECM 2H VFDS ON HEATING WATER PUMPS

The key benefits of this ECM include:

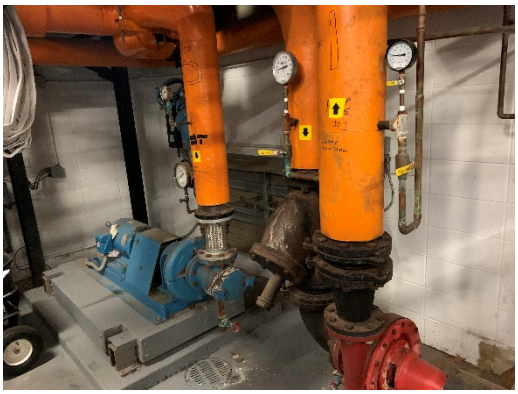
- **Energy savings** from reduced run hours and reduced motor speeds.
- **Equipment longevity** due to more efficient and less wasteful equipment utilization and reduced start-up wear.

ECM Description	Watchung Hills RHS
2H VFDs on Heating Water Pumps	●

ECM Overview

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

North Wing HHW Pumps



North Wing HHW Pumps

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
Watchung Hills RHS	North Wing HHW Pump	1	20.0	Y	Y

Building	Equipment Description	Qty	Motor HP	Replace Motor Y/N	Add VFD Y/N
Watchung Hills RHS	North Wing HHW Pump	1	20.0	Y	Y

Existing Motors

Proposed Solution

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

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

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

Energy Savings Methodology and Results

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

Equipment Information

Manufacturer and Type	Several quality and cost-effective manufacturers are available.
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 2I 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

ECM Description	Watchung Hills RHS
2I Split System Replacements	●

Existing Conditions

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

Split Units – West Wing

Split Units – West Wing

Building	Make	Model	Qty.	Area Served	Tons
Watchung Hills RHS	EMI	MC4D0404	2	Library Offices	3.5

Building	Make	Model	Qty.	Area Served	Tons
Watchung Hills RHS	EMI	MC2 2200	6	Various	2.0
Watchung Hills RHS	EMI	MC2 2200	6	Various	2.0
Watchung Hills RHS	EMI	MC2 2200	1	Security Office	2.0
Watchung Hills RHS	Trane	2TTA072A4	3	Guidance/Vestibule	6.0
Watchung Hills RHS	Trane	TTB012C100A2	3	Guidance/Vestibule	1.0
Watchung Hills RHS	EMI	MC4D0404	3	Auditorium	3.5
Watchung Hills RHS	EMI	SCC12DM	1	Audit. Listening Booth	1.0
Watchung Hills RHS	EMI	MC2 2200	1	TV Studio	2.0
Watchung Hills RHS	EMI	SCC18DF	1	Elev. Mach Room	1.5
Watchung Hills RHS	EMI	SCC12DM	1	Office	1.0
Watchung Hills RHS	Goodman	SSX140601AF	1	Office	5.0

Existing Split Systems 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 BMS.

Building	Make	Model	Qty.	Area Served	Tons
Watchung Hills RHS	Trane	4TTV8042A	2	Library Offices	3.5
Watchung Hills RHS	Trane	NTXSST24A	6	Various	2.0
Watchung Hills RHS	Trane	NTXSST24A	6	Various	2.0
Watchung Hills RHS	Trane	NTXSST24A	1	Security Office	2.0
Watchung Hills RHS	Trane	TTA072/TWE0724	3	Guidance/Vestibule	6.0
Watchung Hills RHS	Trane	NTXSST12A	3	Guidance/Vestibule	1.0
Watchung Hills RHS	Trane	4TTV8042A	3	Auditorium	3.5
Watchung Hills RHS	Trane	NTXSST12A	1	Audit. Listening Booth	1.0
Watchung Hills RHS	Trane	NTXSST24A	1	TV Studio	2.0
Watchung Hills RHS	Trane	NTXSST18A	1	Elev. Mach Room	1.5
Watchung Hills RHS	Trane	NTXSST12A	1	Office	1.0
Watchung Hills RHS	Trane	4TTV8060A	1	Office	5.0

Proposed Split Systems

Scope of Work

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

1. Disconnect existing electric connections.
2. Disconnect piping from the unit.

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

Energy Savings Methodology and Results

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

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

Equipment Information

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

Customer Support and Coordination with Utilities

Coordination of the electrical tie-in will be required.

Environmental Issues

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

ECM 2J HIGH EFFICIENCY CHILLERS

The key benefits of this ECM include:

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

ECM Description	Watchung Hills RHS
2J High Efficiency Chillers	●

Existing Conditions

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

Chiller 1 – South Building

Chiller 2 – South Building

Building	Make	Model	Qty.	Tons
Watchung Hills RHS	York	YCAS0288EB46XGADBT	1	288
Watchung Hills RHS	York	YCAS0288EB46XGADBT	1	288

Existing Chiller Units to be Replaced

Proposed Solution

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

Building	Make	Model	Qty.	Tons
Watchung Hills RHS	Trane	ACRB3005EUA	1	299.8
Watchung Hills RHS	Trane	ACRB3005EUA	1	299.8

Proposed Chiller

Scope of Work

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

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

Energy Savings Methodology and Results

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

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

Equipment Information

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

Customer Support and Coordination with Utilities

Coordination of the electrical tie-in will be required.

Environmental Issues

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

ECM 2M EXHAUST FAN RETRO-COMMISSIONING

The key benefits of this ECM include:

- **Reduced energy usage** from improved efficiency resulting from replacement of older equipment.
- **Lower operational costs** through less frequent maintenance and operational issues.
- **Occupancy comfort and productivity by** way of enhanced temperature and humidity control throughout your buildings

ECM Description	Watchung Hills RHS
2M Exhaust Fan Retro-Commissioning	●

Existing Conditions

The District has multiple exhaust fans on the roof that are inefficient or do not operate at all. There are units which operate 24/7 and have no control except for on/off switches located in mechanical rooms with no ability to schedule for occupied and unoccupied building times.

Watchung RHS – Exhaust Fans

Watchung RHS – Exhaust Fan

Building	Tag	Qty	Mfg.	Model
Watchung Hills Regional HS	WHR-EF-1	1	Various Spaces	28
Watchung Hills Regional HS	WHR-EF-1,2	2	S&P	SDB14
Watchung Hills Regional HS	WHR-EF-1,2	2	Greenheck	6B-180-10
Watchung Hills Regional HS	WHR-EF-2	1	Carnes	VESK24F1C1CA20SPC1
Watchung Hills Regional HS	WHR-EF-3	1	Acme	Centri Master PRN126
Watchung Hills Regional HS	WHR-EF-3	1	Acme	Centri Master PRN100

Building	Tag	Qty	Mfg.	Model
Watchung Hills Regional HS	WHR-EF-4	1	Loren Cook	101 ACRU 101R17DEC
Watchung Hills Regional HS	WHR-EF-10	1	Loren Cook	101 ACRU 101R17DEC
Watchung Hills Regional HS	WHR-EF-13	1	Acme	Centri Master PV180
Watchung Hills Regional HS	WHR-EF-14	1	Loren Cook	210 ACE 210C2B
Watchung Hills Regional HS	WHR-EF-15	1	Loren Cook	150 ACE 150C2B
Watchung Hills Regional HS	WHR-EF-16	1	Loren Cook	60 ACE 60C2B
Watchung Hills Regional HS	WHR-EF-17	1	Loren Cook	150 ACE 150C4B
Watchung Hills Regional HS	WHR-EF-18	1	Loren Cook	135 ACE 135C2B
Watchung Hills Regional HS	WHR-EF-19	1	Loren Cook	120 ACE 120C28
Watchung Hills Regional HS	WHR-EF-21	1	Acme	Centri Master PV165
Watchung Hills Regional HS	WHR-EF-25	1		
Watchung Hills Regional HS	WHR-EF-25	1	Acme	Centri Master PV300
Watchung Hills Regional HS	WHR-EF-26	1	Loren Cook	120 CPA 120 CPA
Watchung Hills Regional HS	WHR-EF-27	1	Loren Cook	210 ACE 210C2B
Watchung Hills Regional HS	WHR-EF-28	1	Loren Cook	195 ACE 195C5B
Watchung Hills Regional HS	WHR-EF-29	1	Loren Cook	150 ACE 150C2B 50
Watchung Hills Regional HS	WHR-EF-32,33	2	Loren Cook	120 CPA
Watchung Hills Regional HS	WHR-EF-39	1	Acme	Skymaster ECH54
Watchung Hills Regional HS	WHR-EF-40	1	Loren Cook	70 ACE 70C2B
Watchung Hills Regional HS	WHR-EF-41	1	Loren Cook	120 ACE 120C3B
Watchung Hills Regional HS	WHR-EF-45	1	Loren Cook	120 ACE 120C3B
Watchung Hills Regional HS	WHR-EF-46	1	Loren Cook	300 ACE 300C6B
Watchung Hills Regional HS	WHR-EF-47	1	Loren Cook	240 TR 24 TR
Watchung Hills Regional HS	WHR-EF-48	1		
Watchung Hills Regional HS	WHR-EF-49	1	Loren Cook	240 TR 24 TR
Watchung Hills Regional HS	WHR-EF-50	1	Loren Cook	240 TR 24 TR
Watchung Hills Regional HS	WHR-EF-51	1		
Watchung Hills Regional HS	WHR-EF-56	1		
Watchung Hills Regional HS	WHR-EF-57	1		
Watchung Hills Regional HS	WHR-EF-58	1	Loren Cook	240 TR 24 TR
Watchung Hills Regional HS	WHR-EF-59	1		
Watchung Hills Regional HS	WHR-EF-60	1		
Watchung Hills Regional HS	WHR-EF-60 - 1A,1B	2		
Watchung Hills Regional HS	WHR-EF-61	1	Accurex	XRUD-161HP-A-6
Watchung Hills Regional HS	WHR-EF-61 - 1A,1B	2		
Watchung Hills Regional HS	WHR-EF-61	1	Accurex	XRUD-161HP-A-6
Watchung Hills Regional HS	WHR-EF-62	1		
Watchung Hills Regional HS	WHR-EF-63	1	Loren Cook	240 TR 24 TR
Watchung Hills Regional HS	WHR-EF-64	1	Loren Cook	300 TR 30 TR

Building	Tag	Qty	Mfg.	Model
Watchung Hills Regional HS	WHR-EF-65	1	Loren Cook	300 TR 30 TR
Watchung Hills Regional HS	WHR-EF-66	1		
Watchung Hills Regional HS	WHR-EF-70	1	Loren Cook	300 ACE 300C7B
Watchung Hills Regional HS	WHR-EF-71	1		
Watchung Hills Regional HS	WHR-EF-72	1	Loren Cook	135 ACE 135C2B
Watchung Hills Regional HS	WHR-EF-73	1		
Watchung Hills Regional HS	WHR-EF-75	1	Snyder General	CRDD070A
Watchung Hills Regional HS	WHR-EF-76	1	Loren Cook	70 ACE 70C3B
Watchung Hills Regional HS	WHR-EF-77	1	Acme	Centri Master PRN171
Watchung Hills Regional HS	WHR-EF-78	1	Loren Cook	100 ACE 100C2B
Watchung Hills Regional HS	WHR-EF-79	1	Jenn Fan	
Watchung Hills Regional HS	WHR-EF-84	1		
Watchung Hills Regional HS	WHR-EF-87	1	Loren Cook	195 ACE 195C3B
Watchung Hills Regional HS	WHR-EF-89	1	Loren Cook	195 ACE 195C3B
Watchung Hills Regional HS	WHR-EF-90	1		
Watchung Hills Regional HS	WHR-EF-91	1	Acme	Centri Master PV260
Watchung Hills Regional HS	WHR-EF-92	1	Loren Cook	195 ACE 195C4B
Watchung Hills Regional HS	WHR-EF-93	1		
Watchung Hills Regional HS	WHR-EF-94	1		
Watchung Hills Regional HS	WHR-EF-95	1	Loren Cook	270 ACE 270C6B
Watchung Hills Regional HS	WHR-EF-96	1	Loren Cook	270 ACE 270C6B
Watchung Hills Regional HS	WHR-EF-97	1	Loren Cook	270 ACE 270C6B
Watchung Hills Regional HS	WHR-EF-98	1		
Watchung Hills Regional HS	WHR-EF-99	1		
Watchung Hills Regional HS	WHR-EF-100	1		
Watchung Hills Regional HS	WHR-EF-101	1	Loren Cook	135 ACE 135C2B
Watchung Hills Regional HS	WHR-EF-102	1	Loren Cook	195 ACE 195C3B
Watchung Hills Regional HS	WHR-EF-103	1	Loren Cook	160 TR 16 TR
Watchung Hills Regional HS	WHR-EF-104	1	Loren Cook	195 ACE 195C3B
Watchung Hills Regional HS	WHR-EF-105	1	Loren Cook	160 TR 16 TR
Watchung Hills Regional HS	WHR-EF-109	1	Loren Cook	160 TR 16 TR
Watchung Hills Regional HS	WHR-EF-110	1	Loren Cook	225 ACE 225C4B
Watchung Hills Regional HS	WHR-EF-111	1	Loren Cook	225 ACE 225C4B
Watchung Hills Regional HS	WHR-EF-112	1	Loren Cook	225 ACE 225C4B
Watchung Hills Regional HS	WHR-EF-113	1		
Watchung Hills Regional HS	WHR-EF-114	1		
Watchung Hills Regional HS	WHR-EF-115	1	Loren Cook	245 ACE 245C5B
Watchung Hills Regional HS	WHR-EF-116	1	Jenn Fan	CRD
Watchung Hills Regional HS	WHR-EF-117	1	Loren Cook	210 ACE 210C4B
Watchung Hills Regional HS	WHR-EF-119	1		
Watchung Hills Regional HS	WHR-EF-121	1		

Building	Tag	Qty	Mfg.	Model
Watchung Hills Regional HS	WHR-EF-122	1	Loren Cook	225 ACE 225C4B
Watchung Hills Regional HS	WHR-EF-123	1		
Watchung Hills Regional HS	WHR-EF-126	1	Loren Cook	225 ACE 225C4B
Watchung Hills Regional HS	WHR-EF-127	1		
Watchung Hills Regional HS	WHR-EF-128	1	Loren Cook	225 ACE 225C4B
Watchung Hills Regional HS	WHR-EF-129	1		
Watchung Hills Regional HS	WHR-EF-130	1	Loren Cook	300 ACE 300C5B
Watchung Hills Regional HS	WHR-EF-131	1		
Watchung Hills Regional HS	WHR-EF-133	1	Loren Cook	160 TR 16 TR
Watchung Hills Regional HS	WHR-EF-134	1		
Watchung Hills Regional HS	WHR-EF-135	1	Loren Cook	100 ACE 100C3B
Watchung Hills Regional HS	WHR-EF-136	1	Loren Cook	160 TR 16 TR
Watchung Hills Regional HS	WHR-EF-138	1	Jenn Fan	
Watchung Hills Regional HS	WHR-EF-140	1	Loren Cook	300 TR 30 TR
Watchung Hills Regional HS	WHR-EF-141	1	Loren Cook	300 TR 30 TR
Watchung Hills Regional HS	WHR-EF-142	1	Loren Cook	240 TR 24 TR
Watchung Hills Regional HS	WHR-EF-143	1	Loren Cook	240 TR 24 TR
Watchung Hills Regional HS	WHR-EF-144	1	Loren Cook	300 ACE 300C6B
Watchung Hills Regional HS	WHR-EF-145	1	Loren Cook	300 ACE 300C6B
Watchung Hills Regional HS	WHR-EF-146	1	Loren Cook	300 ACE 300C6B
Watchung Hills Regional HS	WHR-EF-147	1	Loren Cook	300 ACE 300C6B
Watchung Hills Regional HS	WHR-EF-148	1	Loren Cook	240 TR 24 TR
Watchung Hills Regional HS	WHR-EF-149	1	Loren Cook	240 TR 24 TR
Watchung Hills Regional HS	WHR-EF-150	1	Loren Cook	300 ACE 300C6B
Watchung Hills Regional HS	WHR-EF-150B	1	Loren Cook	300 TR 30 TR
Watchung Hills Regional HS	WHR-EF-151	1	Loren Cook	300 TR 30 TR
Watchung Hills Regional HS	WHR-EF-152	1	Loren Cook	300 ACE 300C6B
Watchung Hills Regional HS	WHR-EF-153	1	Loren Cook	300 ACE 300C6B
Watchung Hills Regional HS	WHR-EF-154	1		
Watchung Hills Regional HS	WHR-EF-155	1	Loren Cook	240 TR 24 TR
Watchung Hills Regional HS	WHR-EF-156	1		
Watchung Hills Regional HS	WHR-EF-157	1	Loren Cook	195 ACE 195C4B
Watchung Hills Regional HS	WHR-EF-158,159	2		
Watchung Hills Regional HS	WHR-EF-160	1		
Watchung Hills Regional HS	WHR-EF-161	1	Loren Cook	300 ACE 300C7B
Watchung Hills Regional HS	WHR-EF-162	1	Loren Cook	300 ACE 300C7B
Watchung Hills Regional HS	WHR-EF-163	1	Loren Cook	300 ACE 300C7B
Watchung Hills Regional HS	WHR-EF-170	1		
Watchung Hills Regional HS	WHR-KEF-1,2	2	Accurex	XRUB-200-30-G
Watchung Hills Regional HS	WHR-KEF-1	1	Accurex	XRUB-200-30-G
Watchung Hills Regional HS	WHR-GV-1,2	2	Carnes	GEGB04204220PY 05

Building	Tag	Qty	Mfg.	Model
Watchung Hills Regional HS	WHR-OAI-2	1	Loren Cook	018018 GI 18X18GT ALUM
Total		**136**		

Existing Exhaust Fans to be Retro Commissioned

Proposed Solution

Honeywell proposes retro commission the existing exhaust fans with associated controls for occupied and unoccupied modes for scheduling and to ensure fan is operating properly. Motors, covers and fans will be inspected for condition and proper operation. Repairs and/or replacements will be made as required.

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) – retro-commission/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 increasing existing efficiency or higher efficiency units.
Waste Production	Existing unit scheduled for removal will be disposed of properly.
Environmental Regulations	No environmental impact is expected.

ECM 2L INSTALL PIPE INSULATION

The key benefits of this ECM include:

- **Reduced energy usage** from reducing heat losses from uninsulated pipes.

ECM Description	Watchung Hills RHS
2L Install Pipe Insulation	●

Existing Conditions

An insulation audit was conducted identifying an approximated quantity of heat that is lost from various locations throughout the buildings. The heat losses result from 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 hot water piping and valves were not insulated. The un-insulated piping and valves waste energy and pose a danger of getting injured with exposed hot piping. In addition, the boiler must work harder to make up for the wasted energy.

Uninsulated Piping – South Kitchen Water Heater

Uninsulated Piping – South Kitchen Water Heater

Building	Pipe Diameter (inches)	Linear Feet of Pipe
Watchung Hills RHS	1.50	20
Watchung Hills RHS	1.00	10

Pipe Diameters and Linear Feet of Insulation

Proposed Solution

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

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".

Equipment Information

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

Changes in Infrastructure

The 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.

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 the reduction of heat loss from uninsulated lines resulting in lower fuel consumption. The equipment uses no other resources.
Waste Production	This measure produces no waste by products.
Environmental Regulations	Asbestos abatement may be required

ECM 2M STEAM TRAP AND TRV REFURBISHMENTS

The key benefits of this ECM include:

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

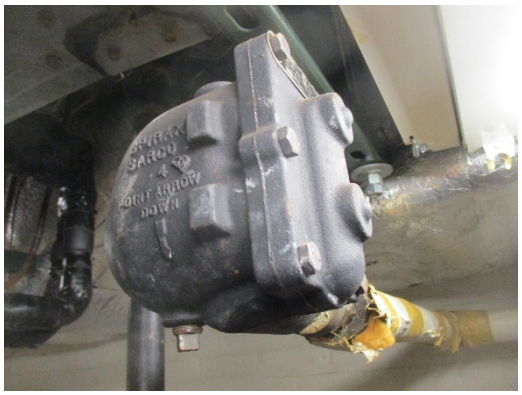
ECM Description	Watchung Hills RHS
2M Steam Trap and TRV Refurbishments	●

Existing Conditions

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

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

Radaitor TRV Valve



Watchung Hills RHS Steam Trap

Building	Trap Size	Steam Traps	Radiator Control Valve
Watchung Hills RHS	½" Thermo.	85	
Watchung Hills RHS	¾" Thermo.	10	
Watchung Hills RHS	¾" F&T	110	
Watchung Hills RHS	1" F&T	13	
Watchung Hills RHS	1-1/4" F&T	21	
Watchung Hills RHS	1-1/2" F&T	2	
Watchung Hills RHS	1/2" TRV		1
Watchung Hills RHS	3/4" TRV		14
Watchung Hills RHS	1" TRV		1
TOTAL		**241**	**16**

Steam Trap and TRV Table

Proposed Solution

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

Energy Savings Methodology and Results

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

We have estimated the steam losses based on a conservative figure of 20% leaking. Failure rates are based on sample testing of the steam trap population. In determining steam losses, the trap/TRV orifices and steam pressures have been grouped and averaged to create a simpler statistical basis.

Equipment Information

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

Customer Support and Coordination with Utilities

Coordination of the trap/TRV installation.

Environmental Issues

Resource Use	Energy savings will result the reduction of steam loss from malfunctioning traps resulting in lower fuel consumption. The equipment uses no other resources.

Waste Production	Existing steam traps/TRVs scheduled for removal will be disposed of properly.
Environmental Regulations	Asbestos abatement may be required.

ECM 2N REPLACE UNIT VENTILATORS-SOUTH BUILDING

The key benefits of this ECM include:

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

ECM Description	Watchung Hills RHS
2N Replace Unit Ventilators – South Building	●

Existing Conditions

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

Watching Hills – South Building Univents

Watching Hills – South Building Univents

Building	Type	Manufacturer	Qty
Watchung Hills RHS	Steam-Chilled Water	Nesbitt	89

Existing Unit Ventilators to be Replaced

Proposed Solution

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

Proposed Unit Ventilators

Building	Type	Manufacturer	Model	Qty
Watchung Hills RHS	Steam-Chilled Water	Trane	VUVE150*S*N1*GL0AB	89

Scope of Work

The following outlines the unit ventilator replacements:

1. Disconnect electrical, steam and chilled water from existing units.
2. Install new univents and reconnect, steam, chilled water and electric.
3. Start up, commissioning and operator training.

Energy Savings Methodology and Results

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

Existing Univent Efficiency	= Heat Input x Existing Efficiency
Proposed Univent Efficiency	= Heat Input x New Efficiency
Energy Savings $	= Heating Production (Proposed Efficiency – Existing Efficiency)

Equipment Information

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

Changes in Infrastructure

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

O&M Impact

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

Customer Support and Coordination with Utilities

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

Environmental Issues

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

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ECM 3A HEALTHY BUILDINGS - BUILDING CONTROLS

The key benefits of this ECM include:

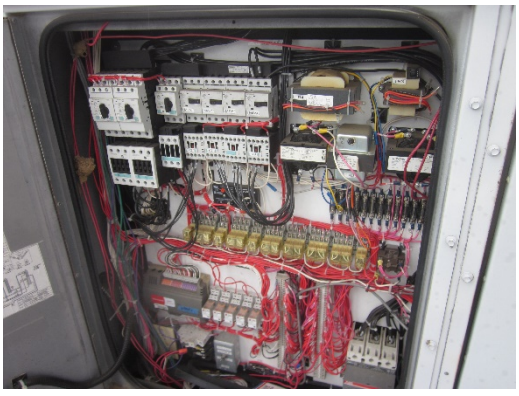
- **Improve Air Quality** by more precise control of air filtration, air composition and ultra-violet cleaning to create a healthier school building environment.
- **Operational efficiency** resulting from better control and system wide visibility.
- **Remote operation** of HVAC systems via mobile phone or off-site computer.
- **Energy savings** from reducing total energy consumption with more efficient, state of the art technology.
- **Occupancy comfort and productivity** resulting from enhanced temperature and humidity control throughout your buildings.

ECM Description	Watchung Hills RHS
3A Healthy Buildings - Building Controls	●

Existing Conditions

The currently installed Watchung Hills Regional High School Building Management System is consists of a collection of first generation Local Operating Network (LON) controllers, which are at the end of their life cycle, and newer, advanced Honeywell Spyder Direct Digital Controllers (DDC) on a Niagara 4 platform. During the lifetime of the Watchung Hills Regional High School, several projects systematically provided the building stand-alone systems or were provided with hybrids of legacy direct digital systems. Renovations subsequently converted some of the HVAC systems to stand-alone LON direct digital controls. One example of such an instance is shown with the control of the classroom unit ventilators. As the existing devices are obsoleted, the ongoing replacement of these devices occur on an as-needed occurrence.

Watchung Hills RHS Controls



Watchung Hills RHS Controls

Proposed Conditions

Building Management System Upgrades

A. One (1) Supervisory Network Controller:
   1. Provide a new Honeywell Niagara 4 (WEBs) JACE(s) w/enclosure(s).
   2. Integrate the existing Building Management System to the District's existing Honeywell Niagara Platform.
   3. Provide LON driver for integration of 3rd party devices.

B. One (1) Hot Water System (HWS) (New Hot Water Boilers (quantity of 3))
   1. Migrate/Upgrade the existing legacy DDC controller to (1) new Honeywell Niagara 4 (WEBs) DDC controller.
   2. Interface with the new boiler master panel/boiler.
   3. Migrate existing or provide new LON communications, power and device control wiring as required.
   4. Retro-commission the existing control devices associated with the proper function of the boilers t (i.e., control valves, relays, current switches, actuators).
   5. Provide new system compatible temperature sensors, as required.
   6. Provide control of new hot water pump Variable Frequency Drives, including new differential pressure sensors and associated wiring.

C. One (1) Low-Pressure Heating System (LPS) (New Steam Boilers (quantity of 3))
   1. Migrate/Upgrade the existing legacy DDC controller to (1) new Honeywell Niagara 4 (WEBs) DDC controller.
   2. Interface with the new boilers master controller.
   3. Migrate existing or provide new LON communications, power and device control wiring, as required.
   4. Retro-commission the existing control devices associated with the proper function of the boilers (i.e., control valves, relays, current switches, actuators).
   5. Provide new system compatible temperature sensors, as required.

D. One (1) Chilled Water System
   1. Migrate/Upgrade the existing legacy DDC controller to (1) new Honeywell Niagara 4 (WEBs) DDC controller.
   2. Interface with the new chillers.
   3. Migrate existing or provide new LON communications. power and device control wiring, as required.
   4. Retro-commission the existing control devices associated with the proper function of the chilled water system (i.e., control valves, relays, current switches, actuators).
   5. Provide new system compatible temperature sensors, as required.

E. Eighteen (18) Roof Top Unit controls
   1. Remove and replace the existing legacy controller with (1) new Honeywell Niagara 4 (WEBs) DDC controller.
   2. Migrate existing LON communications. power and device control wiring.
   3. Retro-commission the existing control devices on the unit (i.e., control valves, relays, current switches, actuators).
   4. Provide Demand Control Ventilation sequences and devices.
   5. Provide new system compatible temperature sensors, as required.

F. Five (5) Addition of Cooling Roof Top Unit controls
   1. Remove and replace the existing legacy controller with (1) new Honeywell Niagara 4 (WEBs) DDC controller.

2. Migrate existing LON communications. power and device control wiring.
3. Retro-commission the existing control devices on the unit (i.e., control valves, relays, current switches, actuators).
4. Provide Demand Control Ventilation sequences and devices.
5. Provide new system compatible temperature sensors, as required.

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G. Forty-Nine (49) Nesbitt Zone controls (TAC to Honeywell)
1. Remove and replace the existing legacy controller with (1) new Honeywell Niagara 4 (WEBs) DDC controller.
2. Migrate existing LON communications. power and device control wiring.
3. Retro-commission the existing control devices on the unit (i.e., control valves, actuators).
4. Provide new system compatible temperature sensors, if required.

H. Ten (10) Duct Reheat Coil controls (TAC to Honeywell)
1. Remove and replace the existing legacy controller with (1) new Honeywell Niagara 4 (WEBs) DDC controller.
2. Migrate existing LON communications. power and device control wiring.
3. Retro-commission the existing control devices on the unit (i.e., control valves, actuators).
4. Provide new system compatible temperature sensors, if required.

I. One-Hundred-Thirty six (136) Exhaust Fan Retro-commissioning
1. Retro-commission the controls of existing Exhaust fans.
2. Existing control devices to remain and to be verified operable and according to the sequence of operations.

J. Six (6) Exhaust Fan, Two (2) Exhaust Hood, One (1) Supply Fan controls:
1. Remove and replace the existing legacy controller with (1) new Honeywell Niagara 4 (WEBs) DDC controller.
2. Migrate existing LON communications. power and device control wiring.
3. Retro-commission the existing control devices on the unit (i.e., relays, current switches, actuators).

K. Fourteen (14) New Heating & Ventilating Unit controls:
1. (1) new Honeywell Niagara 4 (WEBs) DDC controller.
2. New LON communications. Control power and device control wiring.
3. New control devices on the unit (i.e., control valves, temperature sensors, relays, current switches, actuators).
4. Provide Demand Control Ventilation sequences and devices.

L. Fifty-Seven (57) Unit Ventilator controls (TAC to Honeywell)
1. Remove and replace the existing legacy controller with (1) new Honeywell Niagara 4 (WEBs) DDC controller.
2. Migrate existing LON communications. power and device control wiring.
3. Retro-commission the existing control devices on the unit (i.e., control valves, relays, current switches, actuators).
4. Provide new system compatible temperature sensors, if required.

M. Thirty-Three (33) Fan Coil Unit controls (TAC to Honeywell)
1. Remove and replace the existing legacy controller with (1) new Honeywell Niagara 4 (WEBs) DDC controller.
2. Migrate existing LON communications. power and device control wiring.

3. Retro-commission the existing control devices on the unit (i.e., control valves, relays, current switches, actuators).
4. Provide new system compatible temperature sensors, if required.

N. Thirty-Three (33) Blower Coil Unit controls (TAC to Honeywell)
1. Remove and replace the existing legacy controller with (1) new Honeywell Niagara 4 (WEBs) DDC controller.
2. Migrate existing LON communications. power and device control wiring.
3. Retro-commission the existing control devices on the unit (i.e., control valves, relays, current switches, actuators).
4. Provide new system compatible temperature sensors, if required.

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O. Twenty-Nine (29) New Split System Air Conditioning Unit interface (EMI):
1. Integration of the unit manufacturer controls through an Open communications protocol.
2. Provide BACnet thermostat and communications for unit control.

P. One (1) existing Liebert MDF Alarming

Q. One (1) Building Electrical Meter monitoring:
1. Provide and install a new EMON Building electric meter, current transducers, voltage sensors and ancillary devices to allow monitoring and archiving through the BMS by communications interface connection.

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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.

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ECM 3B HEALTHY BUILDINGS - ENVIRONMENTAL OPTIMIZATION

The key benefits of this ECM include:

- **Improve Air Quality** by monitoring, analyzing and controlling key air quality parameters (pressurization, ventilation, temperature, humidity) to create a healthier school building environment.
- **Energy savings** from reducing total energy consumption with more efficient, state of the art technology.
- **Cloud-Based Solution** that connects to a building's existing systems - without the need for capital investment - and optimizes energy consumption to drive up savings.
- **Monitor Energy Consumption** savings and zone comfort levels for any duration of time.
- **Reduced Maintenance & Operational Costs** by reducing the runtime of HVAC systems.

ECM Description	Watchung Hills RHS
3B Healthy Buildings - Environmental Optimization	●

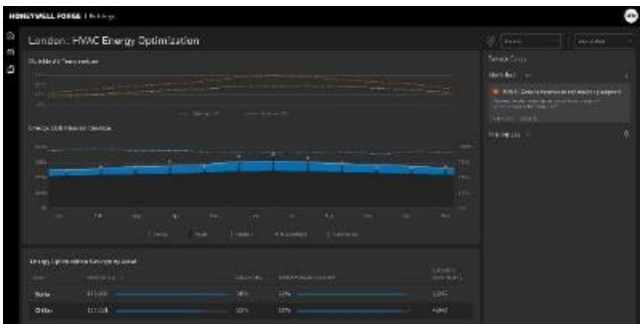
Existing Conditions

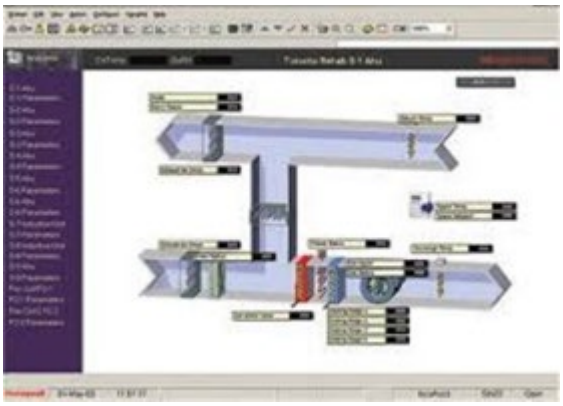
HVAC Systems are the biggest consumer of energy in commercial facilities, and most rely on conservative inefficient control strategies. Manual or scheduled set-point adjustment strategies simply can't account for the complexity of a building's dynamic occupancy and weather conditions – while maintaining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

Solution

HONEYWELL FORGE closed-loop solution operates without the need for customer intervention by regularly analyzing real-time conditions data – weather and occupancy - with predictive, machine learning models that compute and adjust set points automatically over a facility's entire HVAC distribution system.

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





HVAC Equipment Control

HVAC Equipment Control

Scope of Work

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

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

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

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

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

SMART VISUALIZATION
Solution identifies pre-existing faults and delivers real-time energy, savings and comfort metrics.
Energy needs fluctuate based on seasons, weather, occupancy and usage.

Changes in Infrastructure

None.

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 energy usage.
Waste Production	No waste will be generated as a result of this ECM.
Environmental Regulations	No environmental impact is expected.

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ECM 3C HEALTHY BUILDINGS - PLASMA IONIZATION

The key benefits of this ECM include:

- **Improve Air Quality** by inactivating infectious aerosols thereby mitigating the risk of airborne transmission of viral and bacterial pathogens.
- **Improved efficiency & energy savings** through reduction of outside air.
- **Equipment longevity** due to more efficient and less wasteful equipment utilization.
- **Operational savings** from less frequent need to repair or replace equipment.

ECM Description	Watchung Hills RHS
3C Healthy Buildings - Plasma Ionization	●

Existing Conditions

There are many air handling systems throughout the facilities which provide outside air for ventilation. Outside air is expensive to heat and cool but is required to meet indoor air quality requirements. The use of air cleaning equipment will permit the reduction of outside air while maintaining indoor air quality.

Watchung Hills RHS -RTU

Watchung Hills RHS -RTU

Building	Equipment	Total CFM	Location	Type
Watchung Hills Regional HS	WHR-RTU-M4A	11,240	M4A-Performance Art Center (PAC)	GPS-iMod -Snap-**
Watchung Hills Regional HS	WHR-RTU-M4B	11,240	M4B-Performance Art Center (PAC)	GPS-iMod -Snap-**
Watchung Hills Regional HS	WHR-RTU-M5	14,400	M5 - Stage @ PAC	GPS-iMod -Snap-**

Building	Equipment	Total CFM	Location	Type
Watchung Hills Regional HS	WHR-RTU-M3	5,140	M3 - Aux Gym/Boys/Girls Locker Rooms, Wrestling	GPS-iMod -Snap-**
Watchung Hills Regional HS	WHR-RTU-M2A	6,545	M2A - Gym 1-2	GPS-iMod -Snap-**
Watchung Hills Regional HS	WHR-RTU-M2B	6,545	M2B - Gym 1-2	GPS-iMod -Snap-**
Watchung Hills Regional HS	WHR-RTU-M6B	7,715	M6B - Half Auditorium	GPS-iMod -Snap-**
Watchung Hills Regional HS	WHR-RTU-M6A	8,600	M6A - Half Auditorium	GPS-iMod -Snap-**
Watchung Hills Regional HS	WHR-RTU-M8	8,100	M8 - Room 13 & Offices	GPS-iMod -Snap-**
Watchung Hills Regional HS	WHR-RTU-N5	10,560	Zones 5-1 thru 5-10 \ RMs 115, Hall-Facilities,114, Supt. Office, 118,112, Conf. RM,300,302,116	GPS-iMod -Snap-**
Watchung Hills Regional HS	WHR-RTU-N4	10,390	Zones 4-1 thru 4-8 \ RMs 303,301,122,117,119,303,304,306	GPS-iMod -Snap-**
Watchung Hills Regional HS	WHR-RTU-N3	9,695	Zones 3-1 thru 3-7 \ RMs 309,305,307,121,310,120,308	GPS-iMod -Snap-**
Watchung Hills Regional HS	WHR-RTU-N2	10,425	Zones 2-1 thru 2-8 \ RMs 311,313,125,312 Hall,123,312,121 Hall, 124	GPS-iMod -Snap-**
Watchung Hills Regional HS	WHR-RTU-N1	9,420	Zones 1-1 thru 1-8, \ RMs 126,126 Hall, 314,128,316,130,129,315	GPS-iMod -Snap-**
Watchung Hills Regional HS	WHR-RTU-N8	8,880	Zones 8-1 thru 8-3 \Cafeteria Hall, 106, Cafeteria	GPS-iMod -Snap-**
Watchung Hills Regional HS	WHR-RTU-N7	5,975	Zones 7-1 thru 7-5 \107, Kitchen,109,111,104 Hall	GPS-iMod -Snap-**
Watchung Hills Regional HS	WHR-AC-1	2,400	AC1-Science/Tech	GPS-iMod -Snap-**
Watchung Hills Regional HS	WHR-HVAC-1	4,000	Room 4 Robotics	GPS-iMod -Snap-**
Watchung Hills Regional HS	WHR-HVAC-3	3,000	HVAC3 - Business Office	GPS-iMod -Snap-**
Watchung Hills Regional HS	WHR-HVAC-2	2,000	HVAC-2 BOE Office	GPS-iMod -Snap-**
Watchung Hills Regional HS	WHR-ERU-1B	4,700	2nd Floor Classrooms	GPS-iMod -Snap-**
Watchung Hills Regional HS	WHR-HVAC4	2,000	Locker Room 7-8	GPS-iMod -Snap-**

Existing Units to be Retrofitted with Cold Plasma Systems

Overview

Ionization of air and the resultant reduction in volatile organic compounds permits application of the IAQ procedure in ASHRAE 62-2013, Ventilation for Acceptable Indoor Air Quality. The IAQ procedure allows for control of ventilation air based upon VOC concentration rather than the more conventional approach using CO_2 as the controlled parameter. The result is a significant reduction in outside air requirement for

ventilation from 10 to 15 cfm per person to levels at 5 cfm per person or lower. Figure below shows the relationship in CO_2 concentration with the two (2) methods.

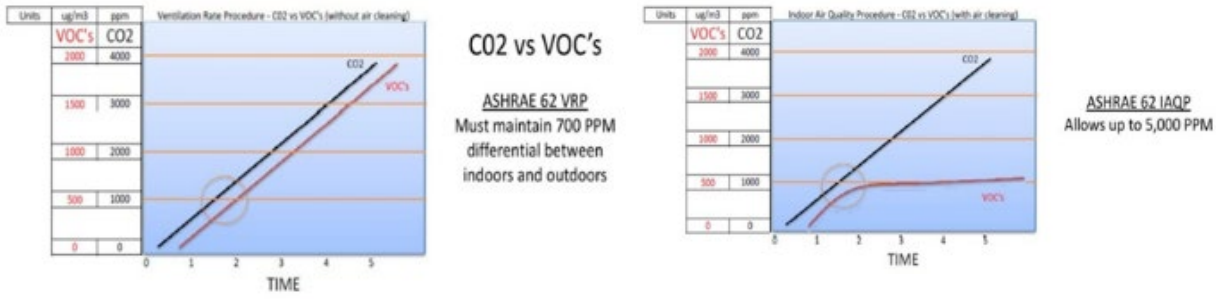

Figure VRP vs. IAQP CO2 Concentrations

In addition to reduced outside air load on a building's HVAC systems, there are a number of other benefits resulting from improving the quality of the air circulating in a space. These are described in the following paragraphs. Note the ionization device is placed in the mixed air stream downstream of the filters for all types of air handling units. This ensures the ions produced mix with the total volume of air being circulated maximizing the benefit. Figure below graphically depicts the effect of ions on an air stream.

Figure - Cold Plasma Impact

Kills Virus, Bacteria & Mold - In the Space - Similar to how positive and negative ions surround particles, they are also attracted to pathogens. When the ions combine on the surface of a pathogen, they rob the pathogen of the hydrogen necessary for them to survive. During the final step of deactivation, the ions eliminate hydrogen from the pathogen and then the plasma cleansing process is complete, making the airborne virus, bacteria, or mold spore inactive.

Reduction in Airborne Particles - The positive and negative ions are drawn to airborne particles by their electrical charge. Once the ions attach to the particle, the particle grows larger by attracting nearby particles of the opposite polarity, thereby allowing low efficiency filters to capture very fine particles.

Odor Control - The ions produced by needlepoint ionization breaks down gases with electron-volt potential numbers below 12 to harmless compounds prevalent in the atmosphere such as oxygen, nitrogen, water vapor and carbon dioxide. The resultant compounds are a function of the entering contaminants into the plasma field.

A simple example would be formaldehyde, which is produced by building furnishings and thought to be carcinogenic; formaldehyde breaks down to carbon dioxide and water vapor, thus eliminating the health hazard. Another example is ammonia, which is produced by occupants (typical body odor smell), and ammonia breaks down to oxygen, nitrogen and water vapor. As you can see, what chemical you start with determines how it reacts with the ionization field and how it breaks down.

Control Allergens - The positive and negative ions generated in the HVAC system flow free into the occupied space through the forced air system. Particles are reduced from the air and once this occurs and the deactivation of the airborne contaminants is complete, people with allergies have reported a reduction in symptoms and many have reported a reduction in required medication, or no medication required at all! Removing the "trigger" items from the air is what helps control allergies.

Proposed Solution

For this application Honeywell intends to deploy a cold plasma ion technology to provide the air cleaning required to implement IAQP. Ions introduced to the system will effectively scrub contaminants from the air stream. The technology also removes smoke, odors, and many pathogens. Over time, the operation of the system will clean cooling coils preventing the buildup of algae and other contaminants on the surface of the coil and fins

Scope of Work

Furnish and install cold plasma ion systems on the air handling systems as listed in table above.

- Furnish and install ionization air cleaning system on the air handling systems identified in Table above.
- Provide power for the ionization unit by tapping the 120VAC power to the unit. The ionization unit requires 85 ma @ 110 VAC. Provide a fused or switched disconnect for the ionization unit. Ionization unit to be installed in mixed air stream above filter. Ionization units to be Global Plasma Solutions Model GPS-3400 or approved equal.
- Reset unit ventilator OA dampers to provide reduced OA volume.
- Furnish and install two VOC sensors in representative locations in the building. Sensors require 24VDC power supply providing 50 mA AC. Connect to 0-10VDC output scaled to 0-5000 ppm to BMS and provide trend log.
- Rebalance exhaust air fans for the reduced outside air volume.
- 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 reduced outside air ventilation. The savings are generally calculated as:

Electric and Thermal Energy Savings	Existing unit energy consumption (kWh) and (therms) – reduced unit energy consumption (kWh) and (therms)

Equipment Information

Manufacturer and Type	Customer and Honeywell 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 reduction of ventilation air requirements.
Waste Production	None.
Environmental Regulations	No environmental impact is expected.

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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	Watchung Hills RHS
4A Building Envelope Improvements	●

Existing Conditions

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

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

Building Envelope – Watchung Hills RHS

Building Envelope – Watchung Hills RHS

Honeywell has helped customers like you to address these problems with a comprehensive and thorough building envelope solution that seals up your buildings to improve occupancy comfort and help eliminate

unwanted energy waste. We propose to conduct a comprehensive weatherization job to weatherproof doors and windows, caulk and seal leaks, and install spray foam and rigid foam boards to stop unwanted air movement and provide a thermal barrier between spaces. Part of this process may include decoupling floor-to-floor and compartmentalizing of components of the building to equalize pressure differences.

Proposed Solution

Task	Watchung Hills RHS
Buck Frame Air Sealing (LF)	432
Door Weather Striping - Doubles (Units)	52
Door Weather Stripping - Singles (Units)	30
Overhang Air Sealing (LF)	34
Overhang Air Sealing (SF)	24
Overhead Door Weather Stripping (Units)	1
Roof-Wall Intersection Air Sealing (LF)	1,666

Roof-Wall Joints

Existing – Buildings throughout the District were found to require roof-wall joint air sealing.

Proposed – Honeywell recommends using a high-performance sealant. In some buildings, two-component foam will be used. Any cantilevers off the buildings will be sealed with backer rod and sealant. Finally, the inside vestibule corners should be sealed with backer rod and sealant.

Roof Penetrations

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

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

Roof Overhangs

Existing – We found that roof overhangs at exterior doors are open to the drop ceilings, providing a pathway allowing heated and cooled air to escape between the interior and exterior of the building.

Proposed – Honeywell proposes to install rigid foam boards and seal the perimeter and any penetrations with spray foam to prevent air leak and provide a sufficient thermal barrier between the spaces.

Windows

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

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

Doors

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

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

Benefits

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

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.

ECM 4B 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** thanks to a tighter and more efficient building envelope.
- **Improved building envelope** from addressing building gaps that allow unconditioned air penetration.
-

ECM Description	Watchung Hills RHS
4B Roof Sealing	●

Existing Conditions

The existing roofs are in good condition; however, the roof warranties are due to expire within the project timeframe. The heat loss and heat gains occurring due to low R-value of the existing roof insulation can be improved through roof sealing. Additionally, roofs in poor condition can lead to water migration and future building envelope problems.

Building	Square Footage
Watchung Hills RHS	65,661

**Roof area is approximated*

Roof – Watchung Hills RHS

Roof – Watchung Hills RHS

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 building.

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

Roof sealing will be installed at the above referenced roof locations.

Support and Coordination with Utilities

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

Environmental Issues

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

ECM 4C WINDOW AND CURTAIN WALL REPLACEMENT

The key benefits of this ECM include:

- **Energy Savings** from reducing outside air infiltration that requires greater HVAC system utilization to overcompensate
- **Occupancy comfort and productivity** by way of enhanced temperature control
- **Enhanced security** from replacement of windows that provide for easier access to buildings

ECM Description	Watchung Hills RHS
4B Window and Curtain Wall Replacement	●

Existing Conditions

Some of the windows and curtain wall structures in the School District are single pane acrylic with aluminum frame. Due to age, construction type, and condition, the windows incur excess air infiltration and provide average thermal resistance to heat transfer.

Windows – Watchung Hills RHS

Curtain Wall – Watchung Hills RHS

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

Proposed Solution

Building	Type	Area	U-Factor/R-Factor Existing Window/Curtain Wall	U-Factor/R-Factor Proposed Window/Curtain Wall
Watchung Hills RHS – South Wing	Window	9,450	0.65	0.30
Watchung Hills RHS – South Wing	Curtain Wall	2,475	0.65	0.65
Watchung Hills RHS – North Wing	Window	2,700	0.65	0.30

Windows and Curtain Wall

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.

Benefits

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

Energy Savings Methodology and Results

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

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

Existing Window Efficiency	= 1/Existing R + Existing Infiltration Rate
Proposed Window Efficiency	= 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 and curtain walls will be installed.

Customer Support and Coordination with Utilities

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

Environmental Issues

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

ECM 5A COGENERATION CHP

The key benefits of this ECM include:

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

ECM Description	Watchung Hills RHS
5A Cogeneration CHP	●

Existing Conditions

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

Proposed Solution

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

Yanmar Unit

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

Scope of Work

Building	Qty	Location	Make	Model
Watchung Hills RHS	1	North Boiler Room	Yanmar	CP-35

Recommended Cogeneration Unit

Equipment Information

Manufacturer and Type	Yanmar-CP35, Electrical Output 35 kW, Thermal Output 203,000 Btu/hr, or approved equal.
Equipment Identification	Product cut sheets and specifications for generally used are available upon request. As part of the measure design and approval process, specific product selection will be provided for your review and approval.

Energy Savings Methodology and Results

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

Changes in Infrastructure

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

Customer Support and Coordination with Utilities

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

Environmental Issues

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

ECM 6A ROOF MOUNTED SOLAR 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	Watchung Hills RHS
6A Roof Mounted Solar PPA	●

ECM Overview

For the District to provide a sustainable future for its students and fight the effects of human caused climate change, Honeywell recommends that the District further assess the feasibility of a solar photovoltaic system on District owned roofs to generate on-site renewable electricity. This could be provided at no upfront cost via a power purchase agreement (PPA). A PPA is a public-private partnership financial arrangement in which a third-party solar company owns, operates, and maintains your photovoltaic system, while the host customer agrees to provide the site for the system on its property. The solar system's power production is purchased by you for a predetermined price ($/kWh) and for a predetermined period. This stable price for electricity will be lower than the utilities and third-party suppliers, thereby allowing you to benefit from lower electricity t 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.

Watchung Hills RHS – Potential Roof Solar

Watchung Hills RHS – Potential Roof Solar

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

Proposed Solution

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

Location	Solar kW-DC
Watchung Hills RHS	2,429.7

Proposed Solar Arrays

Energy Savings Methodology and Results

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

Changes in Infrastructure

The proposed solar array would be roof-mounted only.

Customer Support and Coordination with Utilities

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

Environmental Issues

Resource Use	None.
Waste Production	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 7A TRANSFORMER REPLACEMENT

The key benefits of this ECM include:

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

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

ECM Description	Watchung Hills RHS
7A Transformer Replacement	●

Existing Conditions

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

Transformer – Watchung Hills RHS

Transformer – Watchung Hills RHS

Systems Evaluation and Selection

Typical transformers are not designed to handle harmonic loads of today's modern facilities, and suffer significant losses, even if the transformer is relatively new. Typically, conventional transformer losses, which are non-linear, increase by 2.7 times when feeding computer loads. The nonlinear load loss multiplier reflects this increase in heat loss, which decreases the net transformer efficiency. Also, unlike

most substation transformers that are vented to the exterior, building transformers are ventilated within the building they are located, and their heat losses therefore add to the cooling load.

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

School	Location ID	KVA	QTY
Watchung Hills Regional HS	Admin Rm 14F	300.0	1
Watchung Hills Regional HS	Room 2	300.0	1
Watchung Hills Regional HS	S2	225.0	1
Watchung Hills Regional HS	Elec Rm by Rm 98	150.0	1
Watchung Hills Regional HS	Elec Rm by 15	150.0	1
Watchung Hills Regional HS	S2	150.0	1
Watchung Hills Regional HS	Band Rm Closet	112.5	1
Watchung Hills Regional HS	101 Main Elec	45.0	1
Watchung Hills Regional HS	S 11	45.0	1
Watchung Hills Regional HS	S 11	45.0	1
Watchung Hills Regional HS	Closet by 302	45.0	1
Watchung Hills Regional HS	Closet by 302	45.0	1
Watchung Hills Regional HS	Elec Rm by IDF 15	45.0	1
Watchung Hills Regional HS	101 Main Elec	30.0	1
Watchung Hills Regional HS	101 Main Elec	30.0	1
Watchung Hills Regional HS	Gym Storage 2	30.0	1

Transformer Replacements Watchung RHS

Proposed Solution

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

Scope of Work

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

Energy Savings Methodology and Results

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

Changes in Infrastructure

New transformers where indicated.

Customer Support and Coordination with Utilities

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

Environmental Issues

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

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SECTION D
TECHNICAL AND FINANCIAL SUMMARY

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SECTION D — TECHNICAL AND FINANCIAL SUMMARY

1. Recommended ESIP Project

Recommended ESIP Project	
Value of Project	$6,129,763
Term of Repayment	15 Years
Projected Savings Over Term	$7,769,307
Projected NJ Rebates & Incentives	$255,357
Projected Interest Rate	1.9%

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 Watchung Hills Regional High School District'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
ESCO's PRELIMINARY ENERGY SAVINGS PLAN (ESP):
ENERGY CONSERVATION MEASUREs (ECMs) SUMMARY FORM
WATCHUNG HILLS RHS
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	$ 757,437	$ 179,702	4.21
2E McQuay and Nesbitt RTU Replacements	$ 2,423,986	$ 44,544	54.42
2H VFDs on Heating Water Pumps	$ 54,445	$ 5,107	10.66
2J High Efficiency Chillers	$ 941,470	$ 30,696	30.67
2L Install Pipe Insulation	$ 486	$ 49	9.88
3A Healthy Buildings - Building Controls	$ 379,994	$ 19,660	19.33
3B Healthy Buildings - Environmental Optimization	$ 11,850	$ 4,607	2.57
4A Building Envelope Improvements	$ 96,753	$ 9,085	10.65
6A Roof Mounted Solar PPA RFP	$ 50,000	$ 221,096	0.23
7A Transformer Replacement	$ 296,791	$ 21,852	13.58
P4P Modeling and Management	$ 103,451	$ -	-
			-
			-
Add additional lines as needed* **Project Summary:**	$ 5,116,664	$ 536,399	9.54

Optional ECMs Considered, but not included with base project at this time	Estimated Installed Hard Costs [1] $	Estimated Annual Savings $	Estimated Simple Payback (years)
1B De-Stratification Fans	$ 130,813	$ 5,165	25.32
2A High Efficiency Hot Water and Steam Boilers	$ 1,762,845	$ 19,170	91.96
2B Boiler Burner Controls	$ 142,200	$ 1,360	104.53
2C Domestic Hot Water Replacements	$ 43,646	$ 153	284.66
2D Addition of Cooling	$ 1,320,114	$ (4,153)	(317.85)
2F Kitchen Hood Controls	$ 71,100	$ 3,588	19.82
2G Walk In Compressor Controls	$ 5,333	$ 326	16.36
2I Split System Replacement	$ 585,062	$ 4,588	127.52
2K Exhaust Fan Retro-Commissioning	$ 39,698	$ 7	6,002.41
2M Steam Trap and TRV Refurbishments	$ 216,771	$ 5,195	41.73
2N Replace Unit Ventilators -South Building	$ 544,661	$ 1,714	317.68
3C Healthy Buildings - Plasma Ionization	$ 160,973	$ -	-
4B Roof Sealing	$ 544,661	$ 1,714	317.68
4C Window and Curtain Wall Replacement	$ 3,466,125	$ 12,901	268.68
5A Cogeneration CHP	$ 311,065	$ 7,007	44.39
Design Allowance	$ 60,000	$ -	-

Form III: Recommended Project — Projected Annual Energy Savings Data Form

FORM III

ESCO's PRELIMINARY ENERGY SAVINGS PLAN (ESP)
PROJECTED ANNUAL ENERGY SAVINGS DATA FORM
WATCHUNG HILLS RHS
ENERGY SAVING IMPROVEMENT PROGRAM

ESCO Name: **Honeywell International**

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

Energy/Water	ESCO Developed Baseline (Units)	ESCO Developed Baseline (Costs $)	Proposed Annual Savings (Units)	Proposed Annual Savings (Costs $)
Electric Demand (KW)	12,636	$89,153	3,032	$21,395
Electric Energy (KWH)	4,099,305	$499,538	4,072,279	$407,679
Natural Gas (therms)	195,241	$165,590	9,924	$8,417
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	3,960			
SO2	9,000			
CO2	4,832,089			

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

FORM IV
ESCO's PRELIMINARY ENERGY SAVINGS PLAN (ESP):
PROJECTED ANNUAL ENERGY SAVINGS DATA FORM IN MMBTUs
WATCHUNG HILLS RHS
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)	13,987	13,895	
Natural Gas (MMBTUs)	19,524	992	
Fuel Oil (MMBTUs)	0	0	
Steam (MMBTUs)			
Other (Specify) (MMBTUs)			
Other (Specify)			

Form V: Recommended Project — ESCO's Proposal Project Cost Form

FORM V

ESCO's PRELIMINARY ENERGY SAVINGS PLAN (ESP):
ESCOs PROPOSED FINAL PROJECT COST FORM FOR BASE CASE PROJECT
WATCHUNG HILLS RHS
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]:	$5,116,664	
Project Service Fees		
Investment Grade Energy Audit	$66,517	1.30%
Design Engineering Fees	$0	0.00%
Construction Management & Project Administration	$281,417	5.50%
System Commissioning	$25,583	0.50%
Equipment Initial Training Fees	$25,583	0.50%
ESCO Overhead	$409,333	8.00%
ESCO Profit	$204,667	4.00%
Project Service Fees Sub Total	$399,100	7.80%
TOTAL FINANCED PROJECT COSTS:	$6,129,763	19.80%
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)	$10,233	0.2%
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	$10,233.33	

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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
WATCHUNG HILLS RHS
ENERGY SAVING IMPROVEMENT PROGRAM

ESCO Name: **Honeywell International**

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

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

Honeywell Contract Value: $ 6,129,763
Architect/Professional Fees: $ 434,916 8.5%
Total Project Cost (1): **$ 6,564,679** Interest Rate to Be Used for Proposal Purpos **1.9%**

Year	Annual Energy Savings	Solar Savings	Annual Operational Savings	Energy Rebates/Incentives	Total Annual Savings	Annual Project Costs	Board Costs	Annual Service Costs [3]	Net Cash-Flow to Client	Cumulative Cash Flow
Installation	$ 64,919				$ 64,919	$ -	$ -	$ -	$ 64,919	$ 64,919
1	$ 216,395	$ 221,096	$ 98,907	$ 29,842	$ 566,240	$ (560,040)	$ (570,274)	$ (10,233)	$ 6,200	$ 71,119
2	$ 221,173	$ 221,096	$ 98,907	$ 205,014	$ 746,190	$ (739,990)	$ (739,990)	$ -	$ 6,200	$ 77,319
3	$ 226,056	$ 221,096	$ 45,284	$ 20,501	$ 512,938	$ (506,738)	$ (506,738)	$ -	$ 6,200	$ 83,519
4	$ 231,047	$ 221,096	$ 45,284	$ -	$ 497,427	$ (491,227)	$ (491,227)	$ -	$ 6,200	$ 89,719
5	$ 236,148	$ 221,096	$ 45,284	$ -	$ 502,528	$ (496,328)	$ (496,328)	$ -	$ 6,200	$ 95,919
6	$ 241,362	$ 221,096			$ 462,458	$ (456,258)	$ (456,258)	$ -	$ 6,200	$ 102,119
7	$ 246,691	$ 221,096			$ 467,787	$ (461,587)	$ (461,587)	$ -	$ 6,200	$ 108,319
8	$ 252,137	$ 221,096			$ 473,234	$ (467,034)	$ (467,034)	$ -	$ 6,200	$ 114,519
9	$ 257,704	$ 221,096			$ 478,800	$ (472,600)	$ (472,600)	$ -	$ 6,200	$ 120,719
10	$ 263,394	$ 221,096			$ 484,490	$ (478,290)	$ (478,290)	$ -	$ 6,200	$ 126,919
11	$ 269,209	$ 221,096			$ 490,306	$ (484,106)	$ (484,106)	$ -	$ 6,200	$ 133,119
12	$ 275,153	$ 221,096			$ 496,250	$ (490,050)	$ (490,050)	$ -	$ 6,200	$ 139,319
13	$ 281,229	$ 221,096			$ 502,325	$ (496,125)	$ (496,125)	$ -	$ 6,200	$ 145,519
14	$ 287,438	$ 221,096			$ 508,534	$ (502,334)	$ (502,334)	$ -	$ 6,200	$ 151,719
15	$ 293,785	$ 221,096			$ 514,881	$ (508,562)	$ (508,562)	$ -	$ 6,319	$ 158,037
Totals	$ 3,863,838	$ 3,316,445	$ 333,666	$ 255,357	$ 7,769,307	$ (7,611,270)	$ (7,621,503)	$ (10,233)	$ 158,037	$ 158,037

Additional 3rd P4P Incentive	$ 184,513
Total Cash Flow	$ 342,550

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

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

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2. Utility and Other Rebates and Incentives

NJ Pay-for-Performance Program (P4P)

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

Eligibility

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

ENERGY STAR Portfolio Manager

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

Incentives

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

Incentives, Rebates and Grants Summary

Honeywell has a great deal of experience in applying for, and successfully securing, all available incentives, rebates, and grants for our clients. We have been approved and allocated for over $9M of incentives on behalf of our New Jersey customers alone since the introduction of the Energy Savings Improvement Program legislation in 2009. The New Jersey programs employed included primarily the Office of Clean Energy's Pay for Performance and Cogeneration Incentives. A table of the incentive amounts on a per project basis is provided below.

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

Honeywell has determined that the Watchung Hills Regional High School District is eligible for **$255,357** in estimated total P4P incentives for the projects.

Please refer to the table below for a breakdown of Watchung Hills Regional High School District incentive levels.

P4P Incentives

	P4P Incentives			
Building	**First Incentive**	**Second Incentive**	**Third Incentive**	**Total Incentive**
Watchung Hills Regional High School	$29,842	$205,014	$20,501	$255,357
TOTALS	**$9,750**	**$81,091**	**$10,000**	**$100,841**

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.

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

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

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

Certificates of Participation (COP's)

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

Energy Savings Obligations

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

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SECTION E
MEASUREMENT & VERIFICATION AND MAINTENANCE PLAN

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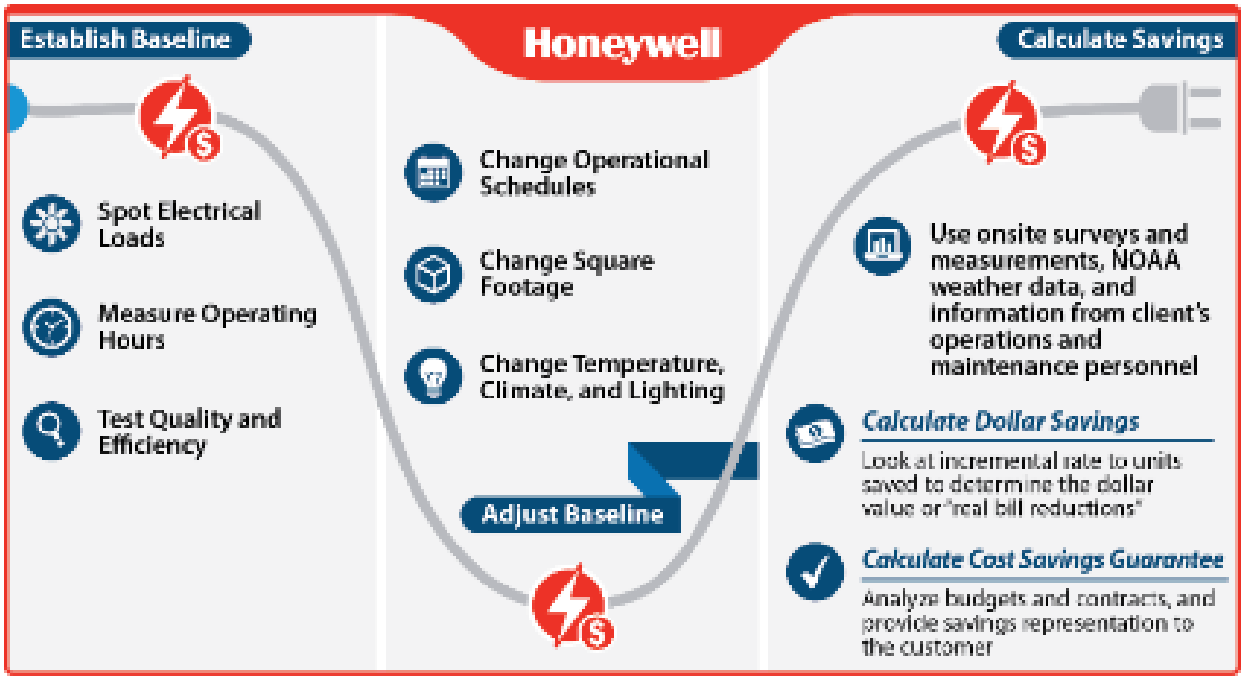
SECTION E — MEASUREMENT & VERIFICATION AND MAINTENANCE PLAN

1. Baseline

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

Honeywell 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, handheld kW meters.
5) Combustion analyzers.
6) Ultrasonic flow meters.
7) Infrared thermometers

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

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

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

Calculating the units of energy saved is a critical measure of energy efficiency improvements, but it does

not indicate the actual dollars saved. To do this, Honeywell and the Watchung Hills Regional High School District will establish the base rates that will act as "floor" rates in calculating the savings as agreed to by both parties.

2. Adjustment to Baseline Methodology

Honeywell's methodology[1] for establishing and adjusting the baseline is determined by the characteristics of the facility, the conservation technology being installed, the technology being replaced, the type of measurement and verification the Watchung Hills Regional High School District requires and the needs of the Watchung Hills Regional High School District for future changes in facility use.

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

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

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

Examples of situations where the baseline needs to be adjusted are: i) changes in the amount of space being air conditioned, ii) changes in auxiliary systems (towers, pumps, etc.) and iii) changes in occupancy or schedule. If the baseline conditions for these factors are not well documented it becomes difficult, if not impossible, to properly adjust them when they change and require changes to payment calculations. To compensate for any addition and deletion of buildings and impact on the baseline model, Honeywell will use sound technical methodologies to adjust the baseline. An example would be to add or delete building energy impact via the calculated cooling load in tons as a percentage of the existing campus tonnage baseline or use indices like W/ft^2 and Btu/ft^2 to calculate the energy consumption of the building and then add or subtract the energy usage to or from the baseline energy consumption.

[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.

3. Energy Savings Calculations

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

Typically, the following data is gathered:

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

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

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

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

where:

$Rate_{kWh,Base}$= defined base rate for kWh consumption
$kWh_{Saved,m}$= calculated kWh savings for month *m*

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

$Rate_{Steam,Base}$= defined base rate for steam consumption ($XX/MMBtu.)
$Steam_{Saved,m}$= calculated Steam savings in MMBtu. for month *m*

$Rate_{NG,Base}$= defined base rate for natural gas consumption ($XX/Therm)
$NG_{Saved,m}$= calculated natural gas savings in Therms for month *m*

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

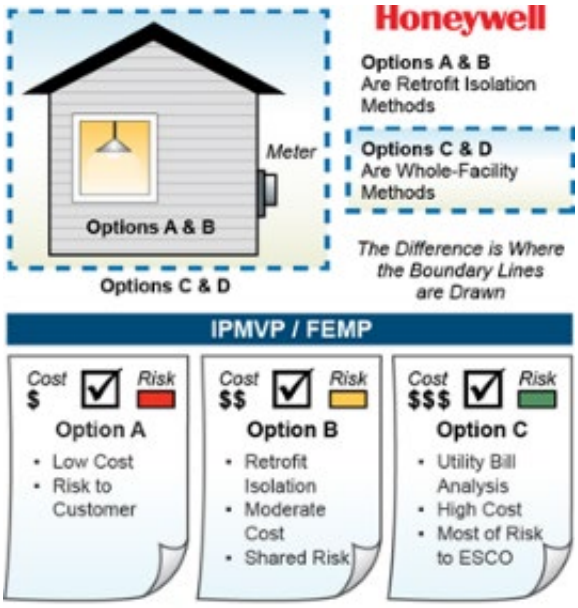
Honeywell assigns dollar values to the true incremental value of savings for energy and water. In other words, we do not combine for example, demand and consumptions numbers so that there is an average value to savings. Honeywell looks at each incremental rate to units saved to properly determine the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

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

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

4. Measurement & Verification

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



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

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

Engineering calculations of energy and cost savings for the project are based on operating parameters (such as weather, temperature settings, run hours, occupancy patterns, and space usage) and equipment performance characteristics. The M&V plan uses the operating parameters established in the baseline for all savings calculations during the term of the project. The intent of the M&V plan is to verify that the ECMs installed by Honeywell will provide the expected energy savings. Therefore, Honeywell will collect data and relative information during the post-retrofit period to demonstrate that the installed equipment is performing at expected levels. It is assumed that the Watchung Hills Regional High School District will continue to be a dynamic institution adding or renovating buildings and desiring to retain the right to set comfort and operating characteristics. To accommodate this, Honeywell will develop its M&V plan in a way that allows the Watchung Hills Regional High School District to adapt to the demands of future campus growth and changes without the need for the Watchung Hills Regional High School District and Honeywell to negotiate energy baseline adjustments.

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

One year after the commencement date of the ECMs, Honeywell will submit a report verifying and calculating the energy and cost savings for the first year. This report will be submitted for facility review and approval. For the remaining contract term, Honeywell will provide annual reports. These reports will

[2] www.ipmvp.org.

include results of inspections of the installed equipment/systems, energy and cost savings, and recommendations to provide optimum energy performance.

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

General Approach to M&V

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

M&V Options

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

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

In general,

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

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

Exceptions to this simple equation are as follows:

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

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

Post-Retrofit M&V Activities

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

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

Verifying the Potential to Generate Savings

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

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

Post-Installation Verification

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

Regular Interval Post-Installation Verification

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

Computation of Energy Savings

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

Construction/Interim Savings

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

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

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

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

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

The total kWh savings is the sum of the kWh_{Saved} for all the installed VFDs.

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5. Site-specific M&V Plan

ECM # and Name	Summary of ECM	M&V Methodology / Recommendation	Description of M&V – Pre- and Post-Process
1A LED Lighting	▪ Upgrade Lighting systems: ○ Re-lamp/Re-ballast T8/T12 to LED, ○ Incandescent to LED ○ Metal Halide and Sodium Vapor to LED High Bays	Option A: ▪ Pre and Post measurements ▪ Line by Line scope and engineering calculations	▪ Pre-M&V: Measurement of kW for 5% sample fixtures in each category ▪ Data log usage hours ▪ Data Log occupancy schedules ▪ Update Line by Line scope with measured kW and usage hours ▪ Post M&V: Measurement of kW for 5% sample fixtures in each category ▪ Usage Hours to remain same ▪ Occupancy schedules to remain same ▪ Energy Savings: Update Line by Line scope with measured kW and usage hours and compare to pre-retrofit calculated savings
1B De-Stratification Fans	▪ Install De-Stratification fans in Gymnasiums to minimize stratification of hot air and maintain hot air flow below the fan level	Option A ▪ Electric and fuel energy savings - Engineering calculations based on programmed parameters.	▪ Pre-M&V: Verify existing operating parameters match the baseline calculation assumptions ▪ Post M&V: Verify that systems are installed as specified and controls are programmed to match the savings assumptions ▪ Energy Savings: Verify savings based on programmed parameters and engineering calculations
2A High Efficiency Hot Water and Steam Boilers	▪ Replace boilers in select locations to handle base load	Option C ▪ Utility Bill Comparison for all fuel related measures	▪ Pre-M&V: Baseline annual fuel cost based on fuel billing data and Metrix tuned to normalize to heating degree days ▪ Perform combustion efficiency test on boilers ▪ Post M&V: Compare post installation M&V fuel cost based on fuel billing data and Metrix tuned to normalize to heating degree days ▪ Perform efficiency test on replaced boilers to ensure operating conditions are maintained
2B Boiler Burner Controls	▪ Install boiler burner controls in select units to increase boiler efficiency	Option C Utility Bill Comparison for all fuel related measures	▪ Pre-M&V: Baseline annual fuel cost based on fuel billing data and Metrix tuned to normalize to heating degree days ▪ Perform combustion efficiency test on boilers ▪ Post M&V: Compare post installation M&V fuel cost based on fuel billing data and Metrix tuned to normalize to heating degree days ▪ Perform efficiency test on replaced boilers to ensure operating conditions are maintained
2C Domestic Hot Water Replacements	▪ Replace existing domestic hot water heaters with condensing natural gas domestic hot water heater	Option C ▪ Utility Bill Comparison for all fuel related measures	▪ Pre-M&V: Baseline annual fuel cost based on fuel billing data. ▪ Post M&V: Compare post installation M&V fuel cost based on fuel billing data.

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2D Addition of Cooling	▪ Add cooling to designated spaces which are currently heating only	Option A Engineering calculations based on nameplate and manufacturer supplied data for the replacement units	▪ Pre-M&V: Verify manufacturer provided data for unit efficiency (EER) ▪ Post M&V: Verify manufacturer provided data for new rooftop unit (EER) – verify the new equipment and controls are installed and commissioned as recommended by manufacturer
2E McQuay and Nesbitt RTU Replacements	▪ Replace antiquated Roof Top Units with new high efficiency Rooftop Units	Option A ▪ Engineering calculations based on nameplate and manufacturer supplied data for the existing and replacement units	▪ Pre-M&V: Verify manufacturer provided data for existing unit efficiency (EER) ▪ Post M&V: Verify manufacturer provided data for new rooftop unit (EER) – verify the new equipment and controls are installed and commissioned as recommended by manufacturer
2F Kitchen Hood Controls	▪ Install control devices on the Kitchen hoods to control exhaust air in response to the cooking load. Replace fan motors with new premium efficiency motors and VFD drives	Option A Energy savings - Engineering calculations based on programmed parameters.	▪ Pre-M&V: Verify existing operating parameters match the baseline calculation assumptions ▪ Post M&V: Verify that systems are installed as specified and controls are programmed to match the savings assumptions
2G 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
2H VFDs on Heating Water Pumps	▪ Install VFDs on select pumps to operate the pump motors in response to the system load. Replace motors with new premium efficiency motors	Option A ▪ Engineering calculations for VFDs following pump affinity laws. Engineering calculations based on nameplate and manufacturer supplied data for the existing and replacement motors	▪ Pre-M&V: Verify manufacturer provided data for the pump performance data and motor efficiencies. ▪ Post M&V: Obtain trend data for VFD operation from the BMS system to verify baseline calculation assumptions on system loads ▪ Verify efficiency of new motors ▪ Verify manufacturer provided data for new VFDs – verify the new equipment and controls are installed and commissioned as recommended by manufacturer

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2I Split System Replacement	▪ Replace select split systems with new high efficiency units	Option A Engineering calculations based on nameplate and manufacturer supplied data for the existing and replacement Units	▪ Pre-M&V: Verify manufacturer provided data for existing unit efficiency (EER) ▪ Post M&V: Verify manufacturer provided data for new split system unit (EER) – verify the new equipment and controls are installed and commissioned as recommended by manufacturer
2J High Efficiency Chillers	▪ Install new High Efficiency Chillers	Option A Electric energy savings - Engineering calculations based on material specifications.	▪ Pre-M&V: Verify manufacturer provided data for existing unit efficiency (kW/ton) ▪ Post M&V: Verify manufacturer provided data for new chiller (kW/ton) – verify the new equipment and controls are installed and commissioned as recommended by manufacturer
2K Exhaust Fan Retro-Commissioning	▪ Retro-Commission Roof Exhaust Fans throughout building	Non-Measured ECM	▪ Pre-M&V: None ▪ Post M&V: Savings stipulated based on engineering calculations for the term of contract
2L Install Pipe Installation	▪ Install, Repair, Replace piping insulation on steam and water systems	Option C ▪ Fuel Savings Utility Bill Comparison for all fuel related measures	▪ Fuel: Compare post installation M&V fuel cost based on fuel billing data and Metrix tuned to normalize to heating degree days
2M Steam Trap and TRV Refurbishments	▪ Comprehensive replacement or internal repair of building steam traps and TRV valves	Option C ▪ Fuel Savings ▪ Utility Bill Comparison for all fuel related measures	▪ Fuel: Compare post installation M&V fuel cost based on fuel billing data and Metrix tuned to normalize to heating degree days
2N Replace Unit Ventilators – South Building	▪ Replace antiquated Unit Ventilators	Option A ▪ Engineering calculations based on nameplate and manufacturer supplied data for the existing and replacement units	▪ Pre-M&V: Baseline annual fuel cost based on fuel billing data and Metrix tuned to normalize to heating degree days ▪ Post M&V: Compare post installation M&V fuel cost based on fuel billing data and Metrix tuned to normalize to heating degree days

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3A Healthy Buildings -Building Controls	▪ Upgrade Building Management Systems to DDC and integrate all systems to a central platform.	Option A ▪ Electric energy savings - Engineering calculations based on programmed parameters. Option C ▪ Fuel Savings Utility Bill Comparison for all fuel related measures	▪ Pre-M&V: Verify existing operating parameters match the baseline calculation assumptions ▪ Post M&V: Verify that systems are installed as specified and controls are programmed to match the savings assumptions ▪ Electric Energy: Verify savings based on programmed parameters and engineering calculations ▪ Fuel: Compare post installation M&V fuel cost based on fuel billing data and Metrix tuned to normalize to heating degree days
3B Healthy Buildings - Energy Optimization	▪ Install Energy Analytics and Graphics to reduce overall building energy usage	Option A ▪ Engineering calculations based on nameplate and manufacturer supplied data	▪ Pre-M&V: Verify manufacturer provided data for existing units efficiency ▪ Post M&V: Verify manufacturer provided data for new units verify the new equipment and controls are installed and commissioned as recommended by manufacturer
3C Healthy Buildings -Plasma Ionization	▪ Install needlepoint ionization system to reduce containments in air stream.	Option A ▪ Engineering calculations based on nameplate and manufacturer supplied data	▪ Pre-M&V: Verify manufacturer provided data for existing units efficiency ▪ Post M&V: Verify manufacturer provided data for new units verify the new equipment and controls are installed and commissioned as recommended by manufacturer
4A Building Envelope Improvements	▪ Install weather stripping on doors, seal roof wall joints and roof penetrations	Option A ▪ Engineering calculations based on nameplate and manufacturer supplied data	▪ Pre-M&V: Verify existing conditions ▪ Post M&V: Visual inspection per scope of work.
4B Roof Sealing	▪ Reseal building roof in select areas	Option A ▪ Engineering calculations based on programmed parameters. Option C ▪ Utility Bill Comparison for fuel related measures	▪ Pre-M&V: Verify existing operating parameters match the baseline calculation assumptions ▪ Post M&V: Verify that systems are installed as specified to match the savings assumptions ▪ Electric Energy: Verify savings based on programmed parameters and engineering calculations ▪ Fuel: Compare post installation M&V fuel cost based on fuel billing data and Metrix tuned to normalize to heating degree days

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4C Window and Curtain Wall Replacement	▪ Reseal building windows and curtain wall in select areas	Option A ▪ Engineering calculations based on programmed parameters. Option C ▪ Utility Bill Comparison for fuel related measures	▪ Pre-M&V: Verify existing operating parameters match the baseline calculation assumptions ▪ Post M&V: Verify that systems are installed as specified to match the savings assumptions ▪ Electric Energy: Verify savings based on programmed parameters and engineering calculations ▪ Fuel: Compare post installation M&V fuel cost based on fuel billing data and Metrix tuned to normalize to heating degree days
5A Cogeneration CHP	▪ Install Cogeneration unit	Option A ▪ Engineering calculations based on nameplate and manufacturer supplied data for the new unit	▪ Pre-M&V: Verify existing operating parameters match the baseline calculation assumptions ▪ Post M&V: Verify that systems are installed as specified and controls are programmed to match the savings assumptions
6A Roof Mounted Solar PPA	▪ Install solar power panels under third party power purchase agreement	N/A	▪ N/A
7A Transformer Replacement	▪ Replace existing secondary transformers with high efficiency equivalents.	Option A ▪ Engineering calculations based on increase in transformer efficiency	▪ Pre-M&V: Measure typical existing transformer (typical one for each size) input and output kW to establish transformer losses ▪ Post M&V: Measure input and output kW for new transformer (typical one for each size) ▪ Verify savings with engineering calculations

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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 Watchung Hills Regional High School District that all installations and work performed are subject to final inspection and the Watchung Hills Regional High School District's acceptance. This procedure ensures all work will be to the level of quality the Watchung Hills Regional High School District expects.

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

Honeywell considers the guarantee to be the cornerstone of our service to you. In order to be considered a *performance contract,* a 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 most risk is shifted from the Watchung Hills Regional High School District 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 Watchung Hills Regional High School District for the long term.

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

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

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

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

As stated above, under the New Jersey ESIP legislation acceptance of a performance guarantee is optional at the Watchung Hills Regional High School District 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.

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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 Watchung Hills Regional High School District does elect to accept a guarantee, New Jersey ESIP law requires that the Watchung Hills Regional High School District 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 Watchung Hills Regional High School District.

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 Watchung Hills Regional High School District opts to accept the Savings Guarantee, the fee indicated on Form V in Section D 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 Watchung Hills Regional High School District for services as desired. Based on Honeywell's vast service organization, we are uniquely qualified to develop design specification for the public bidding per NJ Law.

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

Honeywell recommends routine maintenance on the following systems throughout the Watchung Hills Regional High School District for the duration of an energy guarantee of savings.

Maintenance, Repair and Retrofit Services:

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

Honeywell will work with the Watchung Hills Regional High School District to evaluate current maintenance practices and procedures. This information will be the basis of a preventive maintenance and performance management plan designed to maximize building operating efficiencies, extend the

useful life of your equipment and support the designed Energy Savings Plan.

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

System Support Services

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

Configuration Management

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

Front End / PC Service

1. Verify operation of personal computer and software:
2. Check for PC errors on boot up
3. Check for Windows errors on boot up
4. Check for software operations and performance, responsiveness of system, speed of software
5. Routinely backup system files, on an annual basis:
6. Trend data, alarm information and operator activity data
7. Custom graphics and other information
8. Ensure disaster recovery procedures are updated with current files
9. Clean drives and PC housing, on an annual basis:
10. Open PC and remove dust and dirt from fans and surfaces

11. Open PC interface assemblies and remove dust and dirt
12. Clean and verify operation of monitors.
13. Verify printer operation, check ribbon or ink.
14. Initiate and check log printing functions.
15. Verify modem operation (if applicable).
16. Review IVR schedule for alarms and review (if applicable).

Temperature Controls UNIT VENTS

Services Performed

Annual Inspection

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

PUMPS

Services Performed

Preseason Inspection

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

Seasonal Start-up

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

Mid-season Inspection

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

Seasonal Shut-down

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

PACKAGED AIR-CONDITIONING SYSTEMS

Services Performed

Preseason Inspection

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

Seasonal Start-up

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

Mid-season Inspection

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

Seasonal Shut-down *

1. Shut down per manufacturer's recommendations.

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

BOILERS

Services Performed

Preseason Inspection

1. Inspect fireside of boiler and record condition.
2. Brush and vacuum soot and dirt from flues (not chimneys) and combustion chamber.
3. Inspect firebrick and refractory for defects.
4. Visually inspect boiler pressure vessel for possible leaks and record condition.

5. Disassemble, inspect and clean low-water cutoff.
6. Check hand valves and automatic feed equipment. Repack and adjust as required.
7. Inspect, clean and lubricate the burner and combustion control equipment.
8. Reassemble boiler.
9. Check burner sequence of operation and combustion air equipment.
10. Check fuel piping for leaks and proper support.
11. Review manufacturer's recommendations for boiler and burner start-up.
12. Check fuel supply.
13. Check auxiliary equipment operation.

Seasonal Start-up

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

Mid-season Inspection

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

Seasonal Shut-down

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

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SECTION F
DESIGN APPROACH

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SECTION F — DESIGN APPROACH

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

1. Safety Management Plan

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

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

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.

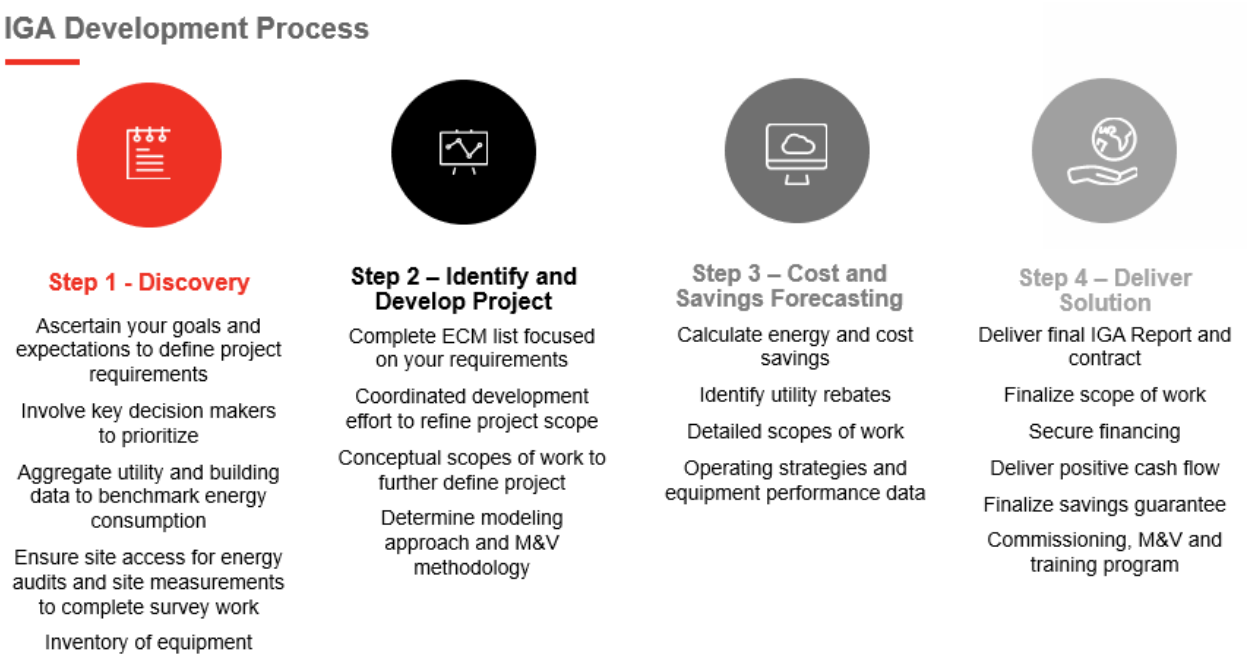
Honeywell will demonstrate our partnership-based commitment to The Watchung Hills Regional High School District throughout the development and delivery of your ESIP project, as we have done for dozens of other public entities throughout New Jersey under the ESIP Law. Our approach is backed by our references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

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

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

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

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



A. Honeywell Performance Contracting

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

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

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

Our Safety Commitment to the Watchung Hills Regional High School District

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

Our projects all begin with the following steps:

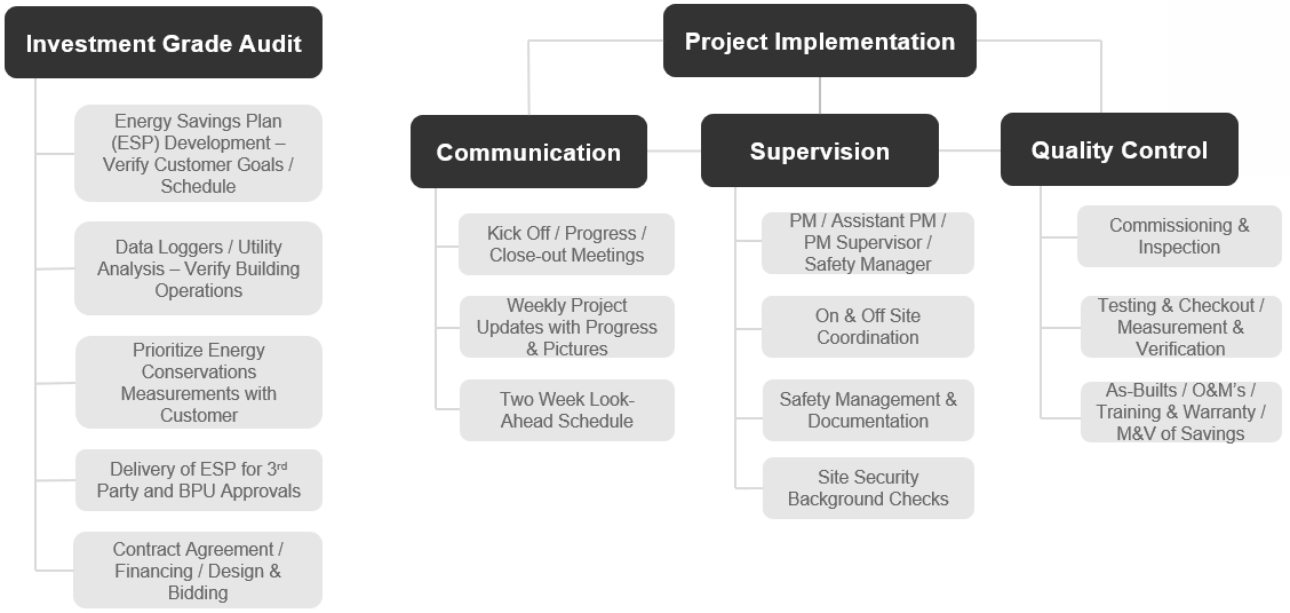
- Safety Training for Employee's and Sub-contractors
- Detailed Work Schedules around the day
- Detailed Background Checks of Personnel
- Detail Logs of Sub Contractor Personnel
- On-Site Logs of Time Sheets, Contact Information for All Personnel
- Clearly Displayed Identification Badges of All Construction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

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

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

C. Project Management Process

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 Watchung Hills Regional High School District/Honeywell partnership and makes changes to ensure achievement of performance requirements in the facilities modernization component. The Project Manager regularly reviews the on-going process of the project with the customers.

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

There are several challenges in this position. The Project Manager must staff the project and create a work force capable of handling the technologies associated with the project (pneumatic or

electric/electronic controls, mechanical systems, etc.), and plan for and use these personnel to achieve optimum results focused on occupant comfort and guarantee requirements.

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 Watchung Hills Regional High School District project, all subcontractors will be selected in accordance with New Jersey public contracts law. Typical areas that are subcontracted are as follows:

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

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

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

Approval of subcontractors that Honeywell proposes to use lies with the Watchung Hills Regional High School District.

4. Commissioning

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

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

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

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

5. Installation Standards

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

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

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

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

Regarding ventilation, Honeywell will upgrade ventilation to meet current standards in those areas where

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

Heating and Cooling Standards

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

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

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

Hazardous Waste Disposal or Recycling

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

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

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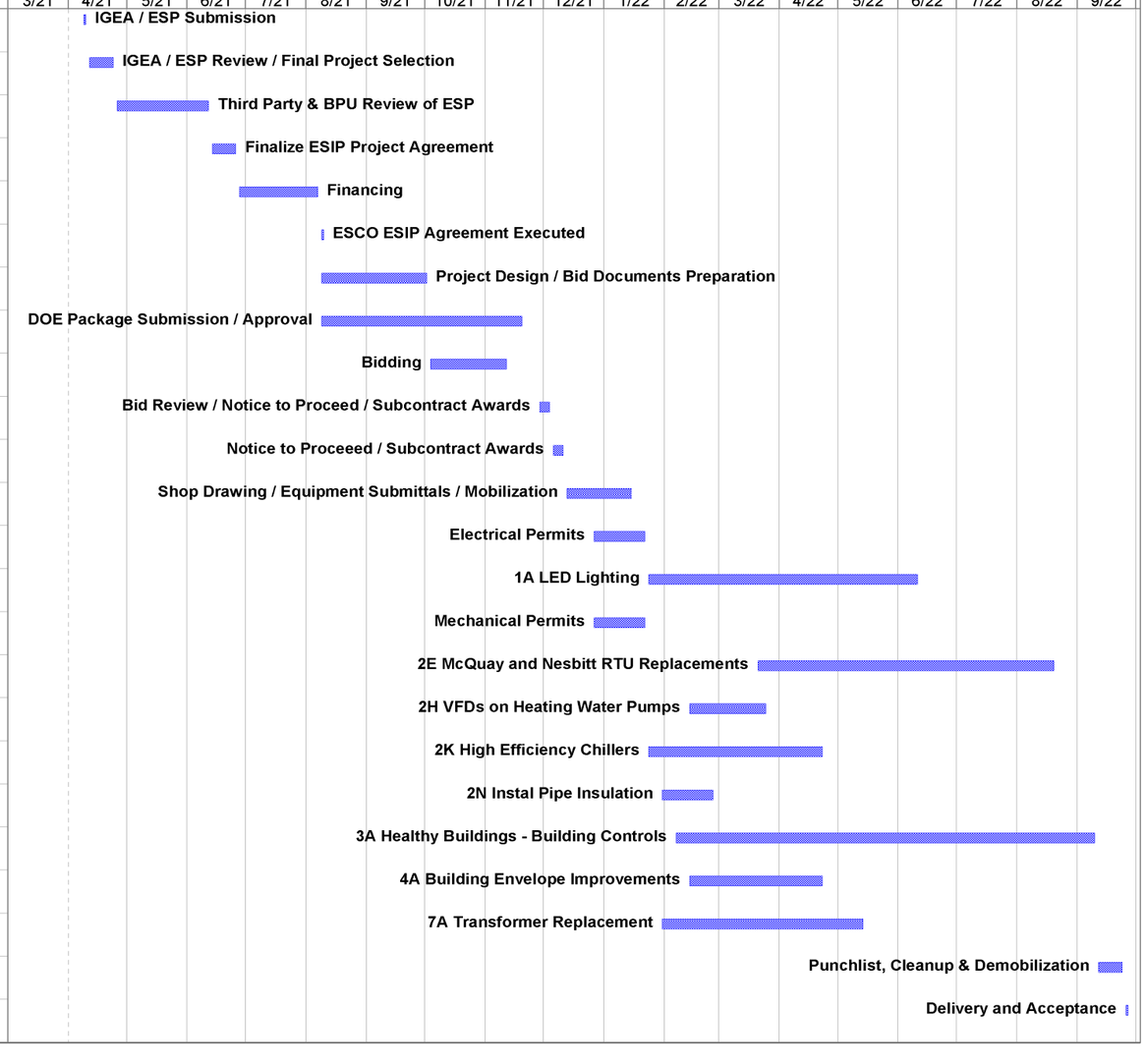
6. Implementation Schedule

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

Watchung Hills Regional High School
Energy Savings Plan Estimated
Construction Schedule

Honeywell

ID	Task Name	Start	Finish
1	IGEA / ESP Submission	Fri 4/9/21	Fri 4/9/21
2	IGEA / ESP Review / Final Project Selection	Mon 4/12/21	Fri 4/23/21
3	Third Party & BPU Review of ESP	Mon 4/26/21	Fri 6/11/21
4	Finalize ESIP Project Agreement	Mon 6/14/21	Fri 6/25/21
5	Financing	Mon 6/28/21	Fri 8/6/21
6	ESCO ESIP Agreement Executed	Mon 8/9/21	Mon 8/9/21
7	Project Design / Bid Documents Preparation	Mon 8/9/21	Fri 10/1/21
8	DOE Package Submission / Approval	Mon 8/9/21	Fri 11/19/21
9	Bidding	Mon 10/4/21	Thu 11/11/21
10	Bid Review / Notice to Proceed / Subcontract Awards	Mon 11/29/21	Fri 12/3/21
11	Notice to Proceeed / Subcontract Awards	Mon 12/6/21	Fri 12/10/21
12	Shop Drawing / Equipment Submittals / Mobilization	Mon 12/13/21	Fri 1/14/22
13	Electrical Permits	Mon 12/27/21	Fri 1/21/22
14	1A LED Lighting	Mon 1/24/22	Fri 6/10/22
15	Mechanical Permits	Mon 12/27/21	Fri 1/21/22
16	2E McQuay and Nesbitt RTU Replacements	Mon 3/21/22	Fri 8/19/22
17	2H VFDs on Heating Water Pumps	Mon 2/14/22	Thu 3/24/22
18	2K High Efficiency Chillers	Mon 1/24/22	Fri 4/22/22
19	2N Instal Pipe Insulation	Mon 1/31/22	Fri 2/25/22
20	3A Healthy Buildings - Building Controls	Mon 2/7/22	Fri 9/9/22
21	4A Building Envelope Improvements	Mon 2/14/22	Fri 4/22/22
22	7A Transformer Replacement	Mon 1/31/22	Fri 5/13/22
23	Punchlist, Cleanup & Demobilization	Mon 9/12/22	Fri 9/23/22
24	Delivery and Acceptance	Mon 9/26/22	Mon 9/26/22



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APPENDICES

For Appendices 1 to 4, please refer to the following files for their electronic version on the USB drive included along in the submission:

`Honeywell – Appendix 1 — INDEPENDENT ENERGY AUDIT (Exhibit 1).pdf
`Honeywell – Appendix 2 — ECM CALCULATIONS.pdf
`Honeywell – Appendix 3 — SAFETY MANAGEMENT PLAN.pdf
`Honeywell – Appendix 4 — EQUIPMENT CUT SHEETS.pdf
`Honeywell – Appendix 5 — LIGHTING LINE BY LINE.pdf

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THE FUTURE IS WHAT WE MAKE IT


Power for Air Taxis


Surveillance Cameras Foresee Buyer Behavior


Access to Quantum Computing


Intelligent Hearing Protection


Robotic Cargo Unloading


Predictive Airplane Maintenance


Real-time Data Makes Work More Efficient


Digital Twins Get Smart About Maintenance


Fast Communication During Emergencies


Virtual Engineering and Control


Machine Learning to Fight Cyberattacks

To learn more about Honeywell innovations visit:
https://www.honeywell.com/en-us/newsroom/news/2019/12/top-innovations-of-2019

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

Joseph Coscia, Sr., Senior Business Consultant
joe.coscia@honeywell.com
(908) 334-1131

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