BOGOTA PUBLIC SCHOOLS

DISTRICT-WIDE ENERGY SAVINGS PLAN

October 30, 2020

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DISTRICT-WIDE ENERGY SAVINGS PLAN

PREPARED FOR:

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School Business Administrator / Board Secretary
Bogota School District
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HONEYWELL PROPRIETARY

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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 CUTSHEETS.pdf

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SECTION A
EXECUTIVE SUMMARY

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SECTION A — EXECUTIVE SUMMARY

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 Bogota Public Schools 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 Bogota Public Schools. 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 Bogota Public Schools 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 Bogota Public School'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 Bogota Public Schools are identified for the purposes of potential inclusion in the program. Final selected ECMs are to be determined by the Bogota Public Schools 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 Bogota Public Schools through the Local Government Energy Audit (LGEA) program. The audits provided by TRC Companies, Inc. have been included on a USB drive as Appendix 1. A comparison can be made between the ECMs outlined in this Independent Energy Audit and the additional ECMs described in the overall Energy Savings Plan.

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

I. Equipment Cutsheets – This section titled Appendix 3: Equipment Cutsheets includes specification data for the equipment which shall be utilized as the basis of design for plans and specifications during the subsequent project development and NJ public bid phase.

J. Safety Management Plan – This section titled Appendix 4: Safety Management Plan establishes a plan for the implementation of Honeywell's Safe Operations Management (SOM) program. The document includes procedures and requirements specific to the Bogota Public Schools necessary to support a safe workplace for all stake holders. The Safety Management Plan is a living document, which will be updated and modified to maintain its relevance throughout the project as site conditions and circumstances change.

Benefits

The measures investigated in this Energy Savings Plan could result in an annual utility savings of 886,109 kWh of electricity and save 28,653 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 618 MTE of CO2 annually. This is equivalent to removing 130 cars from the road annually and /or 585 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 Bogota Public Schools to select the desired content of the project based upon the Bogota Public School'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 Bogota Public Schools 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 Bogota Public Schools 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 Bogota Public Schools 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

Honeywell

Preliminary Utility Analysis

Bogota Board of Education
Bogota, NJ

Helping customers manage energy resources to improve financial performance

Executive Summary

Honeywell would like to thank you for the opportunity of providing you with this Preliminary Utility Analysis. A two 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)

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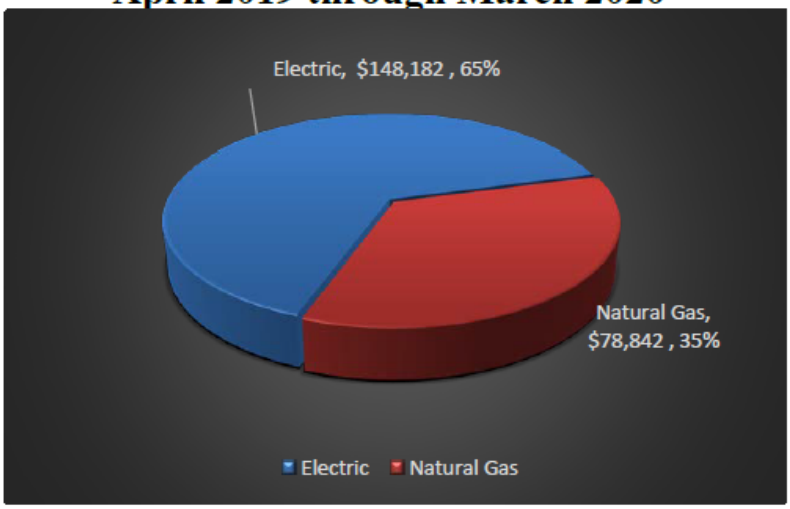
Historical Summary

Utility Analysis Period:
April 2019 through March 2020

	April 2019-March 2020		April 2018-March 2019	
	Electric	Natural Gas	Electric	Natural Gas
Utility Costs*	$148,182	$78,842	$154,423	$94,331
Utility Usage (kWh, Therms)	1,052,555	88,357	1,129,941	107,863
$ Cost/Unit (kWh, Therms)	$0.14	$0.892	$0.14	$0.875
Annual Electric Demand (kW)	3,794		4,001	

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

Actual Cost by Utility
April 2019 through March 2020



Total Cost
$227,025

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Energy Benchmarking

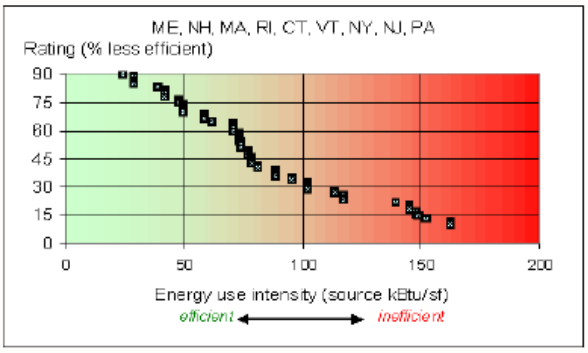
The calculation of EUI (Energy Use Intensity) is shown below. EUI, expressed in kBtu/sf, is normalized for floor area, the most dominant influence on energy use in most buildings. Its use usually provides a good approximation of how your building's energy performance compares to others. Site EUI indicates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

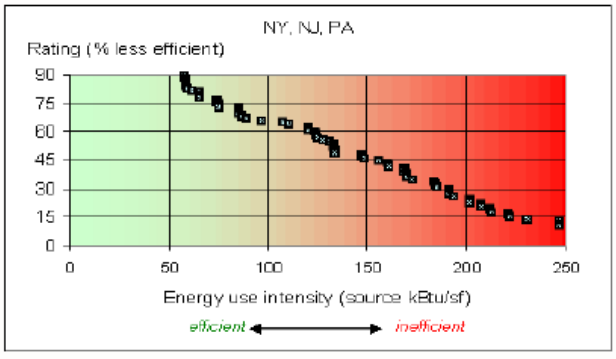
Source EUI Rating for your Building	Energy use and cost reduction potential (%)	Walk-thru energy assessment recommended?
above 60%	below 25%	No
40 to 60%	20 to 35%	Maybe
20 to 40%	35 to 50%	Yes
Below 20%	above 50%	Definitely

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	Bogota Jr. and Sr. High School	412,151	52,715	90,100	74	106	30%
2	Lillian M. Steen Elementary School	322,100	19,645	46,650	66	114	25%
3	E. Roy Bixby Elementary School	278,400	13,769	40,200	58	106	30%
4	Bogota Board Office-Admin Building	19,516	851	2,500	61	115	55%
5	Joseph Fiegel Field House	20,388	1,377	2,500	83	139	50%

School Facilities



Offices



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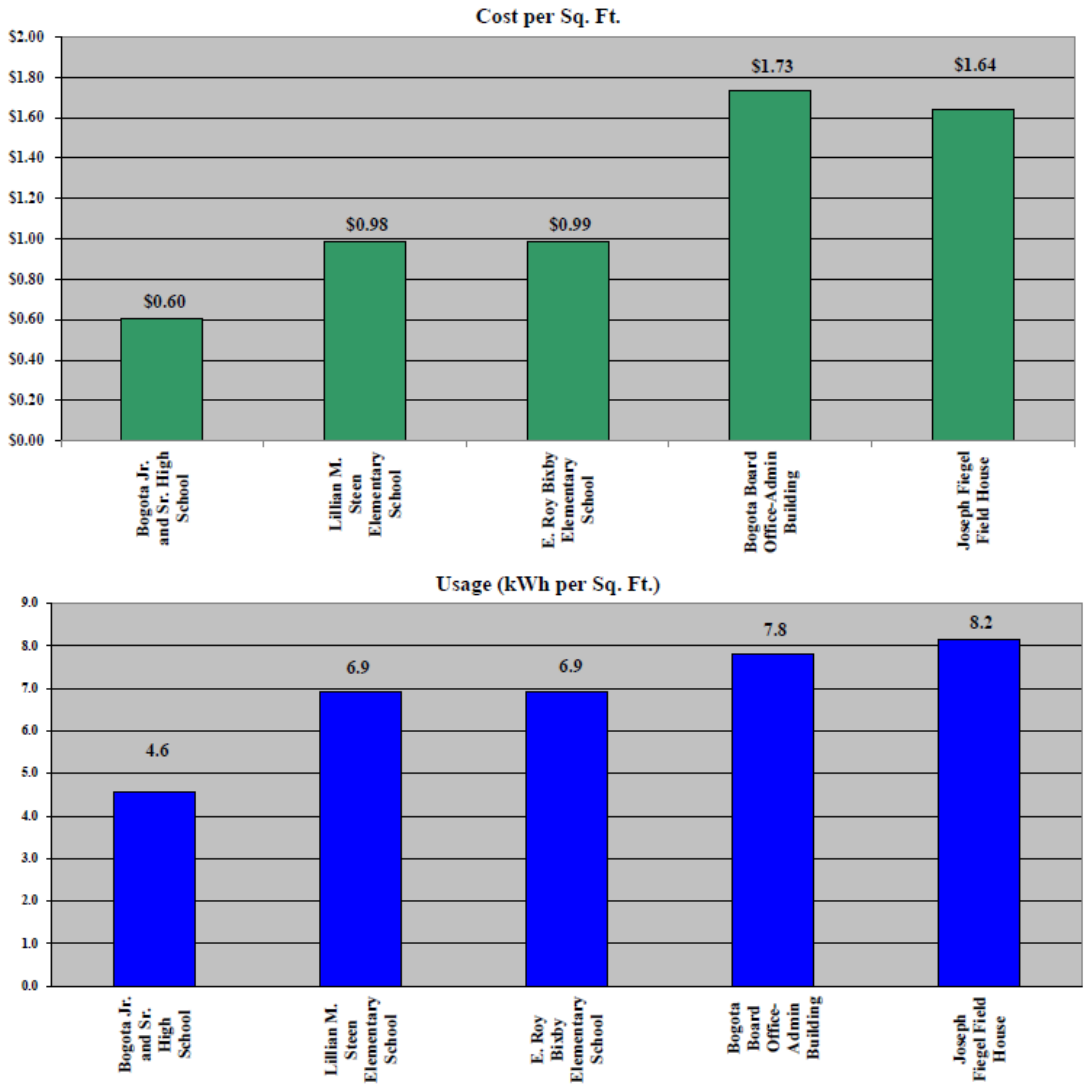
Utility Analysis
Electric

Square Footage Analysis



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

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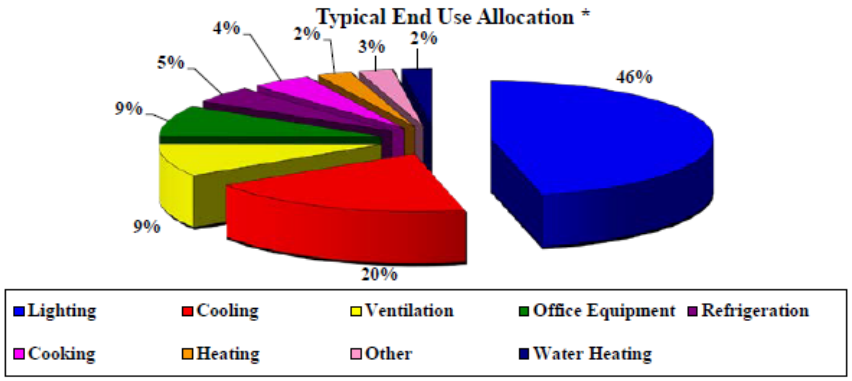
Utility Analysis
Electric

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	$68,608
Cooling	$29,044
Ventilation	$13,633
Office Equipment	$12,744
Refrigeration	$6,965
Cooking	$6,520
Heating	$3,705
Other	$3,705
Water Heating	$3,260
Your Total Cost April 2019 through March 2020	**$148,182**

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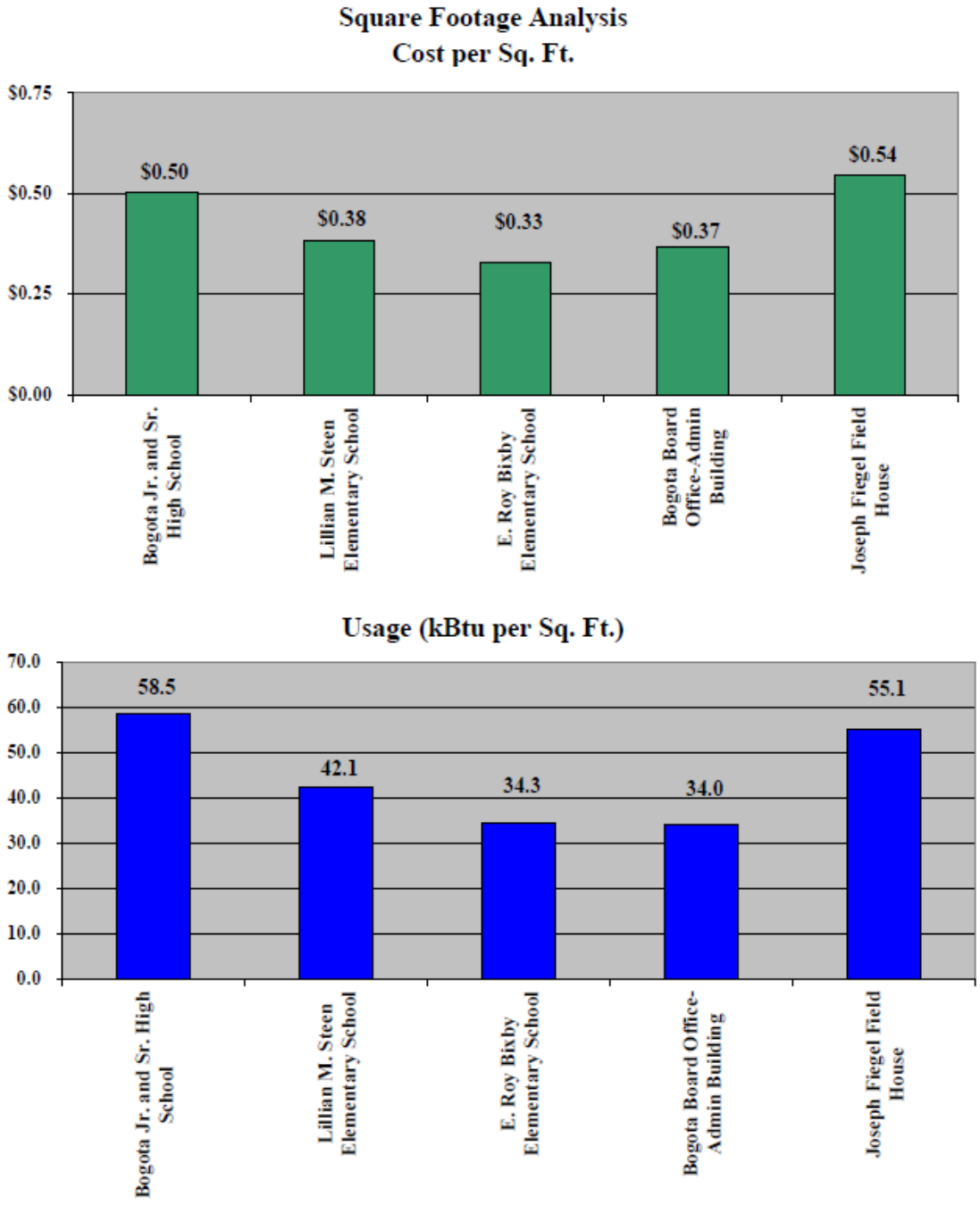
Utility Analysis
Natural Gas

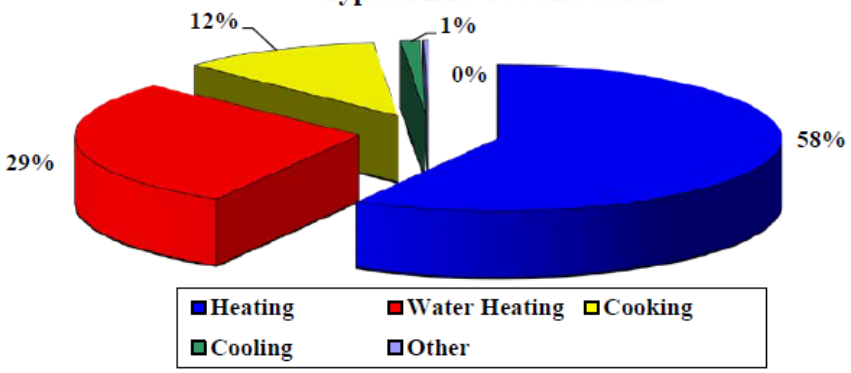


Note: Average kBTU/SF for School buildings in this climate zone is 46.1

Utility Analysis
Natural Gas

Sources of Usage
Natural Gas

Typical End Use Allocation *



**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 Cost**
Natural Gas

Heating	$45,965
Water Heating	$22,785
Cooking	$8,988
Cooling	$867
Other	$237
Your Total Cost April 2019 through March 2020	**$78,842**

Annual Emissions & Environmental Impact

Bogota Board of Education

April 2019 through March 2020

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	1,052,555	kWh
Annual Natural Gas usage	88,357.19	Therms

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

Annual Greenhouse Gas Emissions (Metric tons of equivalent of CO2)		
eCO2 (Electric)	744	MT
eCO2 (Gas)	467	MT
Total eCO2	1,210.116	MT

This is equivalent to one of the following:	
261	No. of passenger vehicles - annual greenhouse gas emissions
1580	No. of acres of U.S. forests - carbon sequestered annually

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Potential Retrofits

Retrofit Description	Utility/Fuel Type	Common Recommendations for Action
Lighting Retrofit and Motion Sensors	Electric/Natural Gas	Upgrade lighting and lighting controls
De-Stratification Fans	Electric/Natural Gas	Redistribution of Conditioned Air
Boiler Replacement	Natural Gas	Install high efficient, modular, condensing boilers
DHW Boiler/Tank Replacements	Electric/Natural Gas	Higher Efficiency Units
AC Unit Replacements	Electric	Higher Efficiency Units
RTU Replacements	Electric/Natural Gas	Higher Efficiency Units
Thermostatic Valve Replacement	Natural Gas	Set-back equipment, provide alarm capabilities and remote monitoring
Building Management System Upgrades	Electric/Natural Gas	Reduce equipment run-time and provide better comfort
Building Envelope Improvements	Electric/Natural Gas	Reduce building leakage
Roof Replacements	Electric/Natural Gas	Reduce building leakage
Computer Controllers	Electric	Put computers to sleep when building is unoccupied
Install Premium Efficient Motors/Variable Frequency Drives	Electric	Provide more efficient motors and variable frequency drives
Water Conservation	Electric/Natural Gas	Lower water consumption
Demand Response	Electric	Lower energy supply side consumption

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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 Bogota Public Schools. This report aims to be an assessment of the feasibility and cost effectiveness of such measures, and an indication of the potential for their implementation. The ECMs listed below 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.

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Energy Conservation Measures

ECM Description	Bogota Jr. and Sr. High School	Lillian M. Steen Elementary School	E. Roy Bixby Elementary School	Bogota Board Office-Admin Building	Joseph Fiegel Field
1A LED Lighting	■	■	■	■	■
1B Lighting Controls	■	■	■	■	
1C Destratification and Disinfection	■	■	■		
1D Plug Load Management	■	■	■	■	■
1E Vending Machine Controls	■				
2A Boiler Replacements	■				
2B Boiler Combustion Control		■	■		
2C Domestic Water Heater Replacement	■				
2D Rooftop Unit Replacement			■		
2E Split System Replacements		■	■		
2F Addition of Cooling	■				
2G Motors and VFDs		■	■		
2H Kitchen Hood Controls	■				
2I Refrigeration Controls	■				
2J Unit Ventilator Refurbishments	■	■	■		
2K Steam Trap Replacements	■				
2L Window AC Unit Replacements	■		■		
2M Convert Steam to Hot Water	■				
3A Building Management Control System	■	■	■		
3B Energy Optimization	■	■	■		
3C Plasma Ionization	■	■	■		
3D Demand Control Ventilation		■	■		
4A Building Envelope Improvements	■	■	■	■	■
4B Roof Sealing		■	■		
5A Combined Heat and Power (Cogeneration)	■				
6A Solar Power Purchase Agreement	■	■	■	■	■
7A Permanent Load Reduction	■	■	■	■	■
8A Low Flow DHW Devices	■	■	■		
9A Energy Education	■	■	■		
10A Computer Power Management	■	■	■	■	

ECMs Included in Recommended Project ■

ECMs Analyzed for Alternate Projects ■

Overview

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

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

REJECT AND ACCEPT MEASURES BASED ON

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

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

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

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

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

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

DEMAND SENSITIVE OPERATION

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

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

BENEFITS OF MECHANICAL IMPROVEMENTS

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

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

INDOOR AIR QUALITY

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

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

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ECM 1A — LED Lighting

The key benefits of this ECM include:

- Energy savings from reducing total energy consumption with more efficient, state of the art technology. Today's most efficient way of illumination and lighting has an estimated energy efficiency of 80%-90% when compared to traditional lighting and conventional light bulbs.
- Improved teacher and student performance from enhanced lighting quality that translates to an enhanced 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!

Building	1A LED Lighting Direct Install
Bogota Jr. and Sr. High School	■
Lillian M. Steen Elementary School	■
E. Roy Bixby Elementary School	■
Bogota Board Office-Admin Building	■
Joseph Fiegel Field	■

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 Bogota Jr. and Sr. High School

Existing Lighting at E. Roy Bixby Elementary School

Direct Install

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

Honeywell has identified all of the buildings are eligible for the Direct Install program and are part of the LED Lighting Solution.

LED Outdoor Lighting Upgrades

Existing Conditions

The District has various types of high-pressure sodium and metal halide wall pack fixtures, which are not as efficient as modern LED types.

Existing Outdoor Lighting at Lillian M. Steen Elementary School

Existing Outdoor Fixture at Lillian M. Steen Elementary School

Scope of Work

Outdoor Lighting

The exterior wall-packs fixtures 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 lamps.

Changes in Infrastructure

New LED lamps and fixtures will be installed as part of this ECM. Existing wall-packs 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.

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ECM 1B — Lighting Controls

The key benefits of this ECM include:

- **Energy savings** from reducing total energy consumption with more efficient, state of the art technology. Lighting controls reduce or eliminate reliance on occupants or staff to turn lights off when spaces are unoccupied by automatically turning lighting fixtures off thereby reducing electrical energy consumption.
- **Reduced maintenance and operational costs** by reducing the runtime of lighting system and components.

Building	1B Lighting Controls
Bogota Jr. and Sr. High School	■
Lillian M. Steen Elementary School	■
E. Roy Bixby Elementary School	■
Bogota Board Office-Admin Building	■
Joseph Fiegel Field	

Existing Conditions

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

Solution

Honeywell proposes the installation of occupancy-based lighting controls for interior spaces, and photo-controls for exterior lighting fixtures where none are currently installed. These controls will automatically control lighting systems based on either occupancy or outdoor light levels.

Lighting Control Space at Bogota Jr. and Sr. High School

Lighting Control Space at E. Roy Bixby Elementary School

Example of interior lighting sensor

Example of Exterior lighting sensor

Scope of Work

Lighting controls lower cost by adjusting light levels by occupancy, turning lights off when not needed.

Changes in Infrastructure

New lighting control devices will be installed as part of this ECM.

Customer Support and Coordination with Utilities

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

Environmental Issues

Resource Use	Energy savings will result from reduced electric energy usage. A slight increase in heating energy is resultant from the reduced heat output from lighting that is turned off.
Waste Production	Proper disposal of any waste generated.
Environmental Regulations	No environmental impact is expected.

ECM 1C — Destratification and Disinfection

The key benefits of this ECM include:

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

Building	1C Destratification and Disinfection
Bogota Jr. and Sr. High School	■
Lillian M. Steen Elementary School	■
E. Roy Bixby Elementary School	■
Bogota Board Office-Admin Building	
Joseph Fiegel Field	

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.

Bogota Jr. and Sr. High School

Lillian M. Steen Elementary School

Proposed Solution

In areas with 10^{+} foot ceiling heights, there is approximately a $15°F^{+}$ temperature difference between the floor and the ceiling. With higher ceilings, it is even greater. That means to generate the heat necessary to maintain a comfortable 70°F temperature at the floor level, where student activities occur, the ceiling could be 85°F or higher.

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

Systems Evaluation and Selection

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

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

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

School	Location	Type	Qty	Type	Qty
Bogota Jr. and Sr. High School	Gym	Air Pear 25	2	PureAir 25	4
Bogota Jr. and Sr. High School	Weight Room	Air Pear 15		PureAir 15	2
Bogota Jr. and Sr. High School	Wrestling	Air Pear 15		PureAir 15	4
Lillian M. Steen Elementary School	Multi-Purpose	Air Pear 25	1	PureAir 25	3
E. Roy Bixby Elementary School	Multi-Purpose	Air Pear 25	1	PureAir 25	1
Total					18

Proposed De-Stratification Fans

Scope of Work

Per De-Stratification Fan:

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

Changes in Infrastructure

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

Customer Support and Coordination with Utilities

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

Environmental Issues

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

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ECM 1D — Plug Load Management

The key benefits of this ECM include:

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

Building	1D Plug Load Management
Bogota Jr. and Sr. High School	■
Lillian M. Steen Elementary School	■
E. Roy Bixby Elementary School	■
Bogota Board Office-Admin Building	■
Joseph Fiegel Field	■

Existing Conditions

The District is equipped with a host of equipment and devices. A byproduct of the electronic devices such as printers, projectors, televisions, and window air conditioning units are their phantom load. Phantom load refers to energy that is used when a device is off. This includes energy used by TV's and copiers when they're in standby mode (i.e. when they can be turned on with a remote), and energy used by chargers or a laptop's AC adapter. Studies estimate that phantom load now accounts for 6% of all energy use. This measure will address energy waste due to phantom loads in your buildings.

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

Plug Load – E. Roy Bixby Elementary School

Plug Load: - Bogota Board Office-Admin Building

Device	Wattage
Large Copiers	30
Small Printers / Copiers	20
Monitor Combos (Printer)	30
Laptop Charging Carts	35
Projectors	21
Water Fountains	6
Coffee Machines	60
Hot / Cold Water Machines	60
Smart Boards	20
Window ACs	100

Electrical Draw per Typical Device

Proposed Solution

Honeywell proposes to install plug load management devices to provide a comprehensive solution to the device control dilemma, by using an existing Wi-Fi network. This computer-based system is designed to allow you to program or control your devices with a customizable schedule. These plugs are a switch that stops all electrical power to the device, turning off equipment and eliminating phantom loads, and are a proven technology with a high degree of reliability and security.

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

Energy Savings Methodology and Results

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

Changes in Infrastructure

None.

Customer Support and Coordination

None.

Environmental Issues

Resource Use	Energy savings come from reduced operating time of controlled equipment.
Waste Production	Proper disposal of any waste generated.
Environmental Regulations	No environmental impact is expected.

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ECM 1E — Vending Machine Controls

The key benefits of this ECM include:

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

Building	1E Vending Machine Controls
Bogota Jr. and Sr. High School	■
Lillian M. Steen Elementary School	
E. Roy Bixby Elementary School	
Bogota Board Office-Admin Building	
Joseph Fiegel Field	

Multiple vending machines were observed in Bogota Jr. and Sr. High School. As such, Honeywell has investigated the use of vending machine misers for these areas.

Existing Conditions

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

Bogota Jr. and Sr. High School – Vending Machine

Bogota Jr. and Sr. High School Vending Machine

Building	Type	Qty	Location
Bogota Jr. and Sr. High School	Cold Beverage	1	Cafeteria
Bogota Jr. and Sr. High School	Cold Beverage	1	Faculty Dining
Total		**2**	

Proposed Vending Machines for Vending Miser Controls

Proposed Solution

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

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

Interface with Existing Equipment

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

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

Changes in Infrastructure

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

Customer Support and Coordination with Utilities

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

Environmental Issues

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

ECM 2A — Boiler Replacements

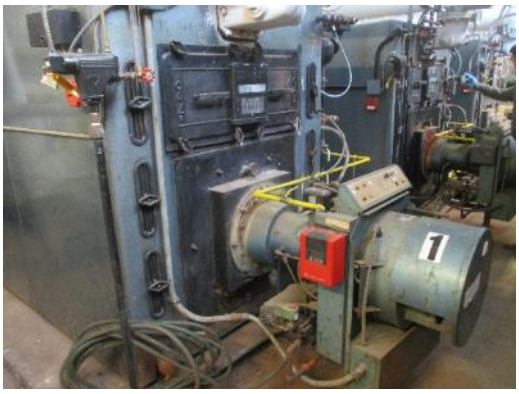
The key benefits of this ECM include:

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

Building	2A Boiler Replacements
Bogota Jr. and Sr. High School	■
Lillian M. Steen Elementary School	
E. Roy Bixby Elementary School	
Bogota Board Office-Admin Building	
Joseph Fiegel Field	

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 Steam Boilers.



Boilers – Bogota Jr. and Sr. High School

Boilers – Bogota Jr. and Sr. High School

Building	Type	Manufacturer	Model	Qty*	Input (MBH)	Fuel
Bogota Jr. and Sr. High School	Steam	Weil McLain	HR-1492SN	3	3,084	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. The existing steam boilers will be replaced with new higher efficiency units, which will still operate at 5% 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 and will take into account the existing system sizing and level of redundancy.

Building	Type	Manufacturer	Model	Qty	Output (MBH)	Fuel
Bogota Jr. and Sr. High School	Steam	HB Smith	28HE-S-10	3	1,951	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 panelboard.
2. Remove existing boilers.
3. Install new boilers.
4. Connect gas and heating steam 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.

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 Combustion Control

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.

Building	2B Boiler Combustion Control
Bogota Jr. and Sr. High School	
Lillian M. Steen Elementary School	■
E. Roy Bixby Elementary School	■
Bogota Board Office-Admin Building	
Joseph Fiegel Field	

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 – E. Roy Bixby Elementary School

Burner Controls – Lillian M. Steen Elementary School

Building	Type	Manufacturer	Model	Qty	Input (MBH)	Fuel
Lillian M. Steen Elementary School	Hot Water	HB Smith	28HE-7	2	2,088	NG
E. Roy Bixby Elementary School	Hot Water	HB Smith	28HE-SW	2	2,718	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.

Combustion Controls

Combustion controls bring 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:

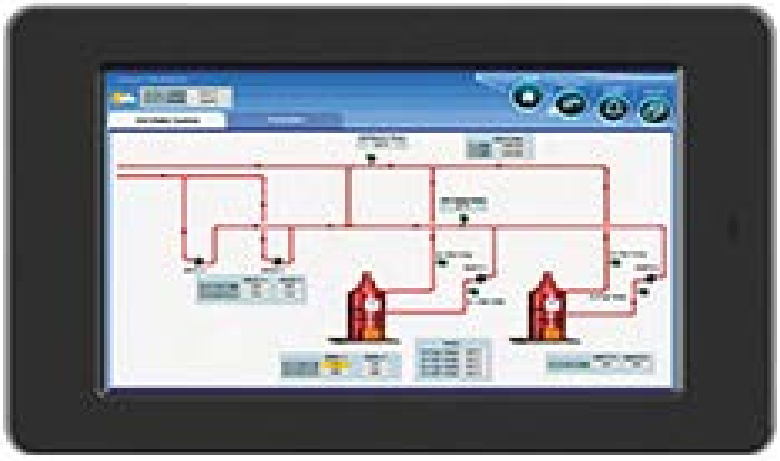
- Disconnect electrical and gas from existing boiler burner.
- Install new burner controls on existing burner (where applicable).
- Start up, commissioning and operator training.

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 Water Heater Replacement

The key benefits of this ECM include:

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

Building	2C Domestic Water Heater Replacement
Bogota Jr. and Sr. High School	■
Lillian M. Steen Elementary School	
E. Roy Bixby Elementary School	
Bogota Board Office-Admin Building	
Joseph Fiegel Field	

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.

DHW – Bogota Jr. and Sr. High School

DHW - Bogota Jr. and Sr. High School

Building	Qty	Manf.	Model	MBH	Storage (Gal)	Fuel
Bogota Jr. and Sr. High School	1	AO Smith	Burkay	670	119	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	MBH	Storage (Gal)	Fuel
Bogota Jr. and Sr. High School	1	Lochinvar	AWN-701PN	700	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 — Roof Top Unit Replacement

The key benefits of this ECM include:

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

Building	2D Roof Top Unit Replacement
Bogota Jr. and Sr. High School	
Lillian M. Steen Elementary School	
E. Roy Bixby Elementary School	■
Bogota Board Office-Admin Building	
Joseph Fiegel Field	

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.

RTU – E. Roy Bixby Elementary School

RTU – E. Roy Bixby Elementary School

Building	Make	Model	Location Served	Tons	Qty.
E. Roy Bixby Elementary School	York	DL-10C00NTAAA3C	Multi-Purpose Room	10	1

Existing Rooftop Units to be Replaced

Proposed Solution

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

Building	Make	Model	Location Served	Tons	Qty.
E. Roy Bixby Elementary School	Trane	YHC120	Multi-Purpose Room	10	1

Proposed Rooftop Unit

Scope of Work

The following outlines the scope of work to install the rooftop unit 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 unit. 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 cutsheets 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 unit.
Waste Production	Existing unit scheduled for removal will be disposed of properly.
Environmental Regulations	No environmental impact is expected.

ECM 2E — 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.

Building	2E Split System Replacements
Bogota Jr. and Sr. High School	
Lillian M. Steen Elementary School	■
E. Roy Bixby Elementary School	■
Bogota Board Office-Admin Building	
Joseph Fiegel Field	

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 Unit – Lillian M. Steen Elementary School

Split Units – E. Roy Bixby Elementary School

Building	Make	Model	Qty.	Area Served	Tons
E. Roy Bixby Elementary School	Trane	HS26-060-4P	1	B18 Preschool Disabled Classroom	5.0
E. Roy Bixby Elementary School	*Lennox*	*13ACXN048-230-23*	*1*	*B19 2nd Grade Classroom*	*4.0*
E. Roy Bixby Elementary School	Lennox	HS26-048-5P	1	B22 Pre-K Classroom	4.0
Lillian M. Steen Elementary School	Lennox	HS26-060-4P	1	Computer Lab	5.0
Lillian M. Steen Elementary School	Lennox	HS29-120-3Y	1	Media Center	10.0

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
E. Roy Bixby Elementary School	Trane	4TTR5060E	1	B18 Preschool Disabled Classroom	5.0
E. Roy Bixby Elementary School	Trane	4TTR5048E	1	B19 2nd Grade Classroom	4.0
E. Roy Bixby Elementary School	Trane	4TTR5048E	1	B22 Pre-K Classroom	4.0
Lillian M. Steen Elementary School	Trane	4TTR5060E	1	Computer Lab	5.0
Lillian M. Steen Elementary School	Trane	TTA1204	1	Media Center	10.0

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

Customer Support and Coordination with Utilities

Coordination of the electrical tie-in will be required.

Environmental Issues

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

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ECM 2F — Addition of Cooling

The key benefits of this ECM include:

- **Comfort** from air conditioning installation.
- **Equipment longevity** due to more efficient and less wasteful equipment utilization.

Building	2F Addition of Cooling
Bogota Jr. and Sr. High School	■
Lillian M. Steen Elementary School	
E. Roy Bixby Elementary School	
Bogota Board Office-Admin Building	
Joseph Fiegel Field	

Existing Conditions

Honeywell and the district have identified several schools 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.

Bogota Jr. and Sr. High School

Bogota Jr. and Sr. High School

Proposed Locations for VRF Systems

Proposed Solution

Honeywell proposes installing high efficiency Variable Refrigerant Flow (VRF) heat pump units at these schools to add cooling to classrooms and offices.

Building	Make	Type	Location*	QTY	Total Tons
Bogota Jr. and Sr. High School	Trane	SSHL*244	Auditorium & Stage	2	24.0
Bogota Jr. and Sr. High School	Trane	Y-Series: PUHY-P	CR 6-19, 23-28, 30-36,41	1	96.0
Bogota Jr. and Sr. High School	Trane	Y-Series: PUHY-P	CR1,43, 29,42,40, WSR	1	22.0
Bogota Jr. and Sr. High School	Trane	Y-Series: PUHY-P	Music Classroom	1	8.0
Bogota Jr. and Sr. High School	Trane	Y-Series: PUHY-P	Guidance Suite	1	4.0
Bogota Jr. and Sr. High School	Trane	Y-Series: PUHY-P	Library	1	21.0
Bogota Jr. and Sr. High School	Trane	Y-Series: PUHY-P	Cafeteria	1	20.0
Bogota Jr. and Sr. High School	Trane	Y-Series: PUHY-P	Faculty Dining	1	5.0
Bogota Jr. and Sr. High School	Trane	Y-Series: PUHY-P	CST Office	1	4.0
Bogota Jr. and Sr. High School	Trane	Y-Series: PUHY-P	Main Office Suite	1	7.0

Building	Make	Type	Location*	QTY	Total Tons
Bogota Jr. and Sr. High School	Trane	Y-Series: PUHY-P	Nurse's Suite	1	2.0
Bogota Jr. and Sr. High School	Trane	Y-Series: PUHY-P	Special Services Suite	1	3.0
Bogota Jr. and Sr. High School	Trane	Y-Series: PUHY-P	Tech Office	1	1.0
Bogota Jr. and Sr. High School	Trane	Y-Series: PUHY-P	Work Room	1	3.0

Proposed Cooling Systems

*Alternate – Due to long payback, only Auditorium & Stage and Cafeteria Areas recommended at this time.

Scope of Work

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

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

Equipment Information

Manufacturer and Type	Several quality and cost-effective manufacturers are available. Honeywell and the customer will determine final selections.
Equipment Identification	Product cutsheets 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 2G — Motors and VFDs

The key benefits of this ECM include:

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

Building	2G Motors and VFDs
Bogota Jr. and Sr. High School	
Lillian M. Steen Elementary School	■
E. Roy Bixby Elementary School	●
Bogota Board Office-Admin Building	
Joseph Fiegel Field	

ECM Overview

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

Motors – E. Roy Bixby Elementary School

Motors – Lillian M. Steen Elementary School

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
Lillian M. Steen Elementary School	Heating Hot Water Pump	2	20	Y	Y
E. Roy Bixby Elementary School	Heating Hot Water Pump	2	20	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 unit ventilators with two-way valves (provided that unit ventilators located at end of piping branches are fitted with three-way valves to keep hot water moving through the distribution piping at all times).

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

Energy Savings Methodology and Results

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

Equipment Information

Manufacturer and Type	Several quality and cost-effective manufacturers are available.
Equipment Identification	Product cutsheets 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 2H — 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.

Building	2H Kitchen Hood Controls
Bogota Jr. and Sr. High School	■
Lillian M. Steen Elementary School	
E. Roy Bixby Elementary School	
Bogota Board Office-Admin Building	
Joseph Fiegel Field	

Existing Conditions

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

Kitchen Hood – Bogota Jr. and Sr. High School

Kitchen Hood – Bogota Jr. and Sr. High School

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	Kitchen Hood Area (sq. ft.)
Bogota Jr. and Sr. High School	70

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 2I — Refrigeration 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.

Building	2I Refrigeration Controls
Bogota Jr. and Sr. High School	■
Lillian M. Steen Elementary School	
E. Roy Bixby Elementary School	
Bogota Board Office-Admin Building	
Joseph Fiegel Field	

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 Refrigerator – Bogota Jr. and Sr. High School

Walk In Freezer – Bogota Jr.a nd Sr. High School

Building	Location	Walk-In Refrigerators	Walk-In Freezers
Bogota Jr. and Sr. High School	Kitchen	1	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 2J — Unit Ventilator Refurbishments

The key benefits of this ECM include:

- **Reduced energy usage** from improved equipment efficiency resulting from refurbishment of the existing unit ventilators.
- **Lower operational costs** through less frequent maintenance and operational issues.

Building	2J Unit Ventilator Replacements/Refurbishments
Bogota Jr. and Sr. High School	■
Lillian M. Steen Elementary School	■
E. Roy Bixby Elementary School	■
Bogota Board Office-Admin Building	
Joseph Fiegel Field	

Existing Conditions

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

Unit Vent Refurbisment– Bogota Jr.and Sr. High School

Unit Vent Replacement– Bogota Jr.and Sr. High School

Building	Location	Replace	Refurbish
Bogota Jr. and Sr. High School	RM 34	■	
Bogota Jr. and Sr. High School	RM 33	■	
Bogota Jr. and Sr. High School	RM 27	■	
Bogota Jr. and Sr. High School	RM 26	■	
Bogota Jr. and Sr. High School	RM 24	■	
Bogota Jr. and Sr. High School	RM 35	■	
Bogota Jr. and Sr. High School	RM 25		■
Bogota Jr. and Sr. High School	RM 19		■
Bogota Jr. and Sr. High School	RM 18		■
Bogota Jr. and Sr. High School	RM 11		■
Bogota Jr. and Sr. High School	RM 10		■
Bogota Jr. and Sr. High School	RM 23		■

Building	Location	Replace	Refurbish
Bogota Jr. and Sr. High School	RM 36		■
Bogota Jr. and Sr. High School	RM 43		■
Bogota Jr. and Sr. High School	RM 32		■
Bogota Jr. and Sr. High School	RM 31		■
Bogota Jr. and Sr. High School	RM 29		■
Bogota Jr. and Sr. High School	RM 28		■
Bogota Jr. and Sr. High School	RM 42		■
Bogota Jr. and Sr. High School	Music Classroom		■
Bogota Jr. and Sr. High School	RM 9		■
Bogota Jr. and Sr. High School	RM 7		■
Bogota Jr. and Sr. High School	RM 6		■
Bogota Jr. and Sr. High School	RM 17		■
Bogota Jr. and Sr. High School	RM 16		■
Bogota Jr. and Sr. High School	RM 15		■
Bogota Jr. and Sr. High School	RM 40		■
Bogota Jr. and Sr. High School	Guidance Suite		■
Bogota Jr. and Sr. High School	RM 14		■
Bogota Jr. and Sr. High School	RM 13		■
Bogota Jr. and Sr. High School	RM 12		■
Bogota Jr. and Sr. High School	Cafeteria		■
Bogota Jr. and Sr. High School	Faculty Dining		■
Lillian M. Steen Elementary School	28 Units*		
E. Roy Bixby Elementary School	25 Units*		

Existing Unit Ventilators to be Replaced/Refurbished

****E. Roy Bixby Elementary School and Lillian M. Steen Elementary School Unit Ventilators – Audited no action recommended at this time***

Proposed Solution

Honeywell proposes to refurbish the existing unit ventilators with new components.

Scope of Work

The following outlines the unit ventilator refurbishments:

1. Install new unit vent components and reconnect, steam, hot water and electric.
2. 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 Unit Vent Efficiency	= Heat Input x Existing Efficiency
Proposed Unit Vent 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 ventilator components 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 ventilator components 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 efficiency, reduced maintenance costs and control.
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 2K — Steam Trap Replacements

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

Building	2K Steam Trap Replacements
Bogota Jr. and Sr. High School	■
Lillian M. Steen Elementary School	
E. Roy Bixby Elementary School	
Bogota Board Office-Admin Building	
Joseph Fiegel Field	

Existing Conditions

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

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

Steam Trap - Bogota Jr. and Sr. High School

Steam Trap – Bogota Jr. and Sr. High School

Building	Mechanical Steam Trap - Replacement	Thermostatic Steam Trap - Replacement	Thermostatic Steam Trap - Rebuild
Bogota Jr. and Sr. High School	52	11	102

Steam Trap Scope of Work

Proposed Solution

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

Energy Savings Methodology and Results

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

We have estimated the steam losses based on a conservative figure of 12.5% leaking. Failure rates are based on sample testing of the steam trap population. In determining steam losses, the trap orifices and steam pressures have been grouped and averaged to create a simpler statistical basis.

Equipment Information

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

Customer Support and Coordination with Utilities

Coordination of the trap installation.

Environmental Issues

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

ECM 2L — Window AC Unit Replacements

The key benefits of this ECM include:

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

Building	2L Window AC Unit Replacements
Bogota Jr. and Sr. High School	■
Lillian M. Steen Elementary School	
E. Roy Bixby Elementary School	■
Bogota Board Office-Admin Building	
Joseph Fiegel Field	

Existing Conditions

Honeywell identified some window air conditioning 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.

Window AC Units – Bogota Jr. and Sr. High School

Window AC Unit – Bogota Jr. and Sr. High School

Building	Qty.	Location	Area Served	Tons
Bogota Jr. and Sr. High School	1	43	Business Internship CR	2
Bogota Jr. and Sr. High School	1	42	Computer Room	2
Bogota Jr. and Sr. High School	1	40	BCC Classroom	2
Bogota Jr. and Sr. High School	1	Faculty Dining	Faculty Dining	2
Bogota Jr. and Sr. High School	1	Kitchen Office	Kitchen Office	0.5
Bogota Jr. and Sr. High School	1	29	Biology Classroom	2
Bogota Jr. and Sr. High School	1	Workshop Room	Utilities Room Office	0.75
Bogota Jr. and Sr. High School	1	Main Office Suite	Main Office Suite	2
Bogota Jr. and Sr. High School	1	Nurse's Suite	Nurse's Suite	0.75
Bogota Jr. and Sr. High School	1	1	Classroom	2
Bogota Jr. and Sr. High School	1	CST Office	Office/Special Services/Conf	0.67
Bogota Jr. and Sr. High School	1	CST Office	Office/Special Services/Conf	2
Bogota Jr. and Sr. High School	2	Special Services	Offices/Special Services Suite	0.75

Building	Qty.	Location	Area Served	Tons
Bogota Jr. and Sr. High School	3	Guidance Suite	Guidance Office Suite	0.75
Bogota Jr. and Sr. High School	4	Main Office Suite	Main Office Suite	0.75
E. Roy Bixby Elementary School	1	107	Nurse	1
E. Roy Bixby Elementary School	1	B02	Faculty Room	1.5

Existing Window AC Units to be Replaced

Proposed Solution

Honeywell proposes replacing the existing window air conditioning units in the table above. The new ***Frigidaire*** units will be installed in the same location as the existing units.

Building	Qty.	Location	Area Served	Tons
Bogota Jr. and Sr. High School	1	43	Business Internship CR	2
Bogota Jr. and Sr. High School	1	42	Computer Room	2
Bogota Jr. and Sr. High School	1	40	BCC Classroom	2
Bogota Jr. and Sr. High School	1	Faculty Dining	Faculty Dining	2
Bogota Jr. and Sr. High School	1	Kitchen Office	Kitchen Office	0.5
Bogota Jr. and Sr. High School	1	29	Biology Classroom	2
Bogota Jr. and Sr. High School	1	Workshop Room	Utilities Room Office	0.75
Bogota Jr. and Sr. High School	1	Main Office Suite	Main Office Suite	2
Bogota Jr. and Sr. High School	1	Nurse's Suite	Nurse's Suite	0.75
Bogota Jr. and Sr. High School	1	1	Classroom	2
Bogota Jr. and Sr. High School	1	CST Office	Office/Special Services/Conf	0.67
Bogota Jr. and Sr. High School	1	CST Office	Office/Special Services/Conf	2
Bogota Jr. and Sr. High School	2	Special Services	Offices/Special Services Suite	0.75
Bogota Jr. and Sr. High School	3	Guidance Suite	Guidance Office Suite	0.75
Bogota Jr. and Sr. High School	4	Main Office Suite	Main Office Suite	0.75
E. Roy Bixby Elementary School	1	107	Nurse	1
E. Roy Bixby Elementary School	1	B02	Faculty Room	1.5

Proposed Window AC Units

Scope of Work

The following outlines the scope of work to install the window air conditioning units listed in the table above.

- Disconnect existing electric connections.
- Remove existing unit.
- Set new unit.
- Connect electric power.
- Start up and commissioning of new unit.
- Maintenance operator(s) training.

Energy Savings Methodology and Results

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

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

Equipment Information

Manufacturer and Type	Several quality and cost-effective manufacturers are available. Honeywell and the customer will determine final selections.
Equipment Identification	Product cutsheets 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 efforts will be needed to reduce or limit impact to building occupants.

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.

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ECM 2M — Convert Steam to Hot Water

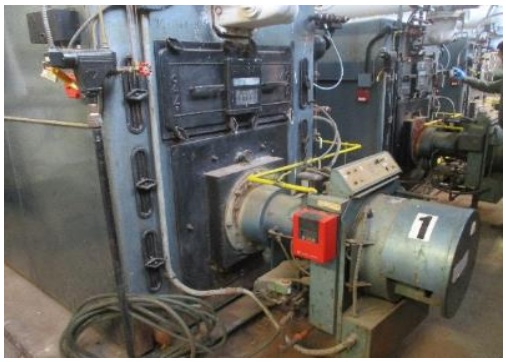
The key benefits of this ECM include:

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

Building	2M Convert Steam to Hot Water
Bogota Jr. and Sr. High School	■
Lillian M. Steen Elementary School	
E. Roy Bixby Elementary School	
Bogota Board Office-Admin Building	
Joseph Fiegel Field	

Existing Conditions

The Bogota Jr. and Sr. High School steam boilers within the District are near or past the end of their useful life and are less efficient compared to new, condensing hot water boilers.



Boilers – Bogota Jr. and Sr. High School

Boilers – Bogota Jr. and Sr. High School

Building	Type	Manufacturer	Model	Qty*	Input (MBH)	Fuel
Bogota Jr. and Sr. High School	Steam	Weil McLain	HR-1492SN	3	3,084	NG

Existing Boilers

Proposed Solution

It is recommended that the boilers listed in the table above be replaced with new, condensing hot water boilers operating at higher efficiency listed in table below. The existing steam boilers will be replaced with new higher efficiency condensing hot water units. New boiler sizes and quantities will be based on the heat load of the building with redundancy and will consider the existing system sizing and level of redundancy.

Building	Type	Manufacturer	Model	Qty	Output (MBH)	Fuel
Bogota Jr. and Sr. High School	Hot Water	Aerco	BMK-2000	3	2,000	NG

Proposed Boiler Equipment

Scope of Work

The following outlines the equipment replacement:

1. Disconnect gas back to shutoff valve and electric back to source panelboard.
2. Remove existing boilers, steam piping, unit ventilators.
3. Install new boilers, heating hot water piping and unit ventilators.
4. Connect gas and heating hot water appurtenances to new boilers.
5. Terminate and power new equipment 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.

O&M Impact

The new boilers will decrease the O&M cost for maintaining the boilers and steam piping system.

Customer Support and Coordination with Utilities

Support will be required for the interruption of utilities for 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 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 3A — Building Management Control System

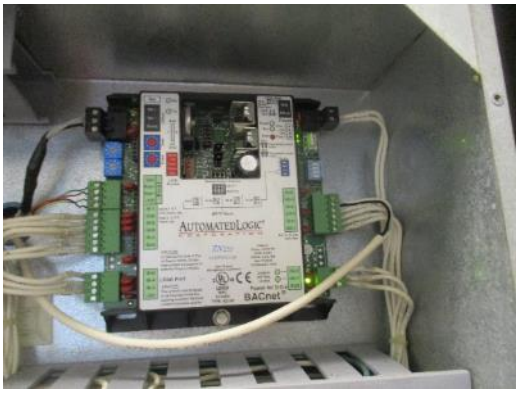
The key benefits of this ECM include:

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

Building	3A Building Management Control System
Bogota Jr. and Sr. High School	■
Lillian M. Steen Elementary School	■
E. Roy Bixby Elementary School	■
Bogota Board Office-Admin Building	
Joseph Fiegel Field	

Existing Conditions

The currently installed Building Management Systems consist of a mismatched collection of antiquated pneumatic and direct digital controls (DDC) collection of various manufacturers, operating independently from one another. Historically, the buildings utilized a pneumatic control system, over the years, some systems were converted to various iterations of a direct digital system. Additional renovations subsequently converted some of the building to stand-alone proprietary DDC controls. The existing direct digital control systems installed are utilizing proprietary based programming that is severely limited in its capabilities to provide the functionality required by the facility's operational personnel. The various buildings' BMS systems only communicate within the existing DDC nodes by a protocol that is not utilized, nor standard, in the building automation industry.



Existing Controls – E. Roy Bixby Elementary School

Existing Controls – Bogota Jr. and Sr. High School

Proposed Conditions

Due to the incompatibility of the various systems to interact with one another, a unified open protocol control system utilizing the Niagara platform communicating with the BACnet protocol is proposed. Coupled with the availability of obtaining the replacement and service of the proposed system through multiple commercial channels, the new BMS will also provide an additional benefit of an Open Source

solution. This feature unleashes the District from obtaining support only from a single source and allows the District to obtain support readily available multiple sources.

District Building Management System Infrastructure

1. Provide one centralized Archival server for collection of the District's individual building data.
2. Provide one Niagara Supervisor for coordinating the District's site Building Management Systems.
3. Provide for each site a customized district, site and equipment 3-dimensional web-based graphic interface with expansion capabilities for future installations.
4. Provide alarming, trending of the District's connected Niagara site.

Bogota Jr. and Sr. High School

1. Provide a new Honeywell (WEBs) 8000 Supervisory Network Controller, enclosure (NEM1) and control power transformer. New network communications wiring between the new BMS DDC controllers.
2. Provide control of the (1) Central Hot Water System:
   a. New enable and status relays for the hot water boiler control panel.
   b. New pressure sensors for the heating system.
   c. New temperature sensor for outside air control.
3. Provide day-night zone for the existing pneumatic zones.

Lillian M. Steen Elementary School

1. Provide a new Honeywell (WEBs) 8000 Supervisory Network Controller, enclosure (NEM1) and control power transformer.
2. Integrate the existing systems to a unified Graphical User Interface (existing controls and devices to remain)
   a. (1) Central Hot Water System
   b. (2) Roof Top Units
   c. (9) Air Conditioning Split-System Units
   d. (11) Cabinet Unit Heaters
   e. (28) Unit Ventilators
   f. (13) Exhaust Fans

E. Roy Bixby Elementary School

1. Provide a new Honeywell (WEBs) 8000 Supervisory Network Controller, enclosure (NEM1) and control power transformer.
2. Integrate the existing systems to a unified Graphical User Interface (existing controls and devices to remain).
   a. (1) Central Hot Water System
   b. (8) Air Conditioning Split-System Units
   c. (9) Cabinet Unit Heaters
   d. (25) Unit Ventilators
   e. (5) Mini-Split PTACs with BMS DDC space temperature sensors.
   f. (13) Exhaust Fans

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 — Energy Optimization

The key benefits of this ECM include:

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

Building	3B Energy Optimization
Bogota Jr. and Sr. High School	■
Lillian M. Steen Elementary School	■
E. Roy Bixby Elementary School	■
Bogota Board Office-Admin Building	
Joseph Fiegel Field	

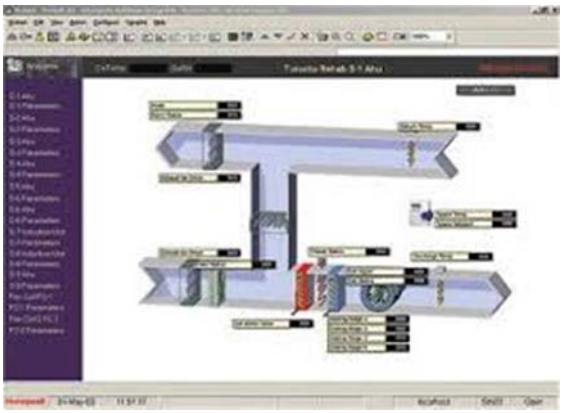
Existing Conditions

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

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

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

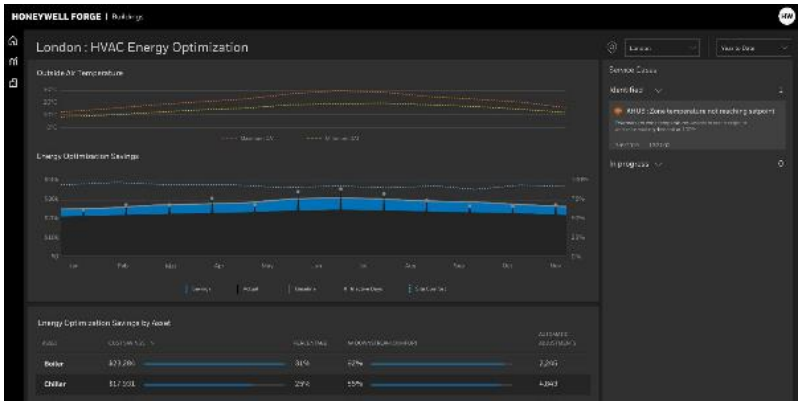
Advanced machine learning calculates occupancy and weather data to optimize set-points every 15-minutes.

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. With Energy Optimization we have demonstrated that we can use the latest self-learning algorithms.

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 — Plasma Ionization

The key benefits of this ECM include:

- **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.

Building	3C Plasma Ionization
Bogota Jr. and Sr. High School	■
Lillian M. Steen Elementary School	■
E. Roy Bixby Elementary School	■
Bogota Board Office-Admin Building	
Joseph Fiegel Field	

Existing Conditions

There are many unit ventilator 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 (IAQ).

Existing Equipment – Lillian M. Steen Elementary School

Existing Equipment – E. Roy Bixby Elementary Schooll

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 volatile organic compounds (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.

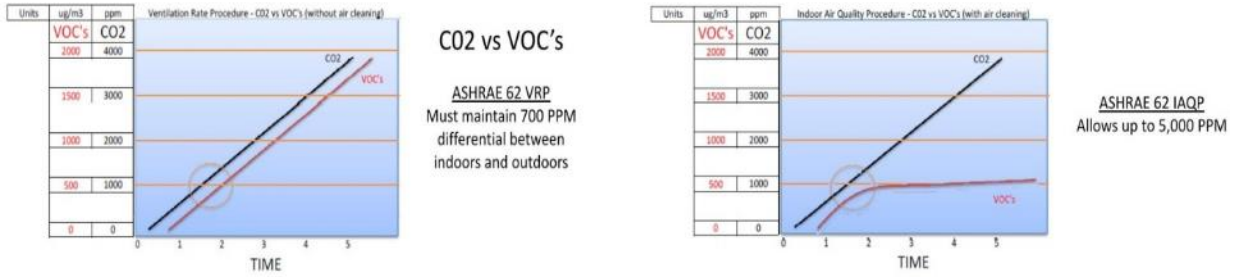

Figure VRP vs. IAQP CO_2 Concentrations

In addition to reduced outside air load on a building's HVAC systems, there are several 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

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.

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.

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.

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. 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.

Building	Locations
Bogota Jr. and Sr. High School	Auditorium, Gym, Weight Room and Library
Lillian M. Steen Elementary School	Multi-Purpose Room, Media Center and Resource Room
E. Roy Bixby Elementary School	Multi-Purpose Room

Proposed Units for Cold Plasma Ion Systems

Scope of Work

Furnish and install cold plasma ion systems on the unit ventilator systems as listed in table above.

- Furnish and install ionization air cleaning system on the systems identified in table above.
- Provide power for the ionization unit by tapping the 120VAC power to the unit.
- Ionization unit to be installed in mixed air stream above filter.
- Reset unit outside air dampers to provide reduced outside air volume.
- Furnish and install two VOC sensors in representative locations in the building. Sensors shall be connected 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	Honeywell and the Customer will determine final selections.
Equipment Identification	Product cutsheets 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.

ECM 3D — Demand Control Ventilation

The key benefits of this ECM include:

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

Building	3D Demand Control Ventilation
Bogota Jr. and Sr. High School	
Lillian M. Steen Elementary School	■
E. Roy Bixby Elementary School	■
Bogota Board Office-Admin Building	
Joseph Fiegel Field	

Existing Conditions

HVAC equipment serving large one-zone spaces such as gyms, auditoriums and multi-purpose rooms are often designed for peak occupancy conditions to supply outside air to the space with return air from space being exhausted. Most of the time these spaces are not fully occupied, which increase energy demand for heating and cooling of excessive amount of outside air.

E. Roy Bixby Elementary School Multi-Purpose Room

Lillian M. Steen Elementary School Multi-Purpose Room

Proposed Solution

Honeywell will install CO_2 sensors at the below locations. The CO_2 sensors will provide the control signal for the HVAC equipment to optimize the quantity of fresh air required. The installation of CO_2 sensors will read the levels of CO_2 in the space and ensure that only the required outside air is supplied and heated to meet the minimum outdoor air requirements. This control strategy will reduce the amount of outside air intake and thus reduce the heating energy used by the HVAC units and electric energy used by the motors. Based on this fact, there are reduced requirements for outside air to the spaces.

Building	Area Served	Number of Units	CFM Total (est. each)
Lillian M. Steen Elementary School	Multi-Purpose Room	2	4,000
E. Roy Bixby Elementary School	Multi-Purpose Room	1	4,000

Existing Units to be installed with CO_2 sensors

Energy Savings Methodology and Results

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

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

The baseline adjustment calculations are included with the energy calculations.

Changes in Infrastructure

None.

Customer Support and Coordination with Utilities

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

Environmental Issues

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

ECM 4A — Building Envelope Improvements

The key benefits of this ECM include:

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

Building	4A Building Envelope
Bogota Jr. and Sr. High School	■
Lillian M. Steen Elementary School	■
E. Roy Bixby Elementary School	■
Bogota Board Office-Admin Building	■
Joseph Fiegel Field	■

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, lack of air sealing, and insulation.

Building Envelope – E. Roy Bixby Elementary School

Building Envelope – Lillian M. Steen Elementary School

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

Proposed Solution

Roof-Wall Joints

Existing – Buildings throughout the 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.

Scope of Work

Building	*Attic Air Barrier Retrofit (SF)	Buck Frame Air Sealing (LF)	Caulking (LF)	Caulking (Units)	Door - Install Jamb Spacer (Units)	Door Weather Striping - Doubles (Units)	Door Weather Stripping - Singles (Units)	Install New Attic Hatch (Units)	Overhead Door Weather Stripping (Units)	Roof-Wall Intersection Air Sealing (LF)
Bogota Board Office-Admin Building							2			
Bogota Jr. and Sr. High School		30	60	10	1	7	9		1	36
E Roy Bixby Elementary School			483			3	6			
Joseph Fiegel Field						1	4			
Lillian M. Steen Elementary School	5,015					3	6	2		
Total Quantity	**5,015**	**30**	**543**	**10**	**1**	**14**	**27**	**2**	**1**	**36**

*Alternate – Due to long payback, Measure not recommended at this time.

Energy Savings Methodology and Results

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

Changes in Infrastructure

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

Customer Support and Coordination with Utilities

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

Environmental Issues

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

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ECM 4B — 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.

Building	4B Roof Sealing
Bogota Jr. and Sr. High School	
Lillian M. Steen Elementary School	■
E. Roy Bixby Elementary School	■
Bogota Board Office-Admin Building	
Joseph Fiegel Field	

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
Lillian M. Steen Elementary School	11,250
E. Roy Bixby Elementary School	17,000

**Roof area is approximated*

Roof – Lillian M. Steen Elementary School

Roof – E. Roy Bixby Elementary School

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 5A — Combined Heat & Power (Cogeneration)

The key benefits of this ECM include:

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

Building	5A Combined Heat and Power
Bogota Jr. and Sr. High School	■
Lillian M. Steen Elementary School	
E. Roy Bixby Elementary School	
Bogota Board Office-Admin Building	
Joseph Fiegel Field	

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 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 CP35WN 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	Make	Model
Bogota Jr. and Sr. High School	1	Yanmar	CP35D1

Recommended Cogeneration Unit

Equipment Information

Manufacturer and Type	Yanmar CP35 WN, Electrical Output 35 kW, Thermal Output 57,100 Btu/hr, or approved equal.
Equipment Identification	Product cutsheets 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 — Solar Power Purchase Agreement

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.

Building	6A Solar Power Purchase Agreement
Bogota Jr. and Sr. High School	■
Lillian M. Steen Elementary School	■
E. Roy Bixby Elementary School	■
Bogota Board Office-Admin Building	■
Joseph Fiegel Field	■

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.

Potential Roof Solar – E. Roy Bixby Elementary School

Potential Roof Solar – Lillian M. Steen Elementary School

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
Bogota Jr. and Sr. High School	277.3
Lillian M. Steen Elementary School	100.7
E. Roy Bixby Elementary School	132.6
Bogota Board Office-Admin Building	16.4
Joseph Fiegel Field	17.1
Total	**544.1**

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 — Permanent Load Reduction

The key benefits of this ECM include:

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

Building	7A Permanent Load Reduction
Bogota Jr. and Sr. High School	■
Lillian M. Steen Elementary School	■
E. Roy Bixby Elementary School	■
Bogota Board Office-Admin Building	■
Joseph Fiegel Field	■

Proposed Solution

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

Load Reduction – Switchgear at Lillian M. Steen Elementary School

Load Reduction – Electric Meter at Bogota Board Office-Admin Building

PJM Permanent Load Reduction

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

Building	Permanent Load Reduction (KW)
Bogota Jr. and Sr. High School	12
Lillian M. Steen Elementary School	16
E. Roy Bixby Elementary School	13
Bogota Board Office-Admin Building	1
Joseph Fiegel Field	1

Proposed Permanent Load Reduction

Energy Savings Methodology and Results

Revenue is generated through participation in the PJM program.

Changes in Infrastructure

None.

Customer Support and Coordination with Utilities

Initiation of demand response curtailment will be required.

Environmental Issues

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

ECM 8A — Low Flow DHW Devices

The key benefits of this ECM include:

- **Reduction in water consumption** from installing low-flow aerators to lower water flow rates.
- **Improved performance** of existing systems by optimizing equipment.
- **Streamlined Maintenance** of existing systems by utilizing identical components for all fixtures across the district.

Building	8A Low Flow DHW Devices
Bogota Jr. and Sr. High School	■
Lillian M. Steen Elementary School	■
E. Roy Bixby Elementary School	■
Bogota Board Office-Admin Building	
Joseph Fiegel Field	

ECM Overview

Honeywell will seek to increase the operational performance of your water systems while minimizing the water usage of existing fixtures.

Lavatory and General-Purpose Sinks

Existing Conditions

Many of the faucets across the district have higher than needed flow rates. Typically, this means 2.2 GPM for lavatory sinks and 1.75 GPM for general purpose sinks. These fixtures use more water than is generally needed to accomplish their task.

Bogota Jr. and Sr. High School

E. Roy Bixby Elementary School

Low flow fixture opportunities

Proposed Solution

Honeywell recommends installing tamper-resistant end use flow restrictors onto the faucets exceeding 1.0 gpm. Honeywell recommends faucets that can accept flow controls will be retrofitted with the following controls matched to the end use: bathroom sinks will be fitted with 0.5 GPM flow controls.

Scope of Work

Lavatory and General-Purpose Sink

Pressure Independent Performance. End-users will enjoy the same level of performance regardless of incoming pressure (flow rate is constant at pressures between 20 and 80 psi). Pressure variations within the facility would be transparent to the end-users.

Invisible to End-Users. Because we carefully apply the appropriate flow rate and pattern to each sink (based upon sink application), end-users will not realize a decline in performance.

Long-Life. Because our flow components are robust in their construction, these devices will serve you well for years to come. Furthermore, we protect the longevity of these products by applying tamper-resistant technology.

One Size Fits All. No longer will you need to stock different aerators for the various faucets within your facility. Rather, because we adapt all faucets to accommodate the same-size flow control device, you need only one size.

Changes in Infrastructure

New low-flow water fixtures will be installed as part of this ECM.

Customer Support and Coordination with Utilities

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

Environmental Issues

Resource Use	Water savings will result from lower water flows through new faucet aerators.
Waste Production	Any waste generated will be disposed of properly.
Environmental Regulations	No environmental impact is expected.

ECM 9A — Energy Education

The key benefits of this ECM include:

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

Building	9A Energy Education
Bogota Jr. and Sr. High School	■
Lillian M. Steen Elementary School	■
E. Roy Bixby Elementary School	■
Bogota Board Office-Admin Building	
Joseph Fiegel Field	

ECM Overview

Putting Energy into Education

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

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

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

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

Curriculum

Curriculum Packet – Each workshop attended will receive a NEED curriculum packet, estimated forty (40) workshop attendees. The NEED basic curriculum packet is provided to educators attending one day training events. This packet contains a planning guide, copies of the Energy Info books and select

curriculum pieces for teachers to implement in their classroom. For the 2019-2020 school year, the packet includes new lessons on energy storage and energy careers as well as a sampling of creative arts connections. Feedback from workshop attendees consistently identifies this packet as their “go to” for energy lessons when returning to the classroom.

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

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

Training

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

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

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

Energy Savings Methodology and Results

Energy savings to manage building energy and operational efficiency, by analyzing the building management system, and controlling events, trends and settings.

Changes in Infrastructure

None.

Customer Support and Coordination with Utilities

Teacher and administrative personnel adoption.

Environmental Issues

Resource Use	None.
Waste Production	This measure will produce no waste by-products.
Environmental Regulations	No environmental impact is expected.

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ECM 10A — Computer Power Management

The key benefits of this ECM include:

- **Guaranteed energy savings** by better managing the power consumption of computer equipment.
- **Longer equipment life resulting from** to reduced usage.
- **Security protection** preventing external access since the computer system is shut down after hours.
- **Virus protection** from the ability to shut down the computers before viruses reach the network.

Building	10A Computer Power Management
Bogota Jr. and Sr. High School	■
Lillian M. Steen Elementary School	■
E. Roy Bixby Elementary School	■
Bogota Board Office-Admin Building	■
Joseph Fiegel Field	

Existing Conditions

Information Technology (IT) is a major consumer of energy in school buildings and campuses. At more than 25% of total energy consumption energy efficient IT becomes less of a nice-to-have and more of a necessity. This ECM implements a power management system for all of your LAN based computers, printers and copiers throughout the building. The software system will automatically shut down your IT equipment at scheduled times to prevent unnecessary energy consumption during unoccupied hours.

Computers – Bogota Jr. and Sr. High School

Computers – Bogota Jr. and Sr. High School

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

Building	Number of Computers
Bogota Jr. and Sr. High School	160
Lillian M. Steen Elementary School	35
E. Roy Bixby Elementary School	40
Bogota Board Office-Admin Building	10
Totals	**245**

Proposed Equipment for Computer Power Management

Energy Savings Methodology and Results

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

Changes in Infrastructure

Server will be integrated into current IT network.

Customer Support and Coordination with Software

Support will be required for software deployment by IT department.

Environmental Issues

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

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 Honeywell Project	$1,861,983
Term of Repayment	15 Years
Projected Savings Over Term	$2,256,646
Projected NJ Rebates & Incentives	$191,360
Projected Interest Rate	2.15%

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 Bogota Public Schools's use in reviewing available scope combinations and options.

Building by Building Simple Payback Summary (Hard Costs Only)

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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
BOGOTA BOE
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 (DI)	$ 214,740	$ 52,212	4.11
1E Vending Machine Controls	$ 723	$ 202	3.58
2A Boiler Replacements	$ 405,508	$ 19,496	20.80
2C Domestic Water Heater Replacement	$ 33,751	$ 411	82.08
2D Roof Top Unit Replacement (DI)	$ 19,266	$ 462	41.74
2E Split System Replacements (DI)	$ 40,208	$ 520	77.30
2G Motors and VFDs	$ 54,001	$ 5,791	9.33
2H Kitchen Hood Controls	$ 42,188	$ 960	43.94
2I Refrigeration Controls	$ 11,077	$ 253	43.79
2J Unit Ventilator Refurbishments	$ 260,362	$ 8,807	29.56
2K Steam Trap Replacements	$ 106,054	$ 9,464	11.21
3A Building Management Control System	$ 139,921	$ 9,112	15.36
3C Plasma Ionization	$ 87,752	$ 1,961	44.75
4A Building Envelope Improvements	$ 29,532	$ 1,586	18.63
6A Solar PPA	$ 0	$ 55,951	0.00
7A Permanent Load Reduction	$ -	$ -	-
8A Low Flow DHW Devices (DI)	$ 917	$ 779	1.18
10A Computer Power Management	$ 7,383	$ 745	9.91
Add additional lines as needed* **Project Summary:**	$ 1,501,599	$ 168,711	8.90

Optional ECMs Considered, but not included with base project at this time	Estimated Installed Hard Costs (1)	Estimated Annual Savings $	Estimated Simple Payback (years)
1B Lighting Controls	$ 30,433	$ 2,296	13.25
1C Destratification and Disinfection	$ 52,072	$ 2,188	23.80
1D Plug Load Management	$ 60,992	$ 3,678	16.58
2B Boiler Combustion Control	$ 120,538	$ 1,565	77.03
2F Addition of Cooling	$ 1,387,393	$ (2,814)	(493.02)
2L Window AC Unit Replacements	$ 41,586	$ 475	87.49
2M Convert Steam to Hot Water	$ 3,473,803	$ 11,863	292.82
3B Energy Optimization	$ 25,313	$ 2,377	10.65
3D Demand Control Ventilation	$ 9,040	$ 175	51.80
4B Roof Sealing	$ 170,260	$ 511	333.41
5A Combined Heat and Power	$ 210,942	$ 8,633	24.44
9A Energy Education	$ -	$ 1,376	-
			-
			-

Add additional lines as needed*

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

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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
BOGOTA BOE
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)	3,794	$26,882	965	$6,905
Electric Energy (KWH)	1,052,555	$148,182	886,109	$97,020
Natural Gas (therms)	88,357	$78,842	28,653	$19,421
Fuel Oil (Gal)	0	$0	0	$0
Steam (Pounds)				
Water (gallons)				
Other (Specify Units)				
Other (Specify Units)				
Avoided Emissions (1)	Provide in Pounds (Lbs)			
NOX	1,105			
SO2	1,958			
CO2	1,361,857			

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

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

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

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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
BOGOTA BOE
ENERGY SAVING IMPROVEMENT PROGRAM

ESCO Name: **Honeywell International**

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

ENERGY	ESCO Developed Baseline	ESCO Proposed Savings Annual	Comments
Electric Energy (MMBTUs)	3,591	3,023	
Natural Gas (MMBTUs)	8,836	2,865	
Fuel Oil (MMBTUs)	0	0	
Steam (MMBTUs)			
Other (Specify) (MMBTUs)			
Other (Specify)			

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

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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
BOGOTA BOE
ENERGY SAVING IMPROVEMENT PROGRAM

ESCO Name: **HONEYWELL INTERNATIONAL**

PROPOSED CONSTRUCTION FEES

Fee Category	Fees [1] Dollar ($) Value	Percentage of Hard Costs
Estimated Value of Hard Costs [2]:	$1,501,599	
Project Service Fees		
Investment Grade Energy Audit	$22,524	1.50%
Design Engineering Fees	$0	0.00%
Construction Management & Project Administration	$90,096	6.00%
System Commissioning	$11,262	0.75%
Equipment Initial Training Fees	$11,262	0.75%
ESCO Overhead	$150,160	10.00%
ESCO Profit	$75,080	5.00%
Project Service Fees Sub Total	$135,144	9.00%
TOTAL FINANCED PROJECT COSTS:	$1,861,983	24.00%
ESCO Termination Fee (To be paid only if the Board decides not to proceed beyond the ESP)	$0.00	0.00%

PROPOSED ANNUAL SERVICE FEES

First Year Annual Service Fees	Fees [1] Dollar ($) Value	Percentage of Hard Costs
SAVINGS GUARANTEE (OPTION)	$0.00	0.00%
Measurement and Verification (Associated w/ Savings Guarantee Option)	$12,500.00	Flat Fee
ENERGY STAR™ Services (optional)	Included	0.00%
Post Construction Services (If applicable)	N/A	-
Performance Monitoring	Included	-
On-going Training Services	N/A	-
Verification Reports	Included	-
TOTAL FIRST YEAR ANNUAL SERVICES	$12,500.00	Flat Fee

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

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

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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
BOGOTA BOE
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:

Architect/Engineer:	$	148,959	8.0%		
Project Cost:	$	1,861,983			
Direct Install Rebate	$	(187,562)			
Lease Issuance Fees:	$	30,000			
Total Project Cost [1]:	$	**1,853,380**	Interest Rate to Be Used for Proposal Purposes:		**2.15%**

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	$ 20,218			$ -	$ 20,218	$ -	$ -	$ -	$ 20,218	$ 20,218
1	$ 67,394	$ 55,951	$ 45,366	$ 950	$ 169,660	$ (167,060)	$ (179,560)	$ (12,500)	$ 2,600	$ 22,818
2	$ 68,915	$ 56,500	$ 45,366	$ 950	$ 171,730	$ (169,130)	$ (169,130)	$ -	$ 2,600	$ 25,418
3	$ 70,471	$ 57,053	$ 18,366	$ 950	$ 146,840	$ (144,240)	$ (144,240)	$ -	$ 2,600	$ 28,018
4	$ 72,062	$ 57,612	$ 18,366	$ 950	$ 148,990	$ (146,390)	$ (146,390)	$ -	$ 2,600	$ 30,618
5	$ 73,689	$ 58,177	$ 18,366	$ -	$ 150,232	$ (147,632)	$ (147,632)	$ -	$ 2,600	$ 33,218
6	$ 75,353	$ 58,747		$ -	$ 134,100	$ (131,500)	$ (131,500)	$ -	$ 2,600	$ 35,818
7	$ 77,055	$ 59,323		$ -	$ 136,378	$ (133,778)	$ (133,778)	$ -	$ 2,600	$ 38,418
8	$ 78,795	$ 59,904		$ -	$ 138,699	$ (136,099)	$ (136,099)	$ -	$ 2,600	$ 41,018
9	$ 80,574	$ 60,491		$ -	$ 141,065	$ (138,465)	$ (138,465)	$ -	$ 2,600	$ 43,618
10	$ 82,394	$ 61,084		$ -	$ 143,478	$ (140,878)	$ (140,878)	$ -	$ 2,600	$ 46,218
11	$ 84,255	$ 61,683		$ -	$ 145,937	$ (143,337)	$ (143,337)	$ -	$ 2,600	$ 48,818
12	$ 86,157	$ 62,287		$ -	$ 148,445	$ (145,845)	$ (145,845)	$ -	$ 2,600	$ 51,418
13	$ 88,103	$ 62,898		$ -	$ 151,001	$ (148,401)	$ (148,401)	$ -	$ 2,600	$ 54,018
14	$ 90,093	$ 63,514		$ -	$ 153,607	$ (151,007)	$ (151,007)	$ -	$ 2,600	$ 56,618
15	$ 92,128	$ 64,136		$ -	$ 156,264	$ (153,564)	$ (153,564)	$ -	$ 2,700	$ 59,319
Totals	$ 1,207,658	$ 899,361	$ 145,829	$ 3,798	$ 2,256,646	$ (2,197,327)	$ (2,209,827)	$ (12,500)	$ 59,319	$ 59,319

Additional 3rd P4P Incentive	$ -
Total Cash Flow	$ 59,319

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

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

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

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BUILDING-BY-BUILDING SIMPLE PAYBACK SUMMARY (HARD COSTS ONLY)

Building & ECM	kWh Savings ($)	kW Savings ($)	Natural Gas Savings ($)	Annual Energy and Operational Cost Savings ($)	Annual Operational Savings ($)	Net Cost ($)	Simple Payback
Bogota Board Office-Admin Building	**$ 3,384**	**$ 193**	**$ 29**	**$ 3,990**	**$ 384**	**$ 5,422**	**1.5**
1A LED Lighting (DI)	$ 884	$ 193	$ (32)	$ 1,429	$ 384	$ 4,464	4.3
4A Building Envelope Improvements	$ 27	$ -	$ 62	$ 88	$ -	$ 656	7.4
6A Solar PPA	$ 2,465	$ -	$ -	$ 2,465	$ -	$ -	-
10A Computer Power Management	$ 8	$ -	$ -	$ 8	$ -	$ 301	35.9
Bogota Jr. and Sr. High School	**$ 39,280**	**$ 1,751**	**$ 17,199**	**$ 92,827**	**$ 34,598**	**$ 1,101,624**	**18.9**
1A LED Lighting (DI)	$ 9,753	$ 1,751	$ (534)	$ 18,567	$ 7,598	$ 87,068	7.9
1E Vending Machine Controls	$ 202	$ -	$ -	$ 202	$ -	$ 723	3.6
2A Boiler Replacements	$ -	$ -	$ 4,496	$ 19,496	$ 15,000	$ 405,508	90.2
2C Domestic Water Heater Replacement	$ -	$ -	$ 411	$ 411	$ -	$ 33,751	82.1
2H Kitchen Hood Controls	$ 119	$ -	$ 841	$ 960	$ -	$ 42,188	43.9
2I Refrigeration Controls	$ 253	$ -	$ -	$ 253	$ -	$ 11,077	43.8
2J Unit Ventilator Refurbishments	$ -	$ -	$ 807	$ 8,807	$ 8,000	$ 260,362	322.5
2K Steam Trap Replacements	$ -	$ -	$ 5,464	$ 9,464	$ 4,000	$ 106,054	19.4
3A Building Management Control System	$ 1,383	$ -	$ 2,837	$ 4,220	$ -	$ 60,124	14.2
3C Plasma Ionization	$ 28	$ -	$ 1,542	$ 1,570	$ -	$ 54,001	34.4
4A Building Envelope Improvements	$ 176	$ -	$ 557	$ 732	$ -	$ 11,611	15.9
6A Solar PPA	$ 26,886	$ -	$ -	$ 26,886	$ -	$ 0	0.0
8A Low Flow DHW Devices (DI)	$ -	$ -	$ 779	$ 779	$ -	$ 226	0.3
10A Computer Power Management	$ 480	$ -	$ -	$ 480	$ -	$ 4,822	10.0
11A Design Allowance	$ -	$ -	$ -	$ -	$ -	$ 24,108	-
E. Roy Bixby Elementary School	**$ 28,625**	**$ 2,102**	**$ 826**	**$ 37,211**	**$ 5,658**	**$ 192,681**	**6.1**
1A LED Lighting (DI)	$ 8,243	$ 2,074	$ (360)	$ 15,616	$ 5,658	$ 53,687	5.4
2D Roof Top Unit Replacement (DI)	$ 462	$ -	$ -	$ 462	$ -	$ 19,266	41.7
2E Split System Replacements (DI)	$ 356	$ -	$ -	$ 356	$ -	$ 29,107	81.8
2G Motors and VFDs	$ 2,902	$ 27	$ -	$ 2,930	$ -	$ 27,001	9.2
3A Building Management Control System	$ 1,318	$ -	$ 867	$ 2,186	$ -	$ 37,367	17.1
3C Plasma Ionization	$ 19	$ -	$ 77	$ 96	$ -	$ 6,750	70.5
4A Building Envelope Improvements	$ 83	$ -	$ 241	$ 324	$ -	$ 5,771	17.8
6A Solar PPA	$ 15,106	$ -	$ -	$ 15,106	$ -	$ -	-
8A Low Flow DHW Devices (DI)	$ -	$ -	$ -	$ -	$ -	$ 473	-
10A Computer Power Management	$ 137	$ -	$ -	$ 137	$ -	$ 1,205	8.8
11A Design Allowance	$ -	$ -	$ -	$ -	$ -	$ 12,054	-
Joseph Fiegel Field	**$ 905**	**$ 186**	**$ 58**	**$ 1,498**	**$ 349**	**$ 3,146**	**2.7**
1A LED Lighting (DI)	$ 867	$ 186	$ (33)	$ 1,369	$ 349	$ 2,021	2.0
4A Building Envelope Improvements	$ 38	$ -	$ 91	$ 129	$ -	$ 1,125	8.7
Lillian M. Steen Elementary School	**$ 24,826**	**$ 2,674**	**$ 1,308**	**$ 33,185**	**$ 4,376**	**$ 198,728**	**6.9**
1A LED Lighting (DI)	$ 8,553	$ 2,658	$ (356)	$ 15,232	$ 4,376	$ 67,500	6.2
2E Split System Replacements (DI)	$ 164	$ -	$ -	$ 164	$ -	$ 11,102	67.5
2G Motors and VFDs	$ 2,845	$ 16	$ -	$ 2,861	$ -	$ 27,001	9.4
3A Building Management Control System	$ 1,528	$ -	$ 1,178	$ 2,706	$ -	$ 42,429	15.7
3C Plasma Ionization	$ 39	$ -	$ 257	$ 295	$ -	$ 27,001	91.4
4A Building Envelope Improvements	$ 83	$ -	$ 229	$ 312	$ -	$ 10,370	33.2
6A Solar PPA	$ 11,494	$ -	$ -	$ 11,494	$ -	$ -	-
8A Low Flow DHW Devices (DI)	$ -	$ -	$ -	$ -	$ -	$ 218	-
10A Computer Power Management	$ 120	$ -	$ -	$ 120	$ -	$ 1,055	8.8
11A Design Allowance	$ -	$ -	$ -	$ -	$ -	$ 12,054	-
Project Total	**$ 97,020**	**$ 6,905**	**$ 19,421**	**$ 168,711**	**$ 45,366**	**$ 1,501,599**	**12.2**

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2. Utility and Other Rebates and Incentives

NJ Pay-for-Performance Program (P4P)

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

Eligibility

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

ENERGY STAR Portfolio Manager

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

Incentives

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

Incentives, Rebates and Grants Summary

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

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 Bogota Public Schools is eligible for **$191,360 in estimated total incentives for the project**. This includes **$187,562** for the **Direct Install** program and **$3,798** Permanent Load Reduction Incentives.

Please refer to the tables on below for a breakdown of Bogota Public Schools incentive levels on a building by building basis for each type of incentive.

Permanent Load Reduction Incentives

Description	Permanent Load Reduction Incentives			
	1st Year Incentive	2nd Year Incentive	3rd Year Incentive	4th Year Incentive
Permanent Load Reduction Incentives	**$950**	**$950**	**$950**	**$950**

Total Rebates and Incentives

Year	Direct Install Incentives	Permanent Load Reduction Incentives	Total Incentives
Direct Install Rebate	$187,562	$0	$187,562
Year 1	$0	$950	$950
Year 2	$0	$950	$950
Year 3	$0	$950	$950
Year 4	$0	$950	$950
TOTALS	**$187,562**	**$3,798**	**$191,360**

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3. Financing the ESIP

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

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

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

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

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

Debt Issuance

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

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

Tax-Exempt Lease Purchase Financing

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

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

Certificates of Participation (COP's)

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

Energy Savings Obligations

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

SECTION E
MEASUREMENT & VERIFICATION AND MAINTENANCE PLAN

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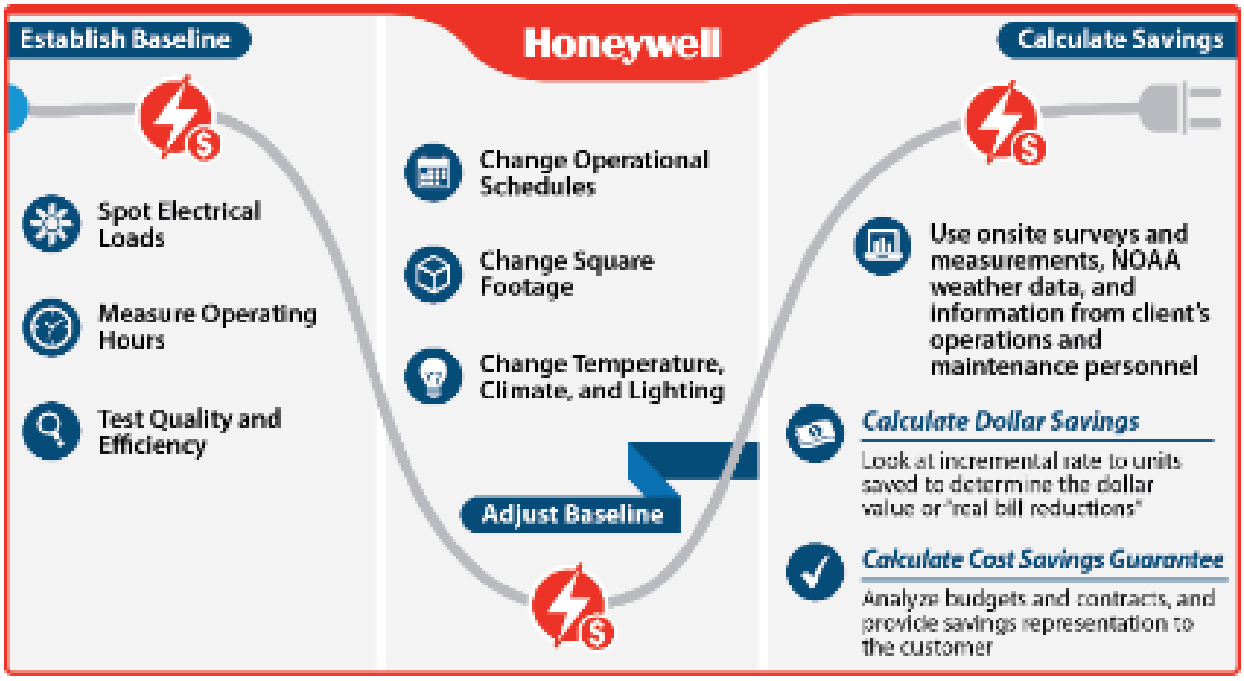
SECTION E — MEASUREMENT & VERIFICATION AND MAINTENANCE PLAN

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 Bogota Public Schools will establish the base rates that will act as "floor" rates in calculating the savings. These are usually the rates that are in effect at the time of the start of the contract or rates used for audit estimated savings.

2. Adjustment to Baseline Methodology

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 Bogota Public Schools requires and the needs of the Bogota Public Schools 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 Bogota Public Schools 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 Bogota Public Schools 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.

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

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*

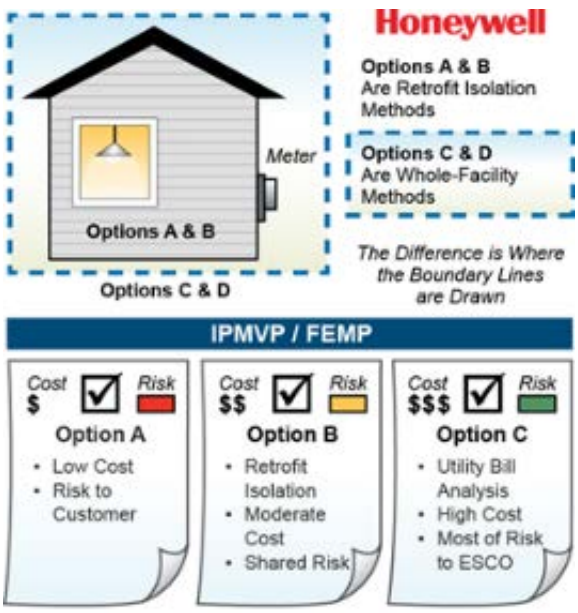
Agreed($)= Annual savings in dollars (water, sewer, maintenance, etc.)

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 Bogota Public Schools 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 Bogota Public Schools’s budgets (labor & direct costs), maintenance contracts and operations (supplier) contracts. Honeywell will analyze the information to provide a conservative savings representation for the Bogota Public Schools’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 Bogota Public Schools 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 Bogota Public Schools 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 Bogota Public Schools to adapt to the demands of future campus growth and changes without the need for the Bogota Public Schools and Honeywell to negotiate energy baseline adjustments.

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

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

[2] www.ipmvp.org.

recommendations to provide optimum energy performance.

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

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 Bogota Public Schools.

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

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

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

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

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

5. Site-specific M&V Plan

ECM # and Name	Summary of ECM	Measurement and Verification Methodology / Recommendation	Description of M&V – Pre and Post Process
ECM 1A – LED Lighting	Upgrade Lighting systems: Re-lamp/Re-ballast T8/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
ECM 1B – Lighting Controls	Install lighting control devices	Option A: Pre and Post measurements Line by Line scope and engineering calculations	Pre-M&V: Measurement of kW for 5% sample fixtures in each category Data log usage hours Data Log occupancy schedules Update Line by Line scope with measured kW and usage hours Post M&V: Measurement of kW for 5% sample fixtures in each category Usage Hours to remain same Occupancy schedules to remain same Energy Savings: Update Line by Line scope with measured kW and usage hours and compare to pre-retrofit calculated savings
ECM 1C - De-Stratification and Disinfection	Install De-Stratification fans in Gymnasiums and Multipurpose Rooms to minimize stratification of hot air and maintain hot air flow below the fan level	Option A Electric energy savings - Engineering calculations based on programmed parameters. Option C: Fuel Savings Utility Bill Comparison for all fuel related measures	Pre-M&V: Verify existing operating parameters match the baseline calculation assumptions Post M&V: Verify that systems are installed as specified and controls are programmed to match the savings assumptions Electric Energy: Verify savings based on programmed parameters and engineering calculations Fuel: Compare post installation M&V fuel cost based on fuel billing data and Metrix tuned to normalize to heating degree days
ECM 1D - Plug Load Management	Provide Wi-Fi enabled programmed electrical control devices to shut down various plug loads when building is not occupied	Option A: Engineering calculations based on comparison of existing operations and post installation operation	Pre-M&V: Verify parameters used in the calculations based on data provided by Data loggers on selected pieces of equipment Post M&V: Verify that the control equipment is installed and programmed as specified. Data log to verify reduced hours of operation
ECM 1E – Vending Machine Controls	Install Vending machine energy management devices	Option A: Pre and Post measurements Line by Line scope and engineering calculations	Pre-M&V: Measurement of kW for 5% sample machines in each category Data log usage hours Data Log occupancy schedules Update Line by Line scope with measured kW and usage hours Post M&V: Measurement of kW for 5% sample machines in each category Usage Hours to remain same Energy Savings scope with measured kW and usage hours and compare to pre-retrofit calculated savings
ECM 2A – Boiler Replacements	Replace boilers in select locations to handle base load	Option C: Utility Bill Comparison for all fuel related measures	Pre-M&V: Baseline annual fuel cost based on fuel billing data and Metrix tuned to normalize to heating degree days Perform combustion efficiency test on boilers Post M&V: Compare post installation M&V fuel cost based on fuel billing data and Metrix tuned to normalize to heating degree days Perform efficiency test on replaced boilers to ensure operating conditions are maintained
ECM 2B – Boiler Combustion Control	Install advanced combustion controls, on existing burners	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 new controls and replaced burners to ensure operating conditions are maintained

ECM # and Name	Summary of ECM	Measurement and Verification Methodology / Recommendation	Description of M&V – Pre and Post Process
ECM 2C – Domestic Water Heater Replacement	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 and Metrix tuned to normalize to heating degree days Post M&V: Compare post installation M&V fuel cost based on fuel billing data and Metrix tuned to normalize to heating degree days
ECM 2D – Roof Top Unit Replacement	Replace antiquated Roof Top Unit with new high efficiency Rooftop Unit	Option A: Engineering calculations based on nameplate and manufacturer supplied data for the existing and replacement units	Pre-M&V: Verify manufacturer provided data for existing unit efficiency (SEER) Post M&V: Verify manufacturer provided data for new rooftop unit (SEER) – verify the new equipment and controls are installed and commissioned as recommended by manufacturer
ECM 2E– Split System Replacements	Replace select split systems with new high efficiency units	Option A: Engineering calculations based on nameplate and manufacturer supplied data for the existing and replacement Units	Pre-M&V: Verify manufacturer provided data for existing units efficiency (SEER) Post M&V: Verify manufacturer provided data for new units (SEER) – verify the new equipment and controls are installed and commissioned as recommended by manufacturer
ECM 2F – Addition of Cooling	Improve comfort in the buildings by installing new VRF systems.	Option A: Electric usage - Engineering calculations based on material specifications.	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 usage based on material specifications and engineering calculations
ECM 2G –Motors and VFDs	Install VFDs on select pumps to operate the pump motors in response to the system load. Replace motors with new premium efficiency motors	Option A: Engineering calculations for VFDs following pump affinity laws. Engineering calculations based on nameplate and manufacturer supplied data for the existing and replacement motors	Pre-M&V: Verify manufacturer provided data for the pump performance data and motor efficiencies. Post M&V: Obtain trend data for VFD operation from the BMS system to verify baseline calculation assumptions on system loads Verify efficiency of new motors Verify manufacturer provided data for new VFDs – verify the new equipment and controls are installed and commissioned as recommended by manufacturer
ECM 2H - 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
ECM 2I – Refrigeration Controls	Install control device on walk-in freezer and refrigerator evaporators to shut down the fan motor when the compressor is off on duty cycle	Option A: Stipulated Engineering calculations based on case studies for the Intellidyne control	Pre-M&V: None Post M&V: Savings stipulated based on engineering calculations for the term of contract
ECM 2J – Unit Ventilator Refurbishments	Replace antiquated Unit Ventilator components for additional 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 Post M&V: Compare post installation M&V fuel cost based on fuel billing data and Metrix tuned to normalize to heating degree days
ECM 2K –Steam Trap Replacements	Replace failed steam traps throughout steam buildings	Option C: Utility Bill Comparison for all fuel related measures	Pre-M&V: Baseline annual fuel cost based on fuel billing data and Metrix tuned to normalize to heating degree days Post M&V: Compare post installation M&V fuel cost based on fuel billing data and Metrix tuned to normalize to heating degree days
ECM 2L– Window AC Unit Replacements	Replace window AC units with new high efficiency units	Option A: Engineering calculations based on nameplate and manufacturer supplied data for the existing and replacement units	Pre-M&V: Verify manufacturer provided data for existing units efficiency (SEER) Post M&V: Verify manufacturer provided data for new units (SEER) – verify the new equipment is installed and commissioned as recommended by manufacturer
ECM 2M– Convert Steam to Hot Water	Replace steam units with new high efficiency, heating hot water units	Option C: Utility Bill Comparison for all fuel related measures	Pre-M&V: Baseline annual fuel cost based on fuel billing data and Metrix tuned to normalize to heating degree days Post M&V: Compare post installation M&V fuel cost based on fuel billing data and Metrix tuned to normalize to heating degree days
ECM 3A - Building Management Control System	Integrate all Building Management 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

ECM # and Name	Summary of ECM	Measurement and Verification Methodology / Recommendation	Description of M&V – Pre and Post Process
ECM 3B – Energy Optimization	Install Honeywell Forge to optimize operation of the building management system.	Option A: Electric energy savings - Engineering calculations based on programmed parameters. Option C: Fuel Savings Utility Bill Comparison for all fuel related measures	Pre-M&V: Verify existing operating parameters match the baseline calculation assumptions Post M&V: Verify that systems are installed as specified and controls are programmed to match the savings assumptions Electric Energy: Verify savings based on programmed parameters and engineering calculations Fuel: Compare post installation M&V fuel cost based on fuel billing data and Metrix tuned to normalize to heating degree days
ECM 3C – Plasma Ionization	Add Global Plasm Solutions for additional efficiency, reduce outside air ventilation to rooms	Option A: Engineering calculations based on programmed parameters.	Pre-M&V: Verify existing operating parameters match the baseline calculation assumptions Post M&V: Verify that systems are installed as specified and controls are programmed to match the savings assumptions
ECM 3D – Demand Control Ventilation	Install CO_2 sensor controls to limit OA based on occupancy of space	Option A: Electric 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 Electric Energy: Verify savings based on programmed parameters and engineering calculations
ECM 4A - Building Envelope Improvements	Install weather stripping on doors, seal roof wall joints and roof penetrations	Option A: Electric energy savings - Engineering calculations based on 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 M&V fuel cost based on fuel billing data and Metrix tuned to normalize to heating degree days
ECM 4B – Roof Sealing	Install new roof sealing in select locations.	Option C: 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
ECM 5A – Combined Heat & Power (CHP)	Install Cogeneration units	Option A: Engineering calculations based on nameplate and manufacturer supplied data for the existing and replacement Units	Pre-M&V: Verify manufacturer provided data for existing units efficiency Post M&V: Verify manufacturer provided data for new units verify the new equipment and controls are installed and commissioned as recommended by manufacturer
ECM 6A – Solar PPA	Install Solar Power using Power Purchase Agreement	N/A	Pre-M&V: N/A Post M&V: N/A
ECM 7A – Permanent Load Reduction	Participate in PJM permanent load reduction program	N/A	Pre-M&V: N/A Post M&V: N/A
ECM – 8A Low Flow DHW Devices	Install low-flow water fixtures	Option A: Engineering calculations based on decrease in flow rates	Pre-M&V: Measure typical existing water fixture flow rates to confirm water loss calculations Post M&V: Confirm installation of new, low-flow water fixtures per scope. Verify savings with engineering calculations
ECM 9A – Energy Education	Institute an Energy Awareness program to Educate Students, Faculty and Staff.	Option A: Stipulated Engineering calculations based on awareness program.	Pre-M&V: None Post M&V: Savings stipulated based on engineering calculations for the term of contract
ECM 10A – Computer Power Management	Install control software to ensure computers revert to sleep mode when not being used.	Option A: Stipulated Engineering calculations based on computer power management Manf. Software information.	Pre-M&V: None Post M&V: Savings stipulated based on engineering calculations for the term of contract

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

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

Honeywell considers the guarantee to be the cornerstone of our service to you. To be considered a *performance contract* an energy guarantee is an optional component under the New Jersey Energy Savings Improvement Program (ESIP) legislation. The basis of an energy performance contract is that the majority of risk is shifted from the Bogota Public Schools 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 Bogota Public Schools for the long term.

Savings Guarantee: With the understanding that the Bogota Public Schools 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 Bogota Public Schools. A first party guarantee eliminates the risk on the Bogota Public Schools 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 Bogota Public Schools 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 Bogota Public Schools sole discretion. In the same way, the duration of the guarantee is also optional. Many of Honeywell's New Jersey customers have elected to keep the guarantee in force for less than the total performance periods, i.e. three (3) to five (5) years. Others have elected to accept a one (1) year guarantee, while reserving the option to renew for additional years after they have had the opportunity to review the track record of actual savings results. Obviously, this a very customer specific decision based on the risk management culture of each unique organization. The key point is that

Honeywell is flexible regarding the structure and duration of the guarantee. The final terms will be discussed and defined as part of our co-authored ESIP project.

Solely for informational purposes, it is worth noting that if the Bogota Public Schools does elect to accept a guarantee, New Jersey ESIP law requires that the Bogota Public Schools 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 Bogota Public Schools.

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 Bogota Public Schools 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 Bogota Public Schools 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 Bogota Public Schools 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 Bogota Public Schools 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 Bogota Public Schools 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. Shutdown per manufacturer's recommendations.

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

BOILERS

Services Performed

Preseason Inspection

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

11. Review manufacturer's recommendations for boiler and burner start-up.
12. Check fuel supply.
13. Check auxiliary equipment operation.

Seasonal Start-up

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

Mid-season Inspection

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

Seasonal Shut-down

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

SECTION F
DESIGN APPROACH

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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 Bogota Public Schools 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 Bogota Public Schools' 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.

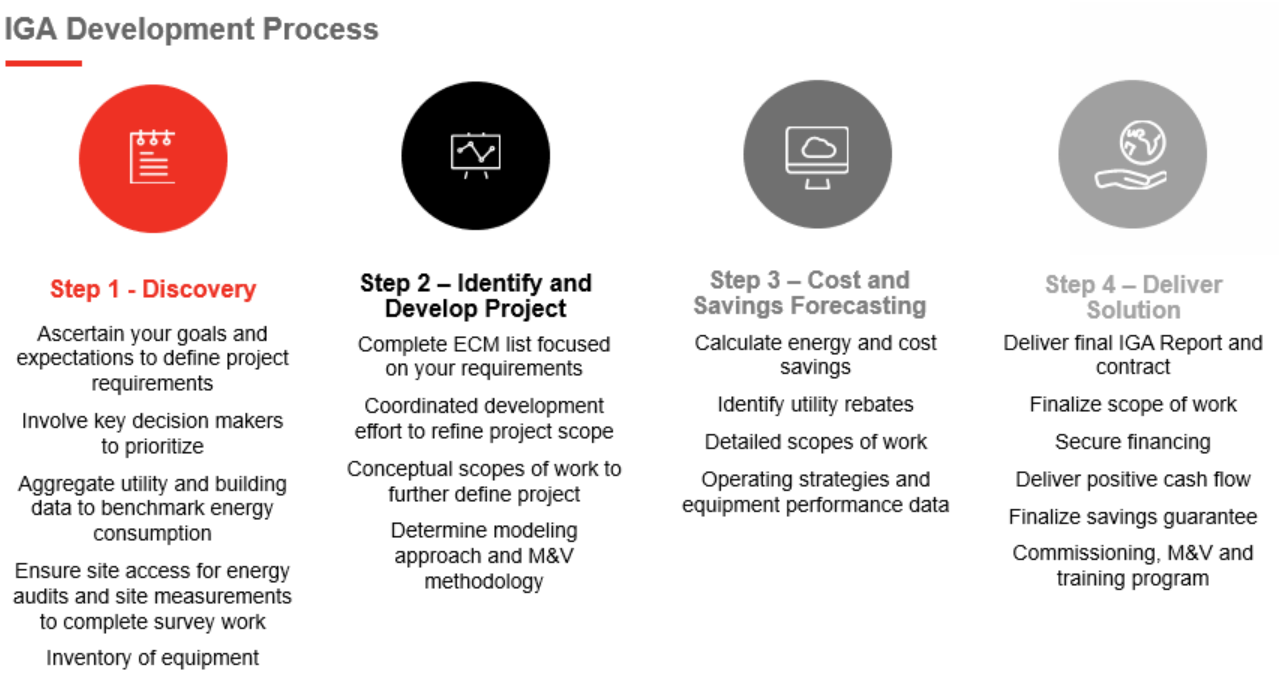
Honeywell will demonstrate our partnership-based commitment to The Bogota Public Schools throughout the development and delivery of your ESIP project, as we have done for dozens of other public entities throughout New Jersey under the ESIP Law. Our approach is backed by our references and track record 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 Bogota Public Schools and Honeywell to review the ESIP Process, including the expectations of both parties during the IGEA, audit parameters, reporting methods, building access protocols, availability of utility and building data, et cetera. Phase 2 will commence after our kickoff meeting has concluded with agreed upon next steps.

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



STEP 1 DISCOVERY

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

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

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

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

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

STEP 2 IDENTIFY AND DEVELOP PROJECT

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

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

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

STEP 3 COST AND SAVINGS FORECASTING

Honeywell will then move on to analyze and quantify your unique savings guarantee utilizing the Bogota Public Schools' dedicated ESIP Team. During this step, we will quantify energy savings by identifying the scope of work and its impact on your facilities and systems. We will measure individual ECMs based on how they will impact future performance of the building as a whole. This will help to ensure that the ECM savings are accounted for only once. Results are then subject to peer reviews to verify accurate modeling and savings forecasts based on the proposed scope of work. Honeywell's unique approach to engineering is why we often exceed the savings guarantee of our contracts.

STEP 4 DELIVER SOLUTION

Honeywell will leverage our experience delivering more than two dozen NJ ESIP projects since 2009 to help the Bogota Public Schools complete a successful project on time that maximizes realistic savings, cash rebates and positive cash flow. We have learned through this unrivaled experience that what matters most is to meet your expectations and ensure your involvement in the decision-making process.

REACT (Rebate Energy Analysis Constructability Tool) will provide for an interactive solution development experience designed to maximize New Jersey Office of Clean Energy rebates. Our No Change Orders policy (which helps distinguish Honeywell from the competition) will further reduce risk and enhance project results. And our in-house finance team (Honeywell Global Finance) will work to ensure that you secure the most competitive financial offering and interest rate available. No ESCO offers more value throughout the ESIP Process than Honeywell.

Our deliverables during this final phase will include:

Step 4 Deliverables

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 BOGOTA PUBLIC SCHOOLS

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:

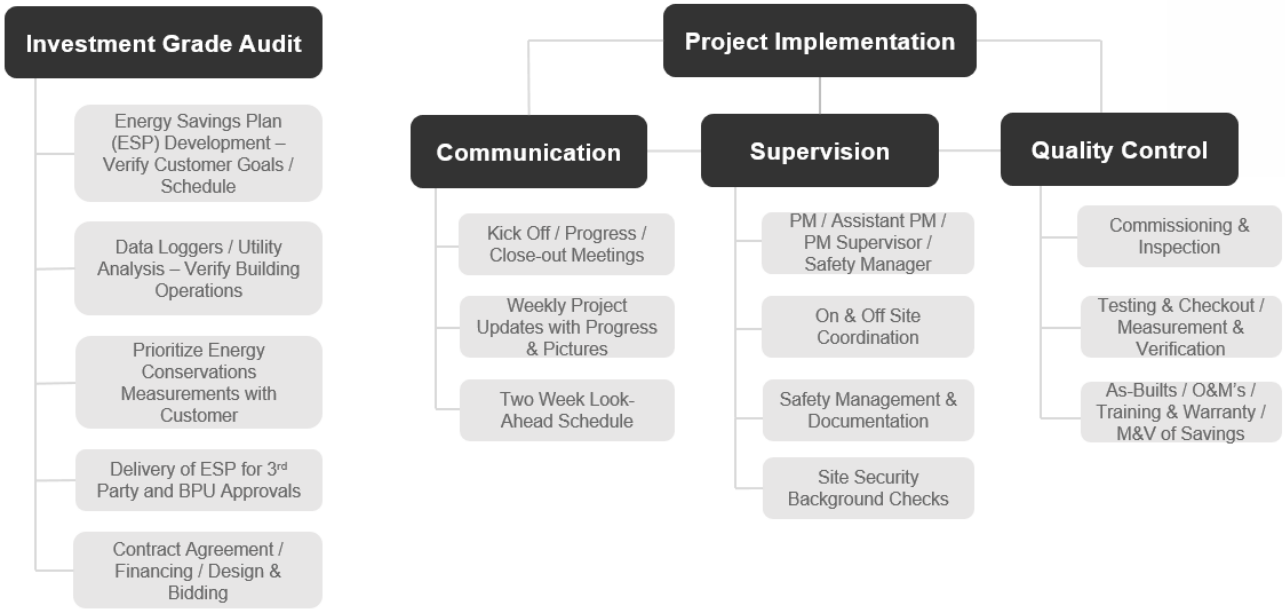
- Safety Training for Employee's and Sub-contractors
- Detailed Work Schedules around the day
- Detailed Background Checks of Personnel
- Detail Logs of Sub Contractor Personnel
- On-Site Logs of Time Sheets, Contact Information for All Personnel
- Clearly Displayed Identification Badges of All Construction 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 Bogota Public Schools/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 Bogota Public Schools 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 Bogota Public Schools 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 Bogota Public Schools.

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 Bogota Public Schools 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 Bogota Public Schools 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 Bogota Public Schools. However, at the option of the Bogota Public Schools, 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 Bogota Public Schools 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 Bogota Public Schools:

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 Bogota Public Schools. Honeywell will work with the Bogota Public Schools to review your hazardous material reports and will identify the areas where work will be completed so that the Bogota Public Schools 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 Bogota Public Schools 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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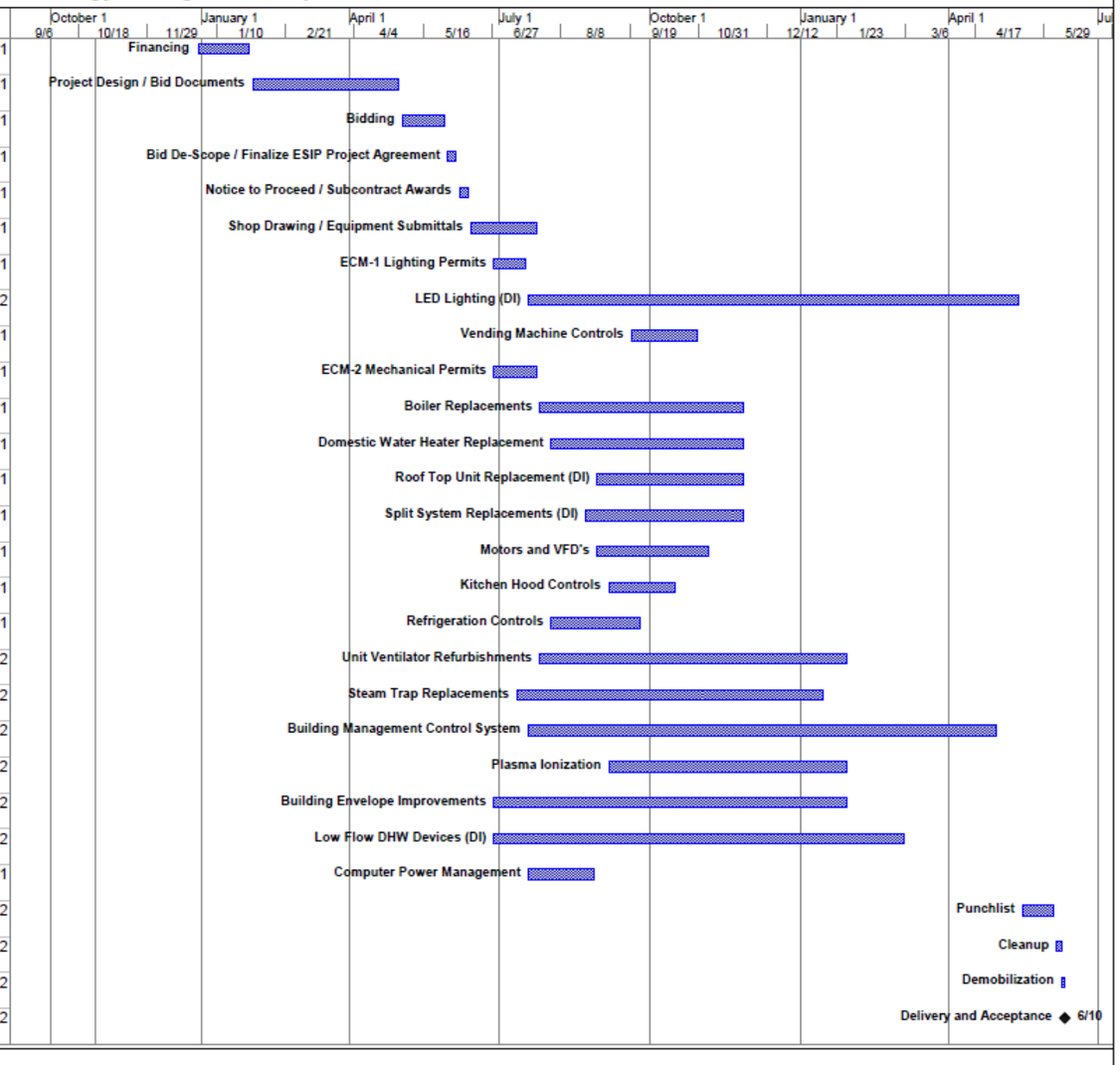
6. Implementation Schedule

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

Bogota
Honeywell Energy Savings Plan Project Schedule

ID	Task Name	Start	Finish
1	Financing	Wed 12/30/20	Fri 1/29/21
2	Project Design / Bid Documents	Mon 2/1/21	Fri 4/30/21
3	Bidding	Mon 5/3/21	Fri 5/28/21
4	Bid De-Scope / Finalize ESIP Project Agreement	Mon 5/31/21	Fri 6/4/21
5	Notice to Proceed / Subcontract Awards	Mon 6/7/21	Fri 6/11/21
6	Shop Drawing / Equipment Submittals	Mon 6/14/21	Fri 7/23/21
7	ECM-1 Lighting Permits	Mon 6/28/21	Fri 7/16/21
8	LED Lighting (DI)	Mon 7/19/21	Fri 5/13/22
9	Vending Machine Controls	Mon 9/20/21	Fri 10/29/21
10	ECM-2 Mechanical Permits	Mon 6/28/21	Fri 7/23/21
11	Boiler Replacements	Mon 7/26/21	Fri 11/26/21
12	Domestic Water Heater Replacement	Mon 8/2/21	Fri 11/26/21
13	Roof Top Unit Replacement (DI)	Mon 8/30/21	Fri 11/26/21
14	Split System Replacements (DI)	Mon 8/23/21	Fri 11/26/21
15	Motors and VFD's	Mon 8/30/21	Fri 11/5/21
16	Kitchen Hood Controls	Mon 9/6/21	Fri 10/15/21
17	Refrigeration Controls	Mon 8/2/21	Fri 9/24/21
18	Unit Ventilator Refurbishments	Mon 7/26/21	Fri 1/28/22
19	Steam Trap Replacements	Mon 7/12/21	Fri 1/14/22
20	Building Management Control System	Mon 7/19/21	Fri 4/29/22
21	Plasma Ionization	Mon 9/6/21	Fri 1/28/22
22	Building Envelope Improvements	Mon 6/28/21	Fri 1/28/22
23	Low Flow DHW Devices (DI)	Mon 6/28/21	Fri 3/4/22
24	Computer Power Management	Mon 7/19/21	Fri 8/27/21
25	Punchlist	Mon 5/16/22	Fri 6/3/22
26	Cleanup	Mon 6/6/22	Wed 6/8/22
27	Demobilization	Thu 6/9/22	Fri 6/10/22
28	Delivery and Acceptance	Fri 6/10/22	Fri 6/10/22



Project: Bogota
Date: Wed 10/28/20

Task Milestone

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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 CUTSHEETS.pdf

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.

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