VINELAND
PUBLIC SCHOOLS
Working Together for a Bright Future

ENERGY SAVINGS PLAN

SUBMITTED BY:
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100 Lenox Drive
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VINELAND PUBLIC SCHOOLS

Working Together for a Bright Future

Table of Contents

ENERGY SAVINGS PLAN

SECTION 1 – PROJECT OVERVIEW

Project Overview

The Energy Savings Plan (ESP) is the core of the Energy Savings Improvement Program (ESIP) process. It describes the Vineland Public School District' preferred Energy Conservation Measures (ECMs), the budget cost for each ECM and the ECM energy savings calculations that self-fund the project via reduced operating costs. The ESP provides the Vineland Public School District with the necessary information to decide which proposed ECMs to implement as part of your (ESIP) project. Vineland Public School District has decided to utilize the ESCO ESIP model, with DCO Energy preparing the Energy Savings Plan. Acacia Financial Group, Inc. is the financial advisor and Wilentz, Goldman & Spitzer, P.A. is the bond counsel. Working with the School District's staff, your selected ESIP project would:

1. Fund a $19,805,025 project.
2. Generate $1,070,933 in annual energy savings – 24% of current utility spend.
3. Eligible for $32,700 in rebates and incentives
4. Reduce utility related annual CO2 emissions by 3,939 metric tons – a 34% reduction.

NOTE: This submitted ESP doesn't constitute any contractual obligation between Vineland Public School District and DCO Energy (DCO). Any contractual obligations will be performed under separate legal documents per mutually signed agreement of the parties involved and subject to the applicable laws and requirements of the ESIP legislation and State of New Jersey.

To ensure conformance with the requirements of Public Finance Notice LFN 2009-11, the ESP must address the following elements:

- *The results of the energy audit (APPENDIX H)*
- *A description of the energy conservation measures that will comprise the program; (Section 3)*
- *An estimate of greenhouse gas reductions resulting from those energy savings; (Section 3)*
- *Identification of all design and compliance issues and identification of who will provide these services; (Section 5)*
- *An assessment of risks involved in the successful implementation of the plan; (Section 5)*
- *Identify the eligibility for, and costs and revenues associated with the PJM Independent System Operator for demand response and curtailable service activities; (Section 3)*

- *Schedules showing calculations of all costs of implementing the proposed energy conservation measures and the projected energy savings; (Section 3)*
- *Maintenance requirements necessary to ensure continued energy savings, and describe how they will be provided; and (Section 6)*
- *If developed by an ESCO, a description of, and cost estimates of, a proposed energy savings guarantee. (Section 7)*

In addition, and per LFN 2009-11, the ESP requires several other important elements:

- *The calculations of energy savings must be made in accordance with protocols for their calculation adopted by the BPU. The calculation shall include all applicable State and federal rebates and tax credits but shall not include the cost of an energy audit and the cost of verifying energy savings. (Section 3)*
- *An independent third party must review the plan and certify that the plan savings were properly calculated pursuant to the BPU protocols.*
- *If an ESCO is used to prepare the plan, the ESCO must provide an estimate of the cost of a guarantee of energy savings. When adopting the plan, the local unit must decide whether to accept the guarantee (covered below). (Section 7)*
- *The plan must be verified by an independent third party to ensure that the calculations were made in accordance with the BPU standards and that all required elements of the ESP are covered.*
- *After verification is completed, the governing body must formally adopt the plan. At that point, the plan must be submitted to the Board of Public Utilities where it will be posted on the BPU website. BPU approval is not required. If the contracting unit maintains its own website, the plan must also be posted on that site.*

Vineland High School North

Vineland Senior High School South is a public high school located in Vineland, New Jersey. It holds classes for 9th and 10th grade students. It is a two-story, 229,580 square foot building built in 1976 and had a roof replacement in 2018. Spaces include: classrooms, gymnasium, library, auditorium, weight room, offices, cafeteria, corridors, stairwells, storage, indoor pool, a kitchen and electrical and mechanical spaces. The school shares an electric meter with High School South, and the usage for this site has been estimated based on the calculated load for this school. The facility is occupied for ten months of the year. Typical weekday occupancy is 1,304 staff and students.

Description of Building HVAC

There are approximately 89 ceiling-mounted water source heat pumps throughout the facility. The heat pumps primarily serve the heating and cooling needs of the building wings. The core of the building is served by air-handling units (AHUs). All AHUs have cooling and heating coils to provide heating and cooling. Hot water is supplied to the coils by the Bryan boilers and chilled water by chillers. There are four split system units serving various small areas such as offices and a Desert Aire packaged unit serving the indoor pool. The split system units have passed their useful life and have been evaluated for replacement. They are controlled with programmable thermostats.

Four Lochinvar non-condensing boilers are part of the building's water-source heat pump system which serves the heating load of the building wings. The boilers are configured in an automated control scheme, coming online as needed. Multiple boilers are required under high load conditions. They are in fair to good condition. The boilers are configured in a constant flow primary distribution with constant speed hot water pumps operating with lead-standby control scheme. The boilers provide hot water to water source heat pump units throughout the building wings. There are also two Bryan hot water boilers that serve the building's core heating loads. These boilers are configured in a lead-lag control scheme. Both boilers may be required under high load conditions. The boilers provide hot water to air-handling units and unit heaters throughout the core of the building. The heating hot water system is controlled by a Novar control system. The pool is heated by two Coates 36 kW electric boilers.

The chiller plant consists of one 300-ton Daikin air-cooled screw chiller. The chiller plant supplies chilled water to air handlers throughout the core of the building. The chiller plant is new. The condenser water system consists of two, two-cell cooling towers. Water is circulated to each tower which operates depending on the associated chiller. The cooling towers are in poor condition. There are also four cooling towers that are part of the water source heat pump system. Each tower serves a wing of the building, there are four one-cell cooling towers. The cooling towers are in poor condition. The chilled water system is controlled by a Novar control system.

Description of Building Lighting

The primary interior lighting system uses 32-Watt linear fluorescent T8 lamps. Additionally, there are some compact fluorescent lamps (CFL), incandescent, HID and LED general purpose lamps. Typically, T8 fluorescent lamps use electronic ballasts. Fixture types include 2-lamp, 3-lamp, or 4-lamp, 2-foot or 4-foot long recessed or surface mounted fixtures and 2-foot fixtures with U-bend and linear tube lamps. Gymnasium fixtures have high bay LED lamps and are manually controlled. Auditorium fixtures have high bay high intensity discharge (HID) lamps and are manually controlled. Most exit signs are LED, however. there are a few CFL units. Most fixtures are in fair condition. Interior lighting levels were generally sufficient. Most lighting fixtures are controlled manually and the remainder by occupancy sensors. Exterior fixtures include wall packs and canopy lights with either high intensity discharge (HID) or LED lamps. The pole-mounted fixtures have high intensity discharge (HID) or LED lamps.

Vineland High School South

Vineland Senior High School South is a public high school located in Vineland, New Jersey. It holds classes for 11th and 12th grade students. It is a two-story, 232,550 square foot building built in 1964. Spaces include: classrooms, gymnasium, auditorium, offices, cafeteria, corridors, stairwells, a commercial kitchen and mechanical space. Recent improvements include HVAC upgrade in the facility in 2017. The school shares an electric meter with High School North, and the usage for this site has been estimated based on the calculated load for this school. The facility is occupied from September through June with some extracurricular activities in the summer. Typical weekday occupancy is 1,166 including full-time staff and students.

Description of Building HVAC

The classroom unit ventilators have Daikin self-contained water source heat pump unit ventilators. The unit ventilators provide heating and cooling and are controlled with the building energy management system (EMS). They were installed during the 2017 facility's HVAC system upgrade. Building areas including the gym, auditorium, library, cafeteria, kitchen, locker rooms are served with AAON water source heat pump units controlled by the EMS. The units are roof and ceiling mounted. The units were all installed in 2017 and are in good condition. There are two cooling towers in the school for heat rejection from the heat pumps. The three gymnasiums (Gyms 1, 2, and 3) and the kitchen are each served by a 30-ton WSHP located in the Penthouse (gym units) and on the roof (kitchen). The auditorium has a roof-mounted 90-ton WSHP. The large WSHP (30 ton and 90 ton) are variable air volume units with the supply and return fans controlled by variable frequency drives.

Some classrooms and hallways are cooled using packaged units. Most of the units were installed in 2016 and were found to be in good condition. Some of the units were installed in 2010. Some units are equipped with an economizer that opens to draw in outside air for cooling when the outside air temperature is cool and dry enough. Smaller spaces such as offices, storage, and server rooms are cooled using split AC units. The split AC units are controlled by programmable thermostats located in their respective zones. There are a few new units, however, several of them have passed their useful life. The split system units are controlled with programmable thermostats. There are numerous fractional horsepower exhaust fans located throughout the building which serve the restrooms and other areas. There are some specialty exhaust blowers for science rooms with fume hoods. The exhaust fans are controlled by the EMS.

The space heating in the school is provided by a mixture of water source heat pumps and make-up air units with gas-fired furnaces. The heat pump loop circulates water to the Aerco gas-fired condensing hot water boilers. Water from the boilers circulates to the various spaces using four, 2 hp variable speed heating hot water pumps. Science classrooms are heated using gas-fired make up air unit furnaces.

Description of Building Lighting

The primary interior lighting system uses 32-Watt linear fluorescent T8 lamps. Additionally, there are some 23-Watt compact fluorescent lamps (CFL), 60-Watt incandescent and several LED general purpose lamps of varying wattage serving smaller spaces. Typically, T8 fluorescent lamps use electronic ballasts. Fixture types include 2-lamp, 3-lamp or 4-lamp, 2-foot or 4-foot long troffers and surface mounted fixtures and 2-foot U-bend and linear tube 2-lamp or 3-lamp fixtures. Most fixtures are in good condition and are controlled with a mixture of manual wall switches and occupancy sensors. The gymnasium has a mix of high bay LED fixtures and linear T8 lamp fixtures, all of which are manually controlled. The auditorium has high bay fixtures with 250Wwatt halogen incandescent lamps and manually controlled linear T8 4-lamp, 4-foot fixtures. All exit signs are LED units. Interior lighting levels were generally sufficient. Exterior fixtures include wall packs, pole lights, flood lights, recessed fixtures, and canopy lights with a mix of high intensity discharge (HID) and LED lamps.

Exterior light fixtures are controlled by a time clock or photocell, depending on the fixture.

Thomas Wallace Middle School

Thomas Wallace Middle School is a two-story, 119,380 square foot building built in 2006. Spaces include: classrooms, gymnasium, auditorium, a library, offices, cafeteria, corridors, stairwells, a school kitchen and electrical and mechanical spaces. The facility houses the school district central kitchen. The school is 100% cooled and heated. The HVAC equipment includes water source heat pump systems. The facility is occupied ten months of the year, when school is in session. Typical weekday occupancy is 658 staff and students.

Description of Building HVAC

The school has two make-up air units with indirect-fired furnaces, one air handler with a gas-fired furnace, and a blower coil unit with electric resistance heating. Each unit has a constant volume supply fan with motors between ½ hp and 10 hp each. Only the blower coil unit receives chilled water and has cooling. The units are original to the building and are controlled by a Trane EMS. The school is served by multiple packaged and split-system roof top units. The packaged and split system units are 13 years old, have reached their useful life, and appear in fair condition. The packaged units are equipped with an economizer that opens to draw in outside air for cooling when the outside air temperature is cool and dry enough. This reduces the demand on the cooling system, lowering its usage hours and saving energy. The packaged units are controlled with the EMS while the small split system units are controlled with programmable thermostats.

There are approximately 147 wells and 88 water source heat pumps (WSHP) throughout the facility. Most of the water source heat pumps are ceiling mounted. They provide cooling and heating to various spaces such as classrooms and offices. Geothermal energy systems take advantage of the fact that subsurface earth temperatures are constant year-round, which makes the earth an ideal heat source and heat sink for heat pumps. The units are controlled using a Trane Summit energy management system (EMS). Supplemental heat is provided in spaces such as mechanical and electrical rooms by electrical resistance heaters when needed. They are controlled with local thermostats.

Connected to the geothermal water loop are two Lochinvar condensing hot water boilers. The burners are fully modulating. The boilers are configured in a lead-lag control scheme. Both boilers are required under high load conditions. The boilers add heat to the water loop during winter months when most units are heating. The boilers are typically enabled when the water loop temperature falls to a minimum value. The boilers serve a primary secondary distribution system with two, 3 hp and two, 1 hp constant speed pumps circulating the primary loop and two VFD-controlled 50 hp heating hot water pumps operating in lead/lag fashion on the secondary loop. Hot water is also supplied to unit heaters. The boilers are between their useful lives and appear in good condition. Hot water system is controlled by a Trane EMS. There is one Fulton 1,005 MBh steam boiler that serves the central kitchen process heating loads used in food preparation. The system uses a 7.5 hp air compressor. The boiler is in good condition.

The chiller plant consists of a 22-ton Carrier Aquasnap air-cooled scroll chiller located on the ground. Chilled water is supplied by a dedicated 5 hp primary pump. The chiller supplies chilled water to air handlers and blower coil units serving the central kitchen. The chiller is original to building.

Description of Building Lighting

The primary interior lighting system uses 32-Watt linear fluorescent T8 lamps. Additionally, there are compact fluorescent lamps (CFL), incandescent, high intensity discharge (HID), and LED general purpose lamps. Typically, T8 fluorescent lamps use electronic ballasts. Fluorescent fixture types include 2-lamp, 3-lamp, or 4-lamp, 2-foot or 4-foot long recessed or surface mounted fixtures and 2-foot fixtures with U-bend or linear tube lamps. Gymnasium and auditorium fixtures have high bay high intensity discharge (HID) lamps and are manually controlled. The auditorium also has several halogen lamps for accent and stage lighting. The CFL fixtures are found in spaces such as “A” wing hallway, main lobby, library, and the conference room. The cold prep room of the central kitchen has some LED linear tubes. All exit signs are LED units. The fixtures are in good condition. Interior lighting fixtures are controlled manually by wall switches. Interior lighting levels were generally sufficient. Exterior fixtures include wall packs, canopy lights, and pole fixtures with high intensity discharge (HID), CFL, or LED lamps. The pole-mounted flood fixtures have with high intensity discharge (HID), or LED sources. Exterior fixtures are time clock controlled.

SGT Dominick Pilla Middle School

SGT Dominick Pilla Middle School is a single story, 99,000 square foot building built in 2018. Spaces include: classrooms, gymnasium, auditorium, offices, cafeteria, offices, a commercial kitchen and a mechanical space. The school is 100% cooled and heated. The HVAC equipment includes geothermal heat pump systems and AAON roof top units. The facility is occupied from September through June. Typical weekday occupancy including full time staff and students is 620.

Description of Building HVAC

Ductless mini-split heat pumps and water source heat pumps provide space cooling to smaller spaces such as the classrooms, offices, and hallways. The units have small fractional horsepower supply fans supplying conditioned air to the respective spaces. All of the units are relatively new, installed in 2018 and are in good condition. Geothermal energy systems take advantage of the fact that subsurface earth temperatures are constant year-round, which makes the earth an ideal heat source and heat sink for heat pumps. The units are controlled using a Trane Summit energy management system (EMS) and programmable thermostats.

Larger spaces including the kitchen, cafeteria, and gym are cooled using AAON packaged units with cooling capacities that range from 3 tons to 25 tons. Most of the units are variable air volume units. They are also equipped with an economizer that opens to draw-in outside air for cooling when the outside air temperature is cool and dry enough. This reduces the demand on the cooling system, lowering its usage hours and saving energy These units have built-in gas-fired furnaces that provide heating to the respective spaces. Kitchen heating is provided by Rupp Air make-up air units.The units are in good condition and well maintained. Space temperatures are controlled using an EMS. Air is exhausted from facility via roof mounted exhaust fans with motors ranging in size from 0.3 hp to 5 hp. They are controlled by the EMS.

Facility space heating is largely provided using geothermal heat pump loop. Water source heat pump units are distributed throughout the building to provide cooling and heating to the space. Units are connected to a water distribution loop which circulated water throughout the building to transfer heat from one area to another. This common water loop yields what is essentially a heat-recovery system. Units providing heating extract heat from loop water while units providing cooling reject heat to the loop. There is a heat exchanger in the mechanical room.

Also connected to this water loop is an Aerco Benchmark condensing hot water boiler. The boiler is used to add heat to the water loop during winter months when most units are heating. The boiler is typically enabled when the water loop temperature falls to a minimum value. Conditioned water is circulated using two 30 hp variable speed circulation pumps. The boiler was installed in 2018, new and in good condition. Boilers and pumps are controlled using the EMS.

Description of Building Lighting

The primary interior lighting system uses 32-Watt linear fluorescent T8 lamps. Additionally, there are some 26-Watt compact fluorescent lamps (CFL). Typically, T8 fluorescent lamps use electronic ballasts. Fixture types include 2-lamp, 3-lamp, 4-lamp or 6-lamp, 2-foot or 4-foot long troffers and surface mounted fixtures. Most fixtures are in good condition. Most of the fixtures are controlled using either wall mounted or ceiling mounted occupancy sensors, however, lighting in part of the building is manually controlled by wall switches. These spaces are further evaluated for the installation of occupancy sensors. All exit signs are 2-Watt LED units. Interior lighting levels were generally sufficient. Exterior wall pack and pole mount fixtures are LED with wattage that varies from 35-Watts to 160-Watts. Most exterior fixtures are controlled by time clock while of the pole mount fixtures are controlled using photocells.

Veterans Memorial Intermediate School

Veterans Memorial Intermediate School is a three-story, 113,150 square foot building built in 1954 and expanded to accommodate additional spaces in 1998. Spaces include: classrooms, gymnasium, auditorium, library, offices, locker rooms, restrooms, storage, cafeteria, corridors, stairwells, a kitchen and electrical and mechanical space. The facility is occupied ten months of the year. Typical weekday occupancy is 746 staff and students.

Description of Building HVAC

The old wing and parts of the newer wing are served by multiple packaged or split-system roof top units. The 3-ton split system units and the 40-ton Trane air-cooled condensing unit have all passed their useful live and appear to be in fair condition. The roof-mounted air handler units have a hot water coil for heating and chilled water coil for cooling. They are all constant air volume units. The units serving the newer wing are controlled by a Trane tracer summit Energy Management System (EMS) while a limited Novar control system controls the old wing.

A Weil McLain hot water boiler serves the heating load of the old wing of the school. The burner is fully non-modulating. Three Lochinvar hot water boilers serve the newer wings of the school. The burners are fully-modulating. The old wing boiler and pumps appear to be in fair condition. The hydronic distribution system is a four-pipe heating only system. The Weil McLain boiler serves a primary only distribution system with two constant speed 2 hp heating hot water pumps operating in lead/lag fashion. The Lochinvar boilers serve a primary/secondary distribution system with three constant speed 1 hp pumps circulating the primary loop and two VFD controlled 20 hp heating hot water pumps operating in lead/lag fashion on the secondary loop. Hot water is supplied to AHUs, fan coils, hydronic baseboards and unit heaters. Heating hot water loop for the newer wing is controlled by a Trane Tracer Summit EMS while a limited Novar control system is used to control the old wing hot water loop.

The chiller plant consists of two, 200-ton Trane air-cooled screw chillers and a single 60-ton Trane air-cooled screw chiller. The 60-ton chiller serves the air-handlers in the old wing of the school and is configured in a primary distribution loop with two 7.5 hp constant speed pumps that operate in lead/lag fashion. The chilled water supply temperature is reset (modulated) based on outside air temperature.

Description of Building Lighting

The primary interior lighting system uses 32-Watt linear fluorescent T8 lamps. There are also a few 40- Watt T12 fixtures in the old warehouse. Additionally, there are several compact fluorescent lamps (CFL) as well as some incandescent, HID, and LED general purpose lamps. Typically, T8 fluorescent lamps use electronic ballasts and T12 fluorescent lamps use magnetic ballasts. Fixture types include 2-lamp, 3-lamp, or 4-lamp, 2-foot or 4-foot long recessed or surface mounted fixtures and 2-foot fixtures with U-bend or linear tube lamps. Gymnasium fixtures have high bay, high intensity discharge (HID) lamps and are manually controlled. Most exit signs are LED, however, there are a few CFL units. Most fixtures are in good condition. Interior lighting levels were generally sufficient. Lighting fixtures are controlled by wall switches.

Exterior fixtures include wall packs and canopy lights with high intensity discharge (HID), CFL, or LED lamps. The pole-mounted fixtures have high intensity discharge (HID) lamps. Exterior light fixtures are controlled by a time clock or photocell, depending on the fixture.

Anthony Rossi Intermediate School

Anthony Rossi Intermediate School is a single-story, 76,000 square foot building built in 1971 with electrical renovations completed in 2001. Spaces include: classrooms, gymnasium, multipurpose room, offices, corridors, storage, restrooms, a kitchen, and electrical and mechanical spaces. The facility is occupied ten months of the year. Typical weekday occupancy is 568 staff and students.

Description of Building HVAC

The classroom McQuay unit ventilators have a supply fan with capacitor motors, outside air dampers, and valves that operate with a local control system. They provide direct expansion cooling and are equipped with electric resistance heaters. Classrooms are served with packaged terminal air conditioning (PTAC) units controlled by room thermostats. The school is served by multiple packaged and split-system roof top units. The small packaged and split system units are controlled with programmable thermostats while the three large RTUs (RTU1, 2, 3) are controlled with a limited Novar control system. The RTUs are equipped with economizer that opens to draw-in outside air for cooling when the outside air temperature is cool and dry enough. This reduces the demand on the cooling system, lowering its usage hours and saving energy. Also, each RTUs has a 90 kW (307 MBh) electric resistance heater.

Description of Building Lighting

The primary interior lighting system uses 32-Watt linear fluorescent T8 lamps. There are also some compact fluorescent lamps (CFL), incandescent, and LED general purpose lamps. Typically, T8 fluorescent lamps use electronic ballasts. Fixture types mainly include 1- 2- or 3-lamp, 2- or 4-foot long recessed and surface mounted fixtures, as well as 2-foot fixtures with U-bend and linear tube lamps. Gymnasium fixtures have high bay high intensity discharge (HID) lamps and are manually controlled. Most exit signs are CFL however there are a few LED units. Most fixtures are in good condition. All lighting fixtures are controlled manually. Interior lighting levels were generally sufficient. Exterior fixtures include wall packs and canopy lights with HID, CFL, or LED lamps. The pole mounted fixtures have HID lamps. Exterior light fixtures are controlled by a time clock or photocell depending on the fixture.

Gloria M. Sabater Elementary School/Casimer Dallago CC

Casimer Dallago Early Childhood Center and Gloria M. Sabater Elementary School is a combined 2-story facility with a total area of 141,585 square foot building built in 2007. Spaces include: classrooms, gymnasium, offices, cafeteria, corridors, stairwells, a commercial kitchen, and mechanical space. Casimer Dallago is a pre-K school and Gloria M Sabater is an elementary school. The building is connected to the city main indoor pool. Casimir Dallago pre-K school has a small indoor pool that is adjacent to the city pool. There are separate electric and gas meter for the pools. The sites are combined and share their electric and gas meters. The building HVAC systems are likewise integrated. The facilities are occupied for ten months out of the year with a typical weekday occupancy of 241 and 787 including staff and students respectively.

Description of Building HVAC

The space cooling and heating is provided by several vertical water source heat pumps, mostly Trane units, with capacities ranging from 2.5 to 4-tons. Geothermal energy systems take advantage of the fact that subsurface earth temperatures are constant year-round, which makes the earth an ideal heat source and heat sink for heat pumps. The system utilizes energy-conserving, heat-recovery capabilities to transfer heat from one area to another to meet individual zone requirements. All the units are in good working condition. They are controlled using a Trane Tozour energy management system (EMS). The direct expansion (DX) system for the facility consists of split systems and large rooftop packaged units (RTUs). Larger spaces such as the cafeteria and gymnasium are heated and cooled by a mix of DES CHAMPS and AAON packaged units with capacities that range from 6-to 40 tons. Most of the units incorporate a gas fired furnace. The heating capacity on these units range from 80 MBh to 400 MBH. The AAON RTUs are variable air volume units while DES CHAMPS units are constant air volume units. There are four Desert Air condensing units that provide cooling to various spaces including the data room. The DX system units were installed in 2007 and have passed their useful life. The large RTUs are controlled by Trane Summit EMS while the split system air conditioners are controlled with programmable thermostats.

The ground heat exchanger system consists of a series of pipes buried in the earth. The earth is used as an energy storage tank. The temperatures from the earth are more stable than air, allowing the water source heat pumps to operate at a lower discharge pressure and use fewer kilowatts. The constant earth temperature will heat or cool the fluid running through buried high-density polyethylene pipe to provide heating and cooling to a building. The ground water from the ground is circulated using two variable speed 40 hp pumps. The water is then circulated to the heat pumps using two variable speed 60 hp pumps. Supplemental heating is spaces such as mechanical rooms is provided by electric resistance heaters that are controlled with thermostats. A Tozour Trane EMS controls the HVAC equipment, heat pumps, and the package units. The EMS provides equipment scheduling control and monitors and controls space temperatures, supply air temperatures, humidity, heating water loop temperatures and chilled water loop temperatures.

Description of Building Lighting

The primary interior lighting system uses 32-Watt linear fluorescent T8 lamps. There are also several 30- watt T5 fixtures in the library of the Gloria M. Sabater school. Additionally, there are some 26-watt, 4 pin compact fluorescent lamps (CFL) and low wattage LED general purpose lamps. Typically, T8 fluorescent lamps use electronic ballasts. T8 fixture types include 2- 3- or 4-lamp, 2- or 4-foot long troffer or surface mounted fixtures and 2-foot fixtures with U-bend tube lamps. T5 fixture types include 3-lamp 4-foot long troffers. Interior lighting system is controlled with both occupancy sensors and wall switches. The lighting systems in the hallways are on timer. Exit signs throughout the facility are LED fixtures. Most fixtures are in good condition but since they are inefficient, they are being evaluated for LED replacements. The gymnasium and the pool areas are lit using 400-watt and 250-watt metal halide fixtures. Interior lighting levels were generally sufficient.

Exterior lighting consists of metal halide fixtures ranging from 50 to 250 watts, halogen incandescent lamp fixtures (70-watt or 250-watt), 26W CFL fixtures, and a mix of LED lamps and fixtures. All exterior lighting is controlled using photocells.

D'Ippolito Elementary School

D'Ippolito Elementary School is a 1-story, 75,860 square foot building built in 1968 with an addition in 1980. Spaces include: classrooms, gymnasium, multipurpose room, offices, cafeteria, corridors, restrooms, storage, library, kitchen, and electrical & mechanical space. The facility is occupied ten months of the year. Typical weekday occupancy is 641 staff and students.

Description of Building HVAC

Classroom McQuay unit ventilators have supply fan with capacitor motors, outside air dampers and valves that operate with a local control system. They provide direct expansion cooling and are equipped with electric resistance heaters. The library office is served with a packaged terminal heat pump (PTHP) unit controlled by room thermostat. Most of the packaged and split system units at this school have passed their useful live and are in poor condition. The Trane packaged units are controlled by the Novar control system while the split system units are controlled with programmable thermostats. The RTUs are equipped with economizer that opens to draw-in outside air for cooling when the outside air temperature is cool and dry enough. This reduces the demand on the cooling system, lowering its usage hours and saving energy. Also, each RTUs has a 90 kW (307 MBh) electric resistance heater.

Description of Building Lighting

The primary interior lighting system uses 32-Watt linear fluorescent T8 lamps. Additionally, there are some high intensity discharge (HID), incandescent, and LED general purpose lamps. Typically, T8 fluorescent lamps use electronic ballasts. Fixture types include 2- 3- or 4-lamp, 2- or 4-foot long recessed or surface mounted fixtures, and 2-foot fixtures with U-bend or linear tube lamps. Gymnasium fixtures have high bay HID lamps and are manually controlled. Most exit signs are incandescent however there are a few LED units. Most fixtures are in good condition. Interior lighting levels were generally sufficient. Lighting fixtures are controlled by wall switches. Exterior fixtures include wall packs and canopy lights with high intensity discharge (HID) or LED lamps. The pole mounted fixtures have HID or LED lamps.
Exterior light fixtures are controlled by a time clock or photocell, depending on the fixture.

Petway Elementary School

Petway Elementary School is a single-story, 74,300 square foot building built in 2006. Spaces include: classrooms, gymnasium, offices, cafeteria, stairwells, a commercial kitchen, and a mechanical space. The school is 100% cooled and heated. The HVAC equipment includes geothermal heat pump systems. The facility is occupied for ten months out of the year. Typical weekday occupancy is 561 including full time staff and students.

Description of Building HVAC

The space cooling and heating is provided by several Trane Axiom™ water source heat pump units. Their capacities range from 1-ton to 15-ton and each has a condensate drain. Geothermal energy systems take advantage of the fact that subsurface earth temperatures are constant year round, which makes the earth an ideal heat source and heat sink for heat pumps. The units are controlled using a Trane Summit energy management system (EMS). There are three Des Champs heat recovery units. Each unit includes two gas-fired furnaces. The capacities of these units have been assumed for analytical purposes. The packaged units were installed in 2006. A Trane makeup air (MUA) units provide heating and ventilation to the kitchen and other areas. They are also original to the building. The packaged units are controlled with the EMS.

There are three 20 ton water to water heat pumps located in the mechanical room. They contain a source side water to refrigerant heat exchanger, and a load side water to refrigerant heat exchanger. The source for the water to water heat pump is connected to a ground source loop system. During the refrigeration cycle, heat is transferred from the source-side heat exchanger to the load-side heat exchanger, or vice versa. The load-side heat exchanger provides conditioned fluid (hot or cold). The ground water is circulated to the heat pumps using two variable speed 40 hp pumps. Supplemental heating in the mechanical and kitchen storage rooms is provided by electric resistance heaters that are controlled with local thermostats. A Trane Tracer Summit EMS controls the HVAC equipment, furnaces, water source heat pumps, and the package units. The EMS provides equipment scheduling control, monitors and controls space temperatures, supply air temperatures, humidity, and heating water loop temperatures.

Description of Building Lighting

The primary interior lighting system uses 32-Watt linear fluorescent T8 lamps. There are 30-Watt T12 lamps in the hallway display case. Additionally, there are 26-watt and 32-watt compact fluorescent lamps (CFL) and 90-watt halogen incandescent lamps. Typically, T8 fluorescent lamps use electronic ballasts and T12 fluorescent lamps use magnetic ballasts. Fixture types include 2- 3- or 4-lamp, 2- or 4-foot long troffers or surface mounted fixtures. Most fixtures are in good condition and the lighting in the areas are generally sufficient. All exit signs are LED units.

The exterior lighting consists of pole mounted 150-watt high pressure sodium fixtures, LED wall pack, recessed fixtures, and 32-watt CFL fixtures. All exterior lighting is controlled by a timeclock or photocells

Dr. William Mennies Elementary School

Dr. William Mennies Elementary School is a two-story, 70,883 square foot building. Spaces include classrooms, gymnasium, auditorium, offices, cafeteria, corridors, stairwells, a kitchen, and a mechanical space. The typical hours of operation for the school are Monday through Friday between 6:00 am and 4:00 pm, with custodial staff on-site after-hours till approximately 11 pm. The facility is rarely utilized on the weekends, and during the summer break months. The school has an enrollment of approximately 618 students and 74 staff.

Description of Building HVAC

In September 2023, an HVAC overhaul of Dr. William Mennies was completed. The old classroom split-system heat pumps were removed and 12 new gas-fired Trane packaged RTUs with D/X coils were installed to serve the classrooms.. The units cooling capacity ranges from 3-20 tons and heating capacity from 120MBH – 600MBH. Two Trane condensing units were installed to serve air-handlers and Fujitsu ductless-split heat pumps were installed to serve office spaces. The units are controlled via a Trane SC+ EMS.

Description of Building Lighting

Interior Lighting within the project was converted to LED as part of the HVAC upgrade project.

Johnstone Elementary School

Johnstone Elementary School is a 1-story, 63,890 square foot building built in 1957. Spaces include: classrooms, gymnasium, offices, cafeteria, a commercial kitchen, and mechanical space. There were additions made to the building in 1998 and 2003. The building is a 100% heated and 90% cooled. The facility is occupied for ten months out of the year. Typical weekday occupancy is about 427 including full time staff and students.

Description of Building HVAC

The 1998 portion of the school contains approximately 20 pneumatically controlled unit ventilators with hot and chilled water coils and supply fan motors. This system is original to the building and appears to be in fair operating condition. Spaces such as the gym, offices, cafeteria, and the kitchen are cooled using packaged Trane units with cooling capacities ranging from 8 to 10 tons. The temperatures in these zones are monitored by an EMS with limited control capabilities. Older sections of the building with classrooms and some offices are cooled using packaged terminal heat pumps with electric heating capacity. The heat pumps are 1.25 tons with a heating capacity of 3.5 kW. These units were installed in 2002. The temperature for these units is controlled at the unit. Several other offices, hallways, and other areas are cooled using window AC units and ductless mini-split AC units with capacities ranging from 0.75 to 1 ton.

There are two gas-fired non-condensing HB Smith hot water boilers providing heating to the unit ventilators and the air handling units equipped with hot water coils. The water from the boilers are circulated to the terminal units using two constant speed 10 hp heating hot water pumps. These boilers were installed in 1998. The hot water pumps were observed to be in good condition. Several other spaces in the original building including room seven, the cafeteria, library, and other spaces are heated using gas-fired Reznor furnaces equipped with supply fans. These furnaces have output capacities ranging from 132 MBh to 270 MBh. All of the furnaces were installed in 1992. Boiler and supply water temperatures and pump operation are only monitored by the EMS; the system provides a limited level of control. Cooling in the 1998 section of the school is provided by two constant speed Trane air cooled screw-chillers with cooling capacities of 70 and 110 tons, respectively. The chilled water is supplied to the unit ventilators and chilled water coils by two constant speed 5 hp pumps and two constant speed 25 hp pumps. The chillers were installed in 1998. The chiller operations and temperatures are monitored by an EMS, which has limited capabilities. The chillers are locked out during the winter months.

Description of Building Lighting

The primary interior lighting system uses 32-Watt linear fluorescent T8 lamps. There are also 16W and 42W 4-pin compact fluorescent lamps (CFL), which are mainly recessed. 65W incandescent lamp fixtures serving smaller spaces such as elevators, storage spaces, restrooms, and closets. Typically, T8 fluorescent lamps use electronic ballasts. Fixture types include 2- or 4-foot 2-, 3- or a few 4-lamp long troffers and surface mounted fixtures and 2- foot fixtures with U-bend tube lamps. Most fixtures are in good condition. Library, tech room and music rooms have 4-foot 1 lamp T5 high output fixtures providing lighting to the spaces. Gym is lit using 100-watt metal halide high bay fixtures. All exit signs are 2W LED units. All the interior fixtures in the school are controlled using wall switches. Interior lighting levels were generally sufficient.

Facility exterior lighting includes recessed fixtures with 54W LED “corn” lamps, wall packs, and pole lights with 50W, 250W and 400W metal halide fixture, as well as 120W LED wall pack fixtures. The exterior lighting is controlled using photocells.

Dr. John H. Winslow Elementary School

John H. Winslow Elementary School is a 1-story, 57,397 square foot building built in 1966. Spaces include: classrooms, gymnasium, cafeteria, corridors, offices, a commercial kitchen and, mechanical space. The building has an older and newer sections. The older section is heated and cooled using heat pumps while the newer section uses hot water boilers and a chiller. The building is 90% cooled and 100% heated. Recent improvements include roof replacement in 2016. The facility is occupied from September through June. Typical weekday occupancy is 455 including full time staff and students.

Description of Building HVAC

Phase 1 of an HVAC project was completed in April 2023 and Phase 2B was completed in October 2023. 14 Trane gas-fired packaged RTUs with D/X coils were installed to serve classroom spaces. Units range from 3-5 tons of cooling capacity and have a heating capacity of 60MBH. New ductless split systems and a VRF system were installed to serve various offices. Various classrooms in the older portion of the facility are cooled and heated using packaged terminal heat pumps, each with a cooling capacity of 1.25 hp and a heating capacity 12.5 MBh. The units were installed in different years between 2000 – 2004. All these units are in poor condition. The gym and cafeteria are each served by a 12.5-ton Thermal Zone packaged unit. Each unit has a 204 MBh gas-fired heating section. They provide constant volume air and have no economizers. The units were installed in 2016 and are in good condition. The space temperatures are set and monitored using a Novar EMS system that has very limited control capabilities. The space temperatures in these units are controlled by programmable thermostats locally.

The facility is heated using two gas-fired hot water non-condensing Weil McLain boilers. The two boilers serving the older portion of the school have output capacities of 2240 MBh. The two old boilers were installed in 1966 and are in poor condition. The hot water from the boiler is circulated to various spaces using constant speed pumps of different sizes. Some parts of the hot water pipes attached to the older section boiler were observed to be uninsulated. The supply temperatures and the boiler schedules are monitored using the Novar EMS. The system has very limited scope for controlling the equipment. The site staff may want to consider expanding this potential.

The newer section of the school is cooled using an air-cooled Trane Chiller with a cooling capacity of 60 tons. The chilled water distribution loop consists of two constant speed chilled water pumps serving the air handler on the roof. The air handler unit is equipped with a chilled and hot water coils. It provides constant air volume using a 40 hp supply fan and a 20 hp return fan. The unit has an economizer. The chiller was installed in 2000 and has been evaluated for replacement. The loop temperatures and the operation are monitored using a Novar EMS system that has very limited controlling capabilities.

Description of Building Lighting

Phase 1 and Phase 2A sections of the school were upgraded to LED flat panels during the HVAC upgrade. The remaining section Phase 2B's primary interior lighting system uses 32-Watt linear fluorescent T8 lamps. There are also 23W and 26W compact fluorescent lamps (CFL) and 65W incandescent lamps serving some smaller spaces. Typically, T8 fluorescent lamps use electronic ballasts. All exit signs are LED units. Fixture types include 1- 2- 3- or 4-lamp, 2- or 4-foot long troffer or surface mounted fixtures and 2-foot fixtures with U-bend tube lamps. Most fixtures are in good condition. Interior lighting levels were generally sufficient. Interior lighting is controlled by manual wall switches. Wall mount or remote mounted occupancy sensors have been evaluated for the appropriate spaces.

Exterior lighting is provided by: recessed fixtures with 50W high pressure sodium or 65W incandescent lamps, wall pack fixtures with 175W metal halide or 54W LED lamps, and pole lights with 250W metal halide or 400W metal halide lamps. Most of the exterior lighting fixtures are controlled using photocells.

Marie Durand Elementary School

The Marie Durand Elementary School is located at 317 West Forest Grove Road in Vineland, New Jersey. The 46,158 SF building was originally built in 1972 with no major additions. The building is a one-story facility comprised of main office, classrooms, multi-purpose, kitchen, library, nurse's offices, art room, faculty room, restrooms, and other utility/storage rooms. The typical hours of operation for the school are Monday through Friday between 6:00 am and 4:00 pm, with custodial staff on-site after-hours till approximately 11 pm. The facility is rarely utilized on the weekends, and during the summer break months. The school has an enrollment of approximately 550 students and 80 staff.

Description of Building HVAC

In September 2022, a major HVAC overhaul was completed at Marie Durand Elementary School. The existing classroom unit ventilators/ packaged terminal air-conditioners (AC) were removed and 14 new gas-fired Trane packaged RTUs with D/X coils were installed to serve the classrooms. The unit range from 4 to 17.5 tons of cooling capacity and 120MBH to 350MBH. The units are controlled via a Trane SC+ EMS.

Description of Building Lighting

Interior Lighting within the project was converted to LED as part of the HVAC upgrade project.

Dane Barse Elementary School

Dane Barse Elementary School is a 1-story, 40,030 square foot building built in 1951. Spaces include: classrooms, gymnasium, auditorium, offices, cafeteria, a kitchen and a mechanical space. The building is heated using forced draft steam and hot water boilers and cooled using split AC units. In the year 2001, the school underwent an electric upgrade. The 1951 and 1966 section windows and exterior doors are in very poor condition and need to be considered for replacement. The facility is occupied ten months of the year. Typical weekday occupancy is 364 people including full time staff and students.

Description of Building HVAC

In September 2023, a major HVAC overhaul was completed at Dane Barse Elementary School. The existing classroom unit ventilators/ packaged terminal air-conditioners (AC) were removed and 24 new gas-fired Carrier packaged RTUs with D/X coils were installed to serve the classrooms. The unit range from 3 to 15 tons of cooling capacity and 120MBH to 300MBH. The units are controlled via a proprietary Carrier iVue energy management system.

Description of Building Lighting

Interior Lighting within the project was converted to LED as part of the HVAC upgrade project.

Cunningham School

Cunningham School (Academy) is a three-story, 36,405 square foot building built in 1918. Spaces include: classrooms, gymnasium, administrative offices, hallways, stairwells, nurse office, kitchen, storage rooms and basement mechanical spaces. The facility is occupied year-round, from September through June. Typical weekday occupancy is 68 students and staff.

Description of Building HVAC

Classrooms, hallways, offices, and the kitchen are all served by a combination of split system heat pumps and split system air conditioners. There are 35 split systems including heat pumps units, 31 of which have passed their useful life and appear in poor condition. The split system ACs vary in capacity between 0.75 ton and 1 ton while heat pumps vary in cooling capacity between 1 ton and 3.5 tons with heating capacities between 13.1 MBh and 32.76 MBh. Units are controlled by programmable thermostats. One office is cooled by a window AC.

An AO Smith 675 MBh condensing hot water boiler serves the newer section heating load including the main office and the gymnasium. Installed in 1996, the boiler is in poor condition. Heating hot water is distributed using two 1 hp and 0.3 hp constant speed hot water pumps. Heating temperature in spaces is controlled with local thermostats. Supplemental heating in various small spaces is provided with electric resistance heaters.

Description of Building Lighting

The interior lighting system consists mostly of 32-Watt linear fluorescent T8 lamps with electronic ballasts. Fixture types include 2-lamp and 4-lamp, 2-foot or 4-foot long troffer, recessed, surface mounted fixtures and 2-foot fixtures with U-bend linear tube lamps. Interior lights are controlled mostly with wall switches. Exit signs in the building are LED fixtures. Most fixtures are in good condition and interior lighting levels were generally sufficient. Exterior fixtures include wall packs with high intensity discharge (175-Watt and 250-Watt metal halide), 75-Watt incandescent lamps, and 23-Watt recessed compact fluorescent lamps all controlled with photocells.

Landis Administrative Building

Landis Administrative Building is a 3-story, 92,320 square foot building built in 1927. Spaces include: offices, restrooms, storage spaces, kitchen areas, conference rooms, an attic floor, and a mechanical space. Recent improvements include some interior alterations in 2017 for converting a school to an administrative building. Lighting was replaced in most areas. The facility is occupied year-round. Typical weekday occupancy is 213 staff.

Description of Building HVAC

The Landis Administration Building has approximately 55-unit ventilators with pneumatically controlled hot water coils, chilled water coils, and supply fan motors. This system is original to the building and appears to be in fair operating condition. The facility has several split AC units, and split system packaged air source heat pumps serving various offices. The exercise building, old kitchen, and the server rooms are served by window AC units. The package air source heat pumps made by York have economizers. The split AC and packaged air source heat pump units have cooling capacities ranging from 0.75-ton to 5- ton. These units are from various manufacturers including Carrier, York, Liebert, Daikin, Rheem, Sanyo, Fujitsu, Arcoaire, and Goodman. The cooling capacity of the Friedrich window AC units are 1 or 2-tons. Programmable thermostats provide temperature control for zones served by these units.

Space heating in the building is provided by two forced draft HB Smith steam boilers with heat exchangers. The boilers have a heating capacity of 3,361.8 MBh. The boilers distribute hot water to various unit ventilators and air handling units through a heating loop using two 7.5 hp and two 0.5 hp constant speed hot water pumps. The facility is heated using a high efficiency Guardian gas fired furnace. The furnace is within its useful life and in good condition. The boiler and heating hot water supply temperature setpoints are monitored by a Novar energy management system (EMS). The EMS system has a very limited scope for providing control. The majority of the building is cooled using two constant speed Trane air cooled screw chillers. The chillers have a cooling capacity of 140 tons. Chilled water is distributed through a loop to the unit ventilators and air handling units using two 30 hp constant speed dual temperature chilled water pumps. The chillers were installed in 1996. The chiller operation and supply temperature are monitored using a Novar EMS.

Description of Building Lighting

The primary interior lighting system uses 32W linear fluorescent T8 lamps and 50W ambient LED fixtures. There are also several 40-Watt T12 fixtures. There are some 14W and 23W compact fluorescent lamps (CFL) and 9W and 11W LED general purpose lamps serving spaces such as the restrooms, janitorial closets, auditorium, attic, and some exterior fixtures. The linear T8 fixtures types include 2- 3- or 4-lamp, 2- or 4-foot long troffers and some surface mounted fixtures. Some parts of the building also contain 2-foot fixtures with U-bend tube lamps. Most fixtures are in good condition. The interior lighting control in the facility consists of a mixture of wall switches and occupancy sensors.

Most exit signs are CFL however there are a few LED units. Interior lighting levels were generally sufficient.

Exterior lighting mostly consists of 45W, 54W, or 135W LED fixtures. There are also some wall packs and pole lights that have 175W or 400 W metal halide lamps or 100W high pressure sodium lamps. All exterior lights are controlled using photocells.

Maintenance/Transportation Building

The Vineland Public School Maintenance and Transportation Building is a one-story, 22,036 square foot building built in 1993. Spaces include: maintenance shops, garage bay areas, break rooms, offices, conference room, restrooms, storage and mechanical spaces. The facility is occupied year-round. It is open Monday through Friday. Typical weekday occupancy is 35 people.

Description of Building HVAC

Building areas including offices, break rooms, and the conference room are conditioned by split system heat pumps and window AC units. There are six split system heat pumps and nine window units. The heat pumps have heating capacities that vary between 10 MBh and 24 MBh and cooling capacities between 1 ton and 2 tons. They are controlled with programmable thermostats. Four window units along with the split system heat pump serving the break room appear in poor condition and have been evaluated for replacement.

One HB Smith forced draft steam boiler serves the building heating load. The burner is nonmodulating. Heating steam is supplied to radiators and unit heaters. Space temperatures are controlled with local thermostats. Supplemental heating in small spaces is provided with electric resistance heaters. Hot water is produced by a 12-gallon, 1.5 kW electric storage water heater that is in good condition.

Description of Building Lighting

The primary interior lighting system uses 32-Watt linear fluorescent T8 lamps with electronic ballasts. Fixture types include 2-lamp or 4-lamp, 4-foot long troffer, recessed, surface mounted fixtures and 2-foot fixtures with U-bend linear tube lamps. There are several metal halide high bay fixtures in the garage bay area. The maintenance shop contains a mix of LED high bay and metal halide fixtures. Lighting fixtures are controlled by wall switches. There are two compact fluorescent and one LED exit sign. Most fixtures are in fair condition.

Exterior fixtures include wall packs and pole-mounted fixtures with high intensity discharge (150-Watt, 175-Watt, 250-Watt, 400-Watt) and LED (54-Watt, 75-Watt) lamps. Exterior fixtures are controlled with photocells.

Central Warehouse

The Central Warehouse at Vineland Public School is a two-story, 23,000 square foot building built in 1998. Spaces include: warehouse, offices, BOE classroom, break room, conference rooms, data room, main and reception areas, restrooms and storage rooms. A section of the building houses the New Jersey Youth Corps of Vineland. The facility is occupied year-round. It is open Monday through Friday. Typical weekday occupancy is 12 people.

Description of Building HVAC

Building areas are served with five Trane rooftop packaged units (RTUs) that provide direct expansion cooling and gas-fired heating to spaces. They are controlled with programmable thermostats. These units have cooling capacities that vary between 2 tons and 14 tons. The gas heating capacities vary between 32 MBh and 121,6 MBh. The units are equipped with economizers that are in fair condition. There is a 1.5-ton split system air conditioner that provides cooling to the data room.

Heating is provided in the warehouse areas with six Trane ceiling-mounted, gas-fired warm air units heaters that are controlled with local thermostats. They are in good condition. Supplemental heating in restrooms is provided by electric resistance heaters. Hot water is produced by a 2-gallon 1.5 kW and a 10-gallon 1.65 kW electric storage water heater

Description of Building Lighting

The primary interior lighting system uses 32-Watt linear fluorescent T8 lamps. There are also some linear T12 fixtures. Additionally, there are several incandescent and LED general purpose lamps. Typically, T8 fluorescent lamps use electronic ballasts and T12 fluorescent lamps use magnetic ballasts. Fixture types include 2-lamp or 4-lamp, 4-foot and 8-foot long troffer, recessed, surface-mounted fixtures and 2-foot fixtures with U-bend linear tube lamps. Exit signs throughout the building are LED fixtures. Interior lights are controlled with manual wall switches. Most fixtures are in good condition. The facility exterior illumination is provided mainly by LED fixtures and six 400-Watt metal halide pole-mounted fixtures. They are all controlled with photocells.

VINELAND PUBLIC SCHOOLS
Working Together for a Bright Future

ENERGY SAVINGS PLAN

SECTION 2 – ENERGY BASELINE

Total Utility Consumption and Site EUI

The Vineland Public School District Energy Savings Plan includes 18 buildings. There are 8 Elementary Schools, 2 Intermediate Schools, 2 Middle Schools, 2 High Schools, 1 Alternative Schools, 2 Maintenance Facilities, and 1 Administration Building. To develop the ESP, DCO Energy was provided with all available utility data (electric, natural gas). DCO Energy tracked and documented this utility data from July of 2023 through June of 2024. A listing of the buildings, the total utility consumption, and Energy Usage Index for the 18 sites are detailed below.

BUILDING/FACILITY NAME	SQFT
Vineland High School North	229,580
Vineland High School North/South	232,550
Thomas Wallace Middle School	119,380
SGT Dominick Pilla Middle Schoool	99,000
Veterans Memorial Intermediate School	113,150
Anthony Rossi Intermediate School	76,000
Gloria M. Sabater Elementay School	141,585
D'Ippilito Elementary School	75,860
Petway Elementary School	74,300
Dr. William Mennies Elementary School	71,747
Johnstone Elementary School	63,890
Dr. John H. Winslow Elementary School	57,397
Marie Durand Elementary School	46,158
Dane Barse Elementary School	40,030
Cunningham School	36,405
Landis Administrative Building	92,320
Maintenance/Transportation Building	22,036
Central Warehouse	23,000
TOTALS	**1,614,388**

Vineland Public School District- Energy Use Summary

Vineland Public Schools BUILDINGS/FACILITIES		ELECTRIC			
BUILDING/FACILITY NAME	SQFT	CONSUMPTION kWh	DEMAND kW	USAGE BTU / SQFT	TOTAL COST $$
Vineland High School North	229,580	2,885,037	785	42,877	446,355
Vineland High School South	232,550	2,885,037	785	42,330	446,355
Thomas Wallace Middle School	119,380	1,864,900	405	53,301	354,803
SGT Dominick Pilla Middle Schoool	99,000	1,011,600	300	34,864	171,821
Veterans Memorial Intermediate School	113,150	2,178,720	771	65,699	377,373
Anthony Rossi Intermediate School	76,000	1,373,800	590	61,676	256,198
Gloria M. Sabater Elementary School	141,585	1,988,740	405	47,926	334,967
D'Ippolito Elementary School	75,860	1,376,000	532	61,889	241,206
Petway Elementary School	74,300	973,200	266	44,691	162,094
Dr. William Mennies Elementary School	71,747	1,335,480	376	63,510	226,953
Johnstone Elementary School	63,890	905,860	298	48,377	160,732
Dr. John H. Winslow Elementary School	57,397	500,640	212	29,761	89,217
Marie Durand Elementary School	46,158	1,135,440	459	83,932	210,942
Dane Barse Elementary School	40,030	656,960	184	55,997	110,456
Cunningham School	36,405	424,400	160	39,776	72,201
Landis Administrative Building	92,320	929,880	238	34,367	160,112
Maintenance/Transportation Building	22,036	237,137	46	36,718	41,006
Central Warehouse	23,000	165,680	70	24,578	29,391
TOTALS	**1,614,388**	**22,828,511**	**6,881**	**48,248**	**$3,892,180**

Vineland Public Schools BUILDINGS/FACILITIES		NATURAL GAS		
BUILDING/FACILITY NAME	SQFT	USAGE THERMS	USAGE BTU / SQFT	TOTAL COST $$
Vineland High School North	229,580	47,753	20,800	$76,152
Vineland High School South	232,550	40,577	17,449	$69,900
Thomas Wallace Middle School	119,380	26,539	22,230	$45,870
SGT Dominick Pilla Middle Schoool	99,000	24,242	24,487	$41,924
Veterans Memorial Intermediate School	113,150	59,735	52,793	$103,738
Anthony Rossi Intermediate School	76,000	683	899	$1,708
Gloria M. Sabater Elementary School	141,585	16,010	11,307	$26,543
D'Ippolito Elementary School	75,860	524	691	$1,392
Petway Elementary School	74,300	2,755	3,708	$5,169
Dr. William Mennies Elementary School	71,747	4,672	6,512	$8,452
Johnstone Elementary School	63,890	28,762	45,018	$49,683
Dr. John H. Winslow Elementary School	57,397	24,699	43,033	$42,768
Marie Durand Elementary School	46,158	11,484	24,879	$19,857
Dane Barse Elementary School	40,030	24,436	61,043	$42,332
Cunningham School	36,405	6,833	18,770	$10,966
Landis Administrative Building	92,320	34,373	37,233	$59,319
Maintenance/Transportation Building	22,036	16,952	76,930	$29,528
Central Warehouse	23,000	8,767	38,116	$15,474
TOTALS	**1,614,388**	**379,796**	**23,526**	**$650,777**

Vineland Public Schools BUILDINGS/FACILITIES		TOTAL ENERGY	TOTAL COST
BUILDING/FACILITY NAME	SQFT	USAGE BTUs	$$
Vineland High School North	229,580	14,619,045,244	$522,507
Vineland High School South	232,550	13,901,453,244	$516,255
Thomas Wallace Middle School	119,380	9,016,902,800	$400,673
SGT Dominick Pilla Middle Schoool	99,000	5,875,757,200	$213,745
Veterans Memorial Intermediate School	113,150	13,407,318,640	$481,111
Anthony Rossi Intermediate School	76,000	4,755,697,600	$257,906
Gloria M. Sabater Elementary School	141,585	8,386,547,880	$361,510
D'Ippolito Elementary School	75,860	4,747,348,000	$242,598
Petway Elementary School	74,300	3,596,035,400	$167,263
Dr. William Mennies Elementary School	71,747	5,023,844,760	$235,405
Johnstone Elementary School	63,890	5,967,004,320	$210,415
Dr. John H. Winslow Elementary School	57,397	4,178,121,680	$131,985
Marie Durand Elementary School	46,158	5,022,487,280	$230,799
Dane Barse Elementary School	40,030	4,685,101,520	$152,788
Cunningham School	36,405	2,131,386,300	$83,167
Landis Administrative Building	92,320	6,610,093,560	$219,432
Maintenance/Transportation Building	22,036	2,504,350,444	$70,534
Central Warehouse	23,000	1,441,957,160	$44,865
TOTALS	**1,614,388**	**115,870,453,032**	**$4,542,957**

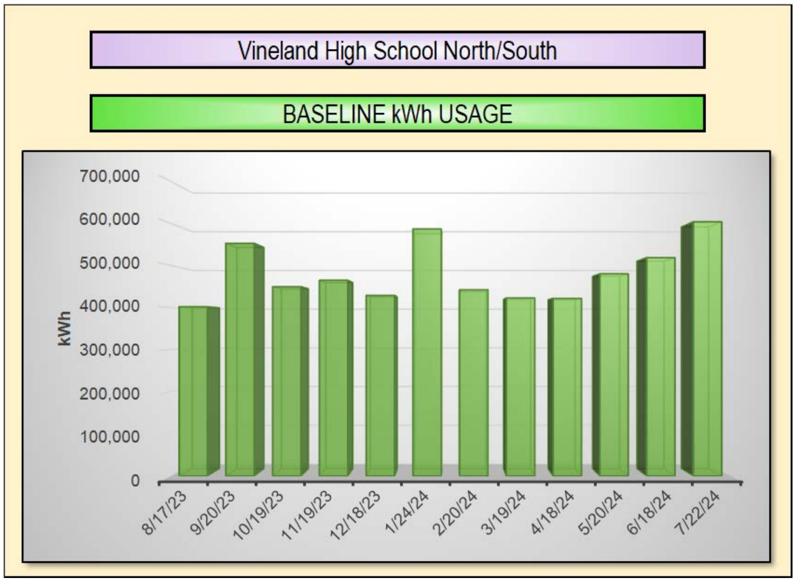
Vineland Public School District– Energy Use & Cost Index

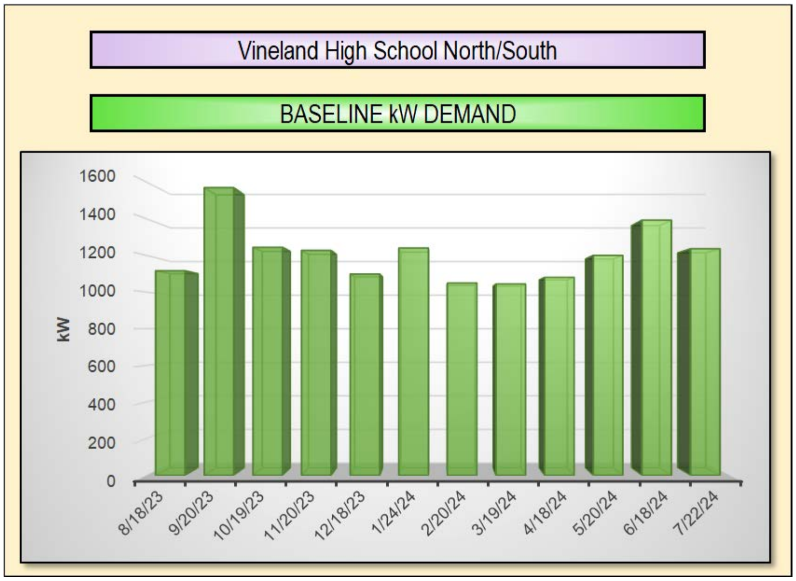
Vineland Public Schools BUILDINGS/FACILITIES		SITE EUI		
BUILDING/FACILITY NAME	SQFT	USAGE BTU / SQFT	NATIONAL MEDIAN BTU / SQFT	NATIONAL MEDIAN +/- %
Vineland High School North	229,580	63,677	68,800	7%
Vineland High School North/South	232,550	59,778	68,800	13%
Thomas Wallace Middle School	119,380	75,531	68,800	-10%
SGT Dominick Pilla Middle Schoool	99,000	59,351	68,800	14%
Veterans Memorial Intermediate School	113,150	118,492	68,800	-72%
Anthony Rossi Intermediate School	76,000	62,575	68,800	9%
Gloria M. Sabater Elementay School	141,585	59,233	68,800	14%
D'Ippilito Elementary School	75,860	62,580	68,800	9%
Petway Elementary School	74,300	48,399	68,800	30%
Dr. William Mennies Elementary School	71,747	70,022	68,800	-2%
Johnstone Elementary School	63,890	93,395	68,800	-36%
Dr. John H. Winslow Elementary School	57,397	72,793	68,800	-6%
Marie Durand Elementary School	46,158	108,811	68,800	-58%
Dane Barse Elementary School	40,030	117,040	68,800	-70%
Cunningham School	36,405	58,547	68,800	15%
Landis Administrative Building	92,320	71,600	68,800	-4%
Maintenance/Transportation Building	22,036	113,648	68,800	-65%
Central Warehouse	23,000	62,694	68,800	9%
TOTALS	**1,614,388**	**71,774**	**68,800**	**-4%**

Vineland Public Schools BUILDINGS/FACILITIES		SITE ECI		
BUILDING/FACILITY NAME	SQFT	COST $$ / SQFT	NATIONAL MEDIAN $$ / SQFT	NATIONAL MEDIAN +/- %
Vineland High School North	229,580	$2.28	$1.38	-65%
Vineland High School North/South	232,550	$2.22	$1.38	-61%
Thomas Wallace Middle School	119,380	$3.30	$1.38	-139%
SGT Dominick Pilla Middle Schoool	99,000	$2.16	$1.38	-57%
Veterans Memorial Intermediate School	113,150	$4.25	$1.38	-208%
Anthony Rossi Intermediate School	76,000	$3.39	$1.38	-146%
Gloria M. Sabater Elementay School	141,585	$2.55	$1.38	-85%
D'Ippilito Elementary School	75,860	$3.20	$1.38	-132%
Petway Elementary School	74,300	$2.25	$1.38	-63%
Dr. William Mennies Elementary School	71,747	$3.28	$1.38	-138%
Johnstone Elementary School	63,890	$3.29	$1.38	-139%
Dr. John H. Winslow Elementary School	57,397	$2.30	$1.38	-67%
Marie Durand Elementary School	46,158	$5.00	$1.38	-263%
Dane Barse Elementary School	40,030	$3.82	$1.38	-177%
Cunningham School	36,405	$2.28	$1.38	-66%
Landis Administrative Building	92,320	$2.38	$1.38	-72%
Maintenance/Transportation Building	22,036	$3.20	$1.38	-132%
Central Warehouse	23,000	$1.95	$1.38	-41%
TOTALS	**1,614,388**	**$2.81**	**$1.38**	**-104%**

Vineland High School North/South Baseline Energy Use

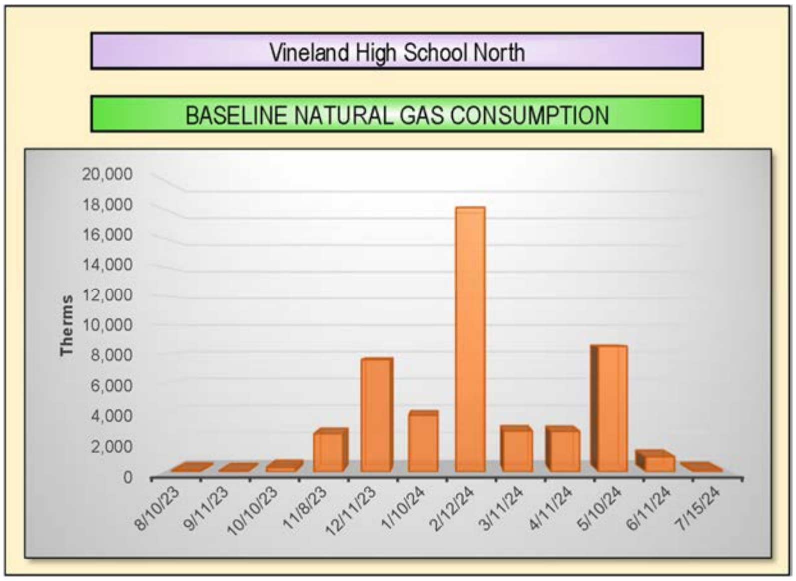
*Note: Vineland High School North and Vineland High School South are located on the same lot and share a common electric meter. Their combined usage is shown below.



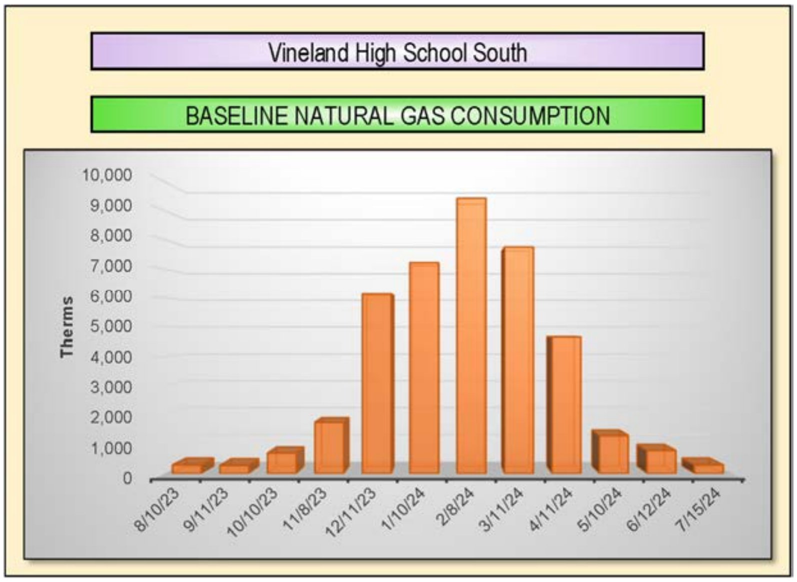


Vineland High School North / South							ELECTRIC METER #1						
Provider:	Vineland Municipal Utility Authoirty				Rate:	GLP 20				Meter #	E31493		
Commodity:	Vineland Municipal Utility Authoirty				Account #	118314				Meter #			
Billing Period Start Date	Actual Reading	Usage kWh	Demand kW	Customer Charge $	Under 70K kWh $	Over 70K kWh $	Energy Cost Clause $	Demand Charge $	Total Electric Charges	Initial kWh Size	Marginal kWh Rate Over 70k kWh	Marginal kWh Rate Under 70k kWh	BTU
7/18/23	8/17/23	399,600	1,116	$500	$6,724	$29,354	$16,639	$11,997	$65,215	70,000	$0.131	$0.138	1,363,435,200
8/18/23	9/20/23	549,600	1,569	$500	$6,724	$42,713	$22,885	$16,867	$89,689	70,000	$0.131	$0.138	1,875,235,200
9/21/23	10/19/23	447,600	1,244	$500	$6,724	$29,664	$18,638	$12,751	$68,278	70,000	$0.120	$0.138	1,527,211,200
10/20/23	11/19/23	463,200	1,227	$500	$6,724	$30,890	$19,288	$12,577	$69,978	70,000	$0.120	$0.138	1,580,438,400
11/20/23	12/18/23	427,200	1,098	$500	$6,724	$28,062	$17,789	$11,255	$64,329	70,000	$0.120	$0.138	1,457,606,400
12/19/23	1/24/24	584,400	1,240	$500	$6,724	$40,411	$24,334	$12,710	$84,680	70,000	$0.120	$0.138	1,993,972,800
1/25/24	2/20/24	440,400	1,049	$500	$6,724	$29,099	$18,338	$10,752	$65,413	70,000	$0.120	$0.138	1,502,644,800
2/21/24	3/19/24	421,200	1,044	$500	$6,724	$27,590	$17,539	$10,722	$63,075	70,000	$0.120	$0.138	1,437,134,400
3/20/24	4/18/24	420,000	1,080	$500	$6,724	$27,496	$17,489	$11,214	$63,423	70,000	$0.120	$0.138	1,433,040,000
4/19/24	5/20/24	477,600	1,200	$500	$6,724	$32,021	$19,887	$12,362	$71,494	70,000	$0.120	$0.138	1,629,571,200
5/21/24	6/18/24	514,800	1,392	$500	$6,724	$39,614	$21,436	$15,093	$83,367	70,000	$0.131	$0.138	1,756,497,600
6/19/24	7/22/24	600,000	1,236	$500	$6,724	$47,202	$24,984	$13,739	$93,149	70,000	$0.131	$0.138	2,047,200,000
TOTALS		5745600	1569	$6,000	$80,690	$404,116	$239,247	$152,036	$882,089	840,000	$0.124	$0.138	19,603,987,200

Vineland High School South							ELECTRIC METER #2						
Provider:	Vineland Municipal Utility Authoirty					Rate:	GLP20				Meter #	E21665	
Commodity:	Vineland Municipal Utility Authoirty					Account #	142420				Meter #		
Billing Period Start Date	Actual Reading	Usage kWh	Demand kW	Customer Charge	Under 15K kWh $	Over 15K kWh $	Energy Cost Clause	Demand Charge	Total Electric Charges	Initial kWh Size	Marginal kWh Rate Over 15k kWh	Marginal kWh Rate Under 15k kWh	BTU
7/18/23	8/18/23	2,159	69	$16	$216.46		$89.90	$724.50	$1,047	$15,000	$0.000	$0.142	7,366,508
8/19/23	9/20/23	2,607	64	$16	$261.38		$108.56	$672.00	$1,058	$15,000	$0.000	$0.142	8,895,084
9/21/23	10/19/23	1,640	64	$16	$164.43		$68.29	$656.00	$905	$15,000	$0.000	$0.142	5,595,680
10/20/23	11/20/23	1,418	14	$16	$142.17		$59.05	$143.50	$361	$15,000	$0.000	$0.142	4,838,216
11/21/23	12/18/23	1,456	3	$16	$145.98		$60.63	$30.75	$253	$15,000	$0.000	$0.142	4,967,872
12/19/23	1/24/24	1,879	64	$16	$188.39		$78.24	$656.00	$939	$15,000	$0.000	$0.142	6,411,148
1/25/24	2/20/24	1,593	64	$16	$159.71		$66.33	$656.00	$898	$15,000	$0.000	$0.142	5,435,316
2/21/24	3/19/24	1,439	64	$16	$144.27		$59.92	$656.00	$876	$15,000	$0.000	$0.142	4,909,868
3/20/24	4/18/24	1,523	65	$16	$152.70		$63.42	$666.25	$898	$15,000	$0.000	$0.142	5,196,476
4/19/24	5/20/24	2,290	64	$16	$229.60		$95.36	$656.00	$997	$15,000	$0.000	$0.142	7,813,480
5/21/24	6/18/24	3,259	70	$16	$326.75		$135.70	$735.00	$1,213	$15,000	$0.000	$0.142	11,119,708
6/19/24	7/22/24	3,211	67	$16	$321.93		$133.71	$703.50	$1,175	$15,000	$0.000	$0.142	10,955,932
TOTALS		24474	70	$192.00	$2,453.77	$0	$1,019	$6,956	$10,620	$180,000	0.00	0.14	83,505,288

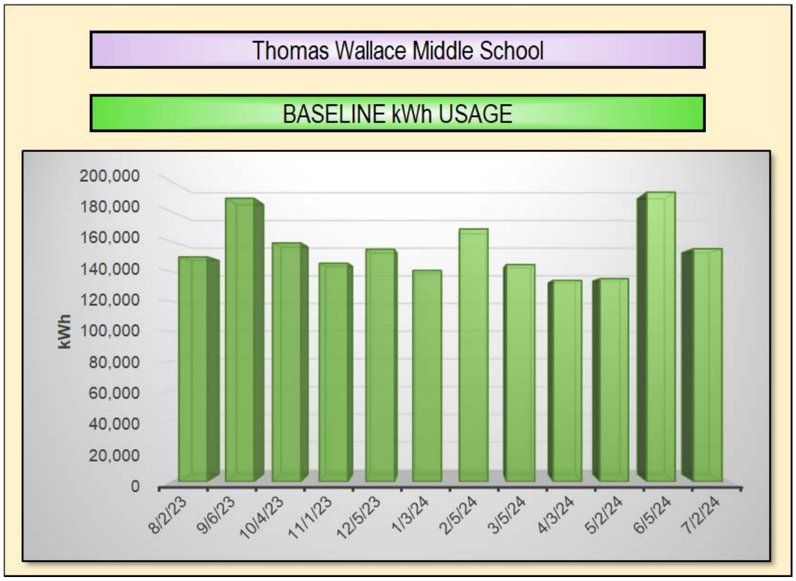


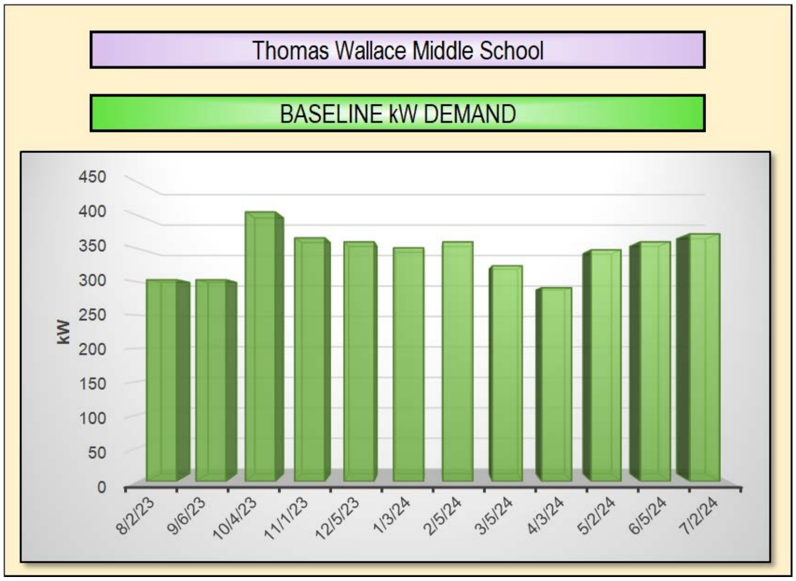
Vineland High School North						Natural Gas Meter #1		
Provider	South Jersey Gas		Account #	6079130000			Meter #	766683
Commodity	UGI Energy Services, LLC		Rate:	General Service LV FT (SJ-GSGLV)			Meter #	
Billing Period Start Date	Actual Reading	Therms	Gas Delivery Charges	Gas Commodity Charges	Fixed Customer Charge	Gas Total Charges	Cost/Therm Checksum	BTU
7/12/23	8/10/23	103	$1,098	$64	$264	$1,426	$1.32	10,290,000
8/11/23	9/11/23	72	$1,148	$45	$282	$1,475	$1.37	7,203,000
9/12/23	10/10/23	309	$1,192	$193	$255	$1,640	$2.66	30,900,000
10/11/23	11/8/23	2,562	$2,668	$1,601	$255	$4,524	$6.34	256,221,000
11/9/23	12/11/23	7,624	$6,096	$4,765	$290	$11,152	$6.10	762,354,000
12/12/23	1/10/24	3,822	$3,521	$2,389	$264	$6,174	$11.29	382,210,000
1/11/24	2/12/24	18,091	$13,006	$11,308	$290	$24,604	$16.57	1,809,096,000
2/13/24	3/11/24	2,748	$2,760	$1,718	$238	$4,715	$4.48	274,805,000
3/12/24	4/11/24	2,714	$2,876	$1,697	$273	$4,845	$1.67	271,432,000
4/12/24	5/10/24	8,543	$6,682	$5,340	$255	$12,277	$1.42	854,291,000
5/11/24	6/11/24	1,031	$807	$645	$283	$1,734	$1.55	103,120,000
6/12/24	7/15/24	134	$1,221	$84	$282	$1,586	$1.34	13,377,000
TOTALS		47,753	$43,074	$29,848	$3,231	$76,152	$1.53	4,775,299,000



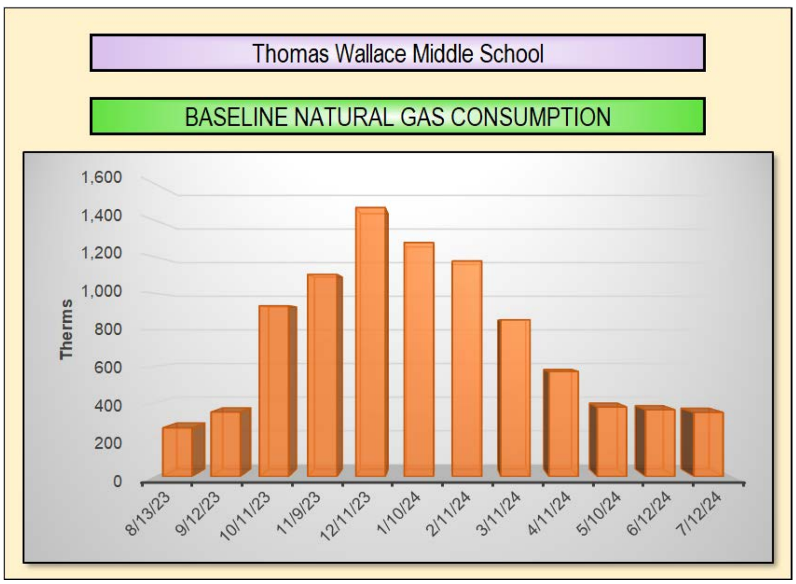
Vineland High School South						Natural Gas Meter #1		
Provider	South Jersey Gas	Account #	5079130000			Meter #	637656	
Commodity	UGI Energy Services, LLC	Rate:	General Service FT (SJ-GSG)			Meter #		
Billing Period Start Date	Actual Reading	Therms	Gas Delivery Charges	Gas Commodity Charges	Fixed Customer Charge	Gas Total Charges	Cost/Therm Checksum	BTU
7/12/23	8/10/23	298	$297	$187	$41	$524	$1.62	29,841,000
8/11/23	9/11/23	278	$277	$174	$43	$494	$1.62	27,783,000
9/12/23	10/10/23	700	$720	$438	$39	$1,197	$1.65	70,040,000
10/11/23	11/8/23	1,739	$1,880	$1,087	$39	$3,006	$1.71	173,901,000
11/9/23	12/11/23	6,136	$6,633	$3,835	$45	$10,513	$1.71	613,602,000
12/12/23	1/10/24	7,221	$7,806	$4,513	$41	$12,360	$1.71	722,067,000
1/11/24	2/8/24	9,412	$10,218	$5,883	$39	$16,140	$1.71	941,184,000
2/9/24	3/11/24	7,757	$8,500	$4,848	$42	$13,390	$1.72	775,676,000
3/12/24	4/11/24	4,652	$5,097	$2,907	$42	$8,047	$1.72	465,164,000
4/12/24	5/10/24	1,291	$1,415	$807	$39	$2,261	$1.72	129,125,000
5/11/24	6/12/24	795	$871	$497	$45	$1,413	$1.72	79,483,000
6/13/24	7/15/24	298	$327	$187	$43	$557	$1.72	29,841,000
TOTALS		40,577	$44,041	$25,362	$497	$69,900	$1.71	4,057,707,000

Thomas Wallace Middle School Baseline Energy Use





Thomas Wallace Middle School							ELECTRIC METER #1						
Provider:	Vineland Municipal Utility Authoirty				Rate:	General Light & Power Service Rate					Meter # 1	E30642	
Commodity:	Vineland Municipal Utility Authoirty				Account #	104904					Meter # 2		
Billing Period Start Date	Actual Reading	Usage kWh	Demand kW	Customer Charge $	Under 200 kWh $	Over 200 kWh $	Energy Cost Clause $	Demand Charge $	Total Electric Charges	Initial kWh Size	Marginal kWh Rate Over 0.2k kWh	Marginal kWh Rate Under 0.2k kWh	BTU
7/1/23	8/2/23	149,400	303	$20	$22	$22,314	$6,221	$0	$28,577	200	$0.191	$0.152	509,752,800
8/3/23	9/6/23	188,400	303	$20	$22	$28,147	$7,845	$0	$36,034	200	$0.191	$0.152	642,820,800
9/7/23	10/4/23	158,700	405	$20	$22	$23,705	$6,608	$0	$30,356	200	$0.191	$0.152	541,484,400
10/5/23	11/1/23	145,200	366	$20	$22	$21,686	$6,046	$0	$27,774	200	$0.191	$0.152	495,422,400
11/2/23	12/5/23	154,500	360	$20	$22	$23,077	$6,433	$0	$29,553	200	$0.191	$0.152	527,154,000
12/6/23	1/3/24	140,400	351	$20	$22	$20,968	$5,846	$0	$26,857	200	$0.191	$0.152	479,044,800
1/4/24	2/5/24	168,000	360	$20	$22	$25,096	$6,996	$0	$32,134	200	$0.191	$0.152	573,216,000
2/6/24	3/5/24	144,300	324	$20	$22	$21,552	$6,009	$0	$27,602	200	$0.191	$0.152	492,351,600
3/6/24	4/3/24	133,800	291	$20	$22	$19,981	$5,571	$0	$25,595	200	$0.191	$0.152	456,525,600
4/4/24	5/2/24	135,000	348	$20	$22	$20,161	$5,621	$0	$25,824	200	$0.191	$0.152	460,620,000
5/3/24	6/5/24	192,400	360	$20	$22	$27,250	$7,595	$0	$34,887	200	$0.181	$0.150	656,468,800
6/6/24	7/2/24	154,800	372	$20	$22	$23,122	$6,446	$0	$29,610	200	$0.191	$0.152	528,177,600
TOTALS		1864900	405	$240	$265	$277,060	$77,238	$0	$354,803	2,400	$0.190	$0.152	6,363,038,800

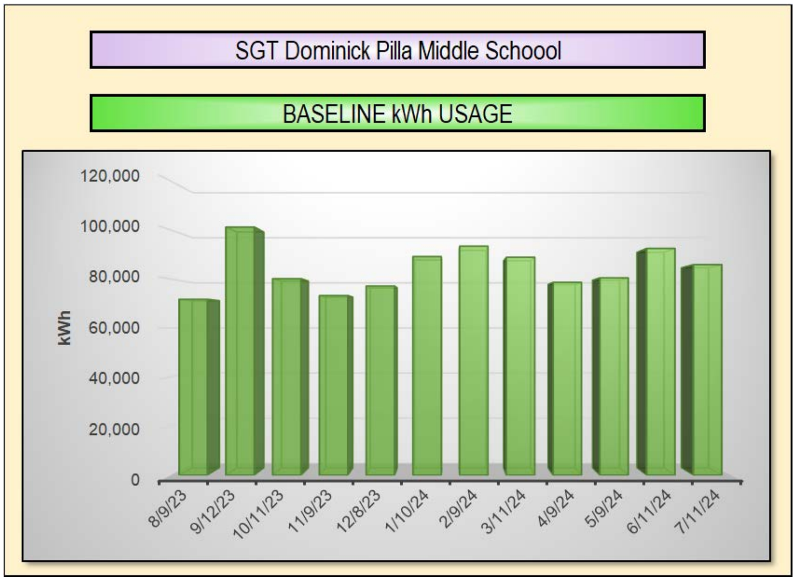


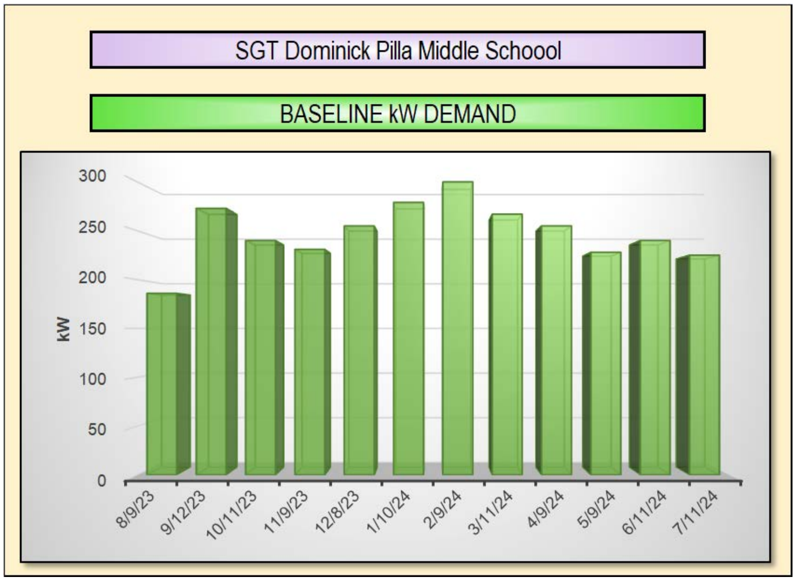
Thomas Wallace Middle School						Natural Gas Meter #1		
Provider	South Jersey Gas	Account #	7406330000				Meter #	623472
Commodity	UGI Energy Services, LLC	Rate:	General Service FT (SJ-GSG)				Meter #	
Billing Period Start Date	Actual Reading	Therms	Gas Delivery Charges	Gas Commodity Charges	Fixed Customer Charge	Gas Total Charges	Cost/Therm Checksum	BTU
7/12/23	8/13/23	265	$264	$166	$45	$475	$1.62	26,548,000
8/14/23	9/12/23	352	$351	$220	$41	$611	$1.62	35,192,000
9/13/23	10/11/23	931	$960	$582	$39	$1,581	$1.66	93,112,000
10/12/23	11/9/23	1,102	$1,191	$689	$39	$1,919	$1.71	110,206,000
11/10/23	12/11/23	1,467	$1,586	$917	$43	$2,546	$1.71	146,686,000
12/12/23	1/10/24	1,276	$1,379	$797	$41	$2,217	$1.71	127,576,000
1/11/24	2/11/24	1,175	$1,277	$735	$43	$2,055	$1.71	117,545,000
2/12/24	3/11/24	854	$936	$534	$38	$1,508	$1.72	85,449,000
3/12/24	4/11/24	573	$628	$358	$42	$1,028	$1.72	57,291,000
4/12/24	5/10/24	379	$415	$237	$39	$692	$1.72	37,911,000
5/11/24	6/12/24	364	$399	$228	$45	$672	$1.72	36,448,500
6/13/24	7/12/24	350	$383	$219	$41	$643	$1.72	34,986,000
TOTALS		9,090	$9,771	$5,681	$495	$15,947	$1.70	908,950,500

Thomas Wallace Middle School						Natural Gas Meter #2		
	South Jersey Gas	Account #	8406330000				Meter #	623464
	UGI Energy Services, LLC	Rate:	General Service FT (SJ-GSG)				Meter #	
Billing Period Start Date	Actual Reading	Therms	Gas Delivery Charges	Gas Commodity Charges	Fixed Customer Charge	Gas Total Charges	Cost/Therm Checksum	BTU
7/12/24	8/13/23	237	$236	$148	$45	$384	$1.62	23,700,000
8/14/23	9/12/23	237	$236	$148	$41	$384	$1.62	23,700,000
9/13/23	10/11/23	319	$329	$200	$39	$529	$1.66	31,900,000
10/12/23	11/9/23	401	$434	$251	$39	$685	$1.71	40,100,000
11/10/23	12/11/23	578	$625	$362	$43	$987	$1.71	57,800,000
12/12/23	1/10/24	3027	$3,272	$1,892	$41	$5,164	$1.71	302,700,000
10/12/23	2/11/24	4128	$4,485	$2,580	$43	$7,065	$1.71	412,800,000
2/12/24	3/22/24	3464	$3,795	$2,165	$38	$5,960	$1.72	346,358,000
3/23/24	4/11/24	3004	$3,292	$1,878	$42	$5,170	$1.72	300,440,000
4/12/24	5/10/24	1178	$1,330	$736	$39	$2,066	$1.75	117,762,000
5/11/24	6/12/24	676	$761	$423	$40	$1,183	$1.75	67,627,500
6/13/24	7/12/24	175	$192	$109	$41	$301	$1.72	17,493,000
TOTALS		17424	$18,987	$10,892	$490	$29,878	$1.71	1,742,380,500

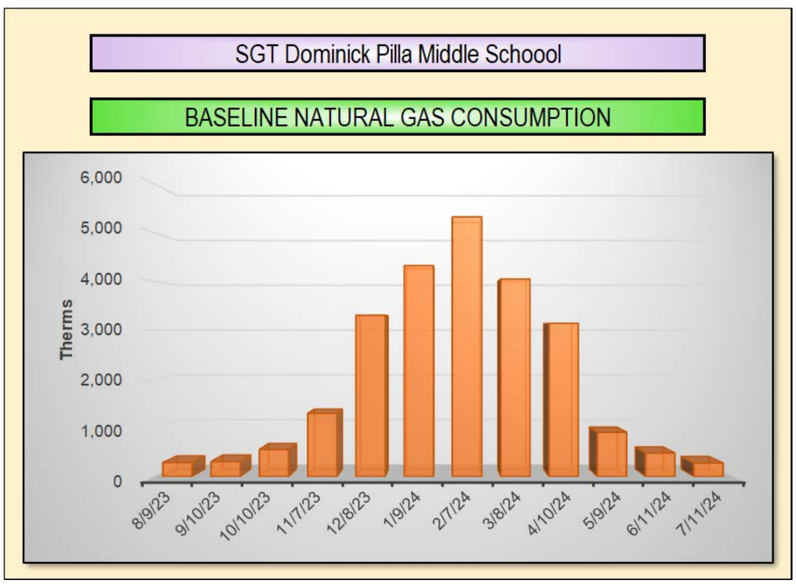
Thomas Wallace Middle School						Natural Gas Meter #3		
Provider	South Jersey Gas	Account #	9506330000			Meter #	572607	
Commodity	UGI Energy Services, LLC	Rate:	General Service FT (SJ-GSG)			Meter #		
Billing Period Start Date	Actual Reading	Therms	Gas Delivery Charges	Gas Commodity Charges	Fixed Customer Charge	Gas Total Charges	Cost/Therm Checksum	BTU
7/12/23	8/13/23	0	$0	$0	$45	$0	$0.00	0
8/14/23	9/12/23	0	$0	$0	$41	$0	$0.00	0
9/13/23	10/11/23	0	$0	$0	$39	$0	$0.00	0
10/12/23	11/9/23	0	$0	$0	$39	$0	$0.00	0
11/10/23	12/11/23	10	$11	$6	$43	$17	$1.70	1,000,000
12/12/23	1/10/24	6	$7	$4	$41	$11	$1.83	600,000
10/12/23	2/11/24	0	$0	$0	$43	$0	$0.00	0
2/12/24	3/11/24	5	$6	$3	$38	$9	$1.72	519,000
3/12/24	4/11/24	4	$5	$3	$42	$7	$1.72	414,000
4/12/24	5/10/24	0	$0	$0	$39	$0	$0.00	0
5/11/24	6/12/24	0	$0	$0	$41	$0	$0.00	0
6/13/24	7/12/24	0	$0	$0	$41	$0	$0.00	0
TOTALS		25	$28	$16	$491	$44	$1.74	2,533,000

SGT Dominick Pilla MS Baseline Energy Use



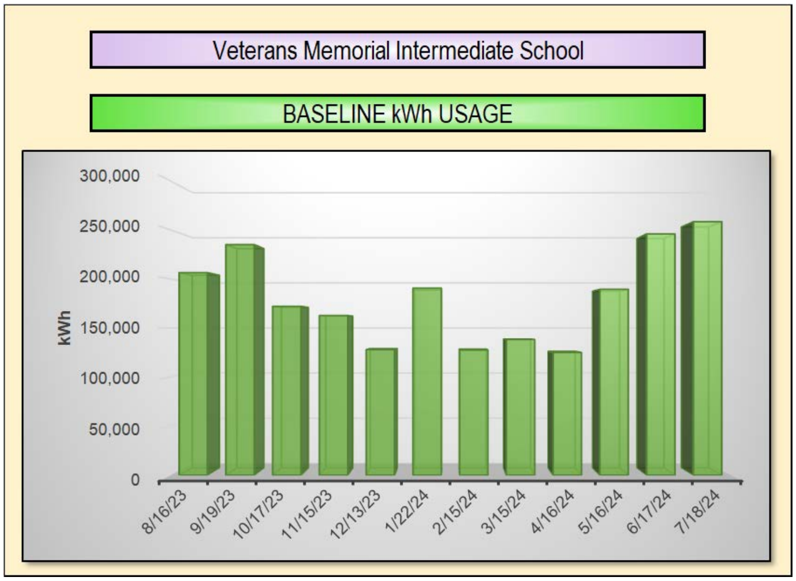


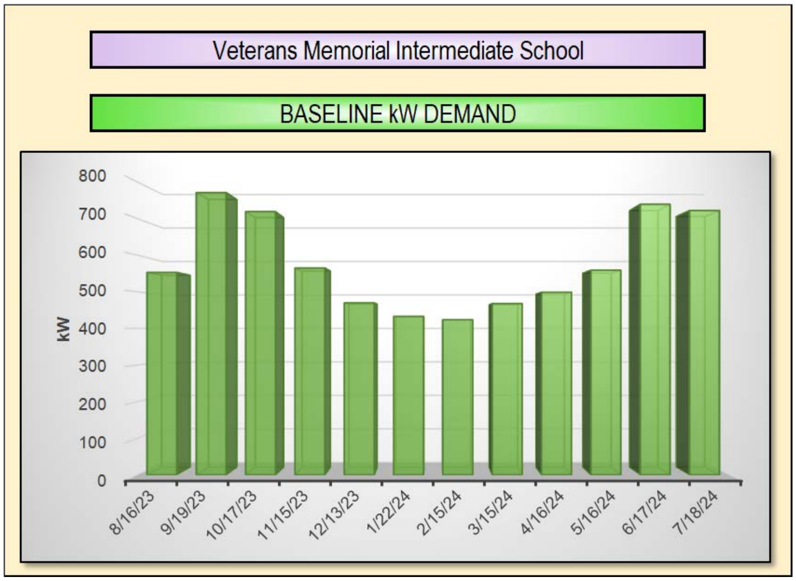
SGT Dominick Pilla Middle Schoool							ELECTRIC METER #1						
Provider:	Vineland Municipal Utility Authoirty				Rate:	GLP20					Meter # 1	E26431	
Commodity:	Vineland Municipal Utility Authoirty				Account #	289038					Meter # 2	E36095	
Billing Period Start Date	Actual Reading	Usage kWh	Demand kW	Customer Charge $	Under 15 K kWh Charge $	Over 15 K kWh Charge $	Energy Cost Clause $	Demand Charge $	Total Electric Charges	Initial kWh Size	Marginal kWh Rate Over 15k kWh	Marginal kWh Rate Under 15k kWh	BTU
7/10/23	8/9/23	71,700	186	$16		$7,189	$2,986	$1,953	$12,143	15,000	$0.142	$0.142	244,640,400
8/10/23	9/12/23	101,100	273	$16		$10,136	$4,210	$2,867	$17,229	15,000	$0.142	$0.142	344,953,200
9/13/23	10/11/23	80,100	240	$16	$1,504	$6,201	$3,355	$2,460	$13,537	15,000	$0.137	$0.142	273,301,200
10/12/23	11/9/23	73,200	231	$16	$1,504	$5,544	$3,048	$2,368	$12,480	15,000	$0.137	$0.142	249,758,400
11/10/23	12/8/23	77,100	255	$16	$1,504	$5,916	$3,210	$2,614	$13,260	15,000	$0.137	$0.142	263,065,200
12/9/23	1/10/24	89,100	279	$16	$1,504	$7,059	$3,710	$2,860	$15,149	15,000	$0.137	$0.142	304,009,200
1/11/24	2/9/24	93,300	300	$16	$1,504	$7,459	$3,885	$3,075	$15,939	15,000	$0.137	$0.142	318,339,600
2/10/24	3/11/24	88,800	267	$16	$1,504	$7,030	$3,698	$2,737	$14,984	15,000	$0.137	$0.142	302,985,600
3/12/24	4/9/24	78,600	255	$16	$1,504	$6,059	$3,273	$2,614	$13,465	15,000	$0.137	$0.142	268,183,200
4/10/24	5/9/24	80,400	228	$16	$1,504	$6,230	$3,348	$2,337	$13,435	15,000	$0.137	$0.142	274,324,800
5/10/24	6/11/24	92,400	240	$16		$9,264	$3,848	$2,520	$15,648	15,000	$0.142	$0.142	315,268,800
6/12/24	7/11/24	85,800	225	$16		$8,602	$3,573	$2,363	$14,554	15,000	$0.142	$0.142	292,749,600
TOTALS		1011600	300		$12,031	$86,689	$42,143	$30,766	$171,821	180,000	$0.139	$0.142	3,451,579,200



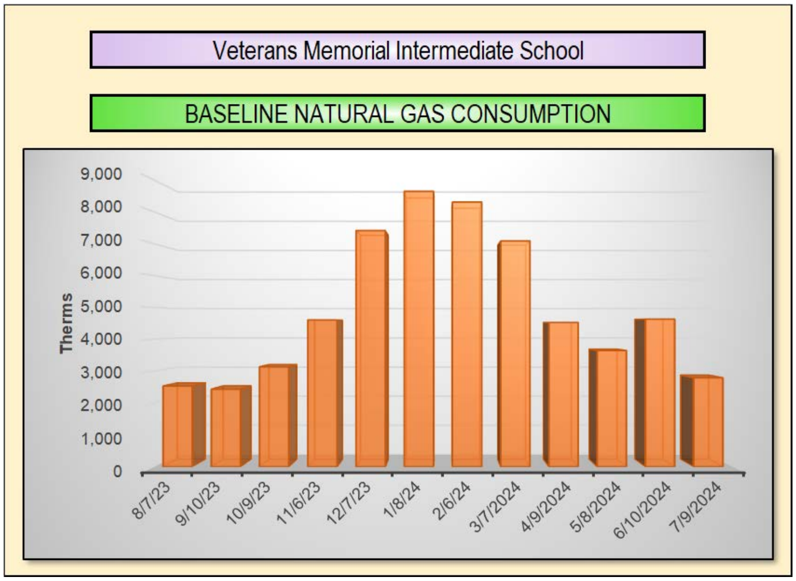
SGT Dominick Pilla Middle Schoool						Natural Gas Meter #1		
Provider	South Jersey Gas	Account #	8411723152				Meter #	648148
Commodity	UGI Energy Services, LLC	Rate:	General Service FT (SJ-GSG)				Meter #	
Billing Period Start Date	Actual Reading	Therms	Gas Delivery Charges	Gas Commodity Charges	Fixed Customer Charge	Gas Total Charges	Cost/Therm Checksum	BTU
7/11/23	8/9/23	288	$287	$180	$41	$508	$1.62	28,812,000
8/10/23	9/10/23	309	$308	$193	$43	$544	$1.62	30,870,000
9/11/23	10/10/23	556	$571	$348	$41	$960	$1.65	55,620,000
10/11/23	11/7/23	1,297	$1,402	$810	$38	$2,250	$1.71	129,654,000
11/8/23	12/8/23	3,306	$3,573	$2,066	$42	$5,681	$1.71	330,560,000
12/9/23	1/9/24	4,318	$4,668	$2,699	$43	$7,410	$1.71	431,794,000
1/10/24	2/7/24	5,315	$5,767	$3,322	$39	$9,128	$1.71	531,480,000
2/8/24	3/8/24	4,044	$4,432	$2,528	$39	$6,999	$1.72	404,430,000
3/9/24	4/10/24	3,139	$3,440	$1,962	$45	$5,446	$1.72	313,908,000
4/11/24	5/9/24	909	$996	$568	$39	$1,603	$1.72	90,904,000
5/10/24	6/11/24	484	$530	$302	$45	$877	$1.72	48,363,000
6/12/24	7/11/24	278	$304	$174	$41	$519	$1.72	27,783,000
TOTALS		24,242	$26,278	$15,152	$494	$41,924	$1.71	2,424,178,000

Veterans Memorial IS Baseline Energy Use



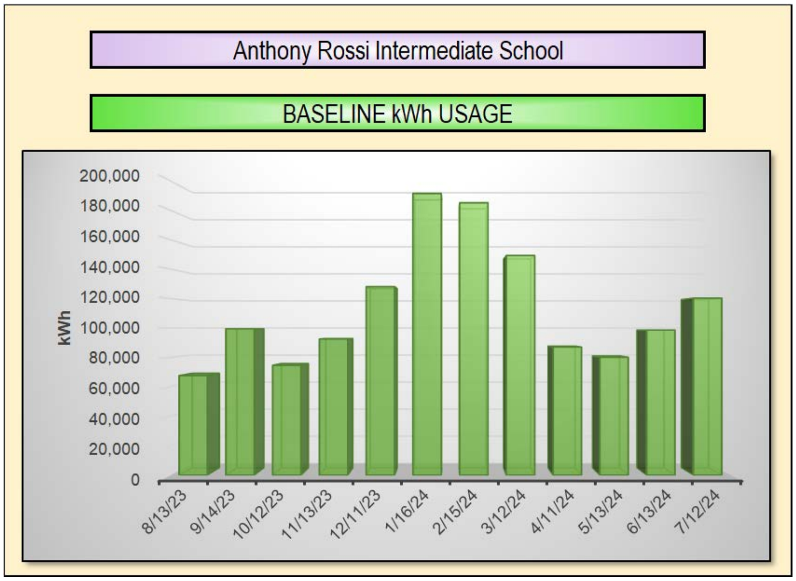


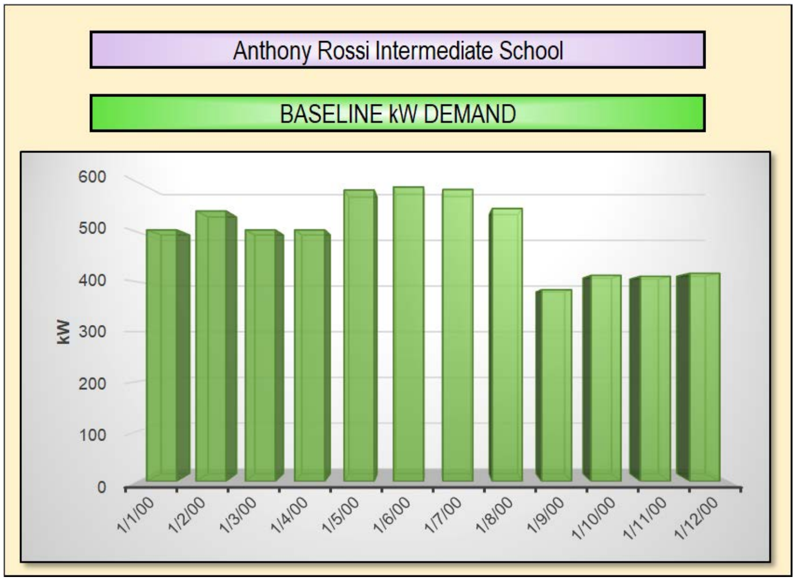
Veterans Memorial Intermediate School						ELECTRIC METER #1							
Provider:	Vineland Municipal Utility Authoirty				Rate:	GLP 20					Meter #	E31398	
Commodity:	Vineland Municipal Utility Authoirty				Account #	170122					Meter #		
Billing Period Start Date	Actual Reading	Usage kWh	Demand kW	Customer Charge $	Under 15 K kWh Charge $	Over 15 K kWh Charge $	Energy Cost Clause $	Demand Charge $	Total Electric Charges	Initial kWh Size	Marginal kWh Rate Over 15k kWh	Marginal kWh Rate Under 15k kWh	BTU
7/14/23	8/16/23	206,400	553	$16		$20,694	$8,595	$5,807	$35,111	15,000	$0.142	$0.142	704,236,800
8/17/23	9/19/23	234,960	771	$16		$23,557	$9,784	$7,466	$40,822	15,000	$0.142	$0.142	801,683,520
9/20/23	10/17/23	172,080	719	$16	$1,504	$14,963	$7,165	$7,370	$31,019	15,000	$0.137	$0.142	587,136,960
10/18/23	11/15/23	162,720	565	$16	$1,504	$14,072	$6,776	$5,791	$28,159	15,000	$0.137	$0.142	555,200,640
11/16/23	12/13/23	127,920	470	$16	$1,504	$10,757	$5,327	$4,818	$22,421	15,000	$0.137	$0.142	436,463,040
12/14/23	1/22/24	190,560	433	$16	$1,504	$16,724	$7,935	$4,438	$30,617	15,000	$0.137	$0.142	650,190,720
1/23/24	2/15/24	127,440	424	$16	$1,504	$10,711	$5,307	$4,346	$21,884	15,000	$0.137	$0.142	434,825,280
2/16/24	3/15/24	138,240	468	$16	$1,504	$11,740	$5,756	$5,289	$24,305	15,000	$0.137	$0.142	471,674,880
3/16/24	4/16/24	125,040	499	$16	$1,504	$10,482	$5,207	$5,914	$23,123	15,000	$0.137	$0.142	426,636,480
4/17/24	5/16/24	189,360	559	$16	$1,504	$16,610	$7,885	$6,242	$32,257	15,000	$0.137	$0.142	646,096,320
5/17/24	6/17/24	245,760	739	$16		$24,640	$10,233	$8,096	$42,985	15,000	$0.142	$0.142	838,533,120
6/18/24	7/18/24	258,240	722	$16		$25,891	$10,753	$8,012	$44,672	15,000	$0.142	$0.142	881,114,880
TOTALS		2178720	771	$192	$12,031	$200,840	$90,722	$73,587	$377,373	180,000	$0.139	$0.142	7,433,792,640



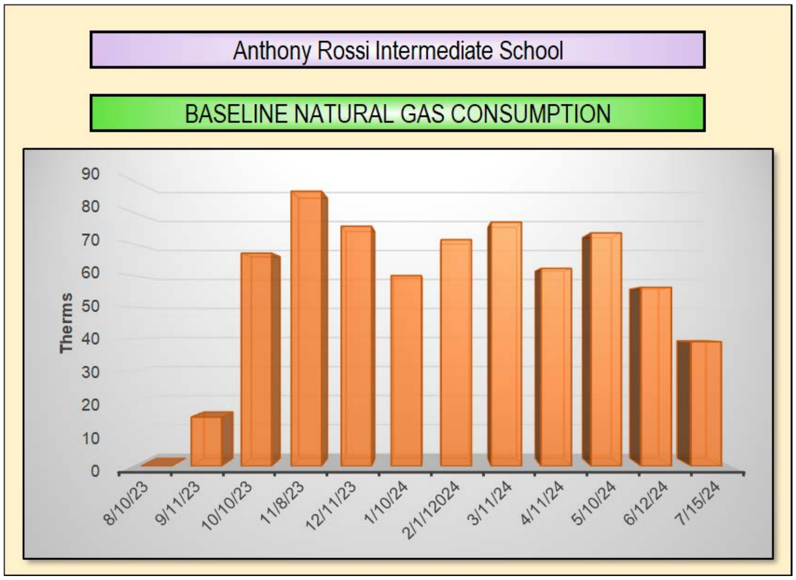
Veterans Memorial Intermediate School						Natural Gas Meter #1		
Provider	South Jersey Gas	Account #	8079130000				Meter #	594873
Commodity	UGI Energy Services, LLC	Rate:	General Service FT (SJ-GSG)				Meter #	842727
Billing Period Start Date	Actual Reading	Therms	Gas Delivery Charges	Gas Commodity Charges	Fixed Customer Charge	Gas Total Charges	Cost/Therm Checksum	BTU
7/10/23	8/7/23	2,532	$2,523	$1,583	$39	$4,145	$1.62	253,237,000
8/8/23	9/10/23	2,433	$2,423	$1,520	$46	$3,990	$1.62	243,256,000
9/11/23	10/9/23	3,135	$3,215	$1,960	$39	$5,214	$1.65	313,532,000
10/10/23	11/6/23	4,605	$4,978	$2,878	$38	$7,894	$1.71	460,478,000
11/7/23	12/7/23	7,409	$8,009	$4,631	$42	$12,682	$1.71	740,868,000
12/8/23	1/8/24	8,641	$9,341	$5,401	$43	$14,785	$1.71	864,105,000
1/9/24	2/6/24	8,305	$9,007	$5,191	$39	$14,237	$1.71	830,450,000
2/7/24	3/7/24	7,083	$8,301	$4,735	$39	$13,075	$1.84	708,300,000
3/8/24	4/9/24	4,527	$5,330	$3,040	$45	$8,415	$1.85	452,700,000
4/10/24	5/8/24	3,646	$4,028	$2,297	$39	$6,364	$1.73	364,600,000
5/9/24	6/10/24	4,631	$5,107	$2,913	$45	$8,065	$1.73	463,100,000
6/11/24	7/9/24	2,789	$3,078	$1,756	$39	$4,873	$1.73	278,900,000
TOTALS		59,735	$65,340	$37,905	$493	$103,738	$1.73	5,973,526,000

Anthony Rossi IS Baseline Energy Use



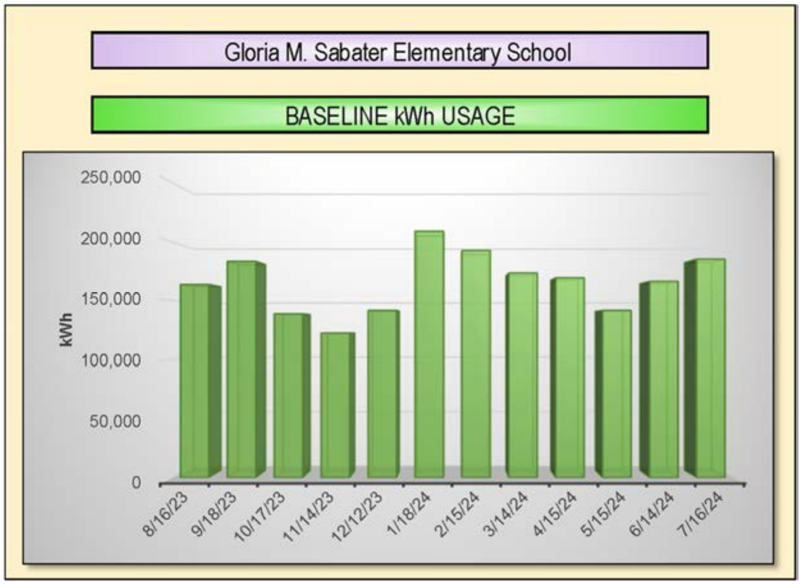


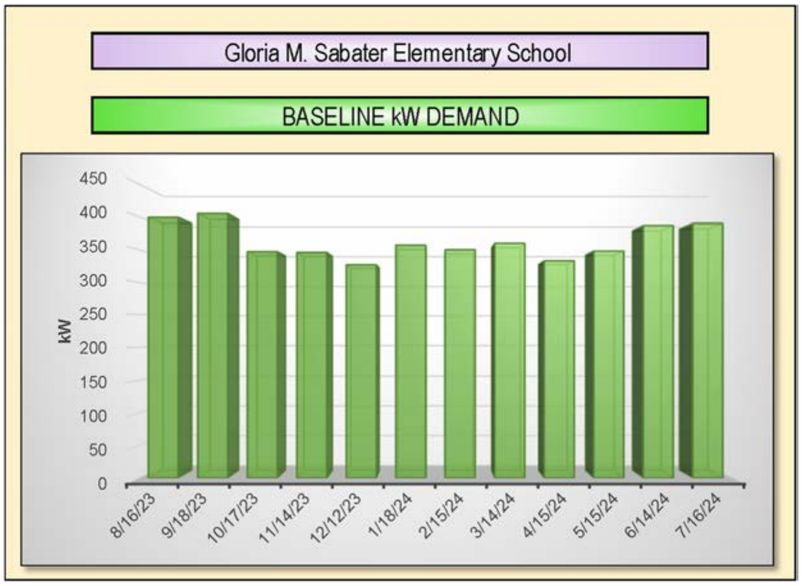
Anthony Rossi Intermediate School							ELECTRIC METER #1						
Provider:	Vineland Municipal Utility Authoirty				Rate:	WLP30					Meter #	E29769	
Commodity:	Vineland Municipal Utility Authoirty				Account #	256126					Meter #		
Billing Period Start Date	Actual Reading	Usage kWh	Demand kW	Customer Charge	Under 70K kWh	Over 70K kWh	Energy Cost Clause	Demand Charge	Total Electric Charges	Initial kWh Size	Marginal kWh Rate Over 70k kWh	Marginal kWh Rate Under 70k kWh	BTU
7/15/23	8/13/23	67,680	504	$450	$6,718	$0	$2,818	$5,670	$15,656	70,000	$0.000	$0.141	230,924,160
8/14/23	9/14/23	99,440	542	$450	$6,948	$2,681	$4,141	$6,098	$20,317	70,000	$0.133	$0.141	339,289,280
9/15/23	10/12/23	74,640	504	$450	$6,948	$385	$3,108	$5,418	$16,310	70,000	$0.125	$0.141	254,671,680
10/13/23	11/13/23	92,480	504	$450	$6,948	$1,867	$3,851	$5,418	$18,534	70,000	$0.125	$0.141	315,541,760
11/14/23	12/11/23	128,080	584	$450	$6,948	$4,824	$5,333	$6,278	$23,834	70,000	$0.125	$0.141	437,008,960
12/12/23	1/16/24	191,360	590	$450	$6,948	$10,080	$7,968	$6,343	$31,789	70,000	$0.125	$0.141	652,920,320
1/17/24	2/15/24	185,000	585	$450	$6,948	$9,552	$7,703	$4,838	$29,491	70,000	$0.125	$0.141	631,220,000
2/16/24	3/12/24	149,200	547	$450	$6,948	$6,578	$6,213	$5,880	$26,069	70,000	$0.125	$0.141	509,070,400
3/13/24	4/11/24	87,040	384	$450	$6,948	$1,415	$3,624	$4,547	$16,985	70,000	$0.125	$0.141	296,980,480
4/12/24	5/13/24	80,080	413	$450	$6,948	$837	$3,335	$4,547	$16,117	70,000	$0.125	$0.141	273,232,960
5/14/24	6/13/24	98,560	411	$450	$6,948	$2,601	$4,104	$4,905	$19,008	70,000	$0.133	$0.141	336,286,720
6/14/24	7/12/24	120,240	417	$450	$6,948	$4,575	$5,007	$5,108	$22,087	70,000	$0.133	$0.141	410,258,880
TOTALS		1373800	590	$5,400	$83,148	$45,396	$57,205	$65,049	$256,198	840,000	$0.116	$0.141	4,687,405,600



Anthony Rossi Intermediate School						Natural Gas Meter #1		
Provider	South Jersey Gas	Account #	6806630000				Meter #	662586
Commodity	UGI Energy Services, LLC	Rate:	General Service FT (SJ-GSG)				Meter #	
Billing Period Start Date	Actual Reading	Therms	Gas Delivery Charges	Gas Commodity Charges	Fixed Customer Charge	Gas Total Charges	Cost/Therm Checksum	BTU
7/12/23	8/10/23	0	$0	$0	$41	$41	$0.00	0
8/11/23	9/11/23	15	$15	$10	$43	$68	$1.62	1,544,000
9/12/23	10/10/23	67	$69	$42	$39	$150	$1.65	6,695,000
10/11/23	11/8/23	86	$93	$54	$39	$187	$1.71	8,644,000
11/9/23	12/11/23	75	$126	$47	$45	$218	$2.30	7,541,000
12/12/23	1/10/24	60	$65	$37	$41	$143	$1.71	5,991,000
1/11/24	2/1/12024	71	$77	$45	$39	$161	$1.71	7,121,000
#VALUE!	3/11/24	77	$84	$48	$42	$174	$1.72	7,674,000
3/12/24	4/11/24	62	$68	$39	$42	$149	$1.72	6,216,000
4/12/24	5/10/24	73	$80	$46	$39	$165	$1.72	7,334,000
5/11/24	6/12/24	56	$62	$35	$45	$141	$1.72	5,622,000
6/13/24	7/15/24	39	$43	$24	$45	$112	$1.72	3,910,000
TOTALS		683	$783	$427	$498	$1,708	$1.77	68,292,000

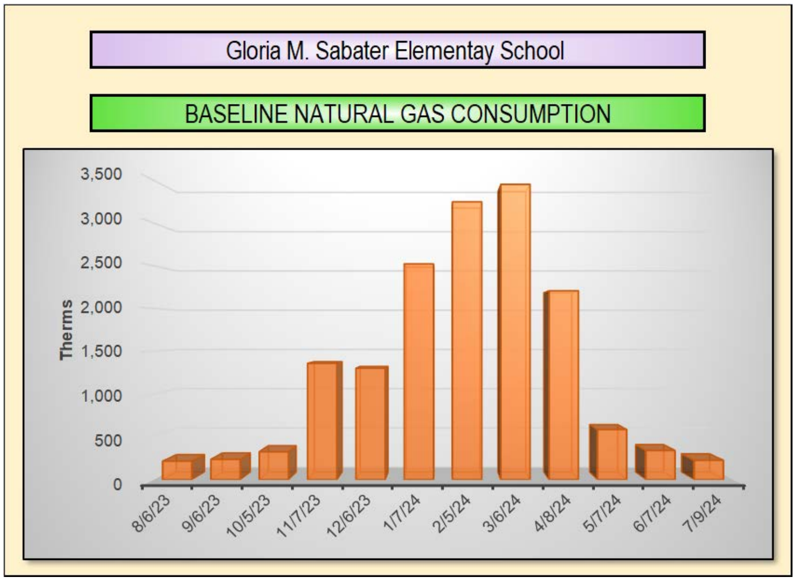
Gloria M. Sabater ES Baseline Energy Use





Gloria M. Sabater Elementary School							ELECTRIC METER #1						
Provider:	Vineland Municipal Utility Authority				Rate:	WLP30					Meter #	E31399	
Commodity:	Vineland Municipal Utility Authoirty				Account #	242540					Meter #		
Billing Period Start Date	Actual Reading	Usage kWh	Demand kW	Customer Charge	Under 70K kWh	Over 70K kWh	Energy Cost Clause	Demand Charge	Total Electric Charges	Initial kWh Size	Marginal kWh Rate Over 70k kWh	Marginal kWh Rate Under 70k kWh	BTU
7/21/23	8/16/23	156,300	399	$450	$6,948	$7,858	$6,508	$4,489	$26,254	70,000	$0.133	$0.141	533,295,600
8/17/23	9/18/23	171,000	405	$450	$6,948	$9,197	$7,120	$4,556	$28,272	70,000	$0.133	$0.141	583,452,000
9/19/23	10/17/23	127,200	347	$450	$6,948	$4,751	$5,297	$3,730	$21,176	70,000	$0.125	$0.141	434,006,400
10/18/23	11/14/23	111,000	346	$450	$6,948	$3,405	$4,622	$3,720	$19,145	70,000	$0.125	$0.141	378,732,000
11/15/23	12/12/23	129,000	327	$450	$6,948	$4,901	$5,372	$3,515	$21,186	70,000	$0.125	$0.141	440,148,000
12/13/23	1/18/24	187,800	357	$450	$6,948	$9,784	$7,820	$3,838	$28,840	70,000	$0.125	$0.141	640,773,600
1/19/24	2/15/24	175,000	350	$450	$6,948	$8,721	$7,287	$3,763	$27,169	70,000	$0.125	$0.141	597,100,000
2/16/24	3/14/24	159,000	360	$450	$6,948	$7,392	$6,621	$3,924	$25,335	70,000	$0.125	$0.141	542,508,000
3/15/24	4/15/24	156,600	333	$450	$6,948	$7,193	$6,521	$3,741	$24,853	70,000	$0.125	$0.141	534,319,200
4/16/24	5/15/24	126,300	348	$450	$6,948	$4,676	$5,259	$4,117	$21,451	70,000	$0.125	$0.141	430,935,600
5/16/24	6/14/24	154,800	387	$450	$6,948	$7,722	$6,446	$4,781	$26,347	70,000	$0.133	$0.141	528,177,600
6/15/24	7/16/24	171,300	390	$450	$6,948	$9,224	$7,133	$4,826	$28,582	70,000	$0.133	$0.141	584,475,600
TOTALS		1825300	405	$5,400	$83,378	$84,826	$76,005	$49,000	$298,610	840,000	$0.127	$0.141	6,227,923,600

Gloria M. Sabater Elementary School								ELECTRIC METER #2					
Provider:	Vineland Municipal Utility Authority					Rate:	GLP20				Meter #	E24800	
Commodity:	Vineland Municipal Utility Authoirty					Account #	242548				Meter #		
Billing Period Start Date	Actual Reading	Usage kWh	Demand kW	Customer Charge	Under 15K kWh $	Over 15K kWh $	Energy Cost Clause	Demand Charge	Total Electric Charges	Initial kWh Size	Marginal kWh Rate Over 15k kWh	Marginal kWh Rate Under 15k kWh	BTU
7/21/23	8/16/23	7,680	51	$16	$770		$320	$354	$1,459	$15,000	$0.000	$0.142	26,204,160
8/17/23	9/18/23	12,560	72	$16	$1,259		$523	$756	$2,554	$15,000	$0.000	$0.142	42,854,720
9/19/23	10/17/23	11,520	69	$16	$1,155		$480	$707	$2,358	$15,000	$0.000	$0.142	39,306,240
10/18/23	11/15/23	11,360	98	$16	$1,139		$473	$1,005	$2,632	$15,000	$0.000	$0.142	38,760,320
11/16/23	12/12/23	12,640	140	$16	$1,267		$526	$1,435	$3,245	$15,000	$0.000	$0.142	43,127,680
12/13/23	1/18/24	21,280	177	$16	$1,503.90	$598	$886	$1,814	$4,818	$15,000	$0.137	$0.142	72,607,360
1/19/24	2/15/24	17,680	162	$16	$1,503.90	$255	$736	$1,661	$4,172	$15,000	$0.137	$0.142	60,324,160
2/16/24	3/14/24	14,640	144	$16	$1,467.81		$610	$1,476	$3,569	$15,000	$0.000	$0.142	49,951,680
3/15/24	4/15/24	12,960	115	$16	$1,299.37		$540	$1,179	$3,034	$15,000	$0.000	$0.142	44,219,520
4/16/24	5/15/24	15,280	93	$16	$1,503.90	$27	$636	$953	$1,616	$15,000	$0.137	$0.142	52,135,360
5/16/24	6/14/24	11,760	80	$16	$1,179		$490	$840	$1,330	$15,000	$0.000	$0.142	40,125,120
6/15/24	7/16/24	14,080	80	$16	$1,412		$586	$840	$1,426	$15,000	$0.000	$0.142	48,040,960
TOTALS		163440	177	$192.00	$15,460.11	$880	$6,806	$13,019	$32,214	$180,000	0.0342	0.14	557,657,280

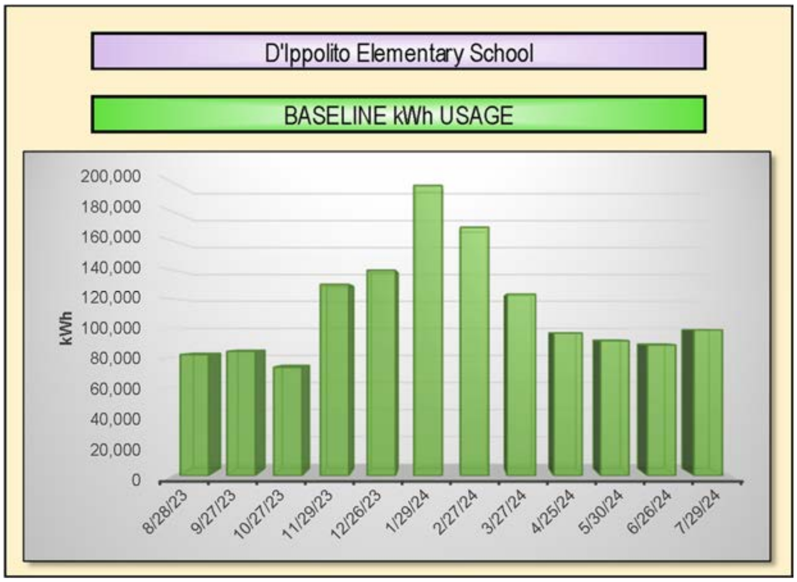


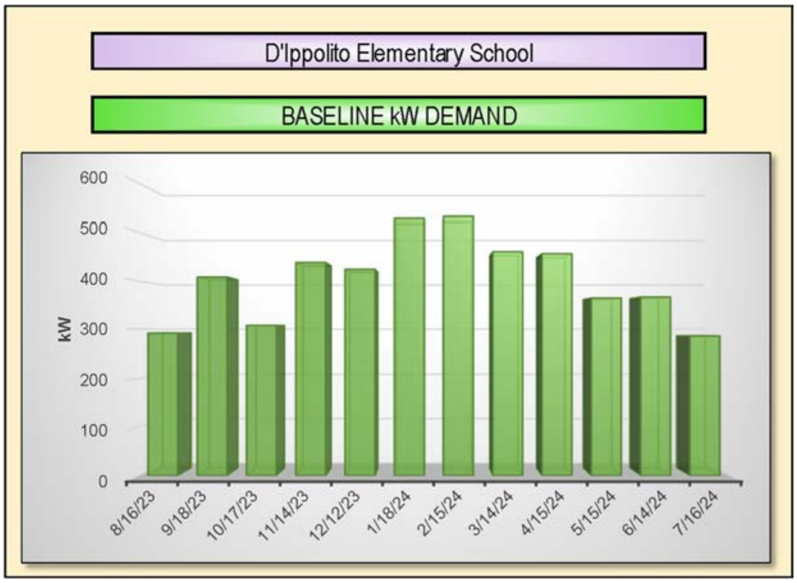
Gloria M. Sabater Elementary School						Natural Gas Meter #1		
Provider	South Jersey Gas		Account #	4852230000			Meter #	637532
Commodity	UGI Energy Services, LLC		Rate:	General Service FT (SJ-GSG)			Meter #	
Billing Period Start Date	Actual Reading	Therms	Gas Delivery Charges	Gas Commodity Charges	Fixed Customer Charge	Gas Total Charges	Cost/Therm Checksum	BTU
7/7/23	8/6/23	216	$215	$135	$42	$392	$1.62	21,609,000
8/7/23	9/6/23	237	$236	$148	$42	$426	$1.62	23,667,000
9/7/23	10/5/23	319	$324	$200	$39	$562	$1.64	31,930,000
10/6/23	11/7/23	885	$957	$553	$45	$1,554	$1.71	88,494,000
11/8/23	12/6/23	269	$290	$168	$39	$497	$1.71	26,858,000
12/7/23	1/7/24	1,353	$1,463	$846	$43	$2,352	$1.71	135,323,000
1/8/24	2/5/24	2,033	$2,204	$1,271	$39	$3,514	$1.71	203,304,000
2/6/24	3/6/24	2,074	$2,273	$1,296	$39	$3,608	$1.72	207,400,000
3/7/24	4/8/24	912	$999	$570	$45	$1,614	$1.72	91,200,000
4/9/24	5/7/24	372	$408	$232	$39	$679	$1.72	37,200,000
5/8/24	6/7/24	340	$372	$212	$42	$626	$1.72	34,000,000
6/8/24	7/9/24	226	$248	$142	$43	$433	$1.73	22,600,000
TOTALS		9,236	$9,989	$5,772	$497	$16,258	$1.71	923,585,000

Gloria M. Sabater Elementary School							Natural Gas Meter #2	
Provider	South Jersey Gas	Account #	7556797693				Meter #	0804974
Commodity	UGI Energy Services, LLC	Rate:	General Service FT (SJ-GSG)				Meter #	
Billing Period Start Date	Actual Reading	Therms	Gas Delivery Charges	Gas Commodity Charges	Fixed Customer Charge	Gas Total Charges	Cost/Therm Checksum	BTU
7/8/23	8/7/23	0	$0	$0	$42	$0	$0.00	0
8/8/23	9/7/23	0	$0	$0	$42	$0	$0.00	0
9/8/23	10/6/23	6	$6	$4	$39	$10	$1.67	600,000
10/7/23	11/6/23	474	$508	$197	$42	$705	$1.49	47,400,000
11/7/23	12/7/23	1032	$1,116	$428	$42	$1,544	$1.50	103,200,000
12/8/23	1/8/24	1167	$1,262	$484	$43	$1,746	$1.50	116,700,000
1/9/24	2/6/24	1213	$1,315	$503	$39	$1,818	$1.50	121,300,000
2/7/24	3/6/24	1116	$1,223	$463	$34	$1,686	$1.51	111,581,000
3/7/24	4/8/24	1035	$1,134	$430	$45	$1,564	$1.51	103,496,000
4/9/24	5/7/24	213	$233	$88	$39	$321	$1.51	21,280,000
5/8/24	6/7/24	0	$0	$0	$42	$0	$0.00	0
6/8/24	7/9/24	0	$0	$0	$43	$0	$0.00	0
TOTALS		6256	$6,797	$2,597	$492	$9,394	$1.50	625,557,000

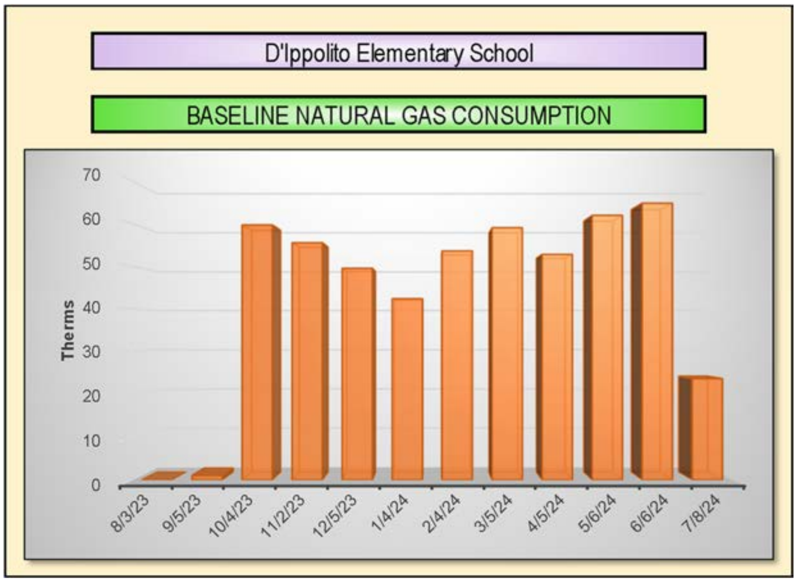
Gloria M. Sabater Elementary School							Natural Gas Meter #3	
Provider	South Jersey Gas	Account #	3852230000				Meter #	766609
Commodity	UGI Energy Services, LLC	Rate:	General Service FT (SJ-GSG)				Meter #	
Billing Period Start Date	Actual Reading	Therms	Gas Delivery Charges	Gas Commodity Charges	Fixed Customer Charge	Gas Total Charges	Cost/Therm Checksum	BTU
7/7/23	8/6/23	0	$0	$0	$42	$0	$0.00	0
8/7/23	9/6/23	0	$0	$0	$42	$0	$0.00	0
9/7/23	10/5/23	0	$0	$0	$39	$0	$0.00	0
10/6/23	11/5/23	0	$0	$0	$42	$0	$0.00	0
11/6/23	12/6/23	0	$0	$0	$42	$0	$0.00	0
12/7/23	1/7/24	0	$0	$0	$43	$0	$0.00	0
1/8/24	2/5/24	0	$0	$0	$39	$0	$0.00	0
2/6/24	3/6/24	259	$284	$162	$39	$446	$1.72	25,925,000
3/7/24	4/8/24	259	$284	$162	$45	$446	$1.72	25,900,000
4/9/24	5/7/24	0	$0	$0	$39	$0	$0.00	0
5/8/24	6/7/24	0	$0	$0	$42	$0	$0.00	0
6/8/24	7/9/24	0	$0	$0	$43	$0	$0.00	0
TOTALS		518	$568	$324	$497	$892	$1.72	51,825,000

D’Ippolito ES Baseline Energy Use



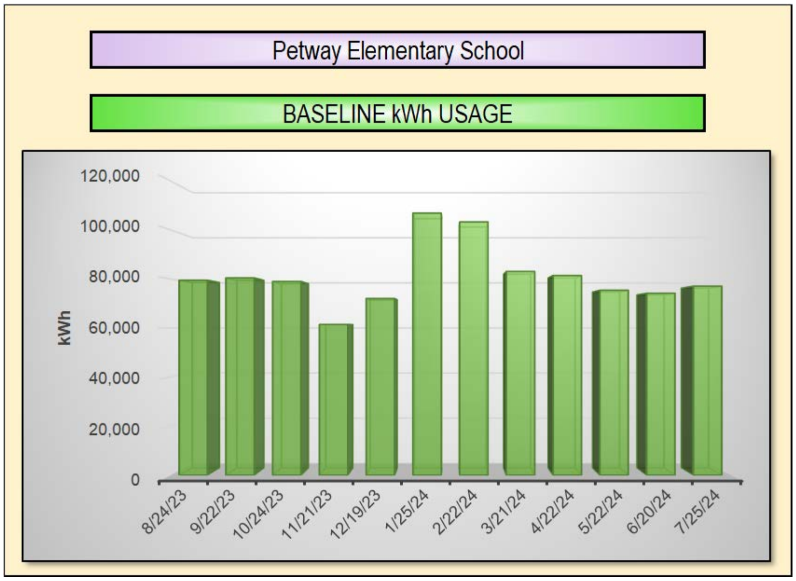


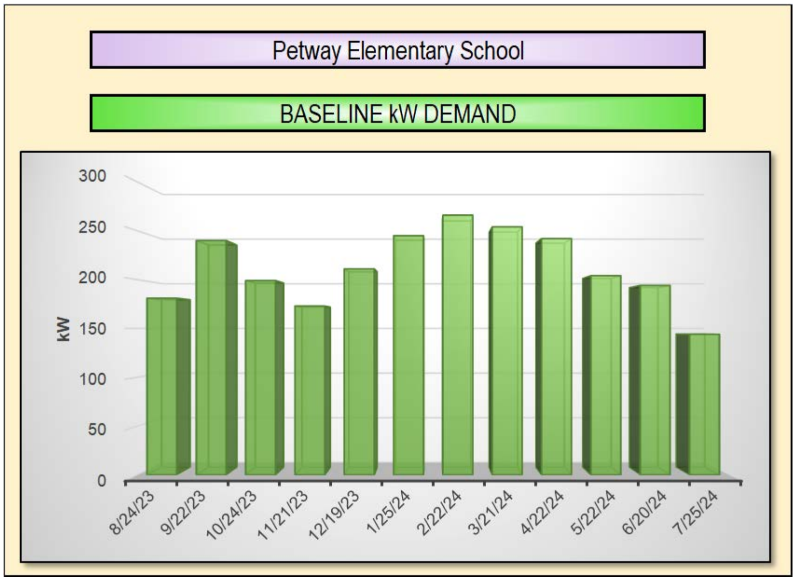
D'Ippolito Elementary School							ELECTRIC METER #1						
Provider:	Vineland Municipal Utility Authoirty				Rate:	GLP20				Meter #	E31400		
Commodity:	Vineland Municipal Utility Authoirty				Account #	109646				Meter #			
Billing Period Start Date	Actual Reading	Usage kWh	Demand kW	Customer Charge	Under 15K kWh $	Over 15K kWh $	Energy Cost Clause	Demand Charge	Total Electric Charges	Initial kWh Size	Marginal kWh Rate Over 15k kWh	Marginal kWh Rate Under 15k kWh	BTU
7/28/23	8/28/23	82,200	292	$16		$8,241	$3,423	$3,066	$14,746	15,000	$0.142	$0.142	280,466,400
8/29/23	9/27/23	84,400	408	$16		$8,462	$3,514	$4,284	$16,276	15,000	$0.142	$0.142	287,972,800
9/28/23	10/27/23	73,600	308	$16	$1,504	$5,582	$3,065	$3,157	$13,324	15,000	$0.137	$0.142	251,123,200
10/28/23	11/29/23	130,200	438	$16	$1,504	$10,974	$5,422	$4,490	$22,405	15,000	$0.137	$0.142	444,242,400
11/30/23	12/26/23	139,800	424	$16	$1,504	$11,888	$5,821	$4,346	$23,576	15,000	$0.137	$0.142	476,997,600
12/27/23	1/29/24	197,400	528	$16	$1,504	$17,375	$8,220	$5,412	$32,527	15,000	$0.137	$0.142	673,528,800
1/30/24	2/27/24	169,000	532	$16	$1,504	$14,670	$7,037	$5,453	$28,680	15,000	$0.137	$0.142	576,628,000
2/28/24	3/27/24	123,200	460	$16	$1,504	$10,307	$5,130	$4,715	$21,672	15,000	$0.137	$0.142	420,358,400
3/28/24	4/25/24	96,800	456	$16	$1,504	$7,792	$4,031	$4,674	$18,017	15,000	$0.137	$0.142	330,281,600
4/26/24	5/30/24	91,600	364	$16	$1,504	$7,297	$3,814	$3,731	$16,362	15,000	$0.137	$0.142	312,539,200
5/31/24	6/26/24	88,800	366	$16		$8,903	$3,698	$3,854	$16,470	15,000	$0.142	$0.142	302,985,600
6/27/24	7/29/24	99,000	286	$16		$9,926	$4,122	$3,087	$17,151	15,000	$0.142	$0.142	337,788,000
TOTALS		1376000	532	$192	$12,031	$121,419	$57,297	$50,268	$241,206	180,000	$0.139	$0.142	4,694,912,000



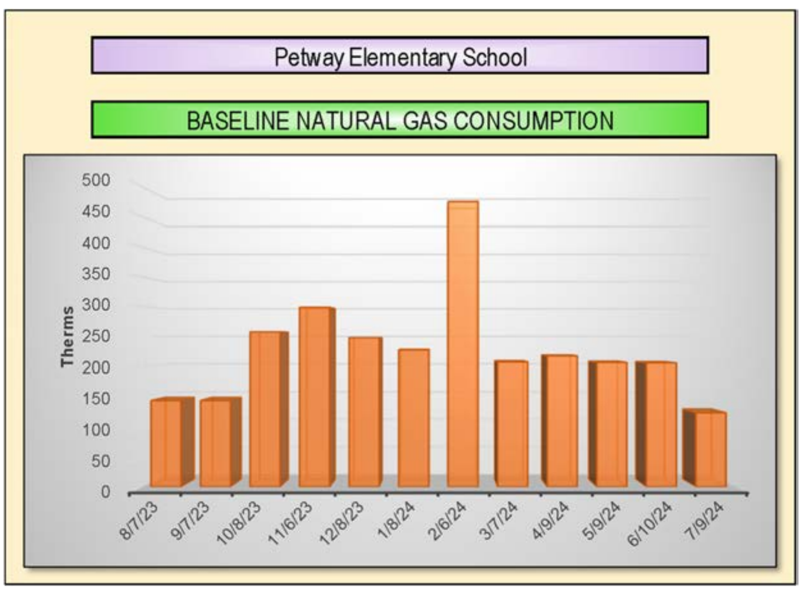
D'Ippolito Elementary School						Natural Gas Meter #1		
Provider	South Jersey Gas	Account #	2950330000				Meter #	766373
Commodity	UGI Energy Services, LLC	Rate:	General Service FT (SJ-GSG)				Meter #	
Billing Period Start Date	Actual Reading	Therms	Gas Delivery Charges	Gas Commodity Charges	Fixed Customer Charge	Gas Total Charges	Cost/Therm Checksum	BTU
7/7/23	8/3/23	0	$0	$0	$39	$39	$0.00	0
8/4/23	9/5/23	1	$1	$1	$45	$46	$1.62	103,000
9/6/23	10/4/23	60	$60	$37	$39	$137	$1.64	5,974,000
10/5/23	11/2/23	56	$60	$35	$39	$133	$1.70	5,557,000
11/3/23	12/5/23	50	$54	$31	$45	$129	$1.71	4,958,000
12/6/23	1/4/24	42	$46	$26	$41	$113	$1.71	4,235,000
1/5/24	2/4/24	54	$58	$34	$42	$134	$1.71	5,366,000
2/5/24	3/5/24	59	$65	$37	$39	$141	$1.72	5,911,000
3/6/24	4/5/24	53	$58	$33	$42	$133	$1.72	5,284,000
4/6/24	5/6/24	62	$68	$40	$42	$150	$1.74	6,198,000
5/7/24	6/6/24	65	$71	$41	$42	$153	$1.72	6,483,000
6/7/24	7/8/24	24	$26	$15	$43	$84	$1.72	2,367,000
TOTALS		524	$566	$329	$497	$1,392	$1.71	52,436,000

Petway ES Baseline Energy Use



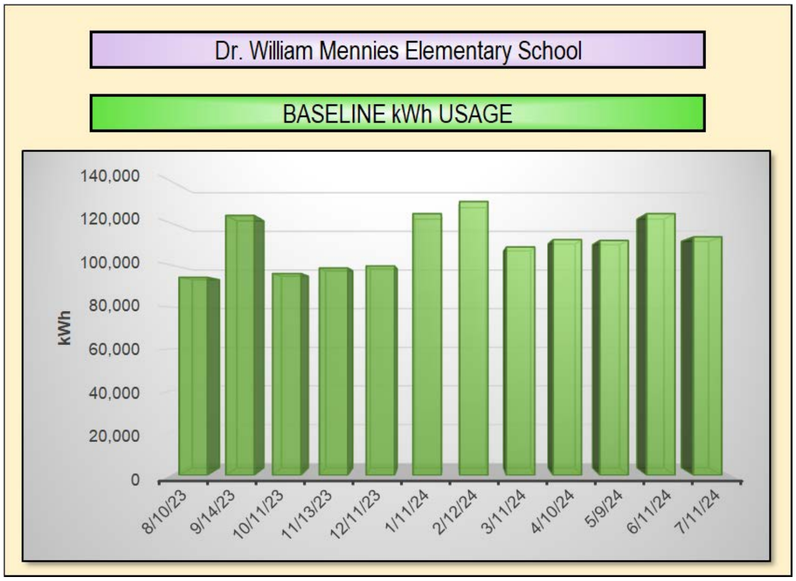


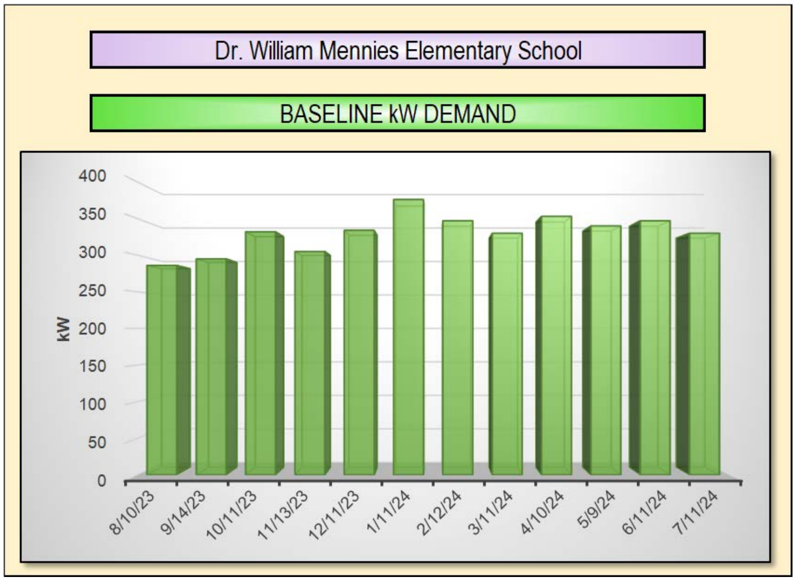
Petway Elementary School							ELECTRIC METER #1						
Provider:	Vineland Municipal Utility Authoirty				Rate:	GLP20					Meter #	E34926	
Commodity:	Vineland Municipal Utility Authoirty				Account #	232922					Meter #		
Billing Period Start Date	Actual Reading	Usage kWh	Demand kW	Customer Charge	Under 15K kWh $	Over 15K kWh $	Energy Cost Clause	Demand Charge	Total Electric Charges	Initial kWh Size	Marginal kWh Rate Over 15k kWh	Marginal kWh Rate Under 15k kWh	BTU
7/24/23	8/24/23	79,440	181	$16		$7,965	$3,308	$1,901	$13,189	15,000	$0.142	$0.142	271,049,280
8/25/23	9/22/23	80,400	240	$16		$8,061	$3,348	$2,520	$13,945	15,000	$0.142	$0.142	274,324,800
9/23/23	10/24/23	78,960	199	$16	$1,504	$6,093	$3,288	$2,040	$12,940	15,000	$0.137	$0.142	269,411,520
10/25/23	11/21/23	61,440	173	$16	$1,504	$4,424	$2,558	$1,773	$10,275	15,000	$0.137	$0.142	209,633,280
11/22/23	12/19/23	72,000	211	$16	$1,504	$5,430	$2,998	$2,163	$12,111	15,000	$0.137	$0.142	245,664,000
12/20/23	1/25/24	106,800	245	$16	$1,504	$8,745	$4,447	$2,511	$17,223	15,000	$0.137	$0.142	364,401,600
1/26/24	2/22/24	103,200	266	$16	$1,504	$8,402	$4,297	$2,727	$16,946	15,000	$0.137	$0.142	352,118,400
2/23/24	3/21/24	83,040	254	$16	$1,504	$6,481	$3,458	$2,604	$14,063	15,000	$0.137	$0.142	283,332,480
3/22/24	4/22/24	81,360	242	$16	$1,504	$6,321	$3,388	$2,481	$13,710	15,000	$0.137	$0.142	277,600,320
4/23/24	5/22/24	75,360	204	$16	$1,504	$5,750	$3,138	$2,091	$12,499	15,000	$0.137	$0.142	257,128,320
5/23/24	6/20/24	74,160	194	$16		$7,435	$3,088	$2,090	$12,629	15,000	$0.142	$0.142	253,033,920
6/21/24	7/25/24	77,040	144	$16		$7,724	$3,208	$1,617	$12,565	15,000	$0.142	$0.142	262,860,480
TOTALS		973200	266	$192	$12,031	$82,831	$40,524	$26,516	$162,094	180,000	$0.139	$0.142	3,320,558,400



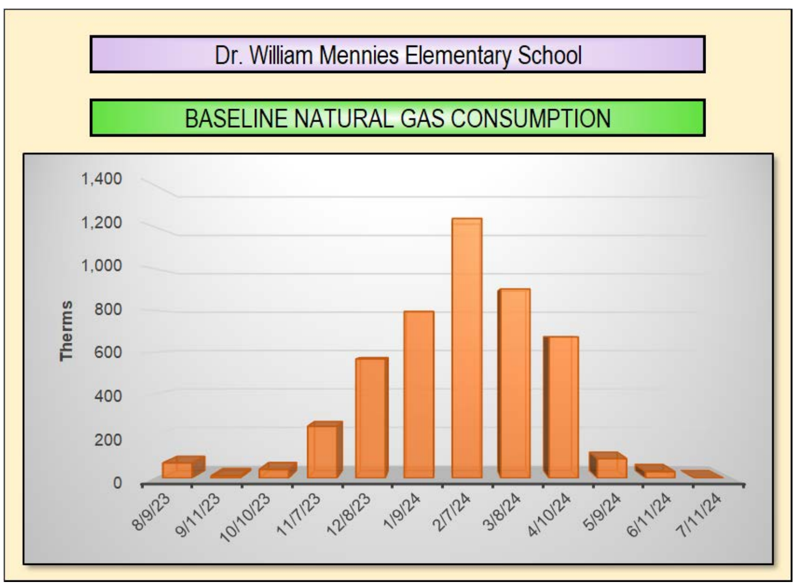
Petway Elementary School						Natural Gas Meter #1		
Provider	South Jersey Gas		Account #	4612230000			Meter #	629095
Commodity	UGI Energy Services, LLC		Rate:	General Service FT (SJ-GSG)			Meter #	
Billing Period Start Date	Actual Reading	Therms	Gas Delivery Charges	Gas Commodity Charges	Fixed Customer Charge	Gas Total Charges	Cost/Therm Checksum	BTU
7/10/23	8/7/23	144	$144	$90	$39	$273	$1.62	14,406,000
8/8/23	9/7/23	144	$144	$90	$42	$276	$1.62	14,406,000
9/8/23	10/8/23	258	$263	$161	$42	$466	$1.65	25,750,000
10/9/23	11/6/23	298	$323	$187	$39	$548	$1.71	29,841,000
11/7/23	12/8/23	248	$268	$155	$43	$466	$1.71	24,792,000
12/9/23	1/8/24	227	$246	$142	$42	$430	$1.71	22,726,000
1/9/24	2/6/24	475	$515	$297	$39	$851	$1.71	47,472,000
2/7/24	3/7/24	207	$227	$130	$39	$396	$1.72	20,740,000
3/8/24	4/9/24	218	$238	$136	$45	$419	$1.72	21,756,000
4/10/24	5/9/24	207	$226	$129	$41	$396	$1.72	20,660,000
5/10/24	6/10/24	206	$226	$129	$43	$397	$1.72	20,580,000
6/11/24	7/9/24	123	$135	$77	$39	$252	$1.72	12,348,000
TOTALS		2,755	$2,954	$1,722	$493	$5,169	$1.70	275,477,000

Dr. William Mennies ES Baseline Energy Use



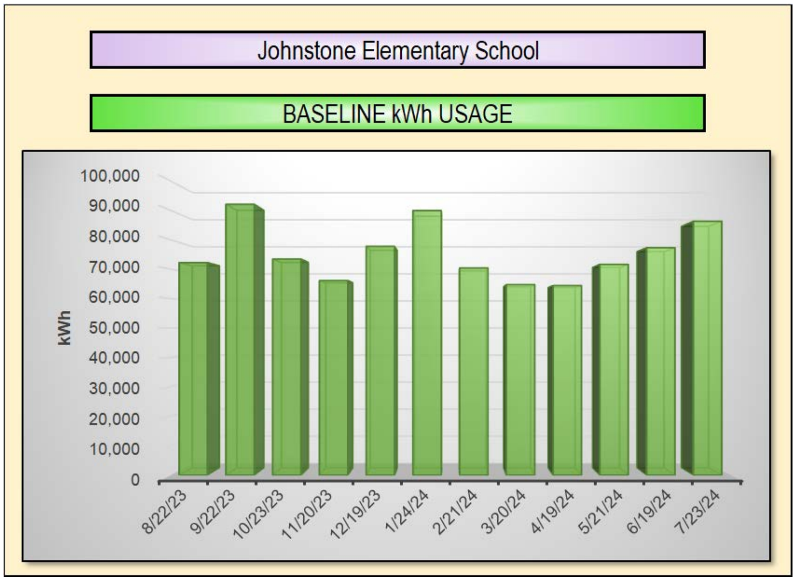


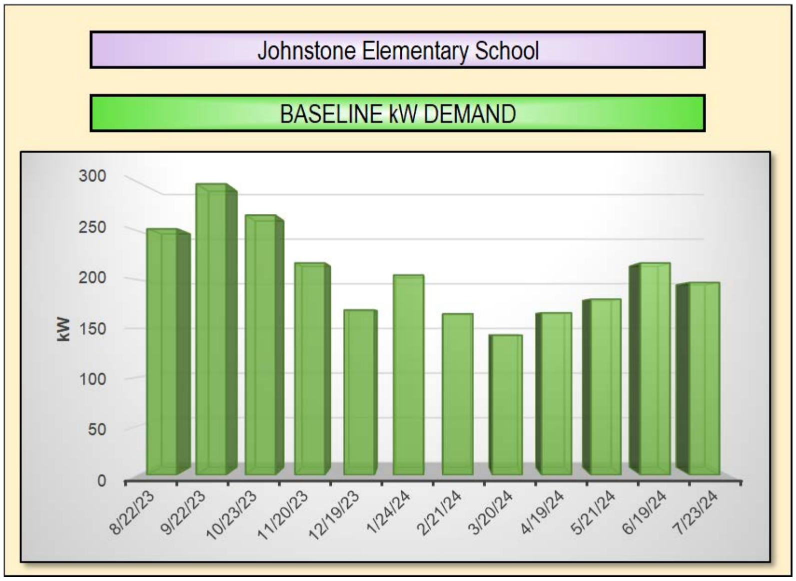
Dr. William Mennies Elementary School							ELECTRIC METER #1						
Provider:	Vineland Municipal Utilities				Rate:	GLP20				Meter #	E30643		
Commodity:	Vineland Municipal Utilities				Account #	139356				Meter #			
Billing Period Start Date	Actual Reading	Usage kWh	Demand kW	Customer Charge	Under 15K kWh $	Over 15K kWh $	Energy Cost Clause	Demand Charge	Total Electric Charges	Initial kWh Size	Marginal kWh Rate Over 15k kWh	Marginal kWh Rate Under 15k kWh	BTU
7/13/23	8/10/23	94,080	286	$16		$9,432	$3,917	$3,003	$16,369	15,000	$0.142	$0.142	321,000,960
8/11/23	9/14/23	123,480	295	$16		$12,380	$5,142	$3,098	$20,635	15,000	$0.142	$0.142	421,313,760
9/15/23	10/11/23	95,880	332	$16	$1,504	$7,705	$3,992	$3,403	$16,620	15,000	$0.137	$0.142	327,142,560
10/12/23	11/13/23	98,520	305	$16	$1,504	$7,956	$4,102	$3,126	$16,705	15,000	$0.137	$0.142	336,150,240
11/14/23	12/11/23	99,480	334	$16	$1,504	$8,048	$4,142	$3,424	$17,133	15,000	$0.137	$0.142	339,425,760
12/12/23	1/11/24	124,320	376	$16	$1,504	$10,414	$5,177	$3,854	$20,964	15,000	$0.137	$0.142	424,179,840
1/12/24	2/12/24	130,080	347	$16	$1,504	$10,963	$5,417	$3,557	$21,456	15,000	$0.137	$0.142	443,832,960
2/13/24	3/11/24	108,480	330	$16	$1,504	$8,905	$4,517	$3,383	$18,324	15,000	$0.137	$0.142	370,133,760
3/12/24	4/10/24	111,960	353	$16	$1,504	$9,236	$4,662	$3,618	$19,037	15,000	$0.137	$0.142	382,007,520
4/11/24	5/9/24	111,600	340	$16	$1,504	$9,202	$4,647	$3,485	$18,854	15,000	$0.137	$0.142	380,779,200
5/10/24	6/11/24	124,320	347	$16		$12,464	$5,177	$3,644	$21,301	15,000	$0.142	$0.142	424,179,840
6/12/24	7/11/24	113,280	330	$16		$11,357	$4,717	$3,465	$19,555	15,000	$0.142	$0.142	386,511,360
TOTALS		1335480	376	$192	$12,031	$118,062	$55,609	$41,058	$226,953	180,000	$0.139	$0.142	4,556,657,760



Dr. William Mennies Elementary School						Natural Gas Meter #1		
Provider	South Jersey Gas		Account #	4885976954			Meter #	788867
Commodity	UGI Energy Services, LLC		Rate:	General Service FT (SJ-GSG)			Meter #	
Billing Period Start Date	Actual Reading	Therms	Gas Delivery Charges	Gas Commodity Charges	Fixed Customer Charge	Gas Total Charges	Cost/Therm Checksum	BTU
7/12/23	8/9/23	72	$72	$26	$39	$137	$1.36	7,203,000
8/10/23	9/11/23	10	$10	$4	$45	$58	$1.35	1,029,000
9/12/23	10/10/23	41	$42	$15	$39	$97	$1.40	4,120,000
10/11/23	11/7/23	247	$267	$154	$38	$459	$1.71	24,696,000
11/8/23	12/8/23	568	$614	$355	$42	$1,011	$1.71	56,815,000
12/9/23	1/9/24	795	$860	$497	$43	$1,400	$1.71	79,541,000
1/10/24	2/7/24	1,238	$1,344	$774	$39	$2,157	$1.71	123,840,000
2/8/24	3/8/24	902	$989	$564	$39	$1,592	$1.72	90,219,000
3/9/24	4/10/24	673	$738	$421	$45	$1,203	$1.72	67,340,000
4/11/24	5/9/24	93	$102	$58	$39	$199	$1.72	9,297,000
5/10/24	6/11/24	31	$34	$19	$45	$98	$1.72	3,087,000
6/12/24	7/11/24	0	$0	$0	$41	$41	$0.00	0
TOTALS		4,672	$5,071	$2,888	$493	$8,452	$1.70	467,187,000

Johnstone ES Baseline Energy Use

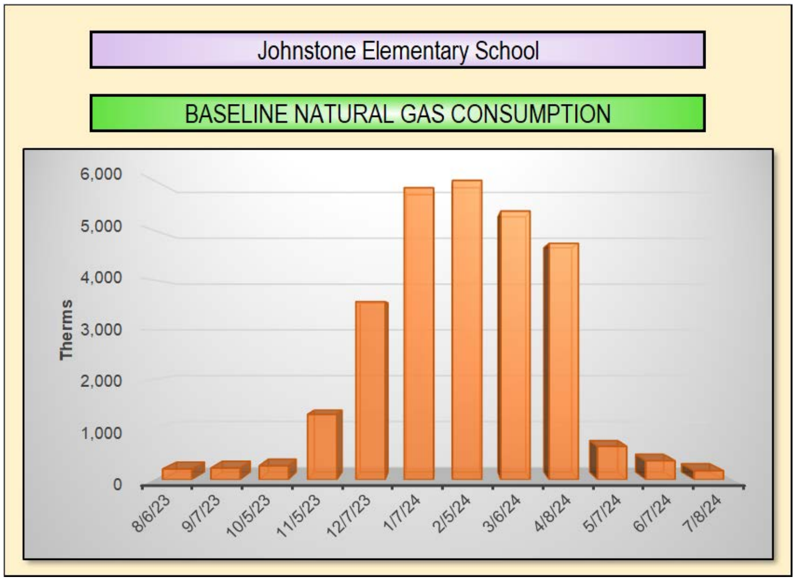




DCO Energy Efficiency Division
100 Lenox Drive
Lawrenceville, NJ 08648

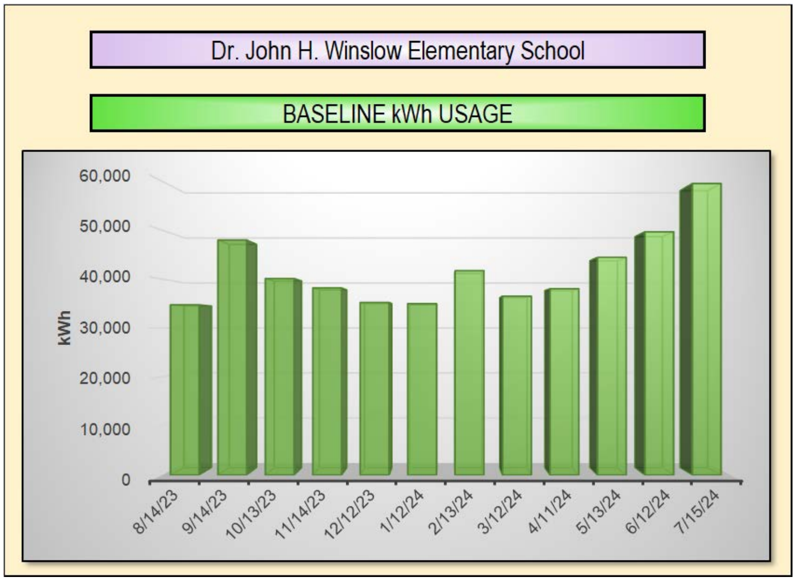
Johnstone Elementary School							ELECTRIC METER #1						
Provider:	Vineland Municipal Utility Authority				Rate:	GLP20				Meter #	E20592		
Commodity:	Vineland Municipal Utility Authoirty				Account #	168214				Meter #			
Billing Period Start Date	Actual Reading	Usage kWh	Demand kW	Customer Charge	Under 15K kWh $	Over 15K kWh $	Energy Cost Clause	Demand Charge	Total Electric Charges	Initial kWh Size	Marginal kWh Rate Over 15k kWh	Marginal kWh Rate Under 15k kWh	BTU
7/25/23	8/22/23	64,640	252	$16		$6,481	$2,692	$2,646	$11,834	15,000	$0.142	$0.142	220,551,680
8/23/23	9/22/23	79,120	298	$16		$7,933	$3,295	$3,129	$14,372	15,000	$0.142	$0.142	269,957,440
9/23/23	10/23/23	65,200	266	$16	$1,504	$4,782	$2,715	$2,727	$11,743	15,000	$0.137	$0.142	222,462,400
10/24/23	11/20/23	56,960	217	$16	$1,504	$3,997	$2,372	$2,224	$10,113	15,000	$0.137	$0.142	194,347,520
11/21/23	12/19/23	61,920	169	$16	$1,504	$4,470	$2,578	$1,732	$10,300	15,000	$0.137	$0.142	211,271,040
12/20/23	1/24/24	74,960	205	$16	$1,504	$5,712	$3,121	$2,097	$12,450	15,000	$0.137	$0.142	255,763,520
1/25/24	2/21/24	57,360	165	$16	$1,504	$4,035	$2,388	$1,691	$9,635	15,000	$0.137	$0.142	195,712,320
2/22/24	3/20/24	56,000	143	$16	$1,504	$3,906	$2,332	$1,702	$9,459	15,000	$0.137	$0.142	191,072,000
3/21/24	4/19/24	56,560	166	$16	$1,504	$3,959	$2,355	$2,040	$9,874	15,000	$0.137	$0.142	192,982,720
4/20/24	5/21/24	61,280	180	$16	$1,504	$4,409	$2,552	$2,265	$10,745	15,000	$0.137	$0.142	209,087,360
5/22/24	6/19/24	63,920	217	$16		$6,409	$2,662	$2,762	$11,848	15,000	$0.142	$0.142	218,095,040
6/20/24	7/23/24	69,040	197	$16		$6,922	$2,875	$2,646	$12,459	15,000	$0.142	$0.142	235,564,480
TOTALS		766960	298	$192	$12,031	$63,013	$31,936	$27,660	$134,833	180,000	$0.139	$0.142	2,616,867,520

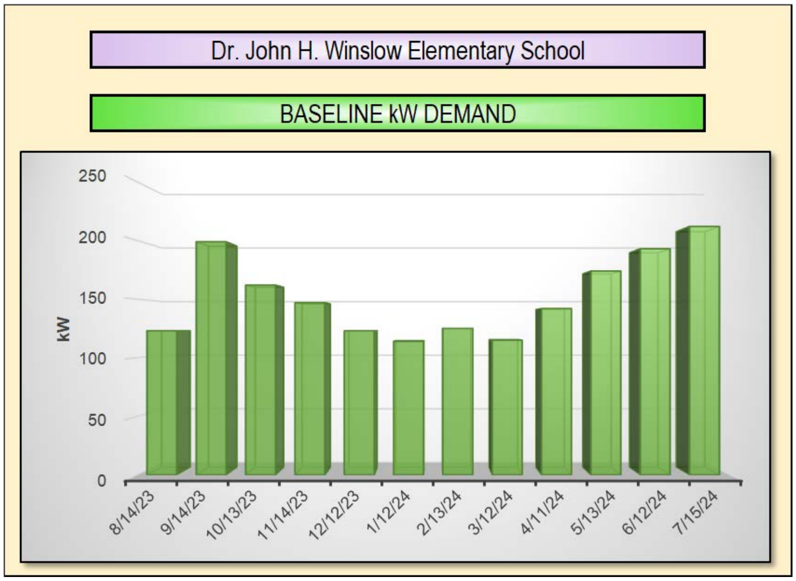
Johnstone Elementary School								ELECTRIC METER #2					
Provider:	Vineland Municipal Utility Authority					Rate:	GLP20				Meter #	E16517	
Commodity:	Vineland Municipal Utility Authoirty					Account #	168212				Meter #		
Billing Period Start Date	Actual Reading	Usage kWh	Demand kW	Customer Charge	Under 15K kWh $	Over 15K kWh $	Energy Cost Clause	Demand Charge	Total Electric Charges	Initial kWh Size	Marginal kWh Rate Over 15k kWh	Marginal kWh Rate Under 15k kWh	BTU
7/26/23	8/22/23	7,560	35	$16	$758		$315	$368	$1,456	$15,000	$0.000	$0.142	25,794,720
8/23/23	9/22/23	12,880	50	$16	$1,291		$536	$525	$2,369	$15,000	$0.000	$0.142	43,946,560
9/23/23	10/23/23	8,200	38	$16	$822		$341	$390	$1,569	$15,000	$0.000	$0.142	27,978,400
10/24/23	11/20/23	9,160	62	$16	$918		$381	$636	$1,951	$15,000	$0.000	$0.142	31,253,920
11/21/23	12/19/23	15,800	56	$16	$1,503.90	$76	$658	$574	$2,828	$15,000	$0.137	$0.142	53,909,600
12/20/23	1/24/24	14,900	50	$16	$1,493.87	$0	$620	$513	$2,643	$15,000	$0.000	$0.142	50,838,800
1/25/24	2/21/24	13,000	44	$16	$1,294.69	$0	$541	$451	$2,303	$15,000	$0.000	$0.141	44,356,000
2/22/24	3/20/24	8,720	35	$16	$874.27	$0	$363	$359	$1,612	$15,000	$0.000	$0.142	29,752,640
3/21/24	4/19/24	7,840	77	$16	$786.04	$0	$326	$789	$1,918	$15,000	$0.000	$0.142	26,750,080
4/20/24	5/21/24	10,320	43	$16	$1,035		$430	$441	$1,921	$15,000	$0.000	$0.142	35,211,840
5/22/24	6/19/24	13,320	46	$16	$1,335		$555	$483	$2,389	$15,000	$0.000	$0.142	45,447,840
6/20/24	7/23/24	17,200	46	$16		$1,724	$716	$483	$2,940	$15,000	$0.142	$0.142	58,686,400
TOTALS		138900	77	$192.00	$12,112.74	$1,801	$5,784	$6,010	$25,899	$180,000	0.02	0.14	473,926,800



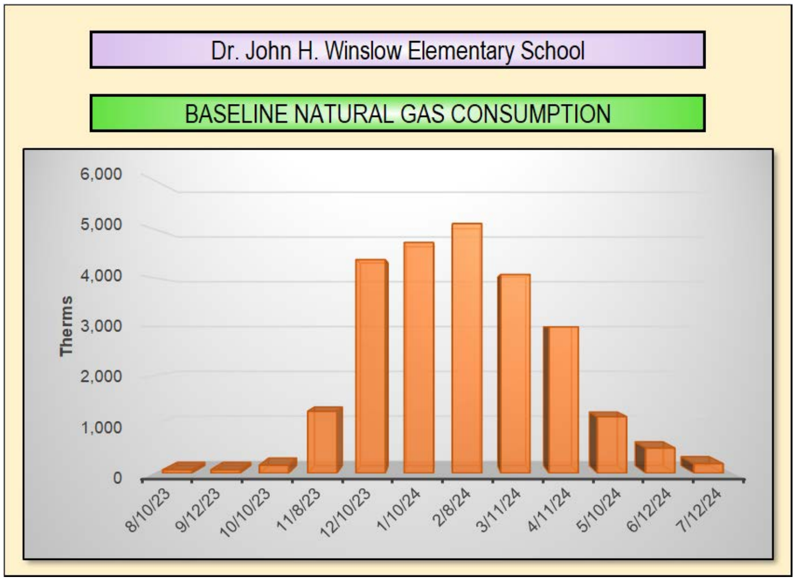
Johnstone Elementary School						Natural Gas Meter #1		
Provider	South Jersey Gas		Account #	9362230000			Meter #	573371
Commodity	UGI Energy Services, LLC		Rate:	General Service FT (SJ-GSG)			Meter #	
Billing Period Start Date	Actual Reading	Therms	Gas Delivery Charges	Gas Commodity Charges	Fixed Customer Charge	Gas Total Charges	Cost/Therm Checksum	BTU
7/7/23	8/6/23	212	$211	$132	$42	$385	$1.62	21,197,000
8/7/23	9/7/23	232	$231	$145	$43	$419	$1.62	23,153,000
9/8/23	10/5/23	275	$279	$172	$38	$489	$1.64	27,501,000
10/6/23	11/5/23	1,307	$1,401	$817	$42	$2,259	$1.70	130,683,000
11/6/23	12/7/23	3,565	$3,854	$2,228	$43	$6,125	$1.71	356,488,000
12/8/23	1/7/24	5,847	$6,321	$3,654	$42	$10,017	$1.71	584,678,000
1/8/24	2/5/24	5,993	$6,497	$3,746	$39	$10,282	$1.71	599,282,000
2/6/24	3/6/24	5,379	$5,894	$3,362	$39	$9,295	$1.72	537,892,000
3/7/24	4/8/24	4,730	$5,184	$2,957	$45	$8,185	$1.72	473,038,000
4/9/24	5/7/24	666	$730	$416	$39	$1,186	$1.72	66,629,000
5/8/24	6/7/24	378	$414	$236	$42	$692	$1.72	37,764,000
6/8/24	7/8/24	179	$196	$112	$42	$350	$1.72	17,905,000
TOTALS		28,762	$31,211	$17,977	$495	$49,683	$1.71	2,876,210,000

Dr. John Winslow ES Baseline Energy Use



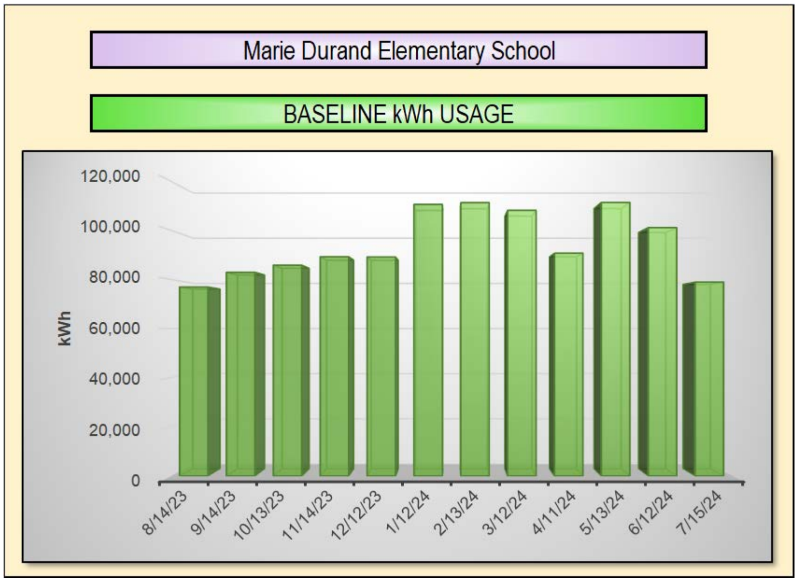


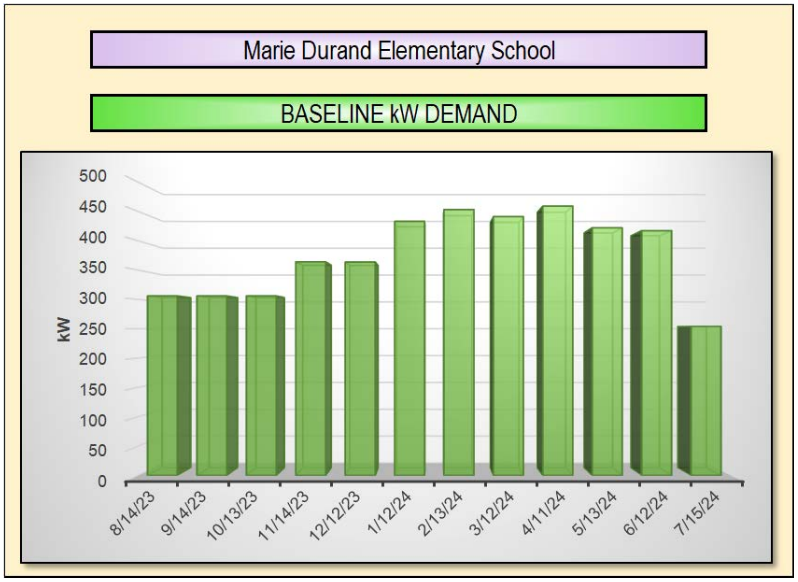
Dr. John H. Winslow Elementary School							ELECTRIC METER #1						
Provider:	Vineland Municipal Utility Authoirty				Rate:	GLP20					Meter #	E24287	
Commodity:	Vineland Municipal Utility Authoirty				Account #	146218					Meter #		
Billing Period Start Date	Actual Reading	Usage kWh	Demand kW	Customer Charge	Under 15K kWh $	Over 15K kWh $	Energy Cost Clause	Demand Charge	Total Electric Charges	Initial kWh Size	Marginal kWh Rate Over 15k kWh	Marginal kWh Rate Under 15k kWh	BTU
7/14/23	8/14/23	34,720	123	$16		$3,481	$1,446	$1,292	$6,234	15,000	$0.142	$0.142	118,464,640
8/15/23	9/14/23	47,920	199	$16		$4,804	$1,995	$2,090	$8,905	15,000	$0.142	$0.142	163,503,040
9/15/23	10/13/23	40,080	162	$16	$1,504	$2,389	$1,669	$1,661	$7,238	15,000	$0.137	$0.142	136,752,960
10/14/23	11/14/23	38,160	147	$16	$1,504	$2,206	$1,589	$1,507	$6,822	15,000	$0.137	$0.142	130,201,920
11/15/23	12/12/23	35,200	123	$16	$1,504	$1,924	$1,466	$1,261	$6,171	15,000	$0.137	$0.142	120,102,400
12/13/23	1/12/24	34,960	114	$16	$1,504	$1,901	$1,456	$1,169	$6,046	15,000	$0.137	$0.142	119,283,520
1/13/24	2/13/24	41,680	125	$16	$1,504	$2,542	$1,736	$1,281	$7,078	15,000	$0.137	$0.142	142,212,160
2/14/24	3/12/24	36,480	115	$16	$1,504	$2,046	$1,519	$1,179	$6,264	15,000	$0.137	$0.142	124,469,760
3/13/24	4/11/24	38,000	142	$16	$1,504	$2,191	$1,582	$1,456	$6,749	15,000	$0.137	$0.142	129,656,000
4/12/24	5/13/24	44,400	174	$16	$1,504	$2,801	$1,849	$1,784	$7,953	15,000	$0.137	$0.142	151,492,800
5/14/24	6/12/24	49,600	193	$16		$4,973	$2,065	$2,027	$9,081	15,000	$0.142	$0.142	169,235,200
6/13/24	7/15/24	59,440	212	$16		$5,959	$2,475	$2,226	$10,677	15,000	$0.142	$0.142	202,809,280
TOTALS		500640	212	$192	$12,031	$37,218	$20,847	$18,929	$89,217	180,000	$0.139	$0.142	1,708,183,680



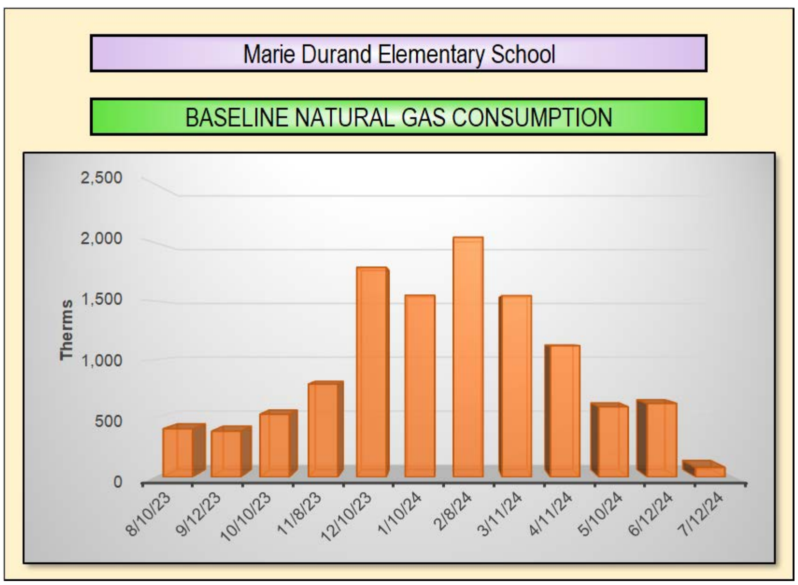
Dr. John H. Winslow Elementary School						Natural Gas Meter #1		
Provider	South Jersey Gas	Account #	6651230000				Meter #	703158
Commodity	UGI Energy Services, LLC	Rate:	General Service FT (SJ-GSG)				Meter #	821149
Billing Period Start Date	Actual Reading	Therms	Gas Delivery Charges	Gas Commodity Charges	Fixed Customer Charge	Gas Total Charges	Cost/Therm Checksum	BTU
7/12/23	8/10/23	72	$72	$45	$41	$157	$1.62	7,203,000
8/11/23	9/12/23	72	$72	$45	$45	$161	$1.62	7,203,000
9/13/23	10/10/23	165	$170	$103	$38	$310	$1.65	16,480,000
10/11/23	11/8/23	1,266	$1,368	$791	$39	$2,198	$1.71	126,567,000
11/9/23	12/10/23	4,370	$4,724	$2,731	$43	$7,498	$1.71	436,959,000
12/11/23	1/10/24	4,721	$5,103	$2,951	$42	$8,096	$1.71	472,081,000
1/11/24	2/8/24	5,108	$5,546	$3,193	$39	$8,778	$1.71	510,840,000
2/9/24	3/11/24	4,065	$4,454	$2,541	$42	$7,037	$1.72	406,504,000
3/12/24	4/11/24	2,994	$3,281	$1,871	$42	$5,194	$1.72	299,404,000
4/12/24	5/10/24	1,157	$1,268	$723	$39	$2,030	$1.72	115,696,000
5/11/24	6/12/24	515	$564	$322	$45	$930	$1.72	51,450,000
6/13/24	7/12/24	196	$214	$122	$41	$377	$1.72	19,551,000
TOTALS		24,699	$26,835	$15,438	$494	$42,768	$1.71	2,469,938,000

Marie Durand ES Baseline Energy Use



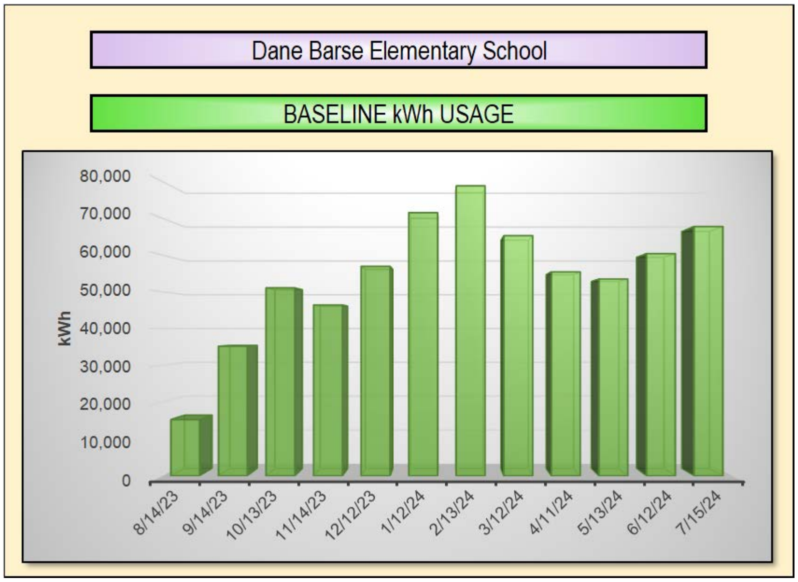


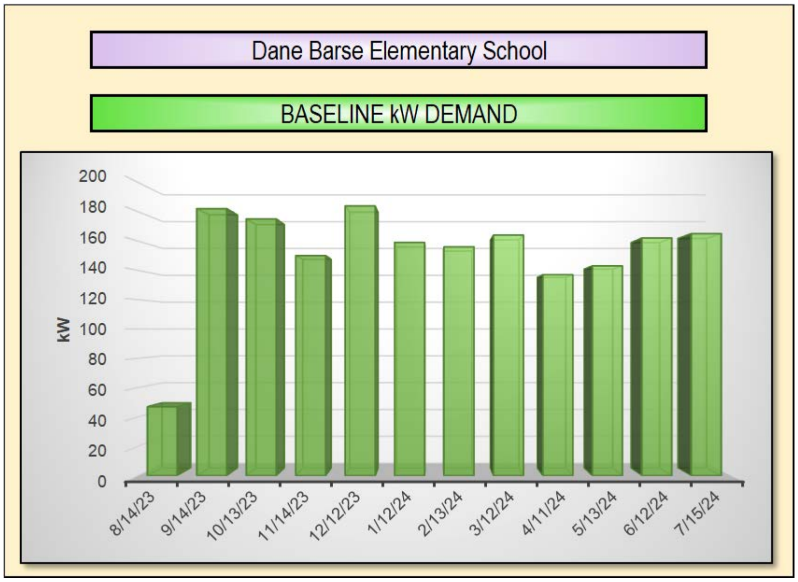
Marie Durand Elementary School						ELECTRIC METER #1							
Provider:	Vineland Municipal Utility Authoirty				Rate:	WLP30					Meter #		
Commodity:	Vineland Municipal Utility Authoirty				Account #	128156					Meter #		E24564
Billing Period Start Date	Actual Reading	Usage kWh	Demand kW	Customer Charge	Under 70K kWh	Over 70K kWh	Energy Cost Clause	Demand Charge	Total Electric Charges	Initial kWh Size	Marginal kWh Rate Over 70k kWh	Marginal kWh Rate Under 70k kWh	BTU
7/6/23	8/1/23	76,880	306	$450	$6,948	$626	$3,201	$3,443	$14,668	70,000	$0.133	$0.141	262,314,560
8/2/23	9/1/23	82,880	306	$450	$6,948	$1,173	$3,451	$3,443	$15,465	70,000	$0.133	$0.141	282,786,560
9/2/23	10/2/23	85,760	306	$450	$6,948	$1,309	$3,571	$3,290	$15,568	70,000	$0.125	$0.141	292,613,120
10/3/23	11/1/23	89,200	364	$450	$6,948	$1,595	$3,714	$3,913	$16,620	70,000	$0.125	$0.141	304,350,400
11/2/23	12/1/23	89,120	364	$450	$6,948	$1,588	$3,711	$3,909	$16,607	70,000	$0.125	$0.141	304,077,440
12/2/23	1/3/24	110,480	433	$450	$6,948	$3,362	$4,600	$4,655	$20,016	70,000	$0.125	$0.141	376,957,760
1/4/24	2/1/24	111,200	453	$450	$6,948	$3,422	$4,630	$4,870	$20,320	70,000	$0.125	$0.141	379,414,400
2/2/24	3/1/24	108,080	441	$450	$6,948	$3,163	$4,500	$4,741	$19,802	70,000	$0.125	$0.141	368,768,960
3/2/24	4/1/24	90,640	459	$450	$6,948	$1,714	$3,774	$4,934	$17,821	70,000	$0.125	$0.141	309,263,680
4/2/24	5/1/24	111,280	422	$450	$6,948	$3,429	$4,634	$4,537	$19,997	70,000	$0.125	$0.141	379,687,360
5/2/24	6/3/24	101,040	417	$450	$6,948	$2,827	$4,207	$4,691	$19,123	70,000	$0.133	$0.141	344,748,480
6/4/24	7/1/24	78,880	254	$450	$6,948	$809	$3,285	$3,443	$14,934	70,000	$0.133	$0.141	269,138,560
TOTALS		1135440	459	$5,400	$83,378	$25,017	$47,280	$49,867	$210,942	840,000	$0.127	$0.141	3,874,121,280



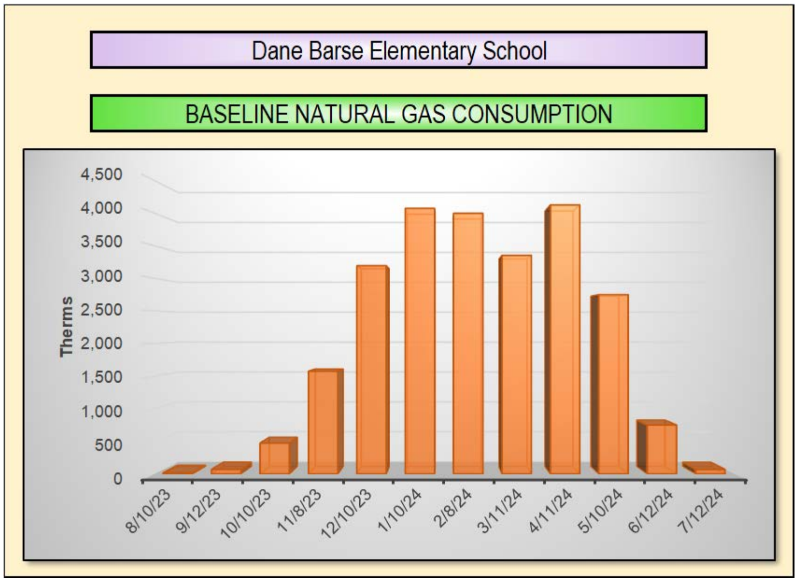
Marie Durand Elementary School							Natural Gas Meter #1	
Provider	South Jersey Gas		Account #	9548152120			Meter #	788881
Commodity	UGI Energy Services, LLC		Rate:	General Service FT (SJ-GSG)			Meter #	
Billing Period Start Date	Actual Reading	Therms	Gas Delivery Charges	Gas Commodity Charges	Fixed Customer Charge	Gas Total Charges	Cost/Therm Checksum	BTU
7/6/23	8/3/23	412	$410	$150	$39	$599	$1.36	41,160,000
8/4/23	9/5/23	391	$390	$139	$45	$573	$1.35	39,102,000
9/6/23	10/4/23	536	$541	$200	$39	$780	$1.38	53,560,000
10/5/23	11/2/23	792	$849	$299	$39	$1,188	$1.45	79,233,000
11/3/23	12/5/23	1,787	$1,932	$1,117	$45	$3,093	$1.71	178,709,000
12/6/23	1/4/24	1,550	$1,675	$969	$41	$2,684	$1.71	154,950,000
1/5/24	2/4/24	2,043	$2,214	$1,277	$42	$3,533	$1.71	204,336,000
2/5/24	3/5/24	1,545	$1,693	$966	$39	$2,698	$1.72	154,513,000
3/6/24	4/5/24	1,119	$1,226	$699	$42	$1,967	$1.72	111,888,000
4/6/24	5/6/24	599	$657	$374	$42	$1,073	$1.72	59,914,000
5/7/24	6/10/24	628	$688	$392	$47	$1,127	$1.72	62,769,000
6/11/24	7/10/24	82	$90	$412	$39	$541	$6.10	8,232,000
TOTALS		11,484	$12,365	$6,995	$498	$19,857	$1.69	1,148,366,000

Dane Barse ES Baseline Energy Use



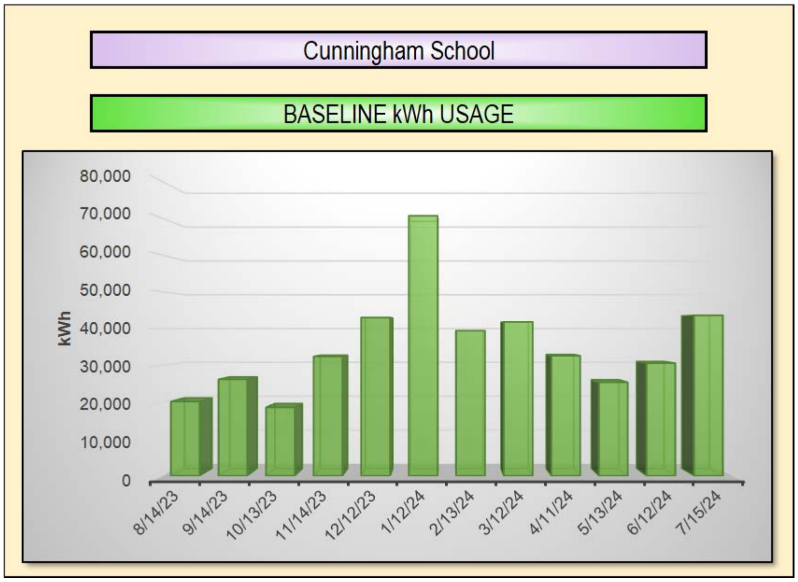


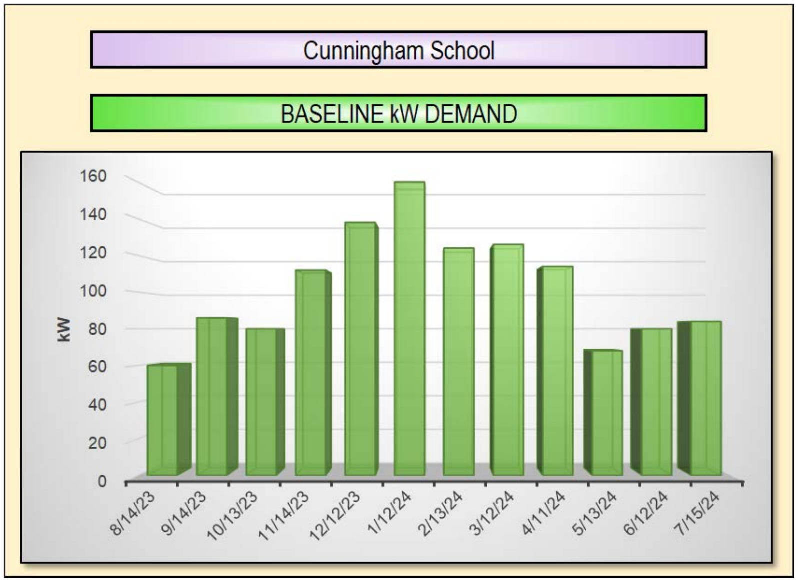
Dane Barse Elementary School							ELECTRIC METER #1							
Provider:	Vineland Municipal Utility Authoirty				Rate:	GLP20					Meter #			
Commodity:	Vineland Municipal Utility Authoirty				Account #	152672					Meter #		E22671	
Billing Period Start Date	Actual Reading	Usage kWh	Demand kW	Customer Charge	Under 15K kWh $	Over 15K kWh $	Energy Cost Clause	Demand Charge	Total Electric Charges	Initial kWh Size	Marginal kWh Rate Over 15k kWh	Marginal kWh Rate Under 15k kWh	BTU	
7/12/23	8/7/23	15,280	47	$16		$1,532	$636	$494	$2,678	15,000	$0.142	$0.142	52,135,360	
8/8/23	9/8/23	35,200	182	$16		$3,529	$1,466	$1,911	$6,922	15,000	$0.142	$0.142	120,102,400	
9/9/23	10/6/23	51,040	175	$16	$1,504	$3,433	$2,125	$1,794	$8,872	15,000	$0.137	$0.142	174,148,480	
10/7/23	11/6/23	46,400	150	$16	$1,504	$2,991	$1,932	$1,538	$7,981	15,000	$0.137	$0.142	158,316,800	
11/7/23	12/6/23	56,880	184	$16	$1,504	$3,989	$2,368	$1,885	$9,763	15,000	$0.137	$0.142	194,074,560	
12/7/23	1/5/24	71,440	159	$16	$1,504	$5,376	$2,975	$1,630	$11,501	15,000	$0.137	$0.142	243,753,280	
1/6/24	2/6/24	78,720	156	$16	$1,504	$6,070	$3,278	$1,599	$12,467	15,000	$0.137	$0.142	268,592,640	
2/7/24	3/6/24	65,200	164	$16	$1,504	$4,782	$2,715	$1,681	$10,698	15,000	$0.137	$0.142	222,462,400	
3/7/24	4/4/24	55,360	137	$16	$1,504	$3,845	$2,305	$1,404	$9,074	15,000	$0.137	$0.142	188,888,320	
4/5/24	5/6/24	53,440	143	$16	$1,504	$3,662	$2,225	$1,466	$8,873	15,000	$0.137	$0.142	182,337,280	
5/7/24	6/6/24	60,320	162	$16		$6,048	$2,512	$1,701	$10,276	15,000	$0.142	$0.142	205,811,840	
6/7/24	7/8/24	67,680	165	$16		$6,786	$2,818	$1,733	$11,352	15,000	$0.142	$0.142	230,924,160	
TOTALS		656960	184	$192	$12,031	$52,043	$27,356	$18,834	$110,456	180,000	$0.139	$0.142	2,241,547,520	



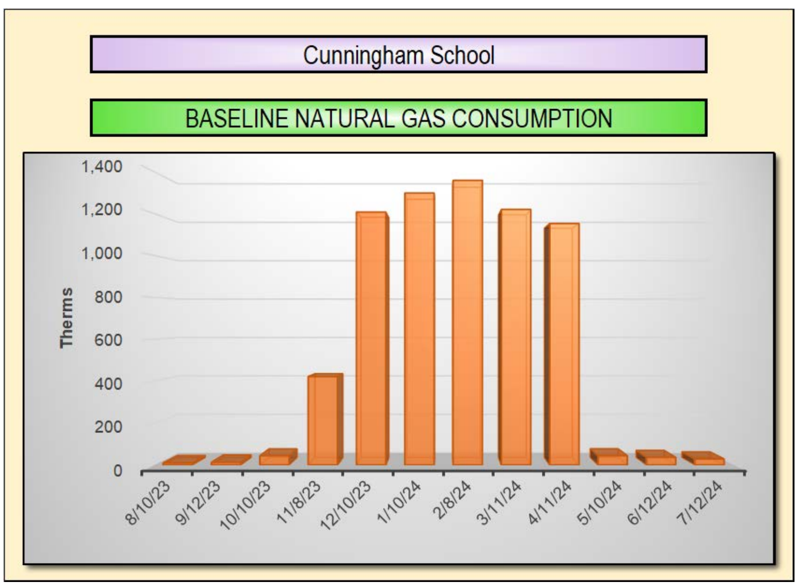
Dane Barse Elementary School						Natural Gas Meter #1		
Provider	South Jersey Gas		Account #	5056330000			Meter #	702928
Commodity	UGI Energy Services, LLC		Rate:	General Service FT (SJ-GSG)			Meter #	853547
Billing Period Start Date	Actual Reading	Therms	Gas Delivery Charges	Gas Commodity Charges	Fixed Customer Charge	Gas Total Charges	Cost/Therm Checksum	BTU
7/14/23	8/14/23	20	$20	$13	$43	$76	$1.62	2,000,000
8/15/23	9/14/23	72	$72	$45	$42	$159	$1.62	7,203,000
9/15/23	10/12/23	474	$491	$296	$38	$825	$1.66	47,380,000
10/13/23	11/12/23	1,574	$1,702	$984	$42	$2,728	$1.71	157,437,000
11/13/23	12/12/23	3,192	$3,451	$1,995	$41	$5,486	$1.71	319,197,000
12/13/23	1/14/24	4,070	$4,400	$2,544	$45	$6,988	$1.71	407,002,000
1/15/24	2/12/24	3,994	$4,344	$2,496	$39	$6,879	$1.71	399,384,000
2/13/24	3/14/24	3,350	$3,670	$2,094	$41	$5,804	$1.72	334,951,000
3/15/24	4/5/24	4,122	$4,517	$2,576	$28	$7,122	$1.72	412,200,000
4/6/24	5/6/24	2,748	$3,011	$1,718	$41	$4,769	$1.72	274,800,000
5/7/24	6/10/24	750	$822	$469	$46	$1,337	$1.72	75,000,000
6/11/24	7/10/24	70	$77	$44	$39	$160	$1.72	7,000,000
TOTALS		24,436	$26,576	$15,273	$483	$42,332	$1.71	2,443,554,000

Cunningham School Baseline Energy Use



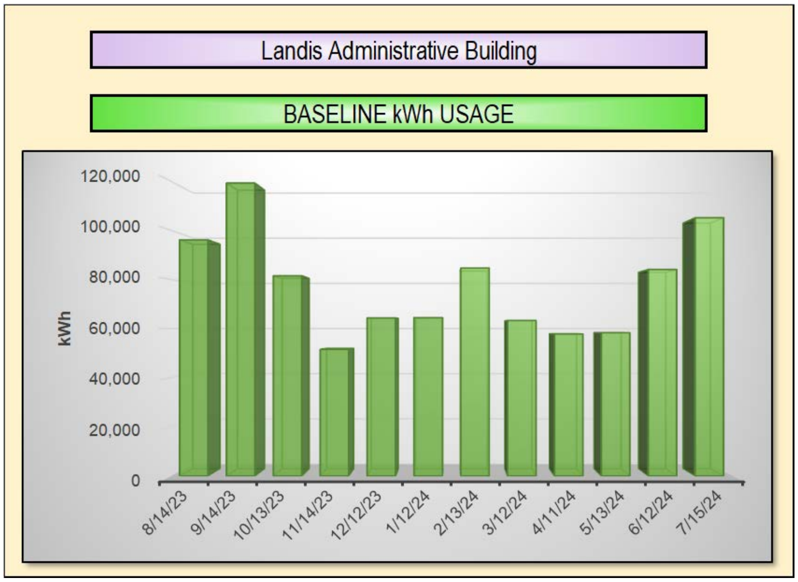


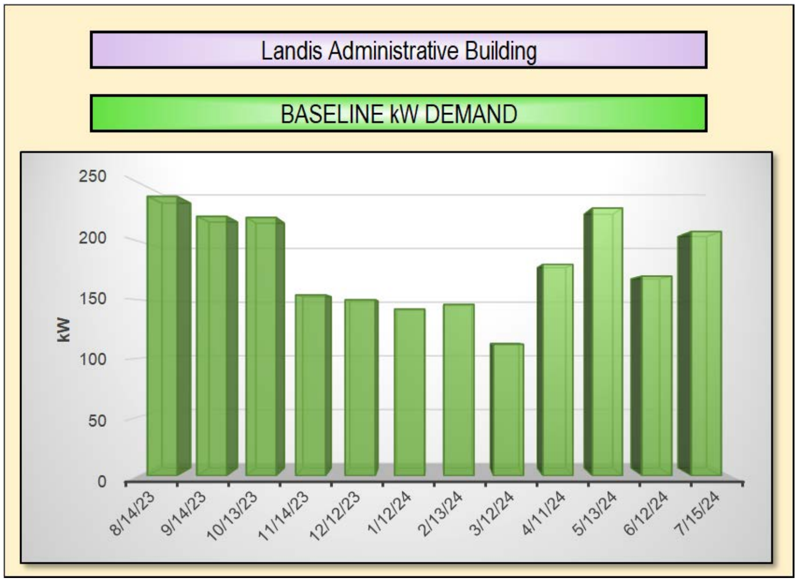
Cunningham School							ELECTRIC METER #1						
Provider:	Vineland Municipal Utility Authoirty				Rate:	GLP20					Meter #	E07867	
Commodity:	Vineland Municipal Utility Authoirty				Account #	126794					Meter #		
Billing Period Start Date	Actual Reading	Usage kWh	Demand kW	Customer Charge	Under 15K kWh $	Over 15K kWh $	Energy Cost Clause	Demand Charge	Total Electric Charges	Initial kWh Size	Marginal kWh Rate Over 15k kWh	Marginal kWh Rate Under 15k kWh	BTU
7/21/23	8/17/23	20,200	60	$16		$2,025	$841	$630	$3,512	15,000	$0.142	$0.142	68,922,400
8/18/23	9/19/23	26,200	86	$16		$2,627	$1,091	$903	$4,637	15,000	$0.142	$0.142	89,394,400
9/20/23	10/17/23	18,600	80	$16	$1,504	$343	$775	$820	$3,457	15,000	$0.137	$0.142	63,463,200
10/18/23	11/16/23	32,400	112	$16	$1,504	$1,658	$1,349	$1,148	$5,675	15,000	$0.137	$0.142	110,548,800
11/17/23	12/14/23	43,000	138	$16	$1,504	$2,667	$1,791	$1,415	$7,392	15,000	$0.137	$0.142	146,716,000
12/15/23	1/22/24	70,600	160	$16	$1,504	$5,296	$2,940	$1,640	$11,396	15,000	$0.137	$0.142	240,887,200
1/23/24	2/15/24	39,400	124	$16	$1,504	$2,324	$1,641	$1,271	$6,756	15,000	$0.137	$0.142	134,432,800
2/16/24	3/15/24	41,800	126	$16	$1,504	$2,553	$1,741	$1,292	$7,105	15,000	$0.137	$0.142	142,621,600
3/16/24	4/16/24	32,600	114	$16	$1,504	$1,677	$1,357	$1,169	$5,722	15,000	$0.137	$0.142	111,231,200
4/17/24	5/16/24	25,400	68	$16	$1,504	$991	$1,058	$697	$4,265	15,000	$0.137	$0.142	86,664,800
5/17/24	6/17/24	30,600	80	$16		$3,068	$1,274	$840	$5,198	15,000	$0.142	$0.142	104,407,200
6/18/24	7/17/24	43,600	84	$16		$4,371	$1,816	$882	$7,085	15,000	$0.142	$0.142	148,763,200
TOTALS		424400	160	$192	$12,031	$29,600	$17,672	$12,706	$72,201	180,000	$0.139	$0.142	1,448,052,800



Cunningham School						Natural Gas Meter #1		
Provider	South Jersey Gas		Account #	5529130000			Meter #	5529130000
Commodity	UGI Energy Services, LLC		Rate:	General Service FT (SJ-GSG)			Meter #	
Billing Period Start Date	Actual Reading	Therms	Gas Delivery Charges	Gas Commodity Charges	Fixed Customer Charge	Gas Total Charges	Cost/Therm Checksum	BTU
7/15/23	8/16/23	10	$10	$6	$43	$60	$1.62	1,029,000
8/17/23	9/14/23	13	$13	$8	$39	$61	$1.62	1,338,000
9/15/23	10/12/23	44	$46	$28	$38	$111	$1.66	4,429,000
10/13/23	11/13/23	422	$456	$264	$43	$763	$1.71	42,189,000
11/14/23	12/13/23	1,207	$1,304	$754	$41	$2,099	$1.71	120,654,000
12/14/23	1/12/24	1,297	$1,403	$811	$41	$2,254	$1.71	129,745,000
1/13/24	2/12/24	1,358	$1,476	$849	$42	$2,367	$1.71	135,811,000
2/13/24	3/12/24	1,220	$1,336	$756	$39	$2,132	$1.72	121,951,000
3/13/24	4/12/24	1,152	$42	$720	$42	$804	$0.66	115,203,000
4/13/24	5/13/24	44	$49	$28	$42	$118	$1.72	4,442,000
5/14/24	6/12/24	37	$40	$23	$40	$103	$1.72	3,661,500
6/13/24	7/16/24	29	$32	$18	$45	$94	$1.72	2,881,000
TOTALS		6,833	$6,207	$4,265	$494	$10,966	$1.53	683,333,500

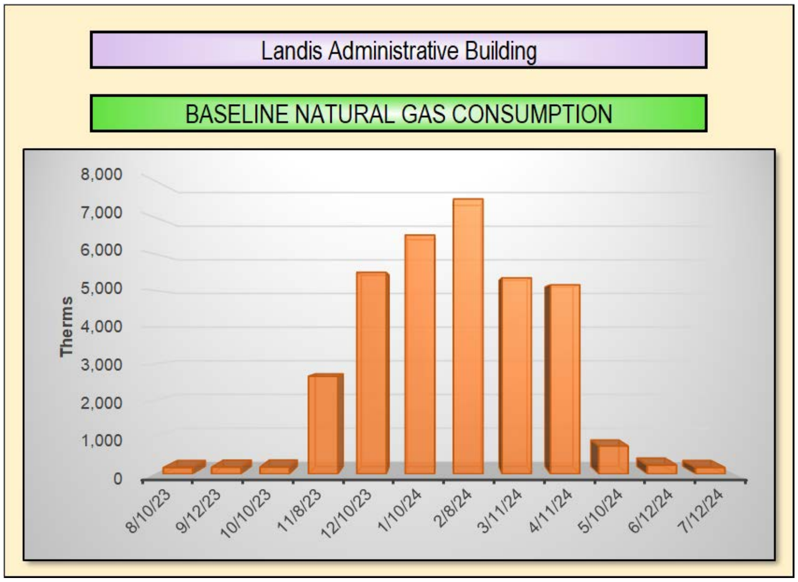
Landis Administrative Building Baseline Energy Use





Landis Administrative Building								ELECTRIC METER #1					
Provider:	Vineland Municipal Utility Authority				Rate:	GLP20				Meter #	E14318		
Commodity:	Vineland Municipal Utility Authoirty				Account #	142516				Meter #			
Billing Period Start Date	Actual Reading	Usage kWh	Demand kW	Customer Charge	Under 15K kWh $	Over 15K kWh $	Energy Cost Clause	Demand Charge	Total Electric Charges	Initial kWh Size	Marginal kWh Rate Over 15k kWh	Marginal kWh Rate Under 15k kWh	BTU
7/11/23	8/4/23	82,200	238	$16		$8,241	$3,423	$2,499	$14,179	15,000	$0.142	$0.142	280,466,400
8/5/23	9/7/23	101,800	221	$16		$10,206	$4,239	$2,321	$16,782	15,000	$0.142	$0.142	347,341,600
9/8/23	10/5/23	71,600	220	$16	$1,504	$5,392	$2,981	$2,255	$12,148	15,000	$0.137	$0.142	244,299,200
10/6/23	11/3/23	42,400	154	$16	$1,504	$2,610	$1,766	$1,579	$7,474	15,000	$0.137	$0.142	144,668,800
11/4/23	12/6/23	51,600	150	$16	$1,504	$3,487	$2,149	$1,538	$8,693	15,000	$0.137	$0.142	176,059,200
12/7/23	1/4/24	48,600	142	$16	$1,504	$3,201	$2,024	$1,456	$8,200	15,000	$0.137	$0.142	165,823,200
1/5/24	2/6/24	63,400	146	$16	$1,504	$4,611	$2,640	$1,497	$10,267	15,000	$0.137	$0.142	216,320,800
2/7/24	3/5/24	48,000	112	$16	$1,504	$3,144	$1,999	$1,322	$7,984	15,000	$0.137	$0.142	163,776,000
3/6/24	4/4/24	46,000	180	$16	$1,504	$2,953	$1,915	$2,132	$8,520	15,000	$0.137	$0.142	156,952,000
4/5/24	5/6/24	49,000	228	$16	$1,504	$3,239	$2,040	$2,675	$9,474	15,000	$0.137	$0.142	167,188,000
5/7/24	6/5/24	74,400	170	$16		$7,459	$3,098	$1,974	$12,547	15,000	$0.142	$0.142	253,852,800
6/6/24	7/5/24	91,600	208	$16		$9,184	$3,814	$2,342	$15,356	15,000	$0.142	$0.142	312,539,200
TOTALS		770600	238	$192	$12,031	$63,726	$32,088	$23,588	$131,625	180,000	$0.139	$0.142	2,629,287,200

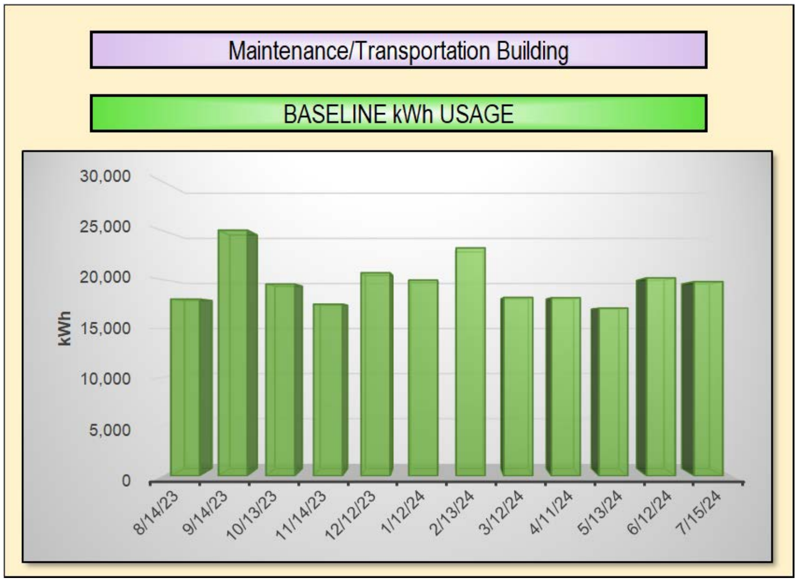
Landis Administrative Building								ELECTRIC METER #2					
Provider:	Vineland Municipal Utility Authority				Rate:	GLP20				Meter #	E20782		
Commodity:	Vineland Municipal Utility Authority				Account #	142514				Meter #			
Billing Period Start Date	Actual Reading	Usage kWh	Demand kW	Customer Charge	Under 15K kWh $	Over 15K kWh $	Energy Cost Clause	Demand Charge	Total Electric Charges	Initial kWh Size	Marginal kWh Rate Over 15k kWh	Marginal kWh Rate Under 15k kWh	BTU
7/12/23	8/7/23	13,840	44	$16	$1,388		$576	$462	$2,442	15,000.00	0.000	0.142	47,222,080
8/8/23	9/8/23	17,360	49	$16		$1,741	$723	$515	$2,994	15,000.00	0.142	0.142	59,232,320
9/9/23	10/5/23	9,840	45	$16	$987		$410	$461	$1,874	15,000.00	0.000	0.142	33,574,080
10/6/23	11/6/23	9,120	42	$16	$914		$380	$431	$1,741	15,000.00	0.000	0.142	31,117,440
11/7/23	12/6/23	12,720	41	$16	$1,275		$530	$420	$2,241	15,000.00	0.000	0.142	43,400,640
12/7/23	1/5/24	15,840	44	$16	$1,503.90	$80	$660	$451	$2,711	15,000.00	0.137	0.142	54,046,080
1/6/24	2/7/24	21,200	49	$16	$1,503.90	$591	$883	$502	$3,496	15,000.00	0.137	0.142	72,334,400
2/8/24	3/6/24	15,280	50	$16	$1,503.90	$27	$636	$513	$2,695	15,000.00	0.137	0.142	52,135,360
3/7/24	4/5/24	11,760	53	$16	$1,179.06		$490	$543	$2,228	15,000.00	0.000	0.142	40,125,120
4/6/24	5/6/24	9,280	64	$16	$930		$386	$656	$1,989	15,000.00	0.000	0.142	31,663,360
5/7/24	6/7/24	9,600	35	$16	$962.50		$400	$368	$1,746	15,000.00	0.000	0.142	32,755,200
6/8/24	7/8/24	13,440	39	$16	$1,347		$560	$410	$2,333	15,000.00	0.000	0.142	45,857,280
TOTALS		159280	64	$192	$13,495.00	$2,438	$6,632	$5,731	$28,488	180,000.00	0.05	0.142	543,463,360

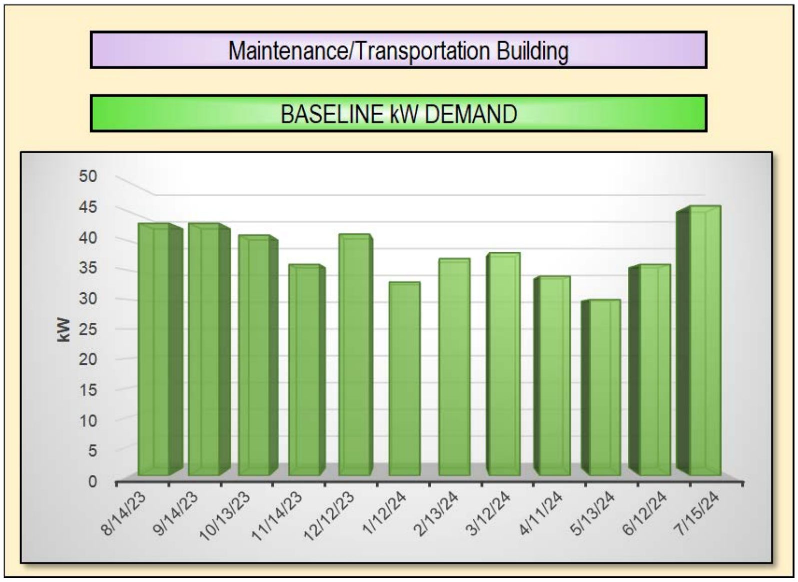


Landis Administrative Building							Natural Gas Meter #1		
Provider	South Jersey Gas		Account #	1869230000			Meter #	822042	
Commodity	UGI Energy Services, LLC		Rate:	General Service FT (SJ-GSG)			Meter #		
Billing Period Start Date	Actual Reading	Therms	Gas Delivery Charges	Gas Commodity Charges	Fixed Customer Charge	Gas Total Charges	Cost/Therm Checksum	BTU	
7/11/23	8/9/23	175	$174	$109	$41	$324	$1.62	17,493,000	
8/10/23	9/11/23	185	$185	$116	$45	$345	$1.62	18,522,000	
9/12/23	10/10/23	175	$180	$109	$39	$329	$1.65	17,510,000	
10/11/23	11/7/23	2,326	$2,514	$1,454	$38	$4,005	$1.71	232,554,000	
11/8/23	12/8/23	4,545	$4,914	$2,841	$42	$7,796	$1.71	454,520,000	
12/9/23	1/9/24	5,156	$5,584	$3,228	$43	$8,855	$1.71	515,600,000	
1/10/24	2/7/24	6,151	$6,674	$3,844	$39	$10,558	$1.71	615,072,000	
2/8/24	3/8/24	4,293	$4,704	$2,683	$39	$7,427	$1.72	429,318,000	
3/9/24	4/10/24	4,217	$4,620	$2,635	$45	$7,301	$1.72	421,652,000	
4/11/24	5/9/24	517	$566	$323	$39	$928	$1.72	51,650,000	
5/10/24	6/11/24	216	$237	$135	$45	$416	$1.72	21,609,000	
6/12/24	7/10/24	175	$192	$109	$39	$340	$1.72	17,493,000	
TOTALS		28,130	$30,544	$17,588	$493	$48,624	$1.71	2,812,993,000	

Landis Administrative Building						Natural Gas Meter #2		
Provider	South Jersey Gas		Account #	0869230000			Meter #	0637352
Commodity	UGI Energy Services, LLC		Rate:	General Service FT (SJ-GSG)			Meter #	
Billing Period Start Date	Actual Reading	Therms	Gas Delivery Charges	Gas Commodity Charges	Fixed Customer Charge	Gas Total Charges	Cost/Therm Checksum	BTU
7/11/23	8/9/23	0	$0	$0	$41	$0	$0.00	0
8/10/23	9/11/23	0	$0	$0	$45	$0	$0.00	0
9/12/23	10/10/23	12	$13	$8	$39	$21	$1.75	1,200,000
10/11/23	11/7/23	335	$365	$210	$35	$575	$1.72	33,500,000
11/8/23	12/8/23	948	$1,025	$593	$42	$1,618	$1.71	94,800,000
12/9/23	1/9/24	1353	$1,463	$846	$43	$2,309	$1.71	135,300,000
1/10/24	2/7/24	1339	$1,452	$837	$39	$2,289	$1.71	133,900,000
2/8/24	3/8/24	1047	$1,148	$655	$39	$1,802	$1.72	104,737,000
3/9/24	4/10/24	934	$1,024	$584	$45	$1,608	$1.72	93,447,000
4/11/24	5/9/24	245	$268	$153	$39	$421	$1.72	24,482,000
5/10/24	6/11/24	30	$33	$19	$45	$51	$1.72	2,984,000
6/12/24	7/10/24	0	$0	$0	$39	$0	$0.00	0
TOTALS		6244	$6,791	$3,904	$491	$10,695	$1.71	624,350,000

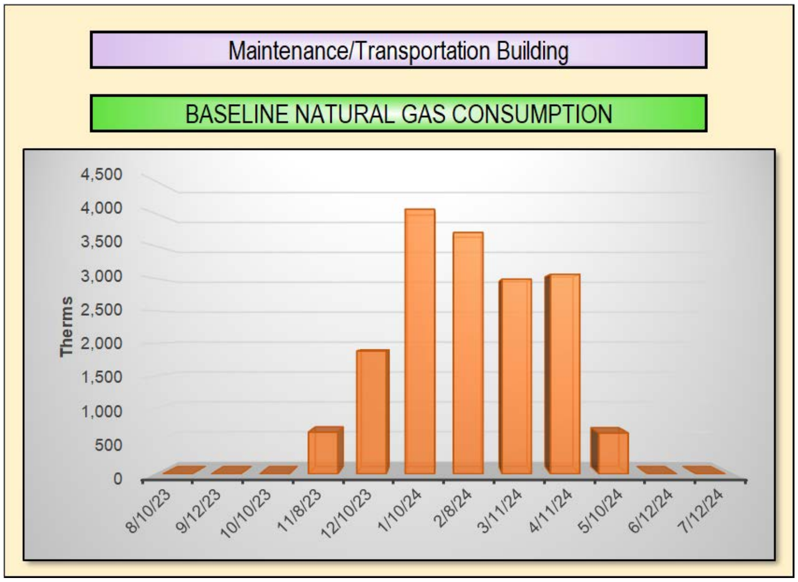
Maintenance Building Baseline Energy Use





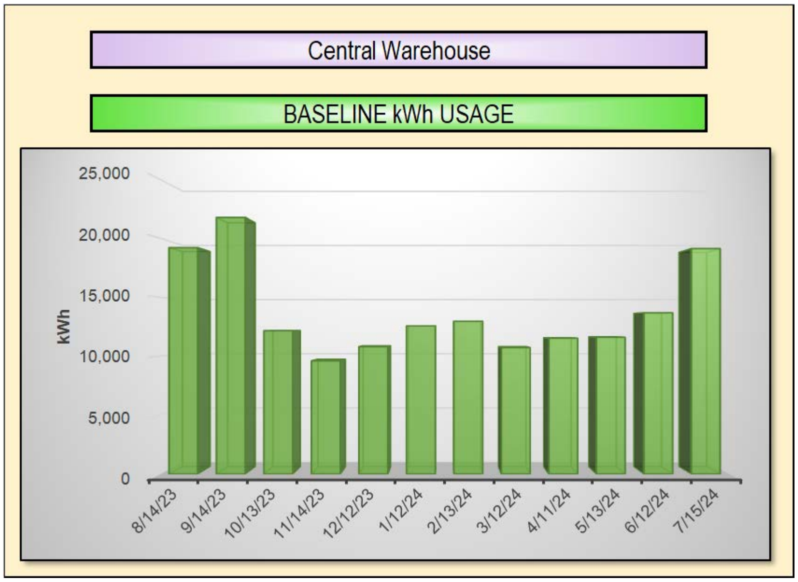
Maintenance/Transportation Building							ELECTRIC METER #1						
Provider:	Vineland Municipal Utility Authoirty				Rate:	GLP20					Meter #	E30629	
Commodity:	Vineland Municipal Utility Authoirty				Account #	120790					Meter #		
Billing Period Start Date	Actual Reading	Usage kWh	Demand kW	Customer Charge	Under 15K kWh $	Over 15K kWh $	Energy Cost Clause	Demand Charge	Total Electric Charges	Initial kWh Size	Marginal kWh Rate Over 15k kWh	Marginal kWh Rate Under 15k kWh	BTU
7/11/23	8/3/23	13,600	43	$16	$1,364		$566	$452	$2,397	15,000	$0.000	$0.142	46,403,200
8/4/23	9/7/23	17,960	43	$16		$1,801	$748	$452	$3,016	15,000	$0.142	$0.142	61,279,520
9/8/23	10/6/23	12,960	41	$16	$1,299		$540	$420	$2,275	15,000	$0.000	$0.142	44,219,520
10/7/23	11/3/23	10,560	36	$16	$1,059		$440	$369	$1,883	15,000	$0.000	$0.142	36,030,720
11/4/23	12/5/23	12,080	41	$16	$1,211		$503	$310	$2,040	15,000	$0.000	$0.142	41,216,960
12/6/23	1/4/24	11,520	33	$16	$1,155		$480	$338	$1,989	15,000	$0.000	$0.142	39,306,240
1/5/24	2/7/24	14,160	37	$16	$1,420		$590	$379	$2,405	15,000	$0.000	$0.142	48,313,920
2/8/24	3/5/24	11,120	38	$16	$1,115		$463	$390	$1,983	15,000	$0.000	$0.142	37,941,440
3/6/24	4/4/24	11,200	34	$16	$1,123		$466	$349	$1,954	15,000	$0.000	$0.142	38,214,400
4/5/24	5/3/24	11,120	30	$16	$1,115		$463	$308	$1,901	15,000	$0.000	$0.142	37,941,440
5/4/24	6/6/24	13,880	36	$16	$1,392		$578	$378	$2,364	15,000	$0.000	$0.142	47,358,560
6/7/24	7/5/24	14,760	46	$16	$1,480		$615	$483	$2,593	15,000	$0.000	$0.142	50,361,120
TOTALS		154920	46	$192	$13,732	$1,801	$6,451	$4,626	$26,801	180,000	$0.012	$0.142	528,587,040

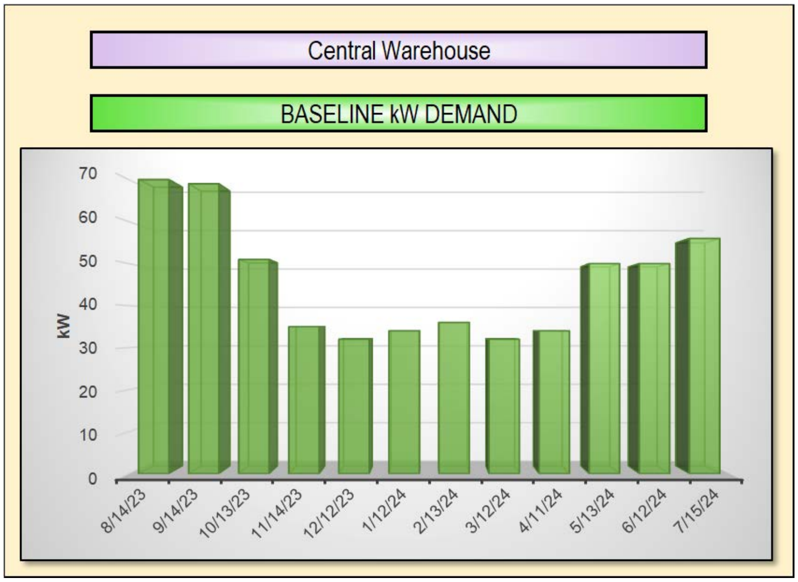
Maintenance/Transportation Building							ELECTRIC METER #2						
Provider:	Vineland Municipal Utility Authoirty					Account #					Meter #	E35975	
Commodity:	Vineland Municipal Utility Authoirty					Account #	268722				Meter #		
Billing Period Start Date	Actual Reading	Usage kWh	Demand kW	Customer Charge	Under 15K kWh $	Over 15K kWh $	Energy Cost Clause	Demand Charge	Total Electric Charges	Initial kWh Size	Marginal kWh Rate Over 15k kWh	Marginal kWh Rate Under 15k kWh	BTU
7/11/23	8/3/23	4,396	19	$16	$441		$183	$200	$839	15,000.00	0.00	0.142	14,999,152
8/4/23	9/7/23	7,052	19	$16	$707		$294	$200	$1,216	15,000.00	0.00	0.142	24,061,424
9/8/23	10/6/23	6,568	19	$16	$659		$273	$195	$1,143	15,000.00	0.00	0.142	22,410,016
10/7/23	11/3/23	6,928	19	$16	$695		$288	$195	$1,194	15,000.00	0.00	0.142	23,638,336
11/4/23	12/5/23	8,594	19	$16	$862		$358	$195	$1,430	15,000.00	0.00	0.142	29,322,728
12/6/23	1/4/24	8,411	19	$16	$843		$350	$195	$1,404	15,000.00	0.00	0.142	28,698,332
1/5/24	2/6/24	9,043	19	$16	$907		$377	$195	$1,494	15,000.00	0.00	0.142	30,854,716
2/7/24	3/5/24	7,047	19	$16	$706.53		$293	$195	$1,211	15,000.00	0.00	0.142	24,044,364
3/6/24	4/4/24	6,941	19	$16	$695.90		$289	$195	$1,196	15,000.00	0.00	0.142	23,682,692
4/5/24	5/3/24	5,957	19	$16	$597.25		$248	$195	$1,056	15,000.00	0.00	0.142	20,325,284
5/4/24	6/6/24	6,271	19	$16	$629		$261	$200	$1,105	15,000.00	0.00	0.142	21,396,652
6/7/24	7/5/24	5,009	18	$16	$502		$209	$189	$916	15,000.00	0.00	0.142	17,090,708
TOTALS		82217	19	$192.00	$8,243.09	$0	$3,424	$2,346	$14,204	180,000.00	0.00	0.142	280,524,404



Maintenance/Transportation Building						Natural Gas Meter #1		
Provider	South Jersey Gas	Account #	7789230000			Meter #	786849	
Commodity	UGI Energy Services, LLC	Rate:	General Service FT (SJ-GSG)			Meter #		
Billing Period Start Date	Actual Reading	Therms	Gas Delivery Charges	Gas Commodity Charges	Fixed Customer Charge	Gas Total Charges	Cost/Therm Checksum	BTU
7/11/23	8/9/23	0	$0	$0	$41	$41	$0.00	0
8/10/23	9/11/23	0	$0	$0	$45	$45	$0.00	0
9/12/23	10/10/23	0	$0	$0	$39	$39	$0.00	0
10/11/23	11/7/23	641	$693	$401	$38	$1,132	$1.71	64,107,000
11/8/23	12/10/23	1,884	$2,037	$1,178	$45	$3,259	$1.71	188,419,000
12/11/23	1/9/24	4,056	$4,384	$2,535	$41	$6,960	$1.71	405,556,000
1/10/24	2/8/24	3,700	$4,015	$2,312	$39	$6,366	$1.71	369,972,000
2/9/24	3/8/24	2,986	$3,272	$1,866	$39	$5,177	$1.72	298,552,000
3/9/24	4/10/24	3,058	$3,351	$1,912	$45	$5,307	$1.72	305,827,000
4/11/24	5/9/24	628	$688	$393	$39	$1,120	$1.72	62,806,000
5/10/24	6/11/24	0	$0	$0	$45	$45	$0.00	0
6/12/24	7/10/24	0	$0	$0	$39	$39	$0.00	0
TOTALS		16,952	$18,440	$10,596	$493	$29,528	$1.71	1,695,239,000

Central Warehouse Baseline Energy Use





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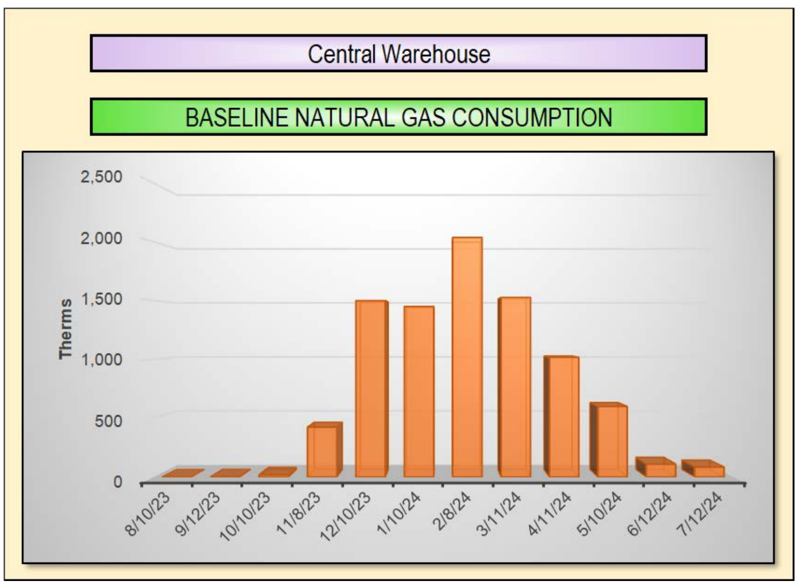
Central Warehouse							ELECTRIC METER #1						
Provider:	Vineland Municipal Utility Authoirty				Rate:	GLP20					Meter #	E34927	
Commodity:	Vineland Municipal Utility Authoirty				Account #	271966					Meter #		
Billing Period Start Date	Actual Reading	Usage kWh	Demand kW	Customer Charge	Under 15K kWh $	Over 15K kWh $	Energy Cost Clause	Demand Charge	Total Electric Charges	Initial kWh Size	Marginal kWh Rate Over 15k kWh	Marginal kWh Rate Under 15k kWh	BTU
7/14/23	8/9/23	19,200	70	$16		$1,925	$799	$735	$3,475	15,000	$0.142	$0.142	65,510,400
8/10/23	9/11/23	21,760	69	$16		$2,182	$906	$725	$3,828	15,000	$0.142	$0.142	74,245,120
9/12/23	10/11/23	12,160	51	$16	$1,219		$506	$523	$2,264	15,000	$0.000	$0.142	41,489,920
10/12/23	11/8/23	9,600	35	$16	$963		$400	$359	$1,737	15,000	$0.000	$0.142	32,755,200
11/9/23	12/8/23	10,800	32	$16	$1,083		$450	$328	$1,877	15,000	$0.000	$0.142	36,849,600
12/9/23	1/9/24	12,560	34	$16	$1,259		$523	$349	$2,147	15,000	$0.000	$0.142	42,854,720
1/10/24	2/9/24	12,960	36	$16	$1,299		$540	$369	$2,224	15,000	$0.000	$0.142	44,219,520
2/10/24	3/8/24	10,720	32	$16	$1,075		$446	$328	$1,865	15,000	$0.000	$0.142	36,576,640
3/9/24	4/8/24	11,520	34	$16	$1,155		$480	$349	$1,999	15,000	$0.000	$0.142	39,306,240
4/9/24	5/8/24	11,600	50	$16	$1,163		$483	$513	$2,175	15,000	$0.000	$0.142	39,579,200
5/9/24	6/10/24	13,680	50	$16	$1,372		$570	$525	$2,482	15,000	$0.000	$0.142	46,676,160
6/11/24	7/10/24	19,120	56	$16		$1,917	$796	$588	$3,317	15,000	$0.142	$0.142	65,237,440
TOTALS		165680	70	192	$10,587	$6,024	$6,899	$5,689	$29,391	180,000	$0.035	$0.142	565,300,160



Central Warehouse						Natural Gas Meter #1		
Provider	South Jersey Gas		Account #	6030430000			Meter #	637356
Commodity	UGI Energy Services, LLC		Account #	General Service FT (SJ-GSG)			Meter #	
Billing Period Start Date	Actual Reading	Therms	Gas Delivery Charges	Gas Commodity Charges	Fixed Customer Charge	Gas Total Charges	Cost/Therm Checksum	BTU
7/6/23	8/2/23	0	$0	$0	$38	$38	$0.00	0
8/3/23	9/5/23	2	$2	$1	$46	$49	$1.62	206,000
9/6/23	10/3/23	20	$20	$12	$38	$70	$1.63	1,957,000
10/4/23	11/1/23	424	$454	$265	$39	$759	$1.70	42,395,000
11/2/23	12/4/23	1,499	$1,620	$937	$45	$2,602	$1.71	149,888,000
12/5/23	1/3/24	1,449	$1,567	$906	$41	$2,513	$1.71	144,930,000
1/4/24	2/1/24	2,035	$2,202	$1,272	$39	$3,513	$1.71	203,510,000
2/2/24	3/5/24	1,526	$1,651	$954	$45	$2,649	$1.71	152,571,000
3/6/24	4/4/24	1,016	$1,114	$635	$42	$1,791	$1.72	101,632,000
4/5/24	5/3/24	600	$658	$375	$39	$1,072	$1.72	60,017,000
5/4/24	6/5/24	110	$121	$69	$45	$234	$1.72	11,010,000
6/6/24	7/3/24	85	$94	$53	$38	$185	$1.72	8,541,000
TOTALS		8,767	$9,502	$5,479	$493	$15,474	$1.71	876,657,000

Energy Savings Utility Rates

DCO Energy used the following marginal rates to calculate energy cost savings:

CALCULATED UTILITY RATES BY BUILDING					
BUILDING/FACILITY	ELECTRIC				NATURAL GAS
	$$ / kW	Summer $$ / kWh	Winter $$ / kWh	Weighted Average $$ / kWh	$$ / Therm
Vineland High School North	$10.95	$0.131	$0.120	$0.1237	$1.53
Vineland High School South	$10.95	$0.131	$0.120	$0.1237	$1.71
Thomas Wallace Middle School	$0.00	$0.189	$0.191	$0.1904	$1.71
SGT Dominick Pilla Middle Schoool	$10.33	$0.142	$0.137	$0.1386	$1.71
Veterans Memorial Intermediate School	$10.65	$0.142	$0.137	$0.1386	$1.73
Anthony Rossi Intermediate School	$10.96	$0.133	$0.125	$0.1274	$1.77
Gloria M. Sabater Elementary School	$14.30	$0.133	$0.125	$0.1274	$1.63
D'Ippolito Elementary School	$10.36	$0.142	$0.137	$0.1386	$1.71
Petway Elementary School	$10.42	$0.142	$0.137	$0.1386	$1.70
Dr. William Mennies Elementary School	$10.33	$0.142	$0.137	$0.1386	$1.70
Johnstone Elementary School	$13.82	$0.142	$0.137	$0.1386	$1.71
Dr. John H. Winslow Elementary School	$10.33	$0.142	$0.137	$0.1386	$1.71
Marie Durand Elementary School	$11.11	$0.133	$0.125	$0.1274	$1.69
Dane Barse Elementary School	$10.33	$0.142	$0.137	$0.1386	$1.71
Cunningham School	$10.33	$0.142	$0.137	$0.1386	$1.53
Landis Administrative Building	$13.64	$0.142	$0.137	$0.1386	$1.71
Maintenance/Transportation Building	$15.30	$0.142	$0.142	$0.1419	$1.71
Central Warehouse	$10.33	$0.142	$0.142	$0.1419	$1.71

ENERGY SAVINGS PLAN

SECTION 3 – ENERGY CONSERVATION MEASURES

Energy Conservation Measure Breakdown by Building

The matrix below details which ECMs were applied and evaluated by building.

Vineland Public Schools ECM Matrix

✓	ECM was evaluated
✅	ECM evaluated & included in the project

ECM #	ECM DESCRIPTION	Vineland High School North	Vineland High School South	Thomas Wallace Middle School	SGT Dominick Pilla Middle School	Veterans Memorial Intermediate School	Anthony Rossi Intermediate School	Gloria M. Sabater Elementary School	D'Ippolito Elementary School	Petway Elementary School	Dr. William Mennies Elementary School	Johnstone Elementary School	Dr. John H. Winslow Elementary School	Marie Durand Elementary School	Dane Barse Elementary School	Cunningham School	Landis Administrative Building	Maintenance/Transportation Building	Central Warehouse
1	LED Lighting Tube Retrofit	✅	✅	✅	✅	✅	✅	✅	✅	✅	✓	✅	✓	✓		✅	✅	✅	✅
2	LED Lighting Volumetric Kit Retrofit	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓		✓	✓	✓	✓
3	LED Lighting Flat Panel Replacement	✓	✓	✓	✓	✓	✓	✓	✓	✓	✅	✓	✅	✅	✅	✓	✓	✓	✓
4	Lighting Controls	✅	✅	✅		✅	✅	✅	✅			✅	✅			✅	✅	✅	
5	Energy Management System Upgrades		✅	✅	✅	✅		✅		✅									
6	Energy Management System Replacement	✅					✅		✅			✅	✓		✅		✅		
7	Pipe and Valve Insulation	✅		✅		✅	✅	✅				✅	✅			✅	✅		
8	Building Envelope Weatherization	✅	✅	✅	✅	✅	✅	✅	✅	✅	✅	✅	✅	✅	✅	✅	✅	✓	✓
9	Plug Load Controls	✅	✅	✅	✅	✅	✅	✅	✅	✅	✅	✅	✅	✅	✅	✅	✅	✅	✅
10	Refrigeration Controls	✅	✅	✅	✅	✅	✅	✅	✅	✅	✅	✅	✅	✅	✅	✅			
11	Retro-Commissioning	✅				✅	✅		✅			✅				✅	✅		
12	Combined Heating & Power	✓	✅																
13	Make-Up Air Unit Replacement			✓				✅		✅									
14	Destratification Fans	✅	✅	✅	✅	✅	✅	✅	✅										
15	Common Area HVAC Upgrades	✓																	
16	VHSN Central Hub Upgrades	✓																	
17	Winslow HVAC Upgrades - Phase 2A												✓						
18	High Efficiency Transformers with Harmonic Mitigation	✓	✓	✅		✅	✓	✓	✓	✓	✓	✓							
19	Domestic Water Heater Conversion to Natural Gas						✓		✓		✓								
20	Boiler Replacement																✅		
21	Unit Ventilator Replacement						✓		✓										
22	Chiller Replacement											✓							
23	HVAC Armor	✅	✅	✅	✅	✅		✅			✅		✅	✅		✓	✅		
24	Window Film	✅	✅	✅	✓	✅	✓	✅	✓	✅	✅	✅	✅	✅	✓	✅	✓		
25	Field Lighting Replacement		✓														✓		
26	PC Power Management	✅	✅	✅	✅	✅	✅	✅	✅	✅	✅	✅	✅		✅	✅	✅		✅

ECM Breakdown by Cost & Savings

Vineland Public Schools		INSTALLED COST	ANNUAL ELECTRIC COST SAVINGS	ANNUAL NATURAL GAS COST SAVINGS
ECM #	ENERGY CONSERVATION MEASURE	$	$	$
1	LED Lighting Tube Retrofit	$3,097,865	$463,778	($3,491)
3	LED Lighting Flat Panel Replacement	$244,836	$81,590	($2,933)
4	Lighting Controls	$441,727	$28,448	($294)
5	Energy Management System Upgrades	$729,420	$7,546	$8,435
6	Energy Management System Replacement	$2,029,332	$11,342	$11,328
7	Pipe and Valve Insulation	$102,612	$7,813	$34,582
8	Building Envelope Weatherization	$586,400	$49,513	$32,538
9	Plug Load Controls	$486,000	$36,885	$0
10	Refrigeration Controls	$278,915	$30,323	$0
11	Retro-Commissioning	$309,600	$40,954	$5,106
12	Combined Heating & Power	$208,026	$2,685	($1,214)
13	Make-Up Air Unit Replacement	$3,584,716	$13,653	$0
14	Destratification Fans	$174,400	$18,452	$14,333
18	High Efficiency Transformers with Harmonic Mitigation	$350,000	$34,582	$0
20	Boiler Replacement	$1,450,000	$1,947	$4,814
23	HVAC Armor	$366,872	$48,441	$0
24	Window Film	$537,072	$115,913	($33,793)
26	PC Power Management	$24,531	$7,658	$0
	TOTALS	$15,002,324	$1,001,523	$69,411

Vineland Public Schools		ANNUAL ENERGY COST SAVINGS	ANNUAL O&M COST SAVINGS	TOTAL ANNUAL COST SAVINGS
ECM #	ENERGY CONSERVATION MEASURE	$	$	$
1	LED Lighting Tube Retrofit	$460,287	$58,065	$518,352
3	LED Lighting Flat Panel Replacement	$78,656	$2,597	$81,253
4	Lighting Controls	$28,154	$0	$28,154
5	Energy Management System Upgrades	$15,981	$37,541	$53,522
6	Energy Management System Replacement	$22,670	$33,983	$56,653
7	Pipe and Valve Insulation	$42,395	$0	$42,395
8	Building Envelope Weatherization	$82,051	$0	$82,051
9	Plug Load Controls	$36,885	$0	$36,885
10	Refrigeration Controls	$30,323	$0	$30,323
11	Retro-Commissioning	$46,060	$9,676	$55,736
12	Combined Heating & Power	$1,471	$0	$1,471
13	Make-Up Air Unit Replacement	$13,653	$6,365	$20,018
14	Destratification Fans	$32,785	$0	$32,785
18	High Efficiency Transformers with Harmonic Mitigation	$34,582	$1,009	$35,591
20	Boiler Replacement	$6,762	$0	$6,762
23	HVAC Armor	$48,441	$0	$48,441
24	Window Film	$82,121	$0	$82,121
26	PC Power Management	$7,658	$0	$7,658
	TOTALS	$1,070,933	$149,237	$1,220,171

DCO ENERGY

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Vineland Public Schools		ELECTRIC CONSUMPTION SAVINGS	ELECTRIC DEMAND SAVINGS	NATURAL GAS SAVINGS
ECM #	ENERGY CONSERVATION MEASURE	kWh	kW	THERMS
1	LED Lighting Tube Retrofit	2,753,483	649	(2,110)
3	LED Lighting Flat Panel Replacement	498,765	109	(1,718)
4	Lighting Controls	166,662	46	(179)
5	Energy Management System Upgrades	49,630	0	4,960
6	Energy Management System Replacement	86,093	0	6,859
7	Pipe and Valve Insulation	61,346	0	20,635
8	Building Envelope Weatherization	279,004	94	19,686
9	Plug Load Controls	264,375	0	0
10	Refrigeration Controls	208,142	0	0
11	Retro-Commissioning	308,809	0	3,069
12	Combined Heating & Power	17,028	4	(710)
13	Make-Up Air Unit Replacement	98,368	5	0
14	Destratification Fans	127,623	0	8,822
18	High Efficiency Transformers with Harmonic Mitigation	214,098	0	0
20	Boiler Replacement	12,012	2	2,813
23	HVAC Armor	163,912	218	0
24	Window Film	596,789	276	(20,195)
26	PC Power Management	57,942	0	0
	TOTALS	5,964,082	1,403	41,932

Vineland Public Schools		TOTAL SITE ENERGY SAVINGS	TOTAL SOURCE ENERGY SAVINGS
ECM #	ENERGY CONSERVATION MEASURE	MMBTU	MMBTU
1	LED Lighting Tube Retrofit	9,184	26,084
3	LED Lighting Flat Panel Replacement	1,530	4,585
4	Lighting Controls	551	1,573
5	Energy Management System Upgrades	665	995
6	Energy Management System Replacement	980	1,543
7	Pipe and Valve Insulation	2,273	2,753
8	Building Envelope Weatherization	2,921	4,733
9	Plug Load Controls	902	2,526
10	Refrigeration Controls	710	1,989
11	Retro-Commissioning	1,361	3,272
12	Combined Heating & Power	-13	88
13	Make-Up Air Unit Replacement	336	940
14	Destratification Fans	1,318	2,146
18	High Efficiency Transformers with Harmonic Mitigation	731	2,045
20	Boiler Replacement	322	410
23	HVAC Armor	559	1,566
24	Window Film	17	3,581
26	PC Power Management	198	554
	TOTALS	24,542.6	61,381.3

ECM Breakdown by Greenhouse Gas Reduction

Vineland Public Schools		Reduction of CO_2	Reduction of NO_x	Reduction of SO_2	Reduction of Hg
ECM #	ENERGY CONSERVATION MEASURE	LBS	LBS	LBS	LBS
1	LED Lighting Tube Retrofit	3,758,602	3,037	2,698	3,028.8
3	LED Lighting Flat Panel Replacement	665,204	538	489	548.6
4	Lighting Controls	226,896	183	163	183.3
5	Energy Management System Upgrades	126,225	101	49	54.6
6	Energy Management System Replacement	198,540	159	84	94.7
7	Pipe and Valve Insulation	325,716	258	60	67.5
8	Building Envelope Weatherization	613,676	491	273	306.9
9	Plug Load Controls	363,252	293	259	290.8
10	Refrigeration Controls	285,986	231	204	229.0
11	Retro-Commissioning	460,208	371	303	339.7
12	Combined Heating & Power	13,699	8	11	0.0
13	Make-Up Air Unit Replacement	135,158	109	96	108.2
14	Destratification Fans	278,570	223	125	140.4
18	High Efficiency Transformers with Harmonic Mitigation	294,170	238	210	235.5
20	Boiler Replacement	49,416	39	12	13.2
23	HVAC Armor	225,215	182	161	180.3
24	Window Film	583,707	477	585	656.5
26	PC Power Management	79,612	64	57	63.7
	TOTALS	8,683,851.1	7,001.1	5,839.5	6,541.8

Note: Factors used to calculate Greenhouse Gas Reductions are as follows.

	UTILITIES			
	ELECTRIC	NATURAL GAS	OTHER ENERGY #2	OTHER ENERGY #3
UNITS	kW & kWh	Therms	Solar PPA (kWh)	Water & Sewer (Gal)
BTU MULTIPLIER	3,412	100,000	3,412	0
CO2 EMISSION FACTOR (LB CO2/UNIT FUEL)	1.10	11.70	0.00	0.00
SITE-SOURCE MULTIPLIER	2.80	1.05	1.00	0.00

- ***NOx = (0.00095*kWh Savings) + (0.0092*Therm Savings)***
- ***SO2 = (0.00221*kWh Savings)***
- ***Hg = (0.00465*kWh Savings)***

See Combined Heat and Power ECM for emission calculation per NJ BPU Protocols.

ECM Breakdown by Building

Please see Appendix F for ECM Breakdown by Building.

ECM Budgeting Narrative

Detailed plans, schematics and specifications for Vineland Public School District were not available to deliver a cost estimate for each ECM. The budgetary costs carried out in the project are based on good faith estimates, contractor supplied budgets for similar ECMs on other recent projects and a database of actual installed costs for various ECMs.

Vineland Public Schools		
ECM #	**ENERGY CONSERVATION MEASURE**	**INSTALLED COST**
1	LED Lighting Tube Retrofit	$3,097,865
3	LED Lighting Flat Panel Replacement	$244,836
4	Lighting Controls	$441,727
5	Energy Management System Upgrades	$729,420
6	Energy Management System Replacement	$2,029,332
7	Pipe and Valve Insulation	$102,612
8	Building Envelope Weatherization	$586,400
9	Plug Load Controls	$486,000
10	Refrigeration Controls	$278,915
11	Retro-Commissioning	$309,600
12	Combined Heating & Power	$208,026
13	Make-Up Air Unit Replacement	$3,584,716
14	Destratification Fans	$174,400
18	High Efficiency Transformers with Harmonic Mitigation	$350,000
20	Boiler Replacement	$1,450,000
23	HVAC Armor	$366,872
24	Window Film	$537,072
26	PC Power Management	$24,531

Prescriptive Rebate

As part of the Energy Savings Plan for Vineland Public School District, prescriptive rebates through South Jersey Gas were investigated. The estimated incentive amount is listed below. Upon final selection of the project scope and award of subcontractor bids, the incentive applications will be filed.

Incentive Calculations

BUILDING/FACILITY	ENERGY CONSERVATION MEASURE	Estimated Incentive $
Gloria M. Sabater Elementary School	Make-Up Air Unit Replacement	$12,000
Petway Elementary School	Make-Up Air Unit Replacement	$8,700
Landis Administrative Building	Boiler Replacement	$12,000

All estimated incentive values for the Vineland Public School District ESIP project were calculated using South Jersey Gas prescriptive rebates. The total incentive amount was calculated to be $32,700

No implied and/or written guarantee is made regarding the receipt of incentives. All incentives estimates carry inherent risks that may jeopardize the receipt of them. Therefore, Vineland Public School District acknowledges and accepts that any project proposed should not rely on the receipt of incentives as a reason to implement it.

Combined Heat & Power

One of the goals of the State of New Jersey is to enhance energy efficiency through on-site power generation with recovery and productive use of waste heat, and to reduce existing and new demands to the electric power grid. The Board of Public Utilities seeks to accomplish this goal by providing generous financial incentives for Combined Heat & Power (CHP) and Fuel Cell (FC) installations.

Eligible CHP or Waste Heat to Power (WHP) projects must achieve an annual system efficiency of at least 60% (Higher Heating Value - HHV), based on total energy input and total utilized energy output. Mechanical energy may be included in the efficiency evaluation.

In order to qualify for incentives, systems must operate a minimum of 5,000 full-load equivalent hours per year (i.e. run at least 5,000 hours per year at full rated kW output). The Office of Clean Energy (OCE) may grant exceptions to this minimum operating hours requirement for Critical Facilities, provided the proposed system operates a minimum of 3,500 full-load equivalent hours per year and is equipped with blackstart and islanding capability. For this program, a Critical Facility is defined as any:

(a) public facility, including any federal, state, county, or municipal facility,

(b) non-profit and/or private facility, including any hospital, police station, fire station, water/wastewater treatment facility, school, multifamily building, or similar facility that:

(A) is determined to be either Tier 1 or critical infrastructure by the New Jersey Office of Emergency Management or the State Office of Homeland Security and Preparedness or

(B) could serve as a Shelter during a power outage. A Shelter is a facility able to provide food, sleeping arrangements, and other amenities to its residents and the community.

The CHP, FC, or WHP system must have a ten (10) year all-inclusive warranty. The warranty must cover the major components of the system eligible for the incentive, to protect against breakdown or degradation in electrical output of more than ten percent from the originally rated electrical output. The warranty shall cover the full cost of repair or replacement of defective components or systems, including coverage for labor costs to remove and reinstall defective components or systems. In the event the system warranty does not meet program requirements, customer must purchase an extended warranty or a ten (10) year maintenance/service contract. The cost of the ten (10) year warranty or service contract may be considered as part of the cost of the project. Notwithstanding the foregoing, public entities that are prohibited from entering into agreements for the full ten (10) years may comply with the 10-year requirement by:

(a) providing an agreement for the longest lawful term,

(b) committing the entity to purchase an agreement for the remaining years, and
(c) either:
(i) providing the vendor's commitment for specific pricing for those remaining years, or
(ii) assuming the pricing for the remaining years will increase by 2.5% each year

Incentive Structure:

Eligible Technologies	Size (Installed Rated Capacity)	Incentive ($/kW)	% of Total Cost Cap per project[3]	$ Cap per project[3]
Powered by non-renewable or renewable fuel source, or combination[4]: Gas Internal Combustion Engine; Gas Combustion Turbine; Microturbine; Fuel Cells with Heat Recovery (FCHR)	≤500 kW	$2,000	30-40%[2]	$2 million
	>500 kW - 1 MW	$1,000		
	> 1 MW - 3 MW	$550	30%	$3 million
	>3 MW	$350		
Fuel Cell without Heat Recover (FCwoHR)	Same as above(1)	Applicable amount above	30%	$1 million
Waste Heat to Power	≤ 1MW	$1,000	30%	$2 million
	> 1MW	$500		$3 million

Footnotes:

(1) Incentives are tiered, which means the incentive levels vary based upon the installed rated capacity, as listed in the chart above. For example, a 4 MW CHP system would receive $2.00/watt for the first 500 kW, $1.00/watt for the second 500 kW, $0.55/watt for the next 2 MW and $0.35/watt for the last 1 MW (up to the caps listed).

(2) The maximum incentive will be limited to 30% of total project. For CHP-FC projects up to 1 MW, this cap will be increased to 40% where a cooling application is used or included with the CHP system (e.g. absorption chiller).

(3) Projects will be eligible for incentives shown above, not to exceed the lesser of % of total project cost per project cap or maximum $ per project cap. Projects installing CHP or FC with WHP will be eligible for incentive shown above, not to exceed the lesser caps of the CHP or FC incentive. Minimum efficiency will be calculated based on annual total electricity generated, utilized waste heat at the host site (i.e. not lost/rejected), and energy input.

(4) Systems fueled by a Class 1 Renewable Fuel Source, as defined by N.J.A.C. 14:8-2.5, are eligible for a 30% incentive bonus. If the fuel is mixed, the bonus will be prorated accordingly. For example, if the mix is 60/40 (60% being a Class 1 renewable), the bonus will be 18%. This bonus will be included in the final performance incentive payment, based on system performance and fuel mix consumption data. Total incentive, inclusive of bonus, shall not exceed above stipulated caps.

(5) CHP or FC systems located at Critical Facility and incorporating blackstart and islanding technology are eligible for a 25% incentive bonus. This bonus incentive will be paid with the second/Installation incentive payment. Total incentive, inclusive of bonus, shall not exceed above stipulated caps.

Incentive Payment Schedule

The total incentive is divided into three partial payments. Each stage of payment requires additional documentation and/or has conditions that must be met. At approval, the maximum incentive partial payment amounts are calculated by multiplying the total incentive by the ratios listed in the following table.

Purchase	Installation	Acceptance of 12 months post-installation performance data
30%	50%	20%

(e.g., for the purpose of calculating a payback period)

ECM 1,3, & 4– LED Lighting Tube Retrofit, LED Lighting Flat Panel Replacement, & Lighting Controls

Vineland Public Schools ECM Matrix

✓	ECM was evaluated
✓ (included)	ECM evaluated & included in the project

ECM #	ECM DESCRIPTION	Vineland High School North	Vineland High School South	Thomas Wallace Middle School	SGT Dominick Pilla Middle Schoool	Veterans Memorial Intermediate School	Anthony Rossi Intermediate School	Gloria M. Sabater Elementary School	D'Ippolito Elementary School	Petway Elementary School	Dr. William Mennies Elementary School	Johnstone Elementary School	Dr. John H. Winslow Elementary School	Marie Durand Elementary School	Dane Barse Elementary School	Cunningham School	Landis Administrative Building	Maintenance/Transportation Building	Central Warehouse
1	LED Lighting Tube Retrofit	✓ (included)	✓ (included)	✓ (included)	✓ (included)	✓ (included)	✓ (included)	✓ (included)	✓ (included)	✓ (included)	✓	✓ (included)	✓	✓		✓ (included)	✓ (included)	✓ (included)	✓ (included)
3	LED Lighting Flat Panel Replacement	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓ (included)	✓	✓ (included)	✓ (included)	✓ (included)	✓	✓	✓	✓
4	Lighting Controls	✓ (included)	✓ (included)	✓ (included)		✓ (included)	✓ (included)	✓ (included)	✓ (included)			✓ (included)	✓ (included)			✓ (included)	✓ (included)	✓ (included)	

Lighting upgrades can greatly reduce energy consumption and lower energy bills, while maintaining lighting levels and quality by upgrading lighting components to more efficient and advanced technologies. Upgrading technologies can also offer employees greater control over lighting, allowing for additional energy savings.

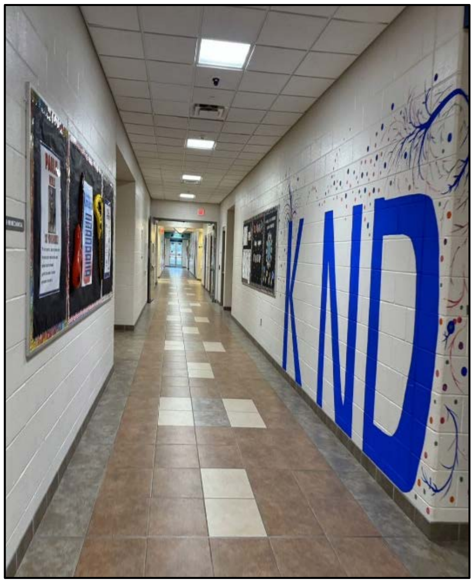
Improvements in lighting technologies have led to increased lifetimes for components that will result in fewer failures and lengthen the time between maintenance activities.

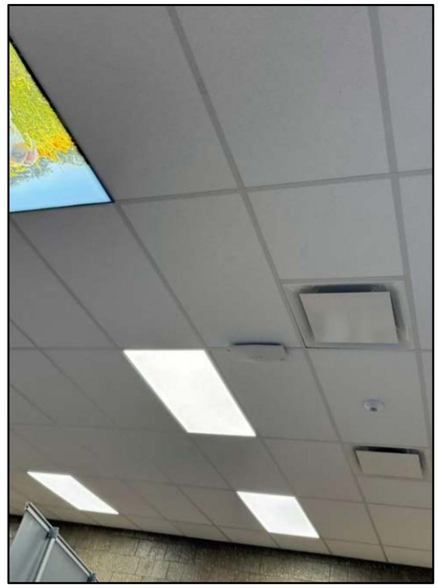
The implementation of a routine maintenance program in addition to the lighting retrofit will greatly simplify the maintenance practices and reduce the operational costs.

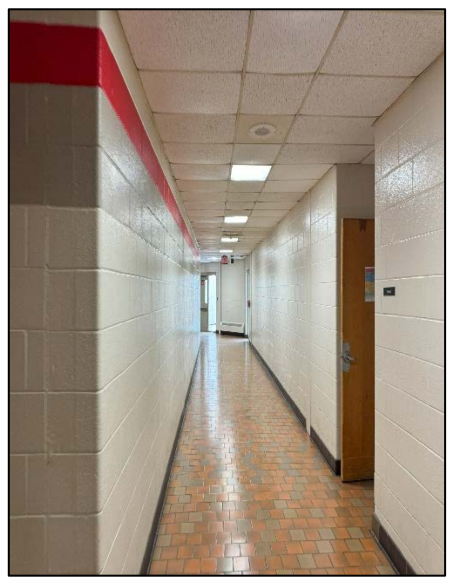
Lighting controls can save energy and reduce peak demand in offices and other facilities. Controls save money while providing the user convenience and an improved lighting environment. There are several different kinds of controls. The choice of control type should be based on lighting usage patterns and the type of space served.

Areas with intermittent occupancy are well-suited to occupancy sensors. In large, open office areas with many occupants, scheduled switching ("time scheduling") is often an effective energy-saving strategy. In daylight offices, properly adjusted daylight sensors with dimming ballasts make sense. Because some workers prefer lower lighting levels, bi-level manual switching is another option. Advanced lighting controls can be used for demand limiting to allow building managers to reduce lighting loads when electricity demand costs are high.

Existing Conditions







Scope of Work – LED Lighting Tube Retrofit & LED Lighting Flat Panel Replacement

Retrofit or replace existing interior and exterior fixtures with LED bulbs/fixtures as proposed in the line-by-lines provided in Appendix G – Energy Savings Supplemental Information. The new LED tube retrofits do not require the existing fluorescent ballasts to operate (Type B retrofit). The existing ballasts across the district will be removed during this implementation.

Scope of Work – Lighting Controls

Add vacancy sensors to existing spaces to control LED tubes. Refer to appendix G for additional details.

ECM Calculations

BPU Protocols were used to calculate LED lighting retrofit and control savings. A coincidence factor is applied to estimate peak demand savings. The impact on the HVAC systems is captured as well. See Appendix G for Lighting Line-by-Lines.

*Note: Full interior LED lighting upgrades were recently completed at Dane Barse ES, Dr. William Mennies ES, and Marie Durand ES, savings are being claimed for those upgrades and only exterior lighting upgrades are included in the project. Partial interior LED lighting upgrades were recently completed at Dr. John H. Winslow ES, those savings are included in the project.

LED Lighting Tube Retrofit Savings

BUILDING	SPACE	kW_b	LPD_b	kW_q	LPD_q	ΔkW	CF	Hours per Year	$HVAC_d$	$HVAC_e$	$HVAC_g$	Peak Demand Savings (kW)	Replacement Energy Savings (kWh)	Replacement Fuel Savings (THERMS)
Vineland High School North	INTERIOR	192.3	0.84	74.1	0.32	118.2	0.50	2575	0.44	0.10	-0.000230	85.13	334,923.30	(700.29)
	EXTERIOR	17.1	0.07	5.3	-	11.8	0.00	4380				-	51,473.76	-
Vineland High School South	INTERIOR	201.6	0.87	76.2	0.33	125.4	0.50	2575	0.44	-0.04		90.27	309,915.88	-
	EXTERIOR	18.1	0.08	4.8	-	13.3	0.00	4380				-	58,297.80	-
Thomas Wallace Middle School	INTERIOR	145.4	1.22	51.7	0.43	93.7	0.50	2575	0.44	-0.04		67.45	231,586.85	-
	EXTERIOR	40.0	0.33	11.9	-	28.1	0.00	4380				-	123,042.96	-
SGT Dominick Pilla Middle Schoool	INTERIOR	102.7	1.04	37.5	0.38	65.2	0.50	2575	0.44	-0.04		46.95	161,199.12	-
Veterans Memorial Intermediate School	INTERIOR	147.1	1.30	48.9	0.43	98.2	0.50	2575	0.44	0.10	-0.000230	70.68	278,038.20	(581.35)
	EXTERIOR	14.0	0.12	4.1	-	10.0	0.00	4380				-	43,672.98	-
Anthony Rossi Intermediate School	INTERIOR	83.9	1.10	31.2	0.41	52.6	0.50	2575	0.44	-0.04		37.90	130,132.26	-
	EXTERIOR	4.1	0.05	1.0	-	3.1	0.00	4380				-	13,591.14	-
Gloria M. Sabater Elementary School	INTERIOR	202.0	1.43	64.1	0.45	137.9	0.50	2575	0.44	-0.04		99.30	340,941.95	-
	EXTERIOR	22.2	-	6.9	-	15.3	0.00	4380				-	67,193.58	-
D'Ippolito Elementary School	INTERIOR	91.262	1.2030319	33.1115	0.43648168	58.1505	0.50	2575	0.44	-0.04		41.87	143,748.04	-
	EXTERIOR	4.73	-	0.995	-	3.735	0.00	4380				-	16,359.30	-
Petway Elementary School	INTERIOR	71.532	0.96274563	26.02	0.35020188	45.512	0.50	2575	0.44	-0.04		32.77	112,505.66	-
	EXTERIOR	6.296	-	2.074	-	4.222	0.00	4380				-	18,492.36	-
Johnstone Elementary School	INTERIOR	61.123	0.95669119	22.993	0.35988418	38.13	0.50	2575	0.44	-0.04		27.45	94,257.36	-
	EXTERIOR	4.934	-	1.738	-	3.196	0.00	4380				-	13,998.48	-
Cunningham School	INTERIOR	31.322	0.86037632	11.639	0.31970883	19.683	0.50	2575	0.44	-0.04		14.17	48,656.38	-
	EXTERIOR	2.949	-	0.795	-	2.154	0.00	4380				-	9,434.52	-
Landis Administrative Building	INTERIOR	36.43	0.39460572	13.2935	0.14399372	23.1365	0.50	2575	0.44	0.10	-0.000230	16.66	65,534.14	(137.03)
	EXTERIOR	5.017	-	1.415	-	3.602	0.00	4380				-	15,776.76	-
Maintenance/Transportation Building	INTERIOR	19.42	0.88128517	7.189	0.32623888	12.231	0.50	2575	0.44	0.10	-0.001075	8.81	34,644.31	(338.57)
Central Warehouse	INTERIOR	20.294	0.88234783	7.561	0.32873913	12.733	0.50	2575	0.44	0.10	-0.001075	9.17	36,066.22	(352.47)

LED Lighting Flat Panel Replacement Savings

BUILDING	SPACE	kW_b	LPD_b	kW_q	LPD_q	ΔkW	CF	Hours per Year	$HVAC_d$	$HVAC_e$	$HVAC_g$	Peak Demand Savings (kW)	Replacement Energy Savings (kWh)	Replacement Fuel Savings (MMBTU)
Dr. William Mennies Elementary School	INTERIOR	67.057	0.93463141	20.063	0.27963539	46.994	0.50	2575	0.44	0.10	-0.000230	33.84	133,110.51	(278.32)
	EXTERIOR	10.672	-	2.7	-	7.972	0.00	4380	0	0.00	0	-	34,917.36	-
Dr. John H. Winslow Elementary School	INTERIOR	52.756	0.91914212	23.5145	0.40968169	29.2415	0.50	2575	0.44	0.10	-0.000230	21.05	82,826.55	(173.18)
	EXTERIOR	7.027	-	1.63	-	5.397	0.00	4380	0	0	0	-	23,638.86	-
Marie Durand Elementary School	INTERIOR	54.726	1.18562329	16.958	0.36739027	37.768	0.50	2575	0.44	0.10	-0.000230	27.19	106,977.86	(223.68)
	EXTERIOR	3.19	-	0.77	-	2.42	0.00	4380	0	0	0	-	10,599.60	-
Dane Barse Elementary School	INTERIOR	54.636	1.36487634	16.968	0.42388209	37.668	0.50	2575	0.44	0.10	-0.001075	27.12	106,694.61	(1,042.70)

Lighting Control Savings												
BUILDING	CF	Hours per Year	HVACd	HVACe	HVACg	kWc (Lighting Controls)	SVG	Lighting Control Demand Savings (kW)	Lighting Control Electric Savings (kWh)	Lighting Control Fuel Savings (MMBTU)	Heating Type	Lighting Control Heating Savings (Therms)
Vineland High School North	0.50	2,575.00	0.44	0.10	(0.00023)	44.70	0.31	8.98	35,324.56	(7.39)	Natural Gas	(73.86)
Vineland High School South	0.50	2,575.00	0.44	(0.04)	-	37.26	0.31	7.48	25,696.74	-	Electric	-
Thomas Wallace Middle School	0.50	2,575.00	0.44	(0.04)	-	27.74	0.31	5.57	19,131.60	-	Electric	-
Veterans Memorial Intermediate School	0.50	2,575.00	0.44	0.10	(0.00023)	28.90	0.31	5.80	22,835.57	(4.77)	Natural Gas	(47.75)
Anthony Rossi Intermediate School	0.50	2,575.00	0.44	(0.04)	-	18.81	0.31	3.78	12,972.69	-	Electric	-
Gloria M. Sabater Elementary School	0.50	2,575.00	0.44	(0.04)	-	8.13	0.31	1.63	5,609.58	-	Electric	-
D'Ippolito Elementary School	0.50	2,575.00	0.44	(0.04)	-	20.23	0.31	4.06	13,952.04	-	Electric	-
Johnstone Elementary School	0.50	2,575.00	0.44	(0.04)	-	14.91	0.31	3.00	10,283.94	-	Electric	-
Dr. John H. Winslow Elementary School	0.50	2,575.00	0.44	0.10	(0.00023)	10.98	0.31	2.21	8,677.14	(1.81)	Natural Gas	(18.14)
Cunningham School	0.50	2,575.00	0.44	(0.04)	-	7.23	0.31	1.45	4,983.69	-	Electric	-
Landis Administrative Building	0.50	2,575.00	0.44	0.10	(0.00023)	6.76	0.31	1.36	5,341.42	(1.12)	Natural Gas	(11.17)
Maintenance/Transportation Building	0.50	2,575.00	0.44	0.10	(0.00108)	4.04	0.31	0.81	3,191.89	(3.12)	Natural Gas	(31.19)

Algorithms

$$\text{DkW} = (\#\,of\ replaced\ fixtures) * (Watts_b) - (\#\,of\ fixtures\ installed) * (Watts_q) = (LPD_b - LPD_q) * (\text{SF})$$

$$\text{Energy Savings}\left(\frac{\text{kWh}}{\text{yr}}\right) = (\Delta\text{kW}) * (\text{Hrs}) * (1 + HVAC_e)$$

$$\text{Peak Demand Savings (kW)} = (\Delta\text{kW}) * (\text{CF}) * (1 + HVAC_d)$$

$$\text{Fuel Savings}\left(\frac{\text{MMBtu}}{\text{yr}}\right) = (\Delta\text{kW}) * (\text{Hrs}) * (\text{HVAC}_g)$$

Definition of Variables

ΔkW = Change in connected load from baseline to efficient lighting
$Watts_{b,q}$ = Wattage of existing baseline and qualifying equipment
LPD_b = Baseline lighting power density in Watt per square foot of space floor area
LPD_q = Lighting power density of qualified fixtures, equal to the sum of installed fixture wattage divided by floor area of the space where the fixtures are installed.
SF = Space floor area, in square feet
CF = Coincidence factor
Hrs = Annual operating hours
$HVAC_d$ = HVAC Interactive Factor for peak demand savings
$HVAC_e$ = HVAC Interactive Factor for annual energy savings
$HVAC_g$ = HVAC Interactive Factor for annual energy savings

Summary of Inputs

Lighting Verification Performance Lighting

Component	Type	Value	Source
$Watts_{b,q}$	Variable	See NGrid Fixture Wattage Table Fixture counts and types, space type, floor area from customer application.	1
SF	Variable	From Customer Application	Application
CF	Fixed	See Table by Building Type	4
Hrs	Fixed	See Table by Building Type	4
$HVAC_d$	Fixed	See Table by Building Type	3, 5
$HVAC_e$	Fixed	See Table by Building Type	3, 5
$HVAC_g$	Fixed	See Table by Building Type	6
LPD_b	Variable	Lighting Power Density for, W/SF	2
LPD_q	Variable	Lighting Power Density, W/SF	Application

Hours of Operation and Coincidence Factor by Building Type

Building Type	Sector	CF	Hours
Grocery	Large Commercial/Industrial & Small Commercial	0.96	7,134
Medical - Clinic	Large Commercial/Industrial & Small Commercial	0.8	3,909
Medical - Hospital	Large Commercial/Industrial & Small Commercial	0.8	8,760[54]
Office	Large Commercial/Industrial	0.7	2,969
	Small Commercial	0.67	2,950
Other	Large Commercial/Industrial & Small Commercial	0.66	4,573
Retail	Large Commercial/Industrial	0.96	4,920
	Small Commercial	0.86	4,926
School	Large Commercial/Industrial & Small Commercial	0.50	2,575
Warehouse/ Industrial	Large Commercial/Industrial	0.7	4,116
	Small Commercial	0.68	3,799

- Typical exterior lighting fixtures should be modeled as lit twelve (12) hours per day on average.

Building Type	Sector	CF	Hours
Multifamily – Common Areas[55]	Multifamily	0.86	5,950
Multifamily – In-Unit[36]	Multifamily	0.59	679
Multifamily – Exterior[36]	Multifamily	0.00	3,338

HVAC Interactive Effects

Building Type	Demand Waste Heat Factor ($HVAC_d$)		Annual Energy Waste Heat Factor by Cooling/Heating Type ($HVAC_e$)			
	AC (Utility)	AC (PJM)	AC/ NonElec	AC/ ElecRes	Heat Pump	NoAC/ ElecRes
Office	0.35	0.32	0.10	-0.15	-0.06	-0.25
Retail	0.27	0.26	0.06	-0.17	-0.05	-0.23
Education	0.44	0.44	0.10	-0.19	-0.04	-0.29
Warehouse	0.22	0.23	0.02	-0.25	-0.11	-0.27
Other[56]	0.34	0.32	0.08	-0.18	-0.07	-0.26

Interactive Factor (HVACg) for Annual Fuel Savings

Project Type	Fuel Type	Impact (MMBtu/ΔkWh)
Large Retrofit (> 200 kW)	C&I Gas Heat	-0.00023
Large Retrofit (> 200 kW)	Oil	-0.00046
Small Retrofit (≤ 200 kW)	Gas Heat	-0.001075
Small Retrofit (> 200 kW)	Oil Heat	-0.000120

Sources

1. Device Codes and Rated Lighting System Wattage Table Retrofit Program, National Grid, January 13, 2015. https://www1.nationalgridus.com/files/AddedPDF/POA/RILightingRetrofit1.pdf

Lighting Controls

Lighting controls include occupancy sensors, daylight dimmer systems, and occupancy controlled hi-low controls for fluorescent, LED and HID fixtures. The measurement of energy savings is based on algorithms with key variables (i.e., coincidence factor, equivalent full load hours) provided through existing end-use metering of a sample of facilities or from other utility programs with experience with these measures (i.e., % of annual lighting energy saved by lighting control). For lighting controls, the baseline is a manual switch, based on the findings of the New Jersey Commercial Energy Efficient Construction Baseline Study.

Algorithms

$$\text{Energy Savings } \left(\frac{\text{kWh}}{\text{yr}}\right) = \text{kW}_c * \text{SVG} * \text{Hrs} * (1 + HVAC_e)$$

$$\text{Peak Demand Savings (kW)} = \text{kW}_c * \text{SVG} * \text{CF} * (1 + HVAC_d)$$

$$\text{Fuel Savings } \left(\frac{\text{MMBtu}}{\text{yr}}\right) = \text{kW}_c * \text{SVG} * (\text{Hrs}) * (\text{HVAC}_g)$$

Definition of Variables

SVG	= % of annual lighting energy saved by lighting control; refer to table by control type
kW_c	= kW lighting load connected to control
$HVAC_d$	= Interactive Factor – This applies to C&I interior lighting only. This represents the secondary demand in reduced HVAC consumption resulting from decreased indoor lighting wattage.
$HVAC_e$	= Interactive Factor – This applies to C&I interior lighting only. This represents the secondary energy savings in reduced HVAC consumption resulting from decreased indoor lighting wattage.
$HVAC_g$	= Interactive Factor – This applies to C&I interior lighting only. This represents the secondary energy savings in reduced HVAC consumption resulting from decreased indoor lighting wattage.
CF	= Coincidence factor
Hrs	= Annual hours of operation prior to installation of controls

Summary of Inputs

Lighting Controls

Component	Type	Value	Source
kW_c	Variable	Load connected to control	Application
SVG	Fixed	Occupancy Sensor, Controlled Hi-Low Fluorescent Control, LED and controlled HID = 31% Daylight Dimmer System= 40%	4, 5, 6
CF	Fixed	See Table by Building in Performance Lighting Section Above	1
Hrs	Fixed	See Table by Building in Performance Lighting Section Above	1
$HVAC_d$	Fixed	See Table by Building Type in Performance Lighting Section Above	2
$HVAC_e$	Fixed	See Table by Building Type in Performance Lighting Table Above	2
$HVAC_g$	Fixed	See Table by Building Type in Performance Lighting Table Above	3

ECM 5 & 6 – Energy Management System Upgrades & Energy Management System Replacement

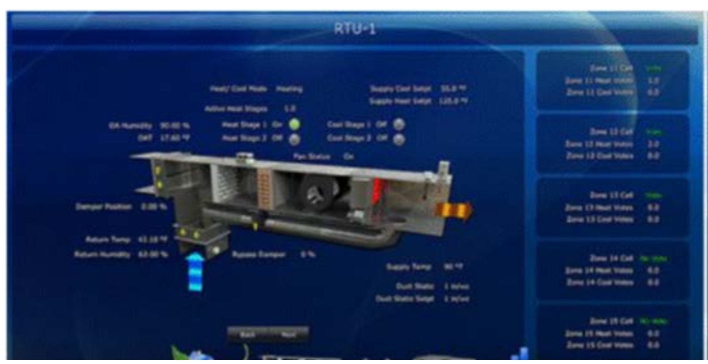
Vineland Public Schools ECM Matrix

✓	ECM was evaluated
✓ (green)	ECM evaluated & included in the project

ECM #	ECM DESCRIPTION	Vineland High School North	Vineland High School South	Thomas Wallace Middle School	SGT Dominick Pilla Middle Schoool	Veterans Memorial Intermediate School	Anthony Rossi Intermediate School	Gloria M. Sabater Elementary School	D'Ippolito Elementary School	Petway Elementary School	Dr. William Mennies Elementary School	Johnstone Elementary School	Dr. John H. Winslow Elementary School	Marie Durand Elementary School	Dane Barse Elementary School	Cunningham School	Landis Administrative Building	Maintenance/Transportation Building	Central Warehouse
5	Energy Management System Upgrades		✓	✓	✓	✓		✓		✓									
6	Energy Management System Replacement	✓					✓		✓			✓	✓		✓		✓		

Energy Management Systems (EMS) are systems comprised of sensors, operators, processors, and a front-end user interface that controls and monitors electrical and mechanical building systems. Such systems provide automated control and monitoring of the heating, cooling, ventilation, lighting and performance of a building or group of buildings. The energy management system will provide Vineland Public School District with continuous monitoring & reporting.

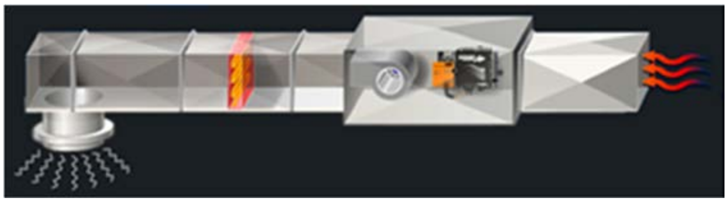
Having building systems monitored from a central location enables the operator to receive alerts and predict future problems or troublesome conditions. The data obtained from this can be used to produce a trend analysis and annual consumption forecasts. Advanced control strategies implemented using these systems such as time scheduling, optimum start and stop, night set-back, and peak demand limiting. The auditor will be able to use the EMS to diagnose current building system problems as well as tailor specific energy savings strategies that utilize the full capability of the given EMS.



Web Based Building Automation Interface

Control strategies will be designed and programmed into the system to maintain building comfort while operating the building mechanical system in the most efficient manner possible. Strategies include:

1. Occupancy Scheduling
2. Building Wide Night Set Back
3. Morning Warm Up
4. Individual Room Temperature Set Point Control
5. Supply Air Temperature Reset
6. Chilled & Heating Supply Water Temperature Resets
7. Economizer Control



Scope of Work

This measure involves upgrading the existing control system with an open-protocol, web-based Energy Management system. A Direct Digital Controller, which leverages current. technology and advanced capabilities for the control of the new HVAC equipment, will tie into the new EMS's architecture. This allows the owner the advantage of having the availability of obtaining replacement and services of the proposed EMS through multiple commercial channels and provides an additional benefit of an Open-Source Building Management System. This distinctive feature prevents the owner from obtaining support from only a single source provider, allowing them instead to obtain support from readily available multiple sources.

The proposed energy management system will be able to vary the operation of the unit, outdoor air damper, space temperature set points, and air conditioning systems (if applicable). This will include zone scheduling, temperature setback and unoccupied outdoor air shut off.

A more specific scope of work includes:

- Building Automation Systems shall be accessible via the Internet.
- Users shall have the ability to view the system graphics, change set points, perform overrides, view schedules, change schedules, view alarms, acknowledge alarms, view trend information as well as print, save & e-mail trend information.
- A Secure Internet Connection to the District Network shall be provided and managed by the District IT Department.
- 3-D Graphics Package will be provided for navigating the Building Automation System as well as viewing floor plans, system graphics and equipment graphics.
- The District Facilities and IT Staff will receive full training on the operation of the system.

Vineland High School North

- Full rip-n-replace of existing Novar controls
- New BACnet MS/TP Comm Link
- New Trane SC+

Vineland High School South

- Upgrade existing Tracer SC to SC+
- Field controls for new CHP
- BACnet MS/TP Comm Link

Thomas Wallace Middle School

- Upgrade existing Tracer Summit BCU to Tracer SC+
  - Integrate (226) downstream devices
  - Device licensing
  - Database migration and associated programming

SGT Dominick Pilla MS

- Connect existing Tracer SC+ to TraneConnect for remote access

Veterans Memorial IS

- Upgrade existing Tracer Summit BCU to Tracer SC+
  - Device licensing for up to (240) devices
  - Integrate existing downstream devices
  - Database migration and associated programming
- Existing Novar Controls
  - Full rip-n-replace of all remaining Novar Controls w/ Trane Controls (boiler/chiller plant, blower coils, OAUs)
- BACnet MS/TP Comm Link to all existing units

Gloria M. Sabater ES

- Upgrade existing Tracer Summit BCU to Tracer SC+
  - Device licensing for up to (180) devices
  - Integrate existing downstream devices
  - Database migration and associated programming
- (5) New Makeup Air Units with Energy Recovery
  - Field installed controllers and duct/zone sensors
  - BACnet MS/TP Comm Link

Petway ES

- Upgrade existing Tracer Summit BCU to Tracer SC+
  - Device licensing for up to (105) devices
  - Integrate existing downstream devices
  - Database migration and associated programming
- (3) New Makeup Air Units with Energy Recovery
  - Field installed controllers and duct/zone sensors
  - BACnet MS/TP Comm Link
- (1) New Makeup Air Units
  - Factory-provided controllers, field install duct/zone sensors
  - BACnet MS/TP Comm Link
- (1) New Kitchen Exhaust Fan
  - Field installed unit controller
- BACnet MS/TP Comm Link to all new units

Anthony Rossi IS

- New Tracer SC+
- (4) New UVs being replaced outside of the ESIP
  - Factory-installed controllers, field installed zone sensors
- Existing Novar Controls
  - Full rip-n-replace of all remaining Novar Controls w/ Trane Controls (UVs, RTUs & CRAC units)
- BACnet MS/TP Comm Link to all units

D'Ippolito

- New Tracer SC+
- (12) New UVs being replaced outside of the ESIP
  - Factory-installed controllers, field installed zone sensors
- Existing Novar Controls
  - Full rip-n-replace of all remaining Novar Controls w/ Trane Controls (UVs, RTUs & CRAC units)
- BACnet MS/TP Comm Link to all units

Johnstone ES

- New Tracer SC+
- Existing Novar Controls
  - Full rip-n-replace of all remaining Novar Controls w/ Trane Controls
    - RTUs, UVs, Duct Furnaces, VAVs, Chiller & Boiler Plant controller
- BACnet MS/TP Comm Link to all existing units

Dane Barse ES

- New Tracer SC+
- Existing Carrier iVue Controls
  - Full rip-n-replace of all remaining Carrier Controls w/ Trane Controls
    - (24) RTUs
    - AHU
    - Associated VAVs
    - EFs
  - BACnet MS/TP Comm Link to all existing units
- Existing Samsung VRF System
  - BACnet MS/TP Communication Link to main VRF controller
  - Integrate to SC+

Landis Administration Building

- New Tracer SC+
- Existing Novar Controls
  - Full rip-n-replace of all remaining Novar Controls w/ Trane Controls
    - Boiler/chiller plants, AHUs, FCUs
- BACnet MS/TP Comm Link to all existing units

ECM Calculations

Energy savings from upgrading the district Energy Management System were calculated using the BPU protocols. The upgraded system will have improved and precise occupied/unoccupied scheduling capabilities programed through user interface at a central computer dashboard. The proposed controls have a heating setpoint of 70F during occupied hours and 65F setpoint during unoccupied hours, and a cooling setpoint of 73F during occupied hours and 78 during unoccupied hours. To be conservative with savings estimates, DCO is claiming savings on 5F setback temperatures during unoccupied hours – typically setbacks greater than 5F are achievable.

*Note: Energy Management System Replacement was evaluated for Dr. John H. Winslow ES, however the District has future plans to overhaul the existing HVAC systems at the school and will include upgrading the EMS in that project.

Energy Management System Savings																
BUILDING	Tier	Proposed Weekly Occupied Heat Hours [H]	Heat Pump Cooling (tons) [CAPhp]	Heat Pump Cooling Efficiency (EER) [EERhp]	RTU Cooling (tons) [CAPrtu]	RTU Cooling Efficiency (EER) [EERrtu]	Chiller Cooling Cap (tons)	Chiller Cooling Efficiency (EER)	RTU Heating (Btu/hr) [CAPrtu]	RTU Heating Efficiency (%) [AFUEh]	Boiler Heating (Btu/hr) [CAPboiler]	Boiler Heating Efficiency (%) [AFUEh]	Heat Pump Heating (tons) [CAPhp]	Heat Pump Heating Efficiency (EER) [EERhp]	ELFHc	ELFHh
Vineland High School North	Tier 1	120.0					300.0	16.5			5,219,639.5	0.81			466.0	901.0
Vineland High School North	Tier 2	120.0	291.7	17.1	49.0	9.3			0.0	0.00			398.1	15.7	466.0	901.0
Vineland High School South	Tier 1	120.0					0.0	0.0			4,126,168.6	0.91			466.0	901.0
Vineland High School South	Tier 2	120.0	378.1	12.1	18.0	10.4			766,000.0	0.72			375.2	14.6	466.0	901.0
Thomas Wallace Middle School	Tier 1	120.0					22.0	10.3			944,886.4	0.82			466.0	901.0
Thomas Wallace Middle School	Tier 2	120.0	227.5	10.9	65.0	9.4			850,000.0	0.69			133.3	12.3	466.0	901.0
SGT Dominick Pilla Middle Schoool	Tier 1	120.0					0.0	0.0			967,866.7	0.88			466.0	901.0
SGT Dominick Pilla Middle Schoool	Tier 2	120.0	127.5	13.2	155.0	12.6			3,480,000.0	0.74			141.7	13.5	466.0	901.0
Veterans Memorial Intermediate School	Tier 1	120.0					500.0	14.1			5,812,418.6	0.84			466.0	901.0
Veterans Memorial Intermediate School	Tier 2	120.0	0.0	0.0	6.0	9.0			250,000.0	0.67			0.0	0.0	466.0	901.0
Anthony Rossi Intermediate School	Tier 2	120.0	232.7	9.7	0.0	0.0			0.0	0.00			152.0	9.0	466.0	901.0
Gloria M. Sabater Elementary School	Tier 1	120.0					0.0	0.0			0.0	0.00			394.0	840.0
Gloria M. Sabater Elementary School	Tier 2	120.0	146.5	10.5	225.0	10.3			2,375,000.0	0.74			131.9	10.4	394.0	840.0
D'Ippolito Elementary School	Tier 2	120.0	153.9	9.1	88.5	9.9			0.0	0.00			152.5	8.8	394.0	840.0
Petway Elementary School	Tier 1	120.0					0.0	0.0			0.0	0.00			394.0	840.0
Petway Elementary School	Tier 2	120.0	245.0	17.5	24.0	13.9			1,450,000.0	0.79			245.0	13.1	394.0	840.0
Johnstone Elementary School	Tier 1	120.0					180.0	12.9			2,916,591.7	0.81			394.0	840.0
Johnstone Elementary School	Tier 2	120.0	76.3	8.6	51.5	8.8			1,500,000.0	0.69			61.0	8.8	394.0	840.0
Dane Barse Elementary School	Tier 1	120.0					0.0	0.0			0.0	0.00			394.0	840.0
Dane Barse Elementary School	Tier 2	120.0	44.0	13.2	124.1	12.7			4,126,061.7	0.79			49.4	12.8	394.0	840.0
Landis Administrative Building	Tier 1	120.0					280.0	12.0			2,927,912.9	0.87			394.0	840.0
Landis Administrative Building	Tier 2	120.0	0.0	0.0	0.0	0.0			0.0	0.00			0.0	0.0	394.0	840.0

Energy Management System Savings															
BUILDING	Tier	Heat Pump Cooling Energy Savings (kWh)	Heat Pump Cooling Demand Savings (kW)	RTU Cooling Energy Savings (kWh)	RTU Cooling Demand Savings (kW)	Chiller Cooling Energy Savings (kWh)	Chiller Cooling Demand Savings (kW)	Heat Pump Heating Energy Savings(kWh)	Heat Pump Heating Demand Savings (kW)	RTU Heating Energy Savings (therms)	Boiler Heating Energy Savings (therms)	Total Electric Savings (kWh)	Total Gas Savings (therms)	Total Electric Savings (kWh)	Total Gas Savings (therms)
Vineland High School North	Tier 1	0	0	0	0	7,809		0	0	0	2,224	7,809	2,224	28,107	2,224
Vineland High School North	Tier 2	7,336	8	2,262	5	0	0	10,700	12	0	0	20,298	0		
Vineland High School South	Tier 1	0	0	0	0	0		0	0	0	1,562	0	1,562	18,598	1,929
Vineland High School South	Tier 2	13,365	15	741	2	0	0	4,492	5	367	0	18,598	367		
Thomas Wallace Middle School	Tier 1	0	0	0	0	915		0	0	0	399	915	399	17,183	826
Thomas Wallace Middle School	Tier 2	8,947	10	2,960	6	0	0	4,361	5	427	0	16,268	427		
SGT Dominick Pilla Middle Schoool	Tier 1	0	0	0	0	0		0	0	0	379	0	379	9,428	1,997
SGT Dominick Pilla Middle Schoool	Tier 2	4,153	5	5,275	11	0	0	0	0	1,619	0	9,428	1,619		
Veterans Memorial Intermediate School	Tier 1	0	0		0			0	0	0	2,385	0	2,385	7,005	2,514
Veterans Memorial Intermediate School	Tier 2	0	0		0	0	0	7,005	8	129	0	7,005	129		
Anthony Rossi Intermediate School	Tier 2	10,262	11	0	0	0	0	4,896	5	0	0	15,157	0	15,157	0
Gloria M. Sabater Elementary School	Tier 1	0	0	0	0	0		0	0	0	0	0	0	19,727	1,031
Gloria M. Sabater Elementary School	Tier 2	5,075	6	7,929	20	0	0	6,722	8	1,031	0	19,727	1,031		
D'Ippolito Elementary School	Tier 2	6,109	7	3,257	8	0	0	7,254	9	0	0	16,620	0	16,620	0
Petway Elementary School	Tier 1	0	0	0	0	0		0	0	0	0	0	0	5,716	589
Petway Elementary School	Tier 2	5,089	6	627	2	0	0	0	0	589	0	5,716	589		
Johnstone Elementary School	Tier 1	0	0	0	0	5,064		0	0	0	1,163	5,064	1,163	10,400	1,866
Johnstone Elementary School	Tier 2	3,218	4	2,118	5	0	0	0	0	703	0	5,336	703		
Dane Barse Elementary School	Tier 1	0	0	0	0	0		0	0	0	0	0	0	7,368	1,680
Dane Barse Elementary School	Tier 2	1,212	1	3,554	9	0	0	2,602	3	1,680	0	7,368	1,680		
Landis Administrative Building	Tier 1	0	0	0	0	8,441		0	0	0	1,088	8,441	1,088	8,441	1,088
Landis Administrative Building	Tier 2	0	0	0	0	0	0	0	0	0	0	0	0		

Occupancy Controlled Thermostat Savings Calculation	
Th (F)	70
Tc (F)	73
Sh (F)	65
Sc (F)	78
H (hrs per week)	Varies
EFLHc (hrs per year)	Varies
EFLHh (hrs per year)	Varies
Ph (%)	3%
Pc (%)	6%

NJ BPU FY 2020 Protocols - Occupancy Controlled Thermostats

Algorithms

Cooling Energy Savings (kWh/yr) = $(((T_c * (H+5) + S_c * (168 - (H+5)))/168) - T_c) * (P_c * Cap_{hp} * 12 * EFLH_c/EER_{hp})$

Heating Energy Savings (kWh/yr) = $(T_h - ((T_h * (H+5) + S_h * (168 - (H+5)))/168)) * (P_h * Cap_{hp} * 12 * EFLH_h/EER_{hp})$

Heating Energy Savings (Therms/yr) = $(T_h - ((T_h * (H+5) + S_h * (168 - (H+5)))/168) * (P_h * Cap_h * EFLH_h/AFUE_h/100{,}000)$

Definition of Variables

T_h = Heating Season Facility Temp. (°F)
T_c = Cooling Season Facility Temp. (°F)
S_h = Heating Season Setback Temp. (°F)
S_c = Cooling Season Setup Temp. (°F)
H = Weekly Occupied Hours
Cap_{hp} = Connected load capacity of heat pump/AC (Tons) – Provided on Application.
Cap_h = Connected heating load capacity (Btu/hr) – Provided on Application.
$EFLH_c$ = Equivalent full load cooling hours
$EFLH_h$ = Equivalent full load heating hours
P_h = Heating season percent savings per degree setback
P_c = Cooling season percent savings per degree setup
$AFUE_h$ = Heating equipment efficiency – Provided on Application.
EER_{hp} = Heat pump/AC equipment efficiency – Provided on Application

12 = Conversion factor from Tons to kBtu/hr to acquire consumption in kWh.

168 = Hours per week.

7 = Assumed weekly hours for setback/setup adjustment period (based on 1 setback/setup per day, 7 days per week).

Summary of Inputs

Occupancy Controlled Thermostats

Component	Type	Value	Source
T_h	Variable		Application
T_c	Variable		Application
S_h	Fixed	T_h-5°	
S_c	Fixed	T_c+5°	
H	Variable		Application; Default of 84 hrs/week
Cap_{hp}	Variable		Application
Cap_h	Variable		Application
$EFLH_{c,h}$	Variable	See Table Below	1
P_h	Fixed	3%	2
P_c	Fixed	6%	2
$AFUE_h$	Variable		Application
EER_{hp}	Variable		Application

EFLH Table

Facility Type	Heating $EFLH_h$	Cooling $EFLH_c$
Assembly	603	669
Auto repair	1910	426
Dormitory	465	800
Hospital	3366	1424
Light industrial	714	549
Lodging – Hotel	1077	2918
Lodging – Motel	619	1233
Office – large	2034	720
Office – small	431	955
Other	681	736
Religious worship	722	279
Restaurant – fast food	813	645
Restaurant – full service	821	574

Facility Type	Heating $EFLH_h$	Cooling $EFLH_c$
Retail – big box	191	1279
Retail – Grocery	191	1279
Retail – small	545	882
Retail – large	2101	1068
School – Community college	1431	846
School – postsecondary	1191	1208
School – primary	840	394
School – secondary	901	466
Warehouse	452	400

Multi-family EFLH by Vintage

Facility Type	Prior to 1979	From 1979 to 2006	From 2007 through Present
Low-rise, Cooling	507	550	562
Low-rise, Heating	757	723	503
High-rise, Cooling	793	843	954
High-rise, Heating	526	395	219

ECM 7 – Pipe and Valve Insulation

Vineland Public Schools ECM Matrix

✔	ECM was evaluated
✔ (green)	ECM evaluated & included in the project

ECM #	ECM DESCRIPTION	Vineland High School North	Vineland High School South	Thomas Wallace Middle School	SGT Dominick Pilla Middle Schoool	Veterans Memorial Intermediate School	Anthony Rossi Intermediate School	Gloria M. Sabater Elementary School	D'Ippolito Elementary School	Petway Elementary School	Dr. William Mennies Elementary School	Johnstone Elementary School	Dr. John H. Winslow Elementary School	Marie Durand Elementary School	Dane Barse Elementary School	Cunningham School	Landis Administrative Building	Maintenance/Transportation Building	Central Warehouse
7	Pipe and Valve Insulation	✔		✔		✔	✔	✔				✔	✔			✔	✔		

Piping insulation is a critical part of energy management. It controls condensation, pipe freezing, and noise amongst other things. A percentage of heating (or cooling) can be lost through conduction if a pipe is not properly insulated.

Higher operational costs are a direct result of this for both heating and cooling systems. This ECM entails wrapping the existing bare metal pipe with an approved high-performance fiberglass insulation jacketing material.

Existing Conditions

Scope of Work

Insulation will be installed on exposed pipes and valves. Failed insulation will be replaced. Poorly insulated pipes in the heating and cooling distribution system are leading to unnecessary distribution losses and wasted energy. The scope of work will include.

- Installation of pipe insulation to meet the insulation requirements of the fluid temperature in the pipe.
- Utilize and install pipe wrap covering and jackets to protect the insulation material as required in the work area.
- Materials will vary by the application and workspace.
  - o Fiberglass, mineral wool, foam glass, Styrofoam, urethane, closed cell rubber

ECM Calculations

Pipe and Valve Insulation savings are calculated using NJ BPU Protocols.

Algorithms

Fossil Fuel Source:

Fuel Savings (MMBtu/yr) = SF * L * Oper Hrs / EFF

Electric Source:

Energy Savings (kWh/yr) = SF * L * Oper Hrs / EFF / C

Scaling: Only applicable if differential between the fluid temperature and space temperature is significantly different than 130°F. If this is the case, the fuel or electric savings calculated with the above formulas should be multiplied by the resulting scaling factor deroived as:

Scaling Factor (unitless) = (FT – ST)/130

Fuel or electric savinsg calculated using the derived savings factors should be multiplied by the acaling factor.

Scaled Savings (MMBtu/year or kWh/yr) = Calculated Savings * Savings Factor

Definition of Variables

SF = Savings factor derived from #E Plus Version 4.1 tool, Btu/hr-ft see table below

L = Length of pipe from water heating source to hot water application, ft

Oper Hrs = hours per year fluid flows in pipe, hours

EFF = Efficiency of equipment providing heat to the fluid

C (kWh) = Conversion factor from Btu to kWh = 3,413 for electric water heating

FT = Fluid Temperature (°F)

ST = Space temperature (°F)

Summary of Inputs

Pipe Insulation

Component	Type	Value	Source
SF	Fixed	See Table Below	1
L	Variable		Application
Oper Hrs	Fixed	4,282 hrs/year (default value reflects average heating season hours)	2
EFF	Fixed	98% electric 80% natural gas	3
FT	Variable		Application
ST	Variable		Application

Savings Factor

	Savings, Btu/hr-ft			
Nominal Pipe Size, Inches	0.5" Insulation	1.0" Insulation	1.5" Insulation	2.0" Insulation
0.50	47	53	56	57
0.75	58	64	68	70
1.00	72	82	85	87
1.25	89	100	107	108
1.50	100	115	120	125
2.00	128	143	148	153
2.50	153	171	182	185
3.00	195	221	230	236
3.50	224	241	248	253
4.00	232	263	274	281

Pipe and Valve Insulation Savings

BUILDING	Component	Fluid Type	Pipe Dia (") or Tank Surface Area(SF)*	PIPE OD ""	Total Quantity or Length	Total Eq Length(LF) or Total Area(SF)*	AMBIENT TEMP	Fluid Temperature	Savings Factor	OPERATION HOURS/YEAR	Heating / Cooling Efficiency	Proposed Insulation Type	Proposed Jacket Type	Proposed Insulation Thickness	Scaling Factor	Fuel Savings Therms	kWh Savings
Anthony Rossi Intermediate School	90 Degree Elbow	DHW	1	1.315	9	16.2	85	125	82	8,760	98%	Cellular Glass	PVC	1.0	0.31	0.00	3479.16
Anthony Rossi Intermediate School	Ball valve	DHW	1	1.315	5	20.5	85	125	85	8,760	98%	Removable Blanket	Fiberglass Fabric	1.5	0.31	0.00	4563.71
Anthony Rossi Intermediate School	Check Valve	DHW	1	1.315	1	4.1	85	125	85	8,760	98%	Removable Blanket	Fiberglass Fabric	1.5	0.31	0.00	912.74
Anthony Rossi Intermediate School	End Cap	DHW	1	1.315	2	3.6	85	125	85	8,760	98%	Removable Blanket	Fiberglass Fabric	1.5	0.31	0.00	801.43
Anthony Rossi Intermediate School	Flange	DHW	1	1.315	4	7.2	85	125	85	8,760	98%	Removable Blanket	Fiberglass Fabric	1.5	0.31	0.00	1602.87
Anthony Rossi Intermediate School	In-Line Pump	DHW	1	1.315	2	10	85	125	85	8,760	98%	Removable Blanket	Fiberglass Fabric	1.5	0.31	0.00	2226.20
Anthony Rossi Intermediate School	Straight Pipe	DHW	1	1.315	35	35	85	125	82	8,760	98%	Cellular Glass	ASJ	1.0	0.31	0.00	7516.71
Anthony Rossi Intermediate School	45 Degree Elbow	DHW	1.5	1.9	1	1	85	125	120	8,760	98%	Cellular Glass	PVC	1.5	0.31	0.00	314.29
Anthony Rossi Intermediate School	90 Degree Elbow	DHW	1.5	1.9	2	3.6	85	125	120	8,760	98%	Cellular Glass	PVC	1.5	0.31	0.00	1131.43
Anthony Rossi Intermediate School	Ball valve	DHW	1.5	1.9	2	8.2	85	125	120	8,760	98%	Removable Blanket	Fiberglass Fabric	1.5	0.31	0.00	2577.16
Anthony Rossi Intermediate School	Straight Pipe	DHW	1 1/2	1.9	6	6	85	125	120	8,760	98%	Cellular Glass	ASJ	1.5	0.31	0.00	1885.72
Anthony Rossi Intermediate School	T Intersection	DHW	1 1/2	1.9	1	1.2	85	125	120	8,760	98%	Cellular Glass	PVC	1.5	0.31	0.00	377.14
Anthony Rossi Intermediate School	90 Degree Elbow	DHW	2	2.375	7	12.6	85	125	148	8,760	98%	Cellular Glass	PVC	1.5	0.31	0.00	4884.03
Anthony Rossi Intermediate School	Ball valve	DHW	2	2.375	3	12.3	85	125	148	8,760	98%	Removable Blanket	Fiberglass Fabric	1.5	0.31	0.00	4767.74
Anthony Rossi Intermediate School	Pipe Reducer	DHW	2	2.375	3	3	85	125	148	8,760	98%	Removable Blanket	Fiberglass Fabric	1.5	0.31	0.00	1162.86
Anthony Rossi Intermediate School	Straight Pipe	DHW	2	2.375	12	12	85	125	148	8,760	98%	Cellular Glass	ASJ	1.5	0.31	0.00	4651.45
Anthony Rossi Intermediate School	Strainer	DHW	2	2.375	1	5	85	125	148	8,760	98%	Removable Blanket	Fiberglass Fabric	1.5	0.31	0.00	1938.11
Anthony Rossi Intermediate School	T Intersection	DHW	2	2.375	3	3.6	85	125	148	8,760	98%	Cellular Glass	PVC	1.5	0.31	0.00	1395.44
Anthony Rossi Intermediate School	90 Degree Elbow	DHW	2.5	2.875	3	5.4	85	125	182	8,760	98%	Cellular Glass	PVC	1.5	0.31	0.00	2574.01
Anthony Rossi Intermediate School	Flange	DHW	2.5	2.875	4	7.2	85	125	182	8,760	98%	Removable Blanket	Fiberglass Fabric	1.5	0.31	0.00	3432.02
Anthony Rossi Intermediate School	Gate Valve	DHW	2.5	2.875	2	10	85	125	182	8,760	98%	Removable Blanket	Fiberglass Fabric	1.5	0.31	0.00	4766.69
Anthony Rossi Intermediate School	Straight Pipe	DHW	2.5	2.875	8	8	85	125	182	8,760	98%	Cellular Glass	ASJ	1.5	0.31	0.00	3813.35
Anthony Rossi Intermediate School	T Intersection	DHW	2 1/2	2.875	1	1.2	85	125	182	8,760	98%	Cellular Glass	PVC	1.5	0.31	0.00	572.00

Pipe and Valve Insulation Savings

BUILDING	Component	Fluid Type	Pipe Dia (") or Tank Surface Area(SF)*	PIPE OD ""	Total Quantity or Length	Total Eq Length(LF) or Total Area(SF)*	AMBIENT TEMP	Fluid Temperature	Savings Factor	OPERATION HOURS/YEAR	Heating / Cooling Efficiency	Proposed Insulation Type	Proposed Jacket Type	Proposed Insulation Thickness	Scaling Factor	Fuel Savings Therms
Cunningham School	Ball valve	MTHW	2	2.375	6	24.6	85	185	148	5,110	83%	Removable Blanket	Fiberglass Fabric	1.5	0.77	224.82
Cunningham School	Flange	MTHW	2	2.375	6	10.8	85	185	148	5,110	83%	Removable Blanket	Fiberglass Fabric	1.5	0.77	98.70
Cunningham School	In-Line Pump	MTHW	2	2.375	3	15	85	185	148	5,110	83%	Removable Blanket	Fiberglass Fabric	1.5	0.77	137.09
Cunningham School	Strainer	MTHW	2	2.375	1	5	85	185	148	5,110	83%	Removable Blanket	Fiberglass Fabric	1.5	0.77	45.70
Cunningham School	Triple Duty Valve	MTHW	2	2.375	2	8.8	85	185	148	5,110	83%	Removable Blanket	Fiberglass Fabric	1.5	0.77	80.42
Dr. John H. Winslow Elementary School	90 Degree Elbow	MTHW	1	1.315	3	5.4	85	185	85	5,110	81%	Cellular Glass	PVC	1.5	0.77	29.01
Dr. John H. Winslow Elementary School	Ball valve	MTHW	1	1.315	1	4.1	85	185	85	5,110	81%	Removable Blanket	Fiberglass Fabric	1.5	0.77	22.03
Dr. John H. Winslow Elementary School	Straight Pipe	MTHW	1	1.315	2	2	85	185	85	5,110	81%	Cellular Glass	ASJ	1.5	0.77	10.74
Dr. John H. Winslow Elementary School	Check Valve	MTHW	2 1/2	2.875	2	8.2	85	185	182	5,110	81%	Removable Blanket	Fiberglass Fabric	1.5	0.77	94.33
Dr. John H. Winslow Elementary School	Control Valve	MTHW	2.5	2.875	1	4.1	85	185	182	5,110	81%	Removable Blanket	Fiberglass Fabric	1.5	0.77	47.16
Dr. John H. Winslow Elementary School	Flange	MTHW	2 1/2	2.875	20	36	85	185	182	5,110	81%	Removable Blanket	Fiberglass Fabric	1.5	0.77	414.11
Dr. John H. Winslow Elementary School	Flex Fitting	MTHW	2 1/2	2.875	4	6	85	185	182	5,110	81%	Removable Blanket	Fiberglass Fabric	1.5	0.77	69.02
Dr. John H. Winslow Elementary School	Gate Valve	MTHW	2.5	2.875	6	30	85	185	182	5,110	81%	Removable Blanket	Fiberglass Fabric	1.5	0.77	345.09
Dr. John H. Winslow Elementary School	In-Line Pump	MTHW	2 1/2	2.875	2	10	85	185	182	5,110	81%	Removable Blanket	Fiberglass Fabric	1.5	0.77	115.03
Dr. John H. Winslow Elementary School	Straight Pipe	MTHW	2 1/2	2.875	4	4	85	185	185	5,110	81%	Cellular Glass	ASJ	2.0	0.77	46.77
Dr. John H. Winslow Elementary School	Strainer	MTHW	2.5	2.875	4	20	85	185	182	5,110	81%	Removable Blanket	Fiberglass Fabric	1.5	0.77	230.06
Dr. John H. Winslow Elementary School	T Intersection	MTHW	2 1/2	2.875	2	2.4	85	185	185	5,110	81%	Cellular Glass	PVC	2.0	0.77	28.06
Dr. John H. Winslow Elementary School	Flange	MTHW	3	3.5	4	7.2	85	185	230	5,110	81%	Removable Blanket	Fiberglass Fabric	1.5	0.77	104.67
Dr. John H. Winslow Elementary School	Strainer	MTHW	3	3.5	1	5	85	185	230	5,110	81%	Removable Blanket	Fiberglass Fabric	1.5	0.77	72.68
Dr. John H. Winslow Elementary School	Triple Duty Valve	MTHW	3	3.5	2	8.8	85	185	230	5,110	81%	Removable Blanket	Fiberglass Fabric	1.5	0.77	127.92
Dr. John H. Winslow Elementary School	Check Valve	MTHW	4	4.5	1	4.1	85	185	274	5,110	81%	Removable Blanket	Fiberglass Fabric	1.5	0.77	71.00
Dr. John H. Winslow Elementary School	Flange	MTHW	4	4.5	12	21.6	85	185	274	5,110	81%	Removable Blanket	Fiberglass Fabric	1.5	0.77	374.07
Dr. John H. Winslow Elementary School	Gate Valve	MTHW	4	4.5	11	55	85	185	274	5,110	81%	Removable Blanket	Fiberglass Fabric	1.5	0.77	952.48
Dr. John H. Winslow Elementary School	Pipe Reducer	MTHW	4	4.5	2	2	85	185	274	5,110	81%	Removable Blanket	Fiberglass Fabric	1.5	0.77	34.64
Dr. John H. Winslow Elementary School	Straight Pipe	MTHW	4	4.5	2	2	85	185	281	5,110	81%	Cellular Glass	ASJ	2.0	0.77	35.52
Dr. John H. Winslow Elementary School	Air Seperator Tank	MTHW	7.85	#N/A	2	15.7	85	185	281	5,110	81%	Cellular Glass	ASJ	2.0	0.77	278.84
Gloria M. Sabater Elementary School	End Cap	MTHW	4	4.5	1	1.8	85	185	281	5,110	80%	Cellular Glass	ASJ	2.0	0.77	32.31
Gloria M. Sabater elementary School	Butterfly Valve	MTHW	6	6.625	4	16.4	85	185	281	5,110	80%	Removable Blanket	Fiberglass Fabric	1.5	0.77	294.36
Gloria M. Sabater elementary School	End Cap	MTHW	6	6.625	1	1.8	85	185	281	5,110	80%	Cellular Glass	ASJ	2.0	0.77	32.31
Gloria M. Sabater elementary School	Flange	MTHW	6	6.625	10	18	85	185	281	5,110	80%	Removable Blanket	Fiberglass Fabric	1.5	0.77	323.08
Gloria M. Sabater elementary School	Flex Fitting	MTHW	6	6.625	4	6	85	185	281	5,110	80%	Removable Blanket	Fiberglass Fabric	1.5	0.77	107.69
Gloria M. Sabater elementary School	Suction Diffuser	MTHW	6	6.625	2	8.8	85	185	281	5,110	80%	Removable Blanket	Fiberglass Fabric	1.5	0.77	157.95
Gloria M. Sabater elementary School	Triple Duty Valve	MTHW	6	6.625	2	8.8	85	185	281	5,110	80%	Removable Blanket	Fiberglass Fabric	1.5	0.77	157.95
Gloria M. Sabater elementary School	90 Degree Elbow	MTHW	8	11.25	1	1.8	85	185	281	5,110	80%	Cellular Glass	PVC	2.0	0.77	32.31
Gloria M. Sabater elementary School	Flange	MTHW	8	8.625	2	3.6	85	185	281	5,110	80%	Removable Blanket	Fiberglass Fabric	1.5	0.77	64.62
Gloria M. Sabater elementary School	Air Seperator Tank	MTHW	31.4	#N/A	1	31.4	85	185	281	5,110	80%	Cellular Glass	ASJ	2.0	0.77	563.59
Johnstone Elementary School	Butterfly Valve	MTHW	5	5.563	2	8.2	85	185	281	5,110	81%	Removable Blanket	Fiberglass Fabric	1.5	0.77	145.63
Johnstone Elementary School	Check Valve	MTHW	5	5.563	2	8.2	85	185	281	5,110	81%	Removable Blanket	Fiberglass Fabric	1.5	0.77	145.63
Johnstone Elementary School	End Cap	MTHW	5	5.563	1	1.8	85	185	281	5,110	81%	Cellular Glass	ASJ	2.0	0.77	31.97
Johnstone Elementary School	Flange	MTHW	5	5.563	22	39.6	85	185	281	5,110	81%	Removable Blanket	Fiberglass Fabric	1.5	0.77	703.31
Johnstone Elementary School	Flex Fitting	MTHW	5	5.563	4	6	85	185	281	5,110	81%	Removable Blanket	Fiberglass Fabric	1.5	0.77	106.56
Johnstone Elementary School	Gate Valve	MTHW	5	5.563	4	20	85	185	281	5,110	81%	Removable Blanket	Fiberglass Fabric	1.5	0.77	355.21
Johnstone Elementary School	In-Line Pump	MTHW	5	5.563	2	10	85	185	281	5,110	81%	Removable Blanket	Fiberglass Fabric	1.5	0.77	177.60
Johnstone Elementary School	Straight Pipe	MTHW	5	5.563	4	4	85	185	281	5,110	81%	Cellular Glass	ASJ	2.0	0.77	71.04
Johnstone Elementary School	Strainer	MTHW	5	5.563	2	10	85	185	281	5,110	81%	Removable Blanket	Fiberglass Fabric	1.5	0.77	177.60
Johnstone Elementary School	T Intersection	MTHW	5	5.563	7	8.4	85	185	281	5,110	81%	Cellular Glass	PVC	2.0	0.77	149.19
Johnstone Elementary School	Triple Duty Valve	MTHW	5	5.563	2	8.8	85	185	281	5,110	81%	Removable Blanket	Fiberglass Fabric	1.5	0.77	156.29
Johnstone Elementary School	Air Seperator Tank	MTHW	15 1/3	#N/A	1	15.3075	85	185	281	5,110	81%	Cellular Glass	ASJ	2.0	0.77	271.87

Pipe and Valve Insulation Savings

BUILDING	Component	Fluid Type	Pipe Dia (") or Tank Surface Area(SF)*	PIPE OD ""	Total Quantity or Length	Total Eq Length(LF) or Total Area(SF)*	AMBIENT TEMP	Fluid Temperature	Savings Factor	OPERATION HOURS/YEAR	Heating / Cooling Efficiency	Proposed Insulation Type	Proposed Jacket Type	Proposed Insulation Thickness	Scaling Factor	Fuel Savings Therms
Landis Administrative Building	Flange	LPS	4	4.5	8	14.4	85	205	274	5,110	87%	Removable Blanket	Fiberglass Fabric	1.5	0.92	232.33
Landis Administrative Building	Gate Valve	LPS	4	4.5	3	15	85	205	274	5,110	87%	Removable Blanket	Fiberglass Fabric	1.5	0.92	242.01
Landis Administrative Building	Flange	LPS	5	5.563	10	18	85	205	281	5,110	87%	Removable Blanket	Fiberglass Fabric	1.5	0.92	297.83
Landis Administrative Building	Gate Valve	LPS	5	5.563	1	5	85	205	281	5,110	87%	Removable Blanket	Fiberglass Fabric	1.5	0.92	82.73
Landis Administrative Building	Straight Pipe	LPS	5	5.563	3	3	85	205	281	5,110	87%	Cellular Glass	ASJ	3.0	0.92	49.64
Landis Administrative Building	End Cap	LPS	10	10.75	7	12.6	85	205	281	5,110	87%	Cellular Glass	ASJ	3.0	0.92	208.48
Landis Administrative Building	Flange	LPS	10	10.75	8	14.4	85	205	281	5,110	87%	Removable Blanket	Fiberglass Fabric	1.5	0.92	238.26
Landis Administrative Building	Gate Valve	LPS	10	10.75	3	15	85	205	281	5,110	87%	Removable Blanket	Fiberglass Fabric	1.5	0.92	248.19
Landis Administrative Building	90 Degree Elbow	Cond	1.5	1.9	5	9	85	165	125	5,110	87%	Cellular Glass	PVC	2.0	0.62	66.24
Landis Administrative Building	Gate Valve	Cond	1.5	1.9	2	10	85	165	120	5,110	87%	Removable Blanket	Fiberglass Fabric	1.5	0.62	70.66
Landis Administrative Building	Steam Trap	Cond	1.5	1.9	1	4.4	85	165	120	5,110	87%	Removable Blanket	Fiberglass Fabric	1.5	0.62	31.09
Landis Administrative Building	Straight Pipe	Cond	1.5	1.9	20	20	85	165	125	5,110	87%	Cellular Glass	ASJ	2.0	0.62	147.21
Landis Administrative Building	Strainer	Cond	1.5	1.9	2	10	85	165	120	5,110	87%	Removable Blanket	Fiberglass Fabric	1.5	0.62	70.66
Landis Administrative Building	90 Degree Elbow	Cond	2	2.375	6	10.8	85	165	153	5,110	87%	Cellular Glass	PVC	2.0	0.62	97.30
Landis Administrative Building	End Cap	Cond	2	2.375	1	1.8	85	165	153	5,110	87%	Cellular Glass	ASJ	2.0	0.62	16.22
Landis Administrative Building	Flange	Cond	2	2.375	3	5.4	85	165	148	5,110	87%	Removable Blanket	Fiberglass Fabric	1.5	0.62	47.06
Landis Administrative Building	Gate Valve	Cond	2	2.375	3	15	85	165	148	5,110	87%	Removable Blanket	Fiberglass Fabric	1.5	0.62	130.72
Landis Administrative Building	Steam Trap	Cond	2	2.375	1	4.4	85	165	148	5,110	87%	Removable Blanket	Fiberglass Fabric	1.5	0.62	38.34
Landis Administrative Building	Straight Pipe	Cond	2	2.375	22	22	85	165	153	5,110	87%	Cellular Glass	ASJ	2.0	0.62	198.20
Landis Administrative Building	Strainer	Cond	2	2.375	1	5	85	165	148	5,110	87%	Removable Blanket	Fiberglass Fabric	1.5	0.62	43.57
Landis Administrative Building	90 Degree Elbow	Cond	3	3.5	5	9	85	165	236	5,110	87%	Cellular Glass	PVC	2.0	0.62	125.07
Landis Administrative Building	Butterfly Valve	Cond	3	3.5	4	16.4	85	165	230	5,110	87%	Removable Blanket	Fiberglass Fabric	1.5	0.62	222.11
Landis Administrative Building	Check Valve	Cond	3	3.5	2	8.2	85	165	230	5,110	87%	Removable Blanket	Fiberglass Fabric	1.5	0.62	111.05
Landis Administrative Building	Flange	Cond	3	3.5	24	43.2	85	165	230	5,110	87%	Removable Blanket	Fiberglass Fabric	1.5	0.62	585.06
Landis Administrative Building	Flex Fitting	Cond	3	3.5	2	3	85	165	230	5,110	87%	Removable Blanket	Fiberglass Fabric	1.5	0.62	40.63
Landis Administrative Building	Gate Valve	Cond	3	3.5	8	40	85	165	230	5,110	87%	Removable Blanket	Fiberglass Fabric	1.5	0.62	541.72
Landis Administrative Building	Condensate Tank	Cond	133.45	#N/A	1	133.45	85	165	281	5,110	87%	Cellular Glass	ASJ	2.0	0.62	2208.07
Thomas Wallace Middle School	90 Degree Elbow	MTHW	1.5	1.9	2	3.6	85	185	125	5,110	82%	Cellular Glass	PVC	2.0	0.77	28.04
Thomas Wallace Middle School	Straight Pipe	MTHW	1 1/2	1.9	6	6	85	185	125	5,110	82%	Cellular Glass	ASJ	2.0	0.77	46.73
Thomas Wallace Middle School	90 Degree Elbow	MTHW	2	2.375	7	12.6	85	185	153	5,110	82%	Cellular Glass	PVC	2.0	0.77	120.13
Thomas Wallace Middle School	Ball valve	MTHW	2	2.375	6	24.6	85	185	148	5,110	82%	Removable Blanket	Fiberglass Fabric	1.5	0.77	226.87
Thomas Wallace Middle School	Butterfly Valve	MTHW	2	2.375	2	8.2	85	185	148	5,110	82%	Removable Blanket	Fiberglass Fabric	1.5	0.77	75.62
Thomas Wallace Middle School	Flange	MTHW	2	2.375	4	7.2	85	185	148	5,110	82%	Removable Blanket	Fiberglass Fabric	1.5	0.77	66.40
Thomas Wallace Middle School	In-Line Pump	MTHW	2	2.375	2	10	85	185	148	5,110	82%	Removable Blanket	Fiberglass Fabric	1.5	0.77	92.22
Thomas Wallace Middle School	Straight Pipe	MTHW	2	2.375	30	30	85	185	153	5,110	82%	Cellular Glass	ASJ	2.0	0.77	286.02
Thomas Wallace Middle School	Strainer	MTHW	2	2.375	2	10	85	185	148	5,110	82%	Removable Blanket	Fiberglass Fabric	1.5	0.77	92.22
Thomas Wallace Middle School	T Intersection	MTHW	2	2.375	2	2.4	85	185	153	5,110	82%	Cellular Glass	PVC	2.0	0.77	22.88
Thomas Wallace Middle School	In-Line Pump	MTHW	6	6.625	4	20	85	185	281	5,110	82%	Removable Blanket	Fiberglass Fabric	1.5	0.77	350.20
Thomas Wallace Middle School	Butterfly Valve	MTHW	8	8.625	2	8.2	85	185	281	5,110	82%	Removable Blanket	Fiberglass Fabric	1.5	0.77	143.58
Thomas Wallace Middle School	Flange	MTHW	8	8.625	8	14.4	85	185	281	5,110	82%	Removable Blanket	Fiberglass Fabric	1.5	0.77	252.14
Thomas Wallace Middle School	Flex Fitting	MTHW	8	8.625	4	6	85	185	281	5,110	82%	Removable Blanket	Fiberglass Fabric	1.5	0.77	105.06
Thomas Wallace Middle School	Suction Diffuser	MTHW	8	8.625	2	8.8	85	185	281	5,110	82%	Removable Blanket	Fiberglass Fabric	1.5	0.77	154.09
Thomas Wallace Middle School	Triple Duty Valve	MTHW	8	8.625	2	8.8	85	185	281	5,110	82%	Removable Blanket	Fiberglass Fabric	1.5	0.77	154.09
Veterans Memorial Intermediate School	Flange	MTHW	1	1.315	2	3.6	85	185	85	5,110	84%	Removable Blanket	Fiberglass Fabric	1.5	0.77	18.55
Veterans Memorial Intermediate School	45 Degree Elbow	MTHW	2	2.375	1	1	85	185	153	5,110	84%	Cellular Glass	PVC	2.0	0.77	9.27
Veterans Memorial Intermediate School	90 Degree Elbow	MTHW	2	2.375	5	9	85	185	153	5,110	84%	Cellular Glass	PVC	2.0	0.77	83.46
Veterans Memorial Intermediate School	Ball valve	MTHW	2	2.375	2	8.2	85	185	148	5,110	84%	Removable Blanket	Fiberglass Fabric	1.5	0.77	73.56
Veterans Memorial Intermediate School	Bonnet	MTHW	2	2.375	2	3.6	85	185	148	5,110	84%	Removable Blanket	Fiberglass Fabric	1.5	0.77	32.29
Veterans Memorial Intermediate School	Flange	MTHW	2	2.375	14	25.2	85	185	148	5,110	84%	Removable Blanket	Fiberglass Fabric	1.5	0.77	226.06
Veterans Memorial Intermediate School	Flex Fitting	MTHW	2	2.375	4	6	85	185	148	5,110	84%	Removable Blanket	Fiberglass Fabric	1.5	0.77	53.82
Veterans Memorial Intermediate School	Flo-Check	MTHW	2	2.375	2	8.2	85	185	148	5,110	84%	Removable Blanket	Fiberglass Fabric	1.5	0.77	73.56
Veterans Memorial Intermediate School	In-Line Pump	MTHW	2	2.375	4	20	85	185	148	5,110	84%	Removable Blanket	Fiberglass Fabric	1.5	0.77	179.41
Veterans Memorial Intermediate School	Pipe Reducer	MTHW	2	2.375	2	2	85	185	148	5,110	84%	Removable Blanket	Fiberglass Fabric	1.5	0.77	17.94
Veterans Memorial Intermediate School	Straight Pipe	MTHW	2	2.375	3	3	85	185	153	5,110	84%	Cellular Glass	ASJ	2.0	0.77	27.82
Veterans Memorial Intermediate School	Suction Diffuser	MTHW	2	2.375	2	8.8	85	185	148	5,110	84%	Removable Blanket	Fiberglass Fabric	1.5	0.77	78.94
Veterans Memorial Intermediate School	Suction Diffuser	MTHW	6	6.625	2	8.8	85	185	281	5,110	84%	Removable Blanket	Fiberglass Fabric	1.5	0.77	149.88
Vineland High School North	90 Degree Elbow	MTHW	0.75	1.05	4	7.2	85	185	68	5,110	81%	Cellular Glass	PVC	1.5	0.77	30.82
Vineland High School North	Ball valve	MTHW	0.75	1.05	1	4.1	85	185	68	5,110	81%	Removable Blanket	Fiberglass Fabric	1.5	0.77	17.55
Vineland High School North	Check Valve	MTHW	0.75	1.05	1	4.1	85	185	68	5,110	81%	Removable Blanket	Fiberglass Fabric	1.5	0.77	17.55
Vineland High School North	Flange	MTHW	0.75	1.05	2	3.6	85	185	68	5,110	81%	Removable Blanket	Fiberglass Fabric	1.5	0.77	15.41
Vineland High School North	In-Line Pump	MTHW	0.75	1.05	1	5	85	185	68	5,110	81%	Removable Blanket	Fiberglass Fabric	1.5	0.77	21.40
Vineland High School North	Straight Pipe	MTHW	0.75	1.05	20	20	85	185	68	5,110	81%	Cellular Glass	ASJ	1.5	0.77	85.60
Vineland High School North	45 Degree Elbow	MTHW	1.5	17.6625	1	1	85	185	125	5,110	81%	Cellular Glass	PVC	2.0	0.77	7.87
Vineland High School North	90 Degree Elbow	MTHW	1.5	1.9	11	19.8	85	185	125	5,110	81%	Cellular Glass	PVC	2.0	0.769231	155.7832198
Vineland High School North	Ball valve	MTHW	1.5	1.9	1	4.1	85	185	120	5,110	81%	Removable Blanket	Fiberglass Fabric	1.5	0.769231	30.96781582
Vineland High School North	Straight Pipe	MTHW	1.5	1.9	55	55	85	185	125	5,110	81%	Cellular Glass	ASJ	2.0	0.769231	432.7311662
Vineland High School North	90 Degree Elbow	MTHW	2	2.375	14	25.2	85	185	153	5,110	81%	Cellular Glass	PVC	2.0	0.769231	242.6819323
Vineland High School North	Ball valve	MTHW	2	2.375	5	20.5	85	185	148	5,110	81%	Removable Blanket	Fiberglass Fabric	1.5	0.769231	190.9681976
Vineland High School North	Ball valve	MTHW	2	2.375	3	12.3	85	185	148	5,110	81%	Removable Blanket	Fiberglass Fabric	1.5	0.769231	114.5809185
Vineland High School North	Butterfly Valve	MTHW	2	2.375	1	4.1	85	185	148	5,110	81%	Removable Blanket	Fiberglass Fabric	1.5	0.769231	38.19363951
Vineland High School North	Flange	MTHW	2	2.375	1	1.8	85	185	148	5,110	81%	Removable Blanket	Fiberglass Fabric	1.5	0.769231	16.7679393
Vineland High School North	Straight Pipe	MTHW	2	2.375	23	23	85	185	153	5,110	81%	Cellular Glass	ASJ	2.0	0.769231	221.4954144
Vineland High School North	Strainer	MTHW	2	2.375	3	15	85	185	148	5,110	81%	Removable Blanket	Fiberglass Fabric	1.5	0.769231	139.7328275
Vineland High School North	T Intersection	MTHW	2	2.375	1	1.2	85	185	153	5,110	81%	Cellular Glass	PVC	2.0	0.769231	11.55628249
Vineland High School North	Butterfly Valve	MTHW	3	3.5	1	4.1	85	185	230	5,110	81%	Removable Blanket	Fiberglass Fabric	1.5	0.769231	59.35498032
Vineland High School North	Pipe Reducer	MTHW	3	3.5	2	2	85	185	230	5,110	81%	Removable Blanket	Fiberglass Fabric	1.5	0.769231	28.95364894
Vineland High School North	Straight Pipe	MTHW	3	3.5	1	1	85	185	236	5,110	81%	Cellular Glass	ASJ	2.0	0.769231	14.85448076
Vineland High School North	Butterfly Valve	MTHW	6	6.625	2	8.2	85	185	281	5,110	81%	Removable Blanket	Fiberglass Fabric	1.5	0.769231	145.0326041
Vineland High School North	Butterfly Valve	MTHW	6	6.625	2	8.2	85	185	281	5,110	81%	Removable Blanket	Fiberglass Fabric	1.5	0.769231	145.0326041
Vineland High School North	Flange	MTHW	6	6.625	1	1.8	85	185	281	5,110	81%	Removable Blanket	Fiberglass Fabric	1.5	0.769231	31.83642529
Vineland High School North	Flange	MTHW	6	6.625	4	7.2	85	185	281	5,110	81%	Removable Blanket	Fiberglass Fabric	1.5	0.769231	127.3457012
Vineland High School North	Suction Diffuser	MTHW	6	6.625	2	8.8	85	185	281	5,110	81%	Removable Blanket	Fiberglass Fabric	1.5	0.769231	155.6447459
Vineland High School North	Triple Duty Valve	MTHW	6	6.625	2	8.8	85	185	281	5,110	81%	Removable Blanket	Fiberglass Fabric	1.5	0.769231	155.6447459

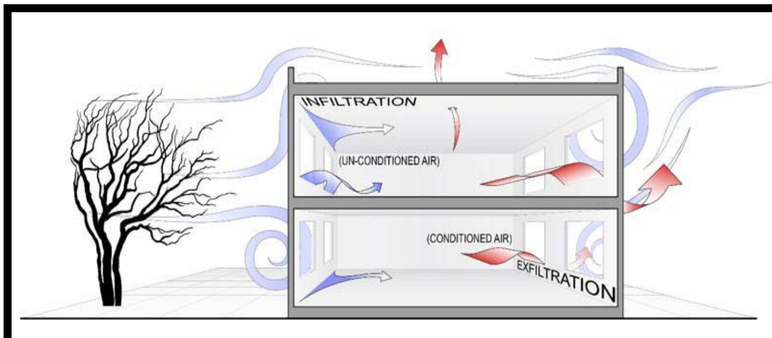
ECM 8 – Building Envelope Weatherization

Vineland Public Schools ECM Matrix

✔	ECM was evaluated
✔	ECM evaluated & included in the project

ECM #	ECM DESCRIPTION	Vineland High School North	Vineland High School South	Thomas Wallace Middle School	SGT Dominick Pilla Middle Schoool	Veterans Memorial Intermediate School	Anthony Rossi Intermediate School	Gloria M. Sabater Elementary School	D'Ippolito Elementary School	Petway Elementary School	Dr. William Mennies Elementary School	Johnstone Elementary School	Dr. John H. Winslow Elementary School	Marie Durand Elementary School	Dane Barse Elementary School	Cunningham School	Landis Administrative Building	Maintenance/Transportation Building	Central Warehouse
8	Building Envelope Weatherization	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔

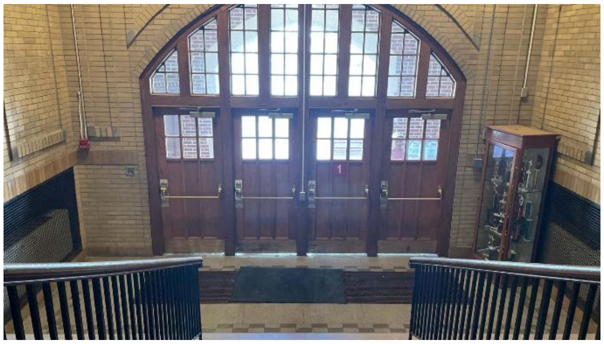
An on-site survey of the existing air barrier continuity was conducted at the Vineland Public School District's buildings. During the on-site inspection, several areas of the facilities were inspected for effective air barriers at the building envelope. Temperature, relative humidity, CO2 levels, smoke pencil testing and Infrared imaging was used to determine areas of uncontrolled air leakage into and out of the buildings.



Infiltration is unconditioned air that enters the building from a variety of paths.

Each of these facilities had varying degrees of uncontrolled air leakage into and out of the buildings. Typically, the exterior doors were found to have failed, missing or worn weather-seals and in some cases the exterior caulking had failed. Many of the facilities had insulation materials installed at the exterior roof/wall intersections. This can increase thermal values, however, the air leakage around the insulation and through the roof/wall joint was significant and results in increased energy costs.

Existing Conditions




Scope of Work

Building Envelope improvements to the district include:

- Door weather Stripping
- Roof-Wall Intersection Air Sealing
- Overhand Air Sealing
- Caulking
- Buck Frame Air Sealing
- Attic Insulation
- Attic Bypass Air Sealing
    - Weather strip and insulate the attic hatch to provide an airtight seal with permanently fixed insulation to prevent thermal heat gain and loss consistent with the surrounding attic recommendations.
- Garage Door Weather Stripping

ECM Calculations

Energy Savings from the installation of building envelope improvements are calculated on the following pages:

Building Envelope - Heating Savings

Building	TYPE	SUBTYPE	INFILTRATION REDUCTION (CFM)	HEATING FUEL	HEATING EFFICIENCY (%)	SENSIABLE HEAT CONSTANT	HOURS (HR/DAY)	HEAT EFFICIENCY FACTOR	HDD	INFILTRATION HEATING SAVINGS (BTU)	Infiltration Heating Savings (Fuel Units)	TOTAL HEATING SAVINGS (kWh)	TOTAL HEATING SAVINGS (Therm)
Anthony Rossi Intermediate School	Door Weather Stripping	Single Door - Sides, Top, Sweep (UT)	40	Electric	263.90%	1.08	24.00	101,814.62	4891.00	1.90	557.97	558	0
Anthony Rossi Intermediate School	Door Weather Stripping	Double Door - Sides, Top, Sweep, Center (UT)	621	Electric	263.90%	1.08	24	101815	4891	30	8,746.12	8,746	0
Anthony Rossi Intermediate School	Door Weather Stripping	Install Door Jamb Spacer (UT)	0	Electric	263.90%	1.08	24	101815	4891	0	0	0	0
Anthony Rossi Intermediate School	Overhang Air Sealing	Seal (LF)	7	Electric	263.90%	1.08	24	101815	4891	0	93	93	0
Anthony Rossi Intermediate School	Overhang Air Sealing	Block, Seal (SF)	111	Electric	263.90%	1.08	24	101815	4891	5	1562	1,562	0
Anthony Rossi Intermediate School	Roof-Wall Intersection Air Sealing	Seal (LF)	1,693	Electric	263.90%	1.08	24	101815	4891	81	23839	23,839	0
Cunningham School	Door Weather Stripping	Single Door - Sides, Top, Sweep (UT)	99	Electric	279.00%	1.08	24	107639	4891	4.50	1,319.44	1,319	0
Cunningham School	Door Weather Stripping	Double Door - Sides, Top, Sweep, Center (UT)	163	Electric	279.00%	1.08	24	107639	4891	7	2177	2,177	0
Dane Barse Elementary School	Door Weather Stripping	Single Door - Sides, Top, Sweep (UT)	79	Natural Gas	79.19%	1.08	24	30552	4891	13	127	0	127
Dane Barse Elementary School	Door Weather Stripping	Double Door - Sides, Top, Sweep, Center (UT)	294	Natural Gas	79.19%	1.08	24	30552	4891	47	471	0	471
Dane Barse Elementary School	Door Weather Stripping	Install Door Jamb Spacer (UT)	0	Natural Gas	79.19%	1.08	24	30552	4891	0	0	0	0
Dane Barse Elementary School	Garage Door Weather Stripping	Roll-Up Door Weather Strip - Sides, Top	27	Natural Gas	79.19%	1.08	24	30552	4891	4	43	0	43
Dane Barse Elementary School	Buck Frame Air Sealing	Seal (LF)	15	Natural Gas	79.19%	1.08	24	30552	4891	2	23	0	23
Dane Barse Elementary School	Overhang Air Sealing	Block, Seal (SF)	44	Natural Gas	79.19%	1.08	24	30552	4891	7	70	0	70
Dane Barse Elementary School	Roof-Wall Intersection Air Sealing	Seal (LF)	1,214	Natural Gas	79.19%	1.08	24	30552	4891	194	1943	0	1,943
D'Ippolito Elementary School	Door Weather Stripping	Single Door - Sides, Top, Sweep (UT)	40	Electric	257.33%	1.08	24	99278	4891	2	572	572	0
D'Ippolito Elementary School	Door Weather Stripping	Double Door - Sides, Top, Sweep, Center (UT)	621	Electric	257.33%	1.08	24	99278	4891	31	8970	8,970	0
D'Ippolito Elementary School	Door Weather Stripping	Install Door Jamb Spacer (UT)	0	Electric	257.33%	1.08	24	99278	4891	0	0	0	0
D'Ippolito Elementary School	Overhang Air Sealing	Block, Seal (SF)	157	Electric	257.33%	1.08	24	99278	4891	8	2260	2,260.3	0
D'Ippolito Elementary School	Roof-Wall Intersection Air Sealing	Seal (LF)	31	Electric	257.33%	1.08	24	99278	4891	2	443	443.5	0
D'Ippolito Elementary School	Roof-Wall Intersection Air Sealing	Block, Seal (LF)	1,611	Electric	257.33%	1.08	24	99278	4891	79	23261	23,261	0

Building Envelope - Heating Savings

Building	TYPE	SUBTYPE	INFILTRATION REDUCTION (CFM)	HEATING FUEL	HEATING EFFICIENCY (%)	SENSIABLE HEAT CONSTANT	HOURS (HR/DAY)	HEAT EFFICIENCY FACTOR	HDD	INFILTRATION HEATING SAVINGS (BTU)	Infiltration Heating Savings (Fuel Units)	TOTAL HEATING SAVINGS (kWh)	TOTAL HEATING SAVINGS (Therm)
Dr. John H. Winslow Elementary School	Door Weather Stripping	Single Door - Sides, Top, Sweep (UT)	99	Natural Gas	80.85%	1.08	24	31192	4891	16	155	0	155
Dr. John H. Winslow Elementary School	Door Weather Stripping	Double Door - Sides, Top, Sweep, Center (UT)	327	Natural Gas	80.85%	1.08	24	31192	4891	51	513	0	513
Dr. John H. Winslow Elementary School	Caulking	Interior Seal (LF)	8	Natural Gas	80.85%	1.08	24	31192	4891	1	12	0	12
Dr. John H. Winslow Elementary School	Roof-Wall Intersection Air Sealing	Seal (LF)	696	Natural Gas	80.85%	1.08	24	31192	4891	109	1091	0	1091
Dr. John H. Winslow Elementary School	Roof-Wall Intersection Air Sealing	Block, Seal (LF)	117	Natural Gas	80.85%	1.08	24	31192	4891	18	183	0	183
Dr. John H. Winslow Elementary School	Overhang Air Sealing	Block, Seal (SF)	75	Natural Gas	80.85%	1.08	24	31192	4891	12	118	0	118
Dr. William Mennies Elementary School	Door Weather Stripping	Single Door - Sides, Top, Sweep (UT)	416	Natural Gas	78.96%	1.08	24	30464	4891	67	668	0	668
Dr. William Mennies Elementary School	Door Weather Stripping	Double Door - Sides, Top, Sweep, Center (UT)	196	Natural Gas	78.96%	1.08	24	30464	4891	31	315	0	315
Dr. William Mennies Elementary School	Door Weather Stripping	Install Door Jamb Spacer (UT)	0	Natural Gas	78.96%	1.08	24	30464	4891	0	0	0	0
Dr. William Mennies Elementary School	Overhang Air Sealing	Block, Seal (LF)	27	Natural Gas	78.96%	1.08	24	30464	4891	4	43	0	43
Dr. William Mennies Elementary School	Overhang Air Sealing	Block, Seal (SF)	95	Natural Gas	78.96%	1.08	24	30464	4891	15	153	0	153
Dr. William Mennies Elementary School	Roof-Wall Intersection Air Sealing	Seal (LF)	703	Natural Gas	78.96%	1.08	24	30464	4891	113	1128	0	1128
Gloria M. Sabater Elementary School	Door Weather Stripping	Single Door - Sides, Top, Sweep (UT)	614	Electric	305.47%	1.08	24	117849	4891	25	7472	7472	0
Gloria M. Sabater Elementary School	Door Weather Stripping	Double Door - Sides, Top, Sweep, Center (UT)	948	Electric	305.47%	1.08	24	117849	4891	39	11533	11533	0
Gloria M. Sabater Elementary School	Door Weather Stripping	Install Door Jamb Spacer (UT)	0	Electric	305.47%	1.08	24	117849	4891	0	0	0	0
Gloria M. Sabater Elementary School	Garage Door Weather Stripping	Roll-Up Door Weather Strip - Sides, Top, Bottom	30	Electric	305.47%	1.08	24	117849	4891	1	362	362	0
Gloria M. Sabater Elementary School	Roof-Wall Intersection Air Sealing	Seal (LF)	1,676	Electric	305.47%	1.08	24	117849	4891	70	20391	20391	0
Vineland High School North	Door Weather Stripping	Single Door - Sides, Top, Sweep (UT)	357	Natural Gas	81.18%	1.08	24	31321	4891	56	557	0	557
Vineland High School North	Door Weather Stripping	Double Door - Sides, Top, Sweep, Center (UT)	850	Natural Gas	81.18%	1.08	24	31321	4891	133	1327	0	1327
Vineland High School North	Door Weather Stripping	Install Door Jamb Spacer (UT)	0	Natural Gas	81.18%	1.08	24	31321	4891	0	0	0	0
Vineland High School North	Overhang Air Sealing	Seal (LF)	11	Natural Gas	81.18%	1.08	24	31321	4891	2	17	0	17
Vineland High School North	Roof-Wall Intersection Air Sealing	Seal (LF)	2,542	Natural Gas	81.18%	1.08	24	31321	4891	397	3970	0	3970
Vineland High School South	Door Weather Stripping	Single Door - Sides, Top, Sweep (UT)	1,605	Electric	426.64%	1.08	24	164598	4891	48	13978	13978	0
Vineland High School South	Door Weather Stripping	Double Door - Sides, Top, Sweep, Center (UT)	229	Electric	426.64%	1.08	24	164598	4891	7	1993	1993	0
Vineland High School South	Door Weather Stripping	Install Door Jamb Spacer (UT)	0	Electric	426.64%	1.08	24	164598	4891	0	0	0	0
Vineland High School South	Garage Door Weather Stripping	Overhead Door Weather Strip - Sides, Top	104	Electric	426.64%	1.08	24	164598	4891	3	906	906	0
Vineland High School South	Garage Door Weather Stripping	Roll-Up Door Weather Strip - Sides, Top	38	Electric	426.64%	1.08	24	164598	4891	1	332	332	0
Vineland High School South	Garage Door Weather Stripping	Roll-Up Door Weather Strip - Sides, Top, Bottom	34	Electric	426.64%	1.08	24	164598	4891	1	293	293	0
Vineland High School South	Roof-Wall Intersection Air Sealing	Seal (LF)	2,297	Electric	426.64%	1.08	24	164598	4891	68	20001	20001	0
Vineland High School South	Buck Frame Air Sealing	Seal (LF)	43	Electric	426.64%	1.08	24	164598	4891	1	371	371	0
Johnstone Elementary School	Door Weather Stripping	Single Door - Sides, Top, Sweep (UT)	119	Electric	257.92%	1.08	24	99504	4891	6	1713	1713	0
Johnstone Elementary School	Door Weather Stripping	Double Door - Sides, Top, Sweep, Center (UT)	360	Electric	257.92%	1.08	24	99504	4891	18	5181	5181	0
Johnstone Elementary School	Door Weather Stripping	Install Door Jamb Spacer (UT)	0	Electric	257.92%	1.08	24	99504	4891	0	0	0	0
Johnstone Elementary School	Roof-Wall Intersection Air Sealing	Seal (LF)	529	Electric	257.92%	1.08	24	99504	4891	26	7622	7622	0

Building Envelope - Heating Savings

Building	TYPE	SUBTYPE	INFILTRATION REDUCTION (CFM)	HEATING FUEL	HEATING EFFICIENCY (%)	SENSIABLE HEAT CONSTANT	HOURS (HR/DAY)	HEAT EFFICIENCY FACTOR	HDD	INFILTRATION HEATING SAVINGS (BTU)	Infiltration Heating Savings (Fuel Units)	TOTAL HEATING SAVINGS (kWh)	TOTAL HEATING SAVINGS (Therm)
Landis Administrative Building	Door Weather Stripping	Single Door - Sides, Top, Sweep (UT)	159	Natural Gas	86.78%	1.08	24	33481	4891	23	232	0	232
Landis Administrative Building	Door Weather Stripping	Double Door - Sides, Top, Sweep, Center (UT)	229	Natural Gas	86.78%	1.08	24	33481	4891	33	334	0	334
Landis Administrative Building	Caulking	Interior Seal (LF)	5	Natural Gas	86.78%	1.08	24	33481	4891	1	8	0	8
Landis Administrative Building	Roof-Wall Intersection Air Sealing	Seal (LF)	139	Natural Gas	86.78%	1.08	24	33481	4891	20	203	0	203
Marie Durand Elementary School	Door Weather Stripping	Single Door - Sides, Top, Sweep (UT)	238	Natural Gas	79.21%	1.08	24	30560	4891	38	381	0	381
Marie Durand Elementary School	Door Weather Stripping	Double Door - Sides, Top, Sweep, Center (UT)	425	Natural Gas	79.21%	1.08	24	30560	4891	68	680	0	680
Marie Durand Elementary School	Door Weather Stripping	Install Door Jamb Spacer (UT)	0	Natural Gas	79.21%	1.08	24	30560	4891	0	0	0	0
Marie Durand Elementary School	Caulking	Interior Seal (LF)	17	Natural Gas	79.21%	1.08	24	30560	4891	3	27	0	27
Marie Durand Elementary School	Caulking	Interior Block, Seal (LF)	32	Natural Gas	79.21%	1.08	24	30560	4891	5	51	0	51
Marie Durand Elementary School	Overhang Air Sealing	Block, Seal (SF)	184	Natural Gas	79.21%	1.08	24	30560	4891	29	295	0	295
Marie Durand Elementary School	Roof-Wall Intersection Air Sealing	Seal (LF)	1,106	Natural Gas	79.21%	1.08	24	30560	4891	177	1770	0	1770
Petway Elementary School	Door Weather Stripping	Single Door - Sides, Top, Sweep (UT)	99	Electric	383.07%	1.08	24	147789	4891	3	961	961	0
Petway Elementary School	Door Weather Stripping	Double Door - Sides, Top, Sweep, Center (UT)	392	Electric	383.07%	1.08	24	147789	4891	13	3805	3805	0
Petway Elementary School	Door Weather Stripping	Install Door Jamb Spacer (UT)	0	Electric	383.07%	1.08	24	147789	4891	0	0	0	0
Petway Elementary School	Caulking	Interior Seal Oversized (LF)	16	Electric	383.07%	1.08	24	147789	4891	1	151	151	0
SGT Dominick Pilla Middle Schoool	Door Weather Stripping	Single Door - Sides, Top, Sweep (UT)	79	Natural Gas	88.44%	1.08	24	34119	4891	11	114	0	114
SGT Dominick Pilla Middle Schoool	Door Weather Stripping	Double Door - Sides, Top, Sweep, Center (UT)	589	Natural Gas	88.44%	1.08	24	34119	4891	84	844	0	844
SGT Dominick Pilla Middle Schoool	Caulking	Interior Seal (LF)	44	Natural Gas	88.44%	1.08	24	34119	4891	6	63	0	63
SGT Dominick Pilla Middle Schoool	Garage Door Weather Stripping	Roll-Up Door Weather Strip - Sides, Top	57	Natural Gas	88.44%	1.08	24	34119	4891	8	82	0	82
Thomas Wallace Middle School	Door Weather Stripping	Single Door - Sides, Top, Sweep (UT)	198	Electric	361.08%	1.08	24	139306	4891	7	2039	2039	0
Thomas Wallace Middle School	Door Weather Stripping	Double Door - Sides, Top, Sweep, Center (UT)	458	Electric	361.08%	1.08	24	139306	4891	16	4710	4710	0
Thomas Wallace Middle School	Door Weather Stripping	Install Door Jamb Spacer (UT)	0	Electric	361.08%	1.08	24	139306	4891	0	0	0	0
Thomas Wallace Middle School	Garage Door Weather Stripping	Overhead Door Weather Strip - Sides, Top, Bottom	135	Electric	361.08%	1.08	24	139306	4891	5	1387	1387	0
Veterans Memorial Intermediate School	Door Weather Stripping	Single Door - Sides, Top, Sweep (UT)	436	Natural Gas	84.31%	1.08	24	32525	4891	66	656	0	656
Veterans Memorial Intermediate School	Door Weather Stripping	Double Door - Sides, Top, Sweep, Center (UT)	294	Natural Gas	84.31%	1.08	24	32525	4891	44	442	0	442
Veterans Memorial Intermediate School	Door Weather Stripping	Install Door Jamb Spacer (UT)	0	Natural Gas	84.31%	1.08	24	32525	4891	0	0	0	0
Veterans Memorial Intermediate School	Buck Frame Air Sealing	Seal (LF)	385	Natural Gas	84.31%	1.08	24	32525	4891	58	580	0	580

Building Envelope Savings - Cooling Savings														
BUILDING	TYPE	SUBTYPE	% of Building Cooled	INFILTRATION REDUCTION (CFM)	INTERIOR DRY BULB TEMP (F)	EXTERIOR DRY BULB TEMP (F)	INTERIOR DRY RELATIVE HUMIDITY (%)	EXTERIOR RELATIVE HUMIDITY (%)	INTERIOR ENTHALPY (SUMMER)	EXTERIOR ENTHALPY (SUMMER)	EFFICIENCY (kW/TON)	Cooling Degree Days	INFILTRATION ELECTRIC SAVINGS (kW)	INFILTRATION ELECTRIC SAVINGS (kWh)
Anthony Rossi Intermediate School	Door Weather Stripping	Single Door - Sides, Top, Sweep (UT)	100%	40	72.0	75.0	40.0	75.0	24.55	33.27	1.17	1067	0	162
Anthony Rossi Intermediate School	Door Weather Stripping	Double Door - Sides, Top, Sweep, Center (UT)	100%	621	72.0	75.0	40.0	75.0	24.55	33.27	1.17	1067	2	2,544
Anthony Rossi Intermediate School	Door Weather Stripping	Install Door Jamb Spacer (UT)	100%	0	72.0	75.0	40.0	75.0	24.55	33.27	1.17	1067	0	0
Anthony Rossi Intermediate School	Overhang Air Sealing	Seal (LF)	100%	7	72.0	75.0	40.0	75.0	24.55	33.27	1.17	1067	0	27
Anthony Rossi Intermediate School	Overhang Air Sealing	Block, Seal (SF)	100%	111	72.0	75.0	40.0	75.0	24.55	33.27	1.17	1067	0	454
Anthony Rossi Intermediate School	Roof-Wall Intersection Air Sealing	Seal (LF)	100%	1,693	72.0	75.0	40.0	75.0	24.55	33.27	1.17	1067	6	6,933
Cunningham School	Door Weather Stripping	Single Door - Sides, Top, Sweep (UT)	100%	99	72.0	75.0	40.0	75.0	24.55	33.27	1.31	1067	0	454
Cunningham School	Door Weather Stripping	Double Door - Sides, Top, Sweep, Center (UT)	100%	163	72.0	75.0	40.0	75.0	24.55	33.27	1.31	1067	1	749
Dane Barse Elementary School	Door Weather Stripping	Single Door - Sides, Top, Sweep (UT)	100%	79	72.0	75.0	40.0	75.0	24.55	33.27	0.94	1067	0	259
Dane Barse Elementary School	Door Weather Stripping	Double Door - Sides, Top, Sweep, Center (UT)	100%	294	72.0	75.0	40.0	75.0	24.55	33.27	0.94	1067	1	961
Dane Barse Elementary School	Door Weather Stripping	Install Door Jamb Spacer (UT)	100%	0	72.0	75.0	40.0	75.0	24.55	33.27	0.94	1067	0	0
Dane Barse Elementary School	Garage Door Weather Stripping	Roll-Up Door Weather Strip - Sides, Top	100%	27	72.0	75.0	40.0	75.0	24.55	33.27	0.94	1067	0	87
Dane Barse Elementary School	Buck Frame Air Sealing	Seal (LF)	100%	14.53	72.0	75.0	40.0	75.0	24.55	33.27	0.94	1067	0	47
Dane Barse Elementary School	Overhang Air Sealing	Block, Seal (SF)	100%	43.59	72.0	75.0	40.0	75.0	24.55	33.27	0.94	1067	0	142
Dane Barse Elementary School	Roof-Wall Intersection Air Sealing	Seal (LF)	100%	1213.68	72.0	75.0	40.0	75.0	24.55	33.27	0.94	1067	4	3,964
D'Ippolito Elementary School	Door Weather Stripping	Single Door - Sides, Top, Sweep (UT)	100%	39.63	72.0	75.0	40.0	75.0	24.55	33.27	1.22	1067	0	169
D'Ippolito Elementary School	Door Weather Stripping	Double Door - Sides, Top, Sweep, Center (UT)	100%	621.21	72.0	75.0	40.0	75.0	24.55	33.27	1.22	1067	2	2,654
D'Ippolito Elementary School	Door Weather Stripping	Install Door Jamb Spacer (UT)	100%	0.00	72.0	75.0	40.0	75.0	24.55	33.27	1.22	1067	0	0
D'Ippolito Elementary School	Overhang Air Sealing	Block, Seal (SF)	100%	156.54	72.0	75.0	40.0	75.0	24.55	33.27	1.22	1067	1	669
D'Ippolito Elementary School	Roof-Wall Intersection Air Sealing	Seal (LF)	100%	30.71	72.0	75.0	40.0	75.0	24.55	33.27	1.22	1067	0	131
D'Ippolito Elementary School	Roof-Wall Intersection Air Sealing	Block, Seal (LF)	100%	1610.98	72.0	75.0	40.0	75.0	24.55	33.27	1.22	1067	6	6,882

Building Envelope Savings - Cooling Savings

BUILDING	TYPE	SUBTYPE	% of Building Cooled	INFILTRATION REDUCTION (CFM)	INTERIOR DRY BULB TEMP (F)	EXTERIOR DRY BULB TEMP (F)	INTERIOR DRY RELATIVE HUMIDITY (%)	EXTERIOR RELATIVE HUMIDITY (%)	INTERIOR ENTHALPY (SUMMER)	EXTERIOR ENTHALPY (SUMMER)	EFFICIENCY (kW/TON)	Cooling Degree Days	INFILTRATION ELECTRIC SAVINGS (kW)	INFILTRATION ELECTRIC SAVINGS (kWh)
Dr. John H. Winslow Elementary School	Door Weather Stripping	Single Door - Sides, Top, Sweep (UT)	100%	99.08	72.0	75.0	40.0	75.0	24.55	33.27	1.00	1067	0	345
Dr. John H. Winslow Elementary School	Door Weather Stripping	Double Door - Sides, Top, Sweep, Center (UT)	100%	326.95	72.0	75.0	40.0	75.0	24.55	33.27	1.00	1067	1	1,139
Dr. John H. Winslow Elementary School	Caulking	Interior Seal (LF)	100%	7.80	72.0	75.0	40.0	75.0	24.55	33.27	1.00	1067	0	27
Dr. John H. Winslow Elementary School	Roof-Wall Intersection Air Sealing	Seal (LF)	100%	695.52	72.0	75.0	40.0	75.0	24.55	33.27	1.00	1067	2	2,423
Dr. John H. Winslow Elementary School	Roof-Wall Intersection Air Sealing	Block, Seal (LF)	100%	116.91	72.0	75.0	40.0	75.0	24.55	33.27	1.00	1067	0	407
Dr. John H. Winslow Elementary School	Overhang Air Sealing	Block, Seal (SF)	100%	75.30	72.0	75.0	40.0	75.0	24.55	33.27	1.00	1067	0	262
Dr. William Mennies Elementary School	Door Weather Stripping	Single Door - Sides, Top, Sweep (UT)	100%	416.12	72.0	75.0	40.0	75.0	24.55	33.27	1.16	1067	2	1,690
Dr. William Mennies Elementary School	Door Weather Stripping	Double Door - Sides, Top, Sweep, Center (UT)	100%	196.17	72.0	75.0	40.0	75.0	24.55	33.27	1.16	1067	1	797
Dr. William Mennies Elementary School	Door Weather Stripping	Install Door Jamb Spacer (UT)	100%	0.00	72.0	75.0	40.0	75.0	24.55	33.27	1.16	1067	0	0
Dr. William Mennies Elementary School	Overhang Air Sealing	Block, Seal (LF)	100%	26.75	72.0	75.0	40.0	75.0	24.55	33.27	1.16	1067	0	109
Dr. William Mennies Elementary School	Overhang Air Sealing	Block, Seal (SF)	100%	95.11	72.0	75.0	40.0	75.0	24.55	33.27	1.16	1067	0	386
Dr. William Mennies Elementary School	Roof-Wall Intersection Air Sealing	Seal (LF)	100%	702.65	72.0	75.0	40.0	75.0	24.55	33.27	1.16	1067	3	2,853
Gloria M. Sabater Elementary School	Door Weather Stripping	Single Door - Sides, Top, Sweep (UT)	100%	614.27	72.0	75.0	40.0	75.0	24.55	33.27	1.23	1067	2	2,628
Gloria M. Sabater Elementary School	Door Weather Stripping	Double Door - Sides, Top, Sweep, Center (UT)	100%	948.16	72.0	75.0	40.0	75.0	24.55	33.27	1.23	1067	4	4,057
Gloria M. Sabater Elementary School	Door Weather Stripping	Install Door Jamb Spacer (UT)	100%	0.00	72.0	75.0	40.0	75.0	24.55	33.27	1.23	1067	0	0
Gloria M. Sabater Elementary School	Garage Door Weather Stripping	Roll-Up Door Weather Strip - Sides, Top, Bottom	100%	29.72	72.0	75.0	40.0	75.0	24.55	33.27	1.23	1067	0	127
Gloria M. Sabater Elementary School	Roof-Wall Intersection Air Sealing	Seal (LF)	100%	1676.37	72.0	75.0	40.0	75.0	24.55	33.27	1.23	1067	7	7,173
Vineland High School North	Door Weather Stripping	Single Door - Sides, Top, Sweep (UT)	100%	356.67	72.0	75.0	40.0	75.0	24.55	33.27	0.77	1067	1	963
Vineland High School North	Door Weather Stripping	Double Door - Sides, Top, Sweep, Center (UT)	100%	850.07	72.0	75.0	40.0	75.0	24.55	33.27	0.77	1067	2	2,295
Vineland High School North	Door Weather Stripping	Install Door Jamb Spacer (UT)	100%	0.00	72.0	75.0	40.0	75.0	24.55	33.27	0.77	1067	0	0
Vineland High School North	Overhang Air Sealing	Seal (LF)	100%	10.57	72.0	75.0	40.0	75.0	24.55	33.27	0.77	1067	0	29
Vineland High School North	Roof-Wall Intersection Air Sealing	Seal (LF)	100%	2542.30	72.0	75.0	40.0	75.0	24.55	33.27	0.77	1067	6	6,863
Vineland High School South	Door Weather Stripping	Single Door - Sides, Top, Sweep (UT)	100%	1605.04	72.0	75.0	40.0	75.0	24.55	33.27	1.00	1067	5	5,584
Vineland High School South	Door Weather Stripping	Double Door - Sides, Top, Sweep, Center (UT)	100%	228.87	72.0	75.0	40.0	75.0	24.55	33.27	1.00	1067	1	796
Vineland High School South	Door Weather Stripping	Install Door Jamb Spacer (UT)	100%	0.00	72.0	75.0	40.0	75.0	24.55	33.27	1.00	1067	0	0
Vineland High School South	Garage Door Weather Stripping	Overhead Door Weather Strip - Sides, Top	100%	104.03	72.0	75.0	40.0	75.0	24.55	33.27	1.00	1067	0	362
Vineland High School South	Garage Door Weather Stripping	Roll-Up Door Weather Strip - Sides, Top	100%	38.14	72.0	75.0	40.0	75.0	24.55	33.27	1.00	1067	0	133
Vineland High School South	Garage Door Weather Stripping	Roll-Up Door Weather Strip - Sides, Top, Bottom	100%	33.69	72.0	75.0	40.0	75.0	24.55	33.27	1.00	1067	0	117
Vineland High School South	Roof-Wall Intersection Air Sealing	Seal (LF)	100%	2296.59	72.0	75.0	40.0	75.0	24.55	33.27	1.00	1067	7	7,990
Vineland High School South	Buck Frame Air Sealing	Seal (LF)	100%	42.60	72.0	75.0	40.0	75.0	24.55	33.27	1.00	1067	0	148
Johnstone Elementary School	Door Weather Stripping	Single Door - Sides, Top, Sweep (UT)	100%	118.89	72.0	75.0	40.0	75.0	24.55	33.27	0.96	1067	0	399
Johnstone Elementary School	Door Weather Stripping	Double Door - Sides, Top, Sweep, Center (UT)	100%	359.65	72.0	75.0	40.0	75.0	24.55	33.27	0.96	1067	1	1,208
Johnstone Elementary School	Door Weather Stripping	Install Door Jamb Spacer (UT)	100%	0.00	72.0	75.0	40.0	75.0	24.55	33.27	0.96	1067	0	0
Johnstone Elementary School	Roof-Wall Intersection Air Sealing	Seal (LF)	100%	529.07	72.0	75.0	40.0	75.0	24.55	33.27	0.96	1067	2	1,777

Building Envelope Savings - Cooling Savings														
BUILDING	TYPE	SUBTYPE	% of Building Cooled	INFILTRATION REDUCTION (CFM)	INTERIOR DRY BULB TEMP (F)	EXTERIOR DRY BULB TEMP (F)	INTERIOR DRY RELATIVE HUMIDITY (%)	EXTERIOR RELATIVE HUMIDITY (%)	INTERIOR ENTHALPY (SUMMER)	EXTERIOR ENTHALPY (SUMMER)	EFFICIENCY (kW/TON)	Cooling Degree Days	INFILTRATION ELECTRIC SAVINGS (kW)	INFILTRATION ELECTRIC SAVINGS (kWh)
Landis Administrative Building	Door Weather Stripping	Single Door - Sides, Top, Sweep (UT)	100%	158.52	72.0	75.0	40.0	75.0	24.55	33.27	1.01	1067	1	558
Landis Administrative Building	Door Weather Stripping	Double Door - Sides, Top, Sweep, Center (UT)	100%	228.87	72.0	75.0	40.0	75.0	24.55	33.27	1.01	1067	1	805
Landis Administrative Building	Caulking	Interior Seal (LF)	100%	5.20	72.0	75.0	40.0	75.0	24.55	33.27	1.01	1067	0	18
Landis Administrative Building	Roof-Wall Intersection Air Sealing	Seal (LF)	100%	138.71	72.0	75.0	40.0	75.0	24.55	33.27	1.01	1067	0	488
Marie Durand Elementary School	Door Weather Stripping	Single Door - Sides, Top, Sweep (UT)	100%	237.78	72.0	75.0	40.0	75.0	24.55	33.27	1.00	1067	1	833
Marie Durand Elementary School	Door Weather Stripping	Double Door - Sides, Top, Sweep, Center (UT)	100%	425.04	72.0	75.0	40.0	75.0	24.55	33.27	1.00	1067	1	1,489
Marie Durand Elementary School	Door Weather Stripping	Install Door Jamb Spacer (UT)	100%	0.00	72.0	75.0	40.0	75.0	24.55	33.27	1.00	1067	0	0
Marie Durand Elementary School	Caulking	Interior Seal (LF)	100%	16.84	72.0	75.0	40.0	75.0	24.55	33.27	1.00	1067	0	59
Marie Durand Elementary School	Caulking	Interior Block, Seal (LF)	100%	31.70	72.0	75.0	40.0	75.0	24.55	33.27	1.00	1067	0	111
Marie Durand Elementary School	Overhang Air Sealing	Block, Seal (SF)	100%	184.28	72.0	75.0	40.0	75.0	24.55	33.27	1.00	1067	1	646
Marie Durand Elementary School	Roof-Wall Intersection Air Sealing	Seal (LF)	100%	1105.69	72.0	75.0	40.0	75.0	24.55	33.27	1.00	1067	4	3,873
Petway Elementary School	Door Weather Stripping	Single Door - Sides, Top, Sweep (UT)	100%	99.08	72.0	75.0	40.0	75.0	24.55	33.27	0.72	1067	0	249
Petway Elementary School	Door Weather Stripping	Double Door - Sides, Top, Sweep, Center (UT)	100%	392.34	72.0	75.0	40.0	75.0	24.55	33.27	0.72	1067	1	986
Petway Elementary School	Door Weather Stripping	Install Door Jamb Spacer (UT)	100%	0.00	72.0	75.0	40.0	75.0	24.55	33.27	0.72	1067	0	0
Petway Elementary School	Caulking	Interior Seal Oversized (LF)	100%	15.60	72.0	75.0	40.0	75.0	24.55	33.27	0.72	1067	0	39
SGT Dominick Pilla Middle Schoool	Door Weather Stripping	Single Door - Sides, Top, Sweep (UT)	100%	79.26	72.0	75.0	40.0	75.0	24.55	33.27	0.95	1067	0	264
SGT Dominick Pilla Middle Schoool	Door Weather Stripping	Double Door - Sides, Top, Sweep, Center (UT)	100%	588.51	72.0	75.0	40.0	75.0	24.55	33.27	0.95	1067	2	1,957
SGT Dominick Pilla Middle Schoool	Caulking	Interior Seal (LF)	100%	43.84	72.0	75.0	40.0	75.0	24.55	33.27	0.95	1067	0	146
SGT Dominick Pilla Middle Schoool	Garage Door Weather Stripping	Roll-Up Door Weather Strip - Sides, Top	100%	57.46	72.0	75.0	40.0	75.0	24.55	33.27	0.95	1067	0	191
Thomas Wallace Middle School	Door Weather Stripping	Single Door - Sides, Top, Sweep (UT)	100%	198.15	72.0	75.0	40.0	75.0	24.55	33.27	1.24	1067	1	856
Thomas Wallace Middle School	Door Weather Stripping	Double Door - Sides, Top, Sweep, Center (UT)	100%	457.73	72.0	75.0	40.0	75.0	24.55	33.27	1.24	1067	2	1,977
Thomas Wallace Middle School	Door Weather Stripping	Install Door Jamb Spacer (UT)	100%	0.00	72.0	75.0	40.0	75.0	24.55	33.27	1.24	1067	0	0
Thomas Wallace Middle School	Garage Door Weather Stripping	Overhead Door Weather Strip - Sides, Top, Bottom	100%	134.74	72.0	75.0	40.0	75.0	24.55	33.27	1.24	1067	1	582
Veterans Memorial Intermediate School	Door Weather Stripping	Single Door - Sides, Top, Sweep (UT)	100%	435.94	72.0	75.0	40.0	75.0	24.55	33.27	0.90	1067	1	1,367
Veterans Memorial Intermediate School	Door Weather Stripping	Double Door - Sides, Top, Sweep, Center (UT)	100%	294.26	72.0	75.0	40.0	75.0	24.55	33.27	0.90	1067	1	923
Veterans Memorial Intermediate School	Door Weather Stripping	Install Door Jamb Spacer (UT)	100%	0.00	72.0	75.0	40.0	75.0	24.55	33.27	0.90	1067	0	0
Veterans Memorial Intermediate School	Buck Frame Air Sealing	Seal (LF)	100%	385.41	72.0	75.0	40.0	75.0	24.55	33.27	0.90	1067	1	1,209

Enthalpy

Based on Interior Relative Humidity of 40% and temperature of 72 degrees F = 24.55 btu/lb. Exterior Enthalpy based on outside relative humidity estimate of 75% and the below NOAA summer temperature data.

Heat Efficiency Factor
The derivation of the Efficiency Factor is based on sensible heat constant (1.08 * 24 Hours per Day) and an assumed efficiency percentage for the heating plant in the building. The efficiency of the heating plant is captured as a percentage of the total energy output of the heating system.

Calculation is = 1.08 * 24 hours per day = 25.92; in order to get the Efficiency Factor in the denominator and account for system efficiency = 1/ (25.92 / (1,000,000 Btus * **Heating** Plant Efficiency Percent).

Infiltration Heating Savings (therm) = Infiltration Reduction (CFM) * Heating Degree Days (HDD) / Heat Efficiency Factor

Thermal Insulation Savings (therm) = Existing Heat Loss (therm) - Proposed Heat Loss (therm)

Existing Heat Loss (therm) = (Existing U-Value * (Hours/Day * Heating Degree Days (HDD)) * Surface Area (Sqft)) / Heating Efficiency (%) / 100,000 Btu/Therm

Proposed Heat Loss (therm) = (Proposed U-Value * (Hours/Day * Heating Degree Days (HDD)) * Surface Area (Sqft)) / Heating Efficiency (%) / 100,000 Btu/Therm

Infiltration Cooling Savings (kWh) = Tons * Efficiency (kW/ton) *Cooling Degree Days (CDD)*12000 btu/hr *0.000293071

Tons = Infiltration Reduction (CFM) * Total Heat Constant * Enthalpy / 12,0000 Btu/hr

Insulation Savings (kWh) = Existing Cooling Loss (kWh) - Proposed Cooling Loss (kWh)

Existing Cooling Loss (kWh) = (Existing U-Value) * (Hours/Day) * (Cooling Degree Days (CDD)) * (Surface Area (Sqft)) * (Cooling Efficiency (kWh/ton-hr)) * (1 Ton-hr/12,000 Btu)

Proposed Cooling Loss (kWh) = (Proposed U-Value) * (Hours/Day) * (Cooling Degree Days (CDD)) * (Surface Area (Sqft)) * (Cooling Efficiency (kWh/ton-hr)) * (1 Ton-hr/12,000 Btu)

ECM 9 – Plug Load Controls

Vineland Public Schools ECM Matrix

✔	ECM was evaluated
✔ (green)	ECM evaluated & included in the project

ECM #	ECM DESCRIPTION	Vineland High School North	Vineland High School South	Thomas Wallace Middle School	SGT Dominick Pilla Middle Schoool	Veterans Memorial Intermediate School	Anthony Rossi Intermediate School	Gloria M. Sabater Elementary School	D'Ippolito Elementary School	Petway Elementary School	Dr. William Mennies Elementary School	Johnstone Elementary School	Dr. John H. Winslow Elementary School	Marie Durand Elementary School	Dane Barse Elementary School	Cunningham School	Landis Administrative Building	Maintenance/Transportation Building	Central Warehouse
9	Plug Load Controls	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔

Plug loads are often used for a small portion of the day. Left unmanaged, these loads can add a significant usage and cost to a building's electric load. Plug load controls utilize specialty sockets from BERT that have software to track real-time usage of your appliances. The software also allows the user to use a web browser to view this usage and automatically turn on/off all appliances plugged into these outlets.

Scope of Work

Existing wall plugs within the facilities will be retrofitted with specialty controllable wall plugs.

ECM Calculations

Energy savings are calculated by multiplying the equipment Power Draw (W) by the number of hours the plug load will shut the equipment off completely:

Plug Load Controls Savings							
BUILDING NAME	Device Type	Quantity	Power Draw (W)	Controller Hours Scheduled ON per Year	Controller Hours Scheduled OFF per Year	Annual Energy Savings (kWh)	Total Annual Energy Savings (kWh)
Vineland High School North	AC-110 (15A)	0	750	1,560	2,472	0	
Vineland High School North	AC-220 (<=20A)	0	1200	1,560	2,472	0	
Vineland High School North	Air Scrubber	0	43	3,389	5,371	0	
Vineland High School North	Copier-110 (15A)	8	40	3,389	5,371	1,719	
Vineland High School North	Dehumidifier	1	400	1,560	2,472	989	
Vineland High School North	Exhaust Fan-110	0	50	3,389	5,371	0	
Vineland High School North	Full Refrig	0	90	3,389	5,371	0	
Vineland High School North	H/C Water Dispenser	4	60	3,389	5,371	1,289	
Vineland High School North	Mini Refrig	0	50	3,389	5,371	0	8,454
Vineland High School North	Other Not Listed	5	30	3,389	5,371	806	
Vineland High School North	Portable Heater	0	1440	1,560	2,472	0	
Vineland High School North	Projector	5	50	3,389	5,371	1,343	
Vineland High School North	Projector/Smartboard Combo	0	50	3,389	5,371	0	
Vineland High School North	PTAC/Split Unit	0	300	3,389	5,371	0	
Vineland High School North	Snack Vending	1	50	3,389	5,371	269	
Vineland High School North	Soda Vending	1	300	3,389	5,371	1,611	
Vineland High School North	Water Fountain	2	40	3,389	5,371	430	
Vineland High School South	AC-110 (15A)	1	750	1,560	2,472	1,854	
Vineland High School South	AC-220 (<=20A)	0	1200	1,560	2,472	0	
Vineland High School South	Air Scrubber	0	43	3,389	5,371	0	
Vineland High School South	Copier-110 (15A)	11	40	3,389	5,371	2,363	
Vineland High School South	Dehumidifier	0	400	1,560	2,472	0	
Vineland High School South	Exhaust Fan-110	0	50	3,389	5,371	0	
Vineland High School South	Full Refrig	0	90	3,389	5,371	0	
Vineland High School South	H/C Water Dispenser	3	60	3,389	5,371	967	
Vineland High School South	Mini Refrig	0	50	3,389	5,371	0	13,133
Vineland High School South	Other Not Listed	1	30	3,389	5,371	161	
Vineland High School South	Portable Heater	0	1440	1,560	2,472	0	
Vineland High School South	Projector	16	50	3,389	5,371	4,297	
Vineland High School South	Projector/Smartboard Combo	2	50	3,389	5,371	537	
Vineland High School South	PTAC/Split Unit	0	300	3,389	5,371	0	
Vineland High School South	Snack Vending	1	50	3,389	5,371	269	
Vineland High School South	Soda Vending	1	300	3,389	5,371	1,611	
Vineland High School South	Water Fountain	5	40	3,389	5,371	1,074	
Thomas Wallace Middle School	AC-110 (15A)	0	750	1,560	2,472	0	
Thomas Wallace Middle School	AC-220 (<=20A)	0	1200	1,560	2,472	0	
Thomas Wallace Middle School	Air Scrubber	0	43	3,389	5,371	0	
Thomas Wallace Middle School	Copier-110 (15A)	7	40	3,389	5,371	1,504	
Thomas Wallace Middle School	Dehumidifier	5	400	1,560	2,472	4,944	
Thomas Wallace Middle School	Exhaust Fan-110	0	50	3,389	5,371	0	
Thomas Wallace Middle School	Full Refrig	0	90	3,389	5,371	0	
Thomas Wallace Middle School	H/C Water Dispenser	3	60	3,389	5,371	967	
Thomas Wallace Middle School	Mini Refrig	0	50	3,389	5,371	0	16,453
Thomas Wallace Middle School	Other Not Listed	4	30	3,389	5,371	645	
Thomas Wallace Middle School	Portable Heater	1	1440	1,560	2,472	3,560	
Thomas Wallace Middle School	Projector	18	50	3,389	5,371	4,834	
Thomas Wallace Middle School	Projector/Smartboard Combo	0	50	3,389	5,371	0	
Thomas Wallace Middle School	PTAC/Split Unit	0	300	3,389	5,371	0	
Thomas Wallace Middle School	Snack Vending	0	50	3,389	5,371	0	
Thomas Wallace Middle School	Soda Vending	0	300	3,389	5,371	0	
Thomas Wallace Middle School	Water Fountain	0	40	3,389	5,371	0	
SGT Dominick Pilla Middle Schoool	AC-110 (15A)	0	750	1,560	2,472	0	
SGT Dominick Pilla Middle Schoool	AC-220 (<=20A)	0	1200	1,560	2,472	0	
SGT Dominick Pilla Middle Schoool	Air Scrubber	1	43	3,389	5,371	231	
SGT Dominick Pilla Middle Schoool	Copier-110 (15A)	6	40	3,389	5,371	1,289	
SGT Dominick Pilla Middle Schoool	Dehumidifier	0	400	1,560	2,472	0	
SGT Dominick Pilla Middle Schoool	Exhaust Fan-110	0	50	3,389	5,371	0	
SGT Dominick Pilla Middle Schoool	Full Refrig	0	90	3,389	5,371	0	
SGT Dominick Pilla Middle Schoool	H/C Water Dispenser	2	60	3,389	5,371	645	
SGT Dominick Pilla Middle Schoool	Mini Refrig	0	50	3,389	5,371	0	4,635
SGT Dominick Pilla Middle Schoool	Other Not Listed	1	30	3,389	5,371	161	
SGT Dominick Pilla Middle Schoool	Portable Heater	0	1440	1,560	2,472	0	
SGT Dominick Pilla Middle Schoool	Projector	0	50	3,389	5,371	0	
SGT Dominick Pilla Middle Schoool	Projector/Smartboard Combo	0	50	3,389	5,371	0	
SGT Dominick Pilla Middle Schoool	PTAC/Split Unit	0	300	3,389	5,371	0	
SGT Dominick Pilla Middle Schoool	Snack Vending	1	50	3,389	5,371	269	
SGT Dominick Pilla Middle Schoool	Soda Vending	1	300	3,389	5,371	1,611	
SGT Dominick Pilla Middle Schoool	Water Fountain	2	40	3,389	5,371	430	

Plug Load Controls Savings

BUILDING NAME	Device Type	Quantity	Power Draw (W)	Controller Hours Scheduled ON per Year	Controller Hours Scheduled OFF per Year	Annual Energy Savings (kWh)	Total Annual Energy Savings (kWh)
Veterans Memorial Intermediate School	AC-110 (15A)	0	750	1,560	2,472	0	7,380
Veterans Memorial Intermediate School	AC-220 (<=20A)	0	1200	1,560	2,472	0	
Veterans Memorial Intermediate School	Air Scrubber	8	43	3,389	5,371	1,848	
Veterans Memorial Intermediate School	Copier-110 (15A)	8	40	3,389	5,371	1,719	
Veterans Memorial Intermediate School	Dehumidifier	0	400	1,560	2,472	0	
Veterans Memorial Intermediate School	Exhaust Fan-110	0	50	3,389	5,371	0	
Veterans Memorial Intermediate School	Full Refrig	0	90	3,389	5,371	0	
Veterans Memorial Intermediate School	H/C Water Dispenser	1	60	3,389	5,371	322	
Veterans Memorial Intermediate School	Mini Refrig	0	50	3,389	5,371	0	
Veterans Memorial Intermediate School	Other Not Listed	0	30	3,389	5,371	0	
Veterans Memorial Intermediate School	Portable Heater	0	1440	1,560	2,472	0	
Veterans Memorial Intermediate School	Projector	6	50	3,389	5,371	1,611	
Veterans Memorial Intermediate School	Projector/Smartboard Combo	0	50	3,389	5,371	0	
Veterans Memorial Intermediate School	PTAC/Split Unit	0	300	3,389	5,371	0	
Veterans Memorial Intermediate School	Snack Vending	1	50	3,389	5,371	269	
Veterans Memorial Intermediate School	Soda Vending	1	300	3,389	5,371	1,611	
Veterans Memorial Intermediate School	Water Fountain	0	40	3,389	5,371	0	
Anthony Rossi Intermediate School	AC-110 (15A)	0	750	1,560	2,472	0	4,238
Anthony Rossi Intermediate School	AC-220 (<=20A)	0	1200	1,560	2,472	0	
Anthony Rossi Intermediate School	Air Scrubber	3	43	3,389	5,371	693	
Anthony Rossi Intermediate School	Copier-110 (15A)	3	40	3,389	5,371	645	
Anthony Rossi Intermediate School	Dehumidifier	0	400	1,560	2,472	0	
Anthony Rossi Intermediate School	Exhaust Fan-110	0	50	3,389	5,371	0	
Anthony Rossi Intermediate School	Full Refrig	0	90	3,389	5,371	0	
Anthony Rossi Intermediate School	H/C Water Dispenser	3	60	3,389	5,371	967	
Anthony Rossi Intermediate School	Mini Refrig	0	50	3,389	5,371	0	
Anthony Rossi Intermediate School	Other Not Listed	0	30	3,389	5,371	0	
Anthony Rossi Intermediate School	Portable Heater	0	1440	1,560	2,472	0	
Anthony Rossi Intermediate School	Projector	4	50	3,389	5,371	1,074	
Anthony Rossi Intermediate School	Projector/Smartboard Combo	0	50	3,389	5,371	0	
Anthony Rossi Intermediate School	PTAC/Split Unit	0	300	3,389	5,371	0	
Anthony Rossi Intermediate School	Snack Vending	0	50	3,389	5,371	0	
Anthony Rossi Intermediate School	Soda Vending	0	300	3,389	5,371	0	
Anthony Rossi Intermediate School	Water Fountain	4	40	3,389	5,371	859	
Gloria M. Sabater Elementary School	AC-110 (15A)	0	750	1,560	2,472	0	22,843
Gloria M. Sabater Elementary School	AC-220 (<=20A)	0	1200	1,560	2,472	0	
Gloria M. Sabater Elementary School	Air Scrubber	21	43	3,389	5,371	4,850	
Gloria M. Sabater Elementary School	Copier-110 (15A)	10	40	3,389	5,371	2,148	
Gloria M. Sabater Elementary School	Dehumidifier	6	400	1,560	2,472	5,933	
Gloria M. Sabater Elementary School	Exhaust Fan-110	0	50	3,389	5,371	0	
Gloria M. Sabater Elementary School	Full Refrig	0	90	3,389	5,371	0	
Gloria M. Sabater Elementary School	H/C Water Dispenser	7	60	3,389	5,371	2,256	
Gloria M. Sabater Elementary School	Mini Refrig	0	50	3,389	5,371	0	
Gloria M. Sabater Elementary School	Other Not Listed	0	30	3,389	5,371	0	
Gloria M. Sabater Elementary School	Portable Heater	2	1440	1,560	2,472	7,119	
Gloria M. Sabater Elementary School	Projector	2	50	3,389	5,371	537	
Gloria M. Sabater Elementary School	Projector/Smartboard Combo	0	50	3,389	5,371	0	
Gloria M. Sabater Elementary School	PTAC/Split Unit	0	300	3,389	5,371	0	
Gloria M. Sabater Elementary School	Snack Vending	0	50	3,389	5,371	0	
Gloria M. Sabater Elementary School	Soda Vending	0	300	3,389	5,371	0	
Gloria M. Sabater Elementary School	Water Fountain	0	40	3,389	5,371	0	
D'Ippolito Elementary School	AC-110 (15A)	0	750	1,560	2,472	0	21,586
D'Ippolito Elementary School	AC-220 (<=20A)	0	1200	1,560	2,472	0	
D'Ippolito Elementary School	Air Scrubber	26	43	3,389	5,371	6,005	
D'Ippolito Elementary School	Copier-110 (15A)	6	40	3,389	5,371	1,289	
D'Ippolito Elementary School	Dehumidifier	10	400	1,560	2,472	9,888	
D'Ippolito Elementary School	Exhaust Fan-110	0	50	3,389	5,371	0	
D'Ippolito Elementary School	Full Refrig	0	90	3,389	5,371	0	
D'Ippolito Elementary School	H/C Water Dispenser	1	60	3,389	5,371	322	
D'Ippolito Elementary School	Mini Refrig	0	50	3,389	5,371	0	
D'Ippolito Elementary School	Other Not Listed	0	30	3,389	5,371	0	
D'Ippolito Elementary School	Portable Heater	0	1440	1,560	2,472	0	
D'Ippolito Elementary School	Projector	5	50	3,389	5,371	1,343	
D'Ippolito Elementary School	Projector/Smartboard Combo	0	50	3,389	5,371	0	
D'Ippolito Elementary School	PTAC/Split Unit	0	300	3,389	5,371	0	
D'Ippolito Elementary School	Snack Vending	1	50	3,389	5,371	269	
D'Ippolito Elementary School	Soda Vending	1	300	3,389	5,371	1,611	
D'Ippolito Elementary School	Water Fountain	4	40	3,389	5,371	859	

Plug Load Controls Savings

BUILDING NAME	Device Type	Quantity	Power Draw (W)	Controller Hours Scheduled ON per Year	Controller Hours Scheduled OFF per Year	Annual Energy Savings (kWh)	Total Annual Energy Savings (kWh)
Marie Durand Elementary School	AC-110 (15A)	0	750	1,560	2,472	0	3,545
Marie Durand Elementary School	AC-220 (<=20A)	0	1200	1,560	2,472	0	
Marie Durand Elementary School	Air Scrubber	0	43	3,389	5,371	0	
Marie Durand Elementary School	Copier-110 (15A)	4	40	3,389	5,371	859	
Marie Durand Elementary School	Dehumidifier	0	400	1,560	2,472	0	
Marie Durand Elementary School	Exhaust Fan-110	0	50	3,389	5,371	0	
Marie Durand Elementary School	Full Refrig	0	90	3,389	5,371	0	
Marie Durand Elementary School	H/C Water Dispenser	1	60	3,389	5,371	322	
Marie Durand Elementary School	Mini Refrig	0	50	3,389	5,371	0	
Marie Durand Elementary School	Other Not Listed	0	30	3,389	5,371	0	
Marie Durand Elementary School	Portable Heater	0	1440	1,560	2,472	0	
Marie Durand Elementary School	Projector	1	50	3,389	5,371	269	
Marie Durand Elementary School	Projector/Smartboard Combo	0	50	3,389	5,371	0	
Marie Durand Elementary School	PTAC/Split Unit	0	300	3,389	5,371	0	
Marie Durand Elementary School	Snack Vending	1	50	3,389	5,371	269	
Marie Durand Elementary School	Soda Vending	1	300	3,389	5,371	1,611	
Marie Durand Elementary School	Water Fountain	1	40	3,389	5,371	215	
Dane Barse Elementary School	AC-110 (15A)	0	750	1,560	2,472	0	11,278
Dane Barse Elementary School	AC-220 (<=20A)	0	1200	1,560	2,472	0	
Dane Barse Elementary School	Air Scrubber	2	43	3,389	5,371	462	
Dane Barse Elementary School	Copier-110 (15A)	4	40	3,389	5,371	859	
Dane Barse Elementary School	Dehumidifier	2	400	1,560	2,472	1,978	
Dane Barse Elementary School	Exhaust Fan-110	0	50	3,389	5,371	0	
Dane Barse Elementary School	Full Refrig	0	90	3,389	5,371	0	
Dane Barse Elementary School	H/C Water Dispenser	2	60	3,389	5,371	645	
Dane Barse Elementary School	Mini Refrig	0	50	3,389	5,371	0	
Dane Barse Elementary School	Other Not Listed	0	30	3,389	5,371	0	
Dane Barse Elementary School	Portable Heater	2	1440	1,560	2,472	7,119	
Dane Barse Elementary School	Projector	0	50	3,389	5,371	0	
Dane Barse Elementary School	Projector/Smartboard Combo	0	50	3,389	5,371	0	
Dane Barse Elementary School	PTAC/Split Unit	0	300	3,389	5,371	0	
Dane Barse Elementary School	Snack Vending	0	50	3,389	5,371	0	
Dane Barse Elementary School	Soda Vending	0	300	3,389	5,371	0	
Dane Barse Elementary School	Water Fountain	1	40	3,389	5,371	215	
Cunningham School	AC-110 (15A)	1	750	1,560	2,472	1,854	10,802
Cunningham School	AC-220 (<=20A)	0	1200	1,560	2,472	0	
Cunningham School	Air Scrubber	5	43	3,389	5,371	1,155	
Cunningham School	Copier-110 (15A)	2	40	3,389	5,371	430	
Cunningham School	Dehumidifier	2	400	1,560	2,472	1,978	
Cunningham School	Exhaust Fan-110	2	50	3,389	5,371	537	
Cunningham School	Full Refrig	0	90	3,389	5,371	0	
Cunningham School	H/C Water Dispenser	2	60	3,389	5,371	645	
Cunningham School	Mini Refrig	0	50	3,389	5,371	0	
Cunningham School	Other Not Listed	0	30	3,389	5,371	0	
Cunningham School	Portable Heater	1	1440	1,560	2,472	3,560	
Cunningham School	Projector	0	50	3,389	5,371	0	
Cunningham School	Projector/Smartboard Combo	0	50	3,389	5,371	0	
Cunningham School	PTAC/Split Unit	0	300	3,389	5,371	0	
Cunningham School	Snack Vending	0	50	3,389	5,371	0	
Cunningham School	Soda Vending	0	300	3,389	5,371	0	
Cunningham School	Water Fountain	3	40	3,389	5,371	645	
Landis Administrative Building	AC-110 (15A)	0	750	1,560	2,472	0	81,167
Landis Administrative Building	AC-220 (<=20A)	1	1200	1,560	2,472	2,966	
Landis Administrative Building	Air Scrubber	0	43	3,389	5,371	0	
Landis Administrative Building	Copier-110 (15A)	13	40	3,389	5,371	2,793	
Landis Administrative Building	Dehumidifier	16	400	1,560	2,472	15,821	
Landis Administrative Building	Exhaust Fan-110	0	50	3,389	5,371	0	
Landis Administrative Building	Full Refrig	0	90	3,389	5,371	0	
Landis Administrative Building	H/C Water Dispenser	5	60	3,389	5,371	1,611	
Landis Administrative Building	Mini Refrig	0	50	3,389	5,371	0	
Landis Administrative Building	Other Not Listed	3	30	3,389	5,371	483	
Landis Administrative Building	Portable Heater	16	1440	1,560	2,472	56,955	
Landis Administrative Building	Projector	0	50	3,389	5,371	0	
Landis Administrative Building	Projector/Smartboard Combo	0	50	3,389	5,371	0	
Landis Administrative Building	PTAC/Split Unit	0	300	3,389	5,371	0	
Landis Administrative Building	Snack Vending	2	50	3,389	5,371	537	
Landis Administrative Building	Soda Vending	0	300	3,389	5,371	0	
Landis Administrative Building	Water Fountain	0	40	3,389	5,371	0	

Plug Load Controls Savings

BUILDING NAME	Device Type	Quantity	Power Draw (W)	Controller Hours Scheduled ON per Year	Controller Hours Scheduled OFF per Year	Annual Energy Savings (kWh)	Total Annual Energy Savings (kWh)
Maintenance/Transportation Building	AC-110 (15A)	8	750	1,560	2,472	14,832	17,432
Maintenance/Transportation Building	AC-220 (<=20A)	0	1200	1,560	2,472	0	
Maintenance/Transportation Building	Air Scrubber	0	43	3,389	5,371	0	
Maintenance/Transportation Building	Copier-110 (15A)	3	40	3,389	5,371	645	
Maintenance/Transportation Building	Dehumidifier	1	400	1,560	2,472	989	
Maintenance/Transportation Building	Exhaust Fan-110	0	50	3,389	5,371	0	
Maintenance/Transportation Building	Full Refrig	0	90	3,389	5,371	0	
Maintenance/Transportation Building	H/C Water Dispenser	3	60	3,389	5,371	967	
Maintenance/Transportation Building	Mini Refrig	0	50	3,389	5,371	0	
Maintenance/Transportation Building	Other Not Listed	0	30	3,389	5,371	0	
Maintenance/Transportation Building	Portable Heater	0	1440	1,560	2,472	0	
Maintenance/Transportation Building	Projector	0	50	3,389	5,371	0	
Maintenance/Transportation Building	Projector/Smartboard Combo	0	50	3,389	5,371	0	
Maintenance/Transportation Building	PTAC/Split Unit	0	300	3,389	5,371	0	
Maintenance/Transportation Building	Snack Vending	0	50	3,389	5,371	0	
Maintenance/Transportation Building	Soda Vending	0	300	3,389	5,371	0	
Maintenance/Transportation Building	Water Fountain	0	40	3,389	5,371	0	
Central Warehouse	AC-110 (15A)	0	750	1,560	2,472	0	1,526
Central Warehouse	AC-220 (<=20A)	0	1200	1,560	2,472	0	
Central Warehouse	Air Scrubber	0	43	3,389	5,371	0	
Central Warehouse	Copier-110 (15A)	1	40	3,389	5,371	215	
Central Warehouse	Dehumidifier	1	400	1,560	2,472	989	
Central Warehouse	Exhaust Fan-110	0	50	3,389	5,371	0	
Central Warehouse	Full Refrig	0	90	3,389	5,371	0	
Central Warehouse	H/C Water Dispenser	1	60	3,389	5,371	322	
Central Warehouse	Mini Refrig	0	50	3,389	5,371	0	
Central Warehouse	Other Not Listed	0	30	3,389	5,371	0	
Central Warehouse	Portable Heater	0	1440	1,560	2,472	0	
Central Warehouse	Projector	0	50	3,389	5,371	0	
Central Warehouse	Projector/Smartboard Combo	0	50	3,389	5,371	0	
Central Warehouse	PTAC/Split Unit	0	300	3,389	5,371	0	
Central Warehouse	Snack Vending	0	50	3,389	5,371	0	
Central Warehouse	Soda Vending	0	300	3,389	5,371	0	
Central Warehouse	Water Fountain	0	40	3,389	5,371	0	

ECM 10 – Refrigeration Controls

Vineland Public Schools ECM Matrix

✔	ECM was evaluated
✔ (green)	ECM evaluated & included in the project

ECM #	ECM DESCRIPTION	Vineland High School North	Vineland High School South	Thomas Wallace Middle School	SGT Dominick Pilla Middle Schoool	Veterans Memorial Intermediate School	Anthony Rossi Intermediate School	Gloria M. Sabater Elementary School	D'Ippolito Elementary School	Petway Elementary School	Dr. William Mennies Elementary School	Johnstone Elementary School	Dr. John H. Winslow Elementary School	Marie Durand Elementary School	Dane Barse Elementary School	Cunningham School	Landis Administrative Building	Maintenance/Transportation Building	Central Warehouse
10	Refrigeration Controls	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔			

ETemp

Commercial refrigerators waste 20% of their energy and run 50% or more cycles than necessary trying to keep temperature constant. This is because air temperature is measured instead of food temperature. eTemp is an energy saving device for commercial refrigerators (walk-in and reach-in coolers and freezers). It is a product temperature sensor that upgrades your existing cooler's air-temp thermostats into product-temp thermostats. Since a food product's temperature change is more gradual than the surrounding air temperature, conventional refrigeration units that control to maintain an air temperature at set point can waste energy and run more cycles than necessary by causing the compressor to overreact to air temperature changes. This product mimics actual food temp so the current thermostat is monitoring related food temperature rather than the surrounding air temperature.

This product covers a wide band of thermal properties, as specified by the National Sanitation Foundation, so no food and beverage products are excluded from the applicable lists of products that can use this device. In addition, NSF performed its own separate analysis which resulted in eTemp being Certified by the NSF for food safety as per their protocols.

Artik Controls

The equipment in the walk-in coolers and freezers utilize a thermostat controlled Liquid Line Solenoid (LLS), a standard time clock for defrost, and up to ten (10) fractional horsepower 115/230 Volt A/C shaded pole fan motors. When the thermostat temperature rises above the setpoint it opens the LLS allowing refrigerant to enter the Evaporator. The Shaded Pole Fan Motors draw air across the evaporator coils allowing the heat in the air to transfer to the coil via conduction (Zeroth Law of Thermodynamics). The refrigerant removes the heat from the coil and transfers it to the condenser, releasing it into the open air. This cycle continues until the thermostat's low setpoint temperature is reached, which closes the LLS. The Standard Defrost Clock is set to place the Evaporator into defrost mode which is typically set for four defrost cycles per day each 34 minutes long to remove any build-up of ice which may occur from moisture in the air. During Defrost mode, the heater circuit energizes, allowing the heater probes to reach temperatures of up to 300℉, the fan motors are disabled, preventing the melted ice from blowing around the Walk-in. When the Standard Defrost Clock reaches the end of the 34 minutes it disables the heater probes. The systems are set to allow for a 10-minute drip time to enable the remaining moisture to be removed from the coils before the fan motors are turned back on. With temperature termination active, the ArtikControl™ WIF will disable the heating elements at the termination temperature of the coils, usually set around 90℉. The temperature is set high enough to defrost the coils and low enough to reduce energy consumption and prevent the ice from being turned into steam. The ability to properly manage the defrost temperature reduces the heat load in the walk-in freezer from prolonged defrost cycles. The reduction in heat load allows the compressor to bring down the box temperature quicker, reducing compressor run times.

ECM Calculations

Energy Savings from the installation of eTemp and Artik Controls are shown below.

eTEMP Savings							
BUILDING NAME	Type	DCO Guaranteed Devices	Baseline Energ Use (kWh)	% Energy Reduction	Savings pe Unit (kWh)	Energy Savings (kWh)	Total Energy Savings (kWh)
Vineland High School North	Walk-in Cooler	0	21,000	20.7%	4,347	0	
Vineland High School North	Walk-in Freezer	0	25,000	20.7%	5,175	0	
Vineland High School North	Reach-in Cooler - 1 door	0	7,500	20.7%	1,553	0	
Vineland High School North	Reach-in Cooler - 2 door	2	9,000	20.7%	1,863	3,726	
Vineland High School North	Reach-in Cooler - 3 door	1	10,000	20.7%	2,070	2,070	5,796
Vineland High School North	Reach-in Coller - 4 door	0	11,000	20.7%	2,277	0	
Vineland High School North	Reach-in Freezer - 1 door	0	10,000	20.7%	2,070	0	
Vineland High School North	Reach-in Freezer - 2 door	0	12,000	20.7%	2,484	0	
Vineland High School North	Reach-in Freezer - 3 door	0	14,000	20.7%	2,898	0	
Vineland High School South	Walk-in Cooler	0	21,000	20.7%	4,347	0	
Vineland High School South	Walk-in Freezer	0	25,000	20.7%	5,175	0	
Vineland High School South	Reach-in Cooler - 1 door	0	7,500	20.7%	1,553	0	
Vineland High School South	Reach-in Cooler - 2 door	7	9,000	20.7%	1,863	13,041	
Vineland High School South	Reach-in Cooler - 3 door	0	10,000	20.7%	2,070	0	13,041
Vineland High School South	Reach-in Coller - 4 door	0	11,000	20.7%	2,277	0	
Vineland High School South	Reach-in Freezer - 1 door	0	10,000	20.7%	2,070	0	
Vineland High School South	Reach-in Freezer - 2 door	0	12,000	20.7%	2,484	0	
Vineland High School South	Reach-in Freezer - 3 door	0	14,000	20.7%	2,898	0	
Thomas Wallace Middle School	Walk-in Cooler	6	21,000	20.7%	4,347	26,082	
Thomas Wallace Middle School	Walk-in Freezer	2	25,000	20.7%	5,175	10,350	
Thomas Wallace Middle School	Reach-in Cooler - 1 door	0	7,500	20.7%	1,553	0	
Thomas Wallace Middle School	Reach-in Cooler - 2 door	1	9,000	20.7%	1,863	1,863	
Thomas Wallace Middle School	Reach-in Cooler - 3 door	0	10,000	20.7%	2,070	0	38,295
Thomas Wallace Middle School	Reach-in Coller - 4 door	0	11,000	20.7%	2,277	0	
Thomas Wallace Middle School	Reach-in Freezer - 1 door	0	10,000	20.7%	2,070	0	
Thomas Wallace Middle School	Reach-in Freezer - 2 door	0	12,000	20.7%	2,484	0	
Thomas Wallace Middle School	Reach-in Freezer - 3 door	0	14,000	20.7%	2,898	0	
SGT Dominick Pilla Middle Schoool	Walk-in Cooler	0	21,000	20.7%	4,347	0	
SGT Dominick Pilla Middle Schoool	Walk-in Freezer	0	25,000	20.7%	5,175	0	
SGT Dominick Pilla Middle Schoool	Reach-in Cooler - 1 door	0	7,500	20.7%	1,553	0	
SGT Dominick Pilla Middle Schoool	Reach-in Cooler - 2 door	2	9,000	20.7%	1,863	3,726	
SGT Dominick Pilla Middle Schoool	Reach-in Cooler - 3 door	0	10,000	20.7%	2,070	0	5,796
SGT Dominick Pilla Middle Schoool	Reach-in Coller - 4 door	0	11,000	20.7%	2,277	0	
SGT Dominick Pilla Middle Schoool	Reach-in Freezer - 1 door	1	10,000	20.7%	2,070	2,070	
SGT Dominick Pilla Middle Schoool	Reach-in Freezer - 2 door	0	12,000	20.7%	2,484	0	
SGT Dominick Pilla Middle Schoool	Reach-in Freezer - 3 door	0	14,000	20.7%	2,898	0	
Veterans Memorial Intermediate School	Walk-in Cooler	1	21,000	20.7%	4,347	4,347	
Veterans Memorial Intermediate School	Walk-in Freezer	1	25,000	20.7%	5,175	5,175	
Veterans Memorial Intermediate School	Reach-in Cooler - 1 door	1	7,500	20.7%	1,553	1,553	
Veterans Memorial Intermediate School	Reach-in Cooler - 2 door	1	9,000	20.7%	1,863	1,863	
Veterans Memorial Intermediate School	Reach-in Cooler - 3 door	0	10,000	20.7%	2,070	0	12,938
Veterans Memorial Intermediate School	Reach-in Coller - 4 door	0	11,000	20.7%	2,277	0	
Veterans Memorial Intermediate School	Reach-in Freezer - 1 door	0	10,000	20.7%	2,070	0	
Veterans Memorial Intermediate School	Reach-in Freezer - 2 door	0	12,000	20.7%	2,484	0	
Veterans Memorial Intermediate School	Reach-in Freezer - 3 door	0	14,000	20.7%	2,898	0	
Anthony Rossi Intermediate School	Walk-in Cooler	1	21,000	20.7%	4,347	4,347	
Anthony Rossi Intermediate School	Walk-in Freezer	1	25,000	20.7%	5,175	5,175	
Anthony Rossi Intermediate School	Reach-in Cooler - 1 door	2	7,500	20.7%	1,553	3,105	
Anthony Rossi Intermediate School	Reach-in Cooler - 2 door	0	9,000	20.7%	1,863	0	
Anthony Rossi Intermediate School	Reach-in Cooler - 3 door	0	10,000	20.7%	2,070	0	12,627
Anthony Rossi Intermediate School	Reach-in Coller - 4 door	0	11,000	20.7%	2,277	0	
Anthony Rossi Intermediate School	Reach-in Freezer - 1 door	0	10,000	20.7%	2,070	0	
Anthony Rossi Intermediate School	Reach-in Freezer - 2 door	0	12,000	20.7%	2,484	0	
Anthony Rossi Intermediate School	Reach-in Freezer - 3 door	0	14,000	20.7%	2,898	0	
Gloria M. Sabater Elementary School	Walk-in Cooler	0	21,000	20.7%	4,347	0	
Gloria M. Sabater Elementary School	Walk-in Freezer	0	25,000	20.7%	5,175	0	
Gloria M. Sabater Elementary School	Reach-in Cooler - 1 door	2	7,500	20.7%	1,553	3,105	
Gloria M. Sabater Elementary School	Reach-in Cooler - 2 door	0	9,000	20.7%	1,863	0	
Gloria M. Sabater Elementary School	Reach-in Cooler - 3 door	1	10,000	20.7%	2,070	2,070	5,175
Gloria M. Sabater Elementary School	Reach-in Coller - 4 door	0	11,000	20.7%	2,277	0	
Gloria M. Sabater Elementary School	Reach-in Freezer - 1 door	0	10,000	20.7%	2,070	0	
Gloria M. Sabater Elementary School	Reach-in Freezer - 2 door	0	12,000	20.7%	2,484	0	
Gloria M. Sabater Elementary School	Reach-in Freezer - 3 door	0	14,000	20.7%	2,898	0	

eTEMP Savings

BUILDING NAME	Type	DCO Guaranteed Devices	Baseline Energ Use (kWh)	% Energy Reduction	Savings pe Unit (kWh)	Energy Savings (kWh)	Total Energy Savings (kWh)
D'Ippolito Elementary School	Walk-in Cooler	0	21,000	20.7%	4,347	0	
D'Ippolito Elementary School	Walk-in Freezer	0	25,000	20.7%	5,175	0	
D'Ippolito Elementary School	Reach-in Cooler - 1 door	3	7,500	20.7%	1,553	4,658	
D'Ippolito Elementary School	Reach-in Cooler - 2 door	0	9,000	20.7%	1,863	0	
D'Ippolito Elementary School	Reach-in Cooler - 3 door	1	10,000	20.7%	2,070	2,070	6,728
D'Ippolito Elementary School	Reach-in Coller - 4 door	0	11,000	20.7%	2,277	0	
D'Ippolito Elementary School	Reach-in Freezer - 1 door	0	10,000	20.7%	2,070	0	
D'Ippolito Elementary School	Reach-in Freezer - 2 door	0	12,000	20.7%	2,484	0	
D'Ippolito Elementary School	Reach-in Freezer - 3 door	0	14,000	20.7%	2,898	0	
Petway Elementary School	Walk-in Cooler	1	21,000	20.7%	4,347	4,347	
Petway Elementary School	Walk-in Freezer	1	25,000	20.7%	5,175	5,175	
Petway Elementary School	Reach-in Cooler - 1 door	2	7,500	20.7%	1,553	3,105	
Petway Elementary School	Reach-in Cooler - 2 door	0	9,000	20.7%	1,863	0	
Petway Elementary School	Reach-in Cooler - 3 door	0	10,000	20.7%	2,070	0	12,627
Petway Elementary School	Reach-in Coller - 4 door	0	11,000	20.7%	2,277	0	
Petway Elementary School	Reach-in Freezer - 1 door	0	10,000	20.7%	2,070	0	
Petway Elementary School	Reach-in Freezer - 2 door	0	12,000	20.7%	2,484	0	
Petway Elementary School	Reach-in Freezer - 3 door	0	14,000	20.7%	2,898	0	
Dr. William Mennies Elementary School	Walk-in Cooler	0	21,000	20.7%	4,347	0	
Dr. William Mennies Elementary School	Walk-in Freezer	0	25,000	20.7%	5,175	0	
Dr. William Mennies Elementary School	Reach-in Cooler - 1 door	4	7,500	20.7%	1,553	6,210	
Dr. William Mennies Elementary School	Reach-in Cooler - 2 door	0	9,000	20.7%	1,863	0	
Dr. William Mennies Elementary School	Reach-in Cooler - 3 door	0	10,000	20.7%	2,070	0	6,210
Dr. William Mennies Elementary School	Reach-in Coller - 4 door	0	11,000	20.7%	2,277	0	
Dr. William Mennies Elementary School	Reach-in Freezer - 1 door	0	10,000	20.7%	2,070	0	
Dr. William Mennies Elementary School	Reach-in Freezer - 2 door	0	12,000	20.7%	2,484	0	
Dr. William Mennies Elementary School	Reach-in Freezer - 3 door	0	14,000	20.7%	2,898	0	
Johnstone Elementary School	Walk-in Cooler	1	21,000	20.7%	4,347	4,347	
Johnstone Elementary School	Walk-in Freezer	1	25,000	20.7%	5,175	5,175	
Johnstone Elementary School	Reach-in Cooler - 1 door	1	7,500	20.7%	1,553	1,553	
Johnstone Elementary School	Reach-in Cooler - 2 door	0	9,000	20.7%	1,863	0	
Johnstone Elementary School	Reach-in Cooler - 3 door	0	10,000	20.7%	2,070	0	11,075
Johnstone Elementary School	Reach-in Coller - 4 door	0	11,000	20.7%	2,277	0	
Johnstone Elementary School	Reach-in Freezer - 1 door	0	10,000	20.7%	2,070	0	
Johnstone Elementary School	Reach-in Freezer - 2 door	0	12,000	20.7%	2,484	0	
Johnstone Elementary School	Reach-in Freezer - 3 door	0	14,000	20.7%	2,898	0	
Dr. John H. Winslow Elementary School	Walk-in Cooler	0	21,000	20.7%	4,347	0	
Dr. John H. Winslow Elementary School	Walk-in Freezer	0	25,000	20.7%	5,175	0	
Dr. John H. Winslow Elementary School	Reach-in Cooler - 1 door	3	7,500	20.7%	1,553	4,658	
Dr. John H. Winslow Elementary School	Reach-in Cooler - 2 door	0	9,000	20.7%	1,863	0	
Dr. John H. Winslow Elementary School	Reach-in Cooler - 3 door	1	10,000	20.7%	2,070	2,070	6,728
Dr. John H. Winslow Elementary School	Reach-in Coller - 4 door	0	11,000	20.7%	2,277	0	
Dr. John H. Winslow Elementary School	Reach-in Freezer - 1 door	0	10,000	20.7%	2,070	0	
Dr. John H. Winslow Elementary School	Reach-in Freezer - 2 door	0	12,000	20.7%	2,484	0	
Dr. John H. Winslow Elementary School	Reach-in Freezer - 3 door	0	14,000	20.7%	2,898	0	
Marie Durand Elementary School	Walk-in Cooler	1	21,000	20.7%	4,347	4,347	
Marie Durand Elementary School	Walk-in Freezer	1	25,000	20.7%	5,175	5,175	
Marie Durand Elementary School	Reach-in Cooler - 1 door	3	7,500	20.7%	1,553	4,658	
Marie Durand Elementary School	Reach-in Cooler - 2 door	0	9,000	20.7%	1,863	0	
Marie Durand Elementary School	Reach-in Cooler - 3 door	0	10,000	20.7%	2,070	0	14,180
Marie Durand Elementary School	Reach-in Coller - 4 door	0	11,000	20.7%	2,277	0	
Marie Durand Elementary School	Reach-in Freezer - 1 door	0	10,000	20.7%	2,070	0	
Marie Durand Elementary School	Reach-in Freezer - 2 door	0	12,000	20.7%	2,484	0	
Marie Durand Elementary School	Reach-in Freezer - 3 door	0	14,000	20.7%	2,898	0	
Dane Barse Elementary School	Walk-in Cooler	0	21,000	20.7%	4,347	0	
Dane Barse Elementary School	Walk-in Freezer	0	25,000	20.7%	5,175	0	
Dane Barse Elementary School	Reach-in Cooler - 1 door	3	7,500	20.7%	1,553	4,658	
Dane Barse Elementary School	Reach-in Cooler - 2 door	1	9,000	20.7%	1,863	1,863	
Dane Barse Elementary School	Reach-in Cooler - 3 door	1	10,000	20.7%	2,070	2,070	11,489
Dane Barse Elementary School	Reach-in Coller - 4 door	0	11,000	20.7%	2,277	0	
Dane Barse Elementary School	Reach-in Freezer - 1 door	0	10,000	20.7%	2,070	0	
Dane Barse Elementary School	Reach-in Freezer - 2 door	0	12,000	20.7%	2,484	0	
Dane Barse Elementary School	Reach-in Freezer - 3 door	1	14,000	20.7%	2,898	2,898	
Cunningham School	Walk-in Cooler	0	21,000	20.7%	4,347	0	
Cunningham School	Walk-in Freezer	0	25,000	20.7%	5,175	0	
Cunningham School	Reach-in Cooler - 1 door	1	7,500	20.7%	1,553	1,553	
Cunningham School	Reach-in Cooler - 2 door	1	9,000	20.7%	1,863	1,863	
Cunningham School	Reach-in Cooler - 3 door	0	10,000	20.7%	2,070	0	5,486
Cunningham School	Reach-in Coller - 4 door	0	11,000	20.7%	2,277	0	
Cunningham School	Reach-in Freezer - 1 door	1	10,000	20.7%	2,070	2,070	
Cunningham School	Reach-in Freezer - 2 door	0	12,000	20.7%	2,484	0	
Cunningham School	Reach-in Freezer - 3 door	0	14,000	20.7%	2,898	0	

Artik Control Savings

Location	Cooler or Freezer	Control Proposed	Motor Qty	Existing motor type	Existing motor	HP	Proposed Motor Style
Dr. William Mennies Elementary School	Walk in Freezer	WIF	2.00	Shaded Pole	1/20 hp, 208V	1/20	EC2S
Dr. William Mennies Elementary School	Walk in cooler	FSC	1.00	Shaded Pole	1/15 hp, 115V	1/15	EC2S
SGT Dominick Pilla Middle Schoool	Walk in cooler	FSC	2.00	Shaded Pole	1/20 hp, 115V	1/20	EC2S
SGT Dominick Pilla Middle Schoool	Walk in Freezer	WIF	2.00	Shaded Pole	1/15 hp, 208V	1/15	EC2S
Dr. John H. Winslow Elementary School	Walk in Freezer	WIF	2.00	Shaded Pole	1/15 hp, 208V	1/15	EC2S
Dr. John H. Winslow Elementary School	Walk in cooler	FSC	1.00	Shaded Pole	1/15 hp, 115V	1/15	EC2S
D'Ippolito Elementary School	Walk in cooler	FSC	1.00	Shaded Pole	1/15 hp, 115V	1/15	EC2S
D'Ippolito Elementary School	Walk in Freezer	WIF	2.00	Shaded Pole	1/15 hp, 208V	1/15	EC2S
Gloria M. Sabater Elementary School	Walk in cooler	FSC	2.00	Shaded Pole	1/15 hp, 115V	1/15	EC2S
Gloria M. Sabater Elementary School	Walk in Freezer	WIF	1.00	Shaded Pole	1/15 hp, 208V	1/15	EC2S
Anthony Rossi Intermediate School	Walk in Cooler	FSC	1.00	Shaded pole	1/15 hp, 115V	1/15	EC2S
Anthony Rossi Intermediate School	Walk in Freezer	WIF	1.00	shaded pole	1/15 hp, 208V	1/15	EC2S
Petway Elementary School	Walk in cooler	FSC	2.00	shaded pole	1/15 hp, 115V	1/15	EC2S
Petway Elementary School	Walk in Freezer	WIF	2.00	shaded pole	1/15 hp, 208V	1/15	EC2S
Vineland High School North	Walk in cooler	FSC	3.00	shaded pole	1/15 hp, 115V	1/15	EC2S
Vineland High School North	Walk in Freezer	WIF	2.00	shaded pole	1/20 hp, 208V	1/20	EC2S
Thomas Wallace Middle School	Walk in cooler	FSC	2.00	shaded pole	1/20 hp, 115V	1/20	EC2S
Vineland High School South	Walk in cooler	FSC	1.00	shaded pole	1/15 hp, 115V	1/15	EC2S
Thomas Wallace Middle School	Walk in freezer	WIF	3.00	shaded pole	1/15 hp, 208V	1/15	EC2S
Vineland High School South	Walk in freezer	WIF	3.00	shaded pole	1/20 hp, 208V	1/20	EC2S

Artik Control Savings

Location	Cooler or Freezer	Proposed Motor Style	Constant	Eff_B	Eff_Q	LF	Equipment Type	IF_e	Pre-Retrofit kW_b	Post-Retrofit kW_q	$\%On_b$	$\%On_q$	kWh_b	kWh_q	kWh Savings	Kw Savings
Dr. William Mennies Elementary School	Walk in Freezer	EC2S	0.746	30%	70%	0.90	SP Base, Freezer	1.76	0.224	0.096	0.978	0.692	2866.06	869.11	1996.94	0.02
Dr. William Mennies Elementary School	Walk in cooler	EC2S	0.746	30%	70%	0.90	SP Base, Cooler	1.38	0.15	0.06	0.978	0.692	1498.17	454.31	1043.86	0.01
SGT Dominick Pilla Middle Schoool	Walk in cooler	EC2S	0.746	30%	70%	0.90	SP Base, Cooler	1.38	0.22	0.10	0.978	0.692	2247.25	681.46	1565.79	0.02
SGT Dominick Pilla Middle Schoool	Walk in Freezer	EC2S	0.746	30%	70%	0.90	SP Base, Freezer	1.76	0.30	0.13	0.978	0.692	3821.41	1158.81	2662.59	0.03
Dr. John H. Winslow Elementary School	Walk in Freezer	EC2S	0.746	30%	70%	0.90	SP Base, Freezer	1.76	0.30	0.13	0.978	0.692	3821.41	1158.81	2662.59	0.03
Dr. John H. Winslow Elementary School	Walk in cooler	EC2S	0.746	30%	70%	0.90	SP Base, Cooler	1.38	0.15	0.06	0.978	0.692	1498.17	454.31	1043.86	0.01
D'Ippolito Elementary School	Walk in cooler	EC2S	0.746	30%	70%	0.90	SP Base, Cooler	1.38	0.15	0.06	0.978	0.692	1498.17	454.31	1043.86	0.01
D'Ippolito Elementary School	Walk in Freezer	EC2S	0.746	30%	70%	0.90	SP Base, Freezer	1.76	0.30	0.13	0.978	0.692	3821.41	1158.81	2662.59	0.03
Gloria M. Sabater Elementary School	Walk in cooler	EC2S	0.746	30%	70%	0.90	SP Base, Cooler	1.38	0.30	0.13	0.978	0.692	2996.33	908.62	2087.71	0.02
Gloria M. Sabater Elementary School	Walk in Freezer	EC2S	0.746	30%	70%	0.90	SP Base, Freezer	1.76	0.15	0.06	0.978	0.692	1910.70	579.41	1331.30	0.01
Anthony Rossi Intermediate School	Walk in Cooler	EC2S	0.746	30%	70%	0.90	SP Base, Cooler	1.38	0.15	0.06	0.978	0.692	1498.17	454.31	1043.86	0.01
Anthony Rossi Intermediate School	Walk in Freezer	EC2S	0.746	30%	70%	0.90	SP Base, Freezer	1.76	0.15	0.06	0.978	0.692	1910.70	579.41	1331.30	0.01
Petway Elementary School	Walk in cooler	EC2S	0.746	30%	70%	0.90	SP Base, Cooler	1.38	0.30	0.13	0.978	0.692	2996.33	908.62	2087.71	0.02
Petway Elementary School	Walk in Freezer	EC2S	0.746	30%	70%	0.90	SP Base, Freezer	1.76	0.30	0.13	0.978	0.692	3821.41	1158.81	2662.59	0.03
Vineland High School North	Walk in cooler	EC2S	0.746	30%	70%	0.90	SP Base, Cooler	1.38	0.45	0.19	0.978	0.692	4494.50	1362.92	3131.57	0.03
Vineland High School North	Walk in Freezer	EC2S	0.746	30%	70%	0.90	SP Base, Freezer	1.76	0.22	0.10	0.978	0.692	2866.06	869.11	1996.94	0.02
Thomas Wallace Middle School	Walk in cooler	EC2S	0.746	30%	70%	0.90	SP Base, Cooler	1.38	0.22	0.10	0.978	0.692	2247.25	681.46	1565.79	0.02
Vineland High School South	Walk in cooler	EC2S	0.746	30%	70%	0.90	SP Base, Cooler	1.38	0.15	0.06	0.978	0.692	1498.17	454.31	1043.86	0.01
Thomas Wallace Middle School	Walk in freezer	EC2S	0.746	30%	70%	0.90	SP Base, Freezer	1.76	0.45	0.19	0.978	0.692	5732.11	1738.22	3993.89	0.04
Vineland High School South	Walk in freezer	EC2S	0.746	30%	70%	0.90	SP Base, Freezer	1.76	0.34	0.14	0.978	0.692	4299.08	1303.67	2995.42	0.03

Annual Energy Savings Algorithms

Annual Electric Energy Savings

$$\Delta kWh = kW \times (\%ON_b - \%ON_q) \times Hrs \times IF_e$$

Where,

$$kW = HP \times LF \times 0.746/\eta$$

Annual Fuel Savings

$$\Delta Therms = N/A$$

Peak Demand Savings

$$\Delta kW_{Peak} = \frac{\Delta kWh}{Hrs} \times CF$$

Daily Peak Fuel Savings

$$\Delta Therms_{Peak} = N/A$$

Lifetime Energy Savings Algorithms

Lifetime Electric Energy Savings

$$\Delta kWh_{Life} = \Delta kWh \times EUL$$

Lifetime Fuel Savings

$$\Delta Therms_{Life} = N/A$$

Dual:

Lifetime Electric Energy Savings

$$\Delta kWh_{Life} = \Delta kWh_{EREP} \times RUL + \Delta kWh_{NR} \times EUL$$

Lifetime Fuel Savings

$$\Delta Therms_{Life} = \text{N/A}$$

Calculation Parameters

Table 3-303 Calculation Parameters

Variable	Description	Value	Units	Ref
ΔkWh	Annual electric energy savings	Calculated	kWh/yr	
ΔkW_{Peak}	Peak Demand Savings	Calculated	kW	
ΔkWh_{Life}	Lifetime electric energy savings	Calculated	kWh	
kW	Input wattage of the SP, PSC or ECM motor	Site-specific, if unknown calculated	kW	
0.746	Conversion factor	0.746	kW/HP	[148]
LF	Load Factor - Ratio between the actual load and the rated load.	Site-specific, if unknown use 0.9	N/A	[148]
HP	Horsepower of SP, PSC or ECM motor	Site-specific	HP	
η	Motor efficiency of the SP, PSC or ECM motor	SP: 30% PSC: 60% ECM: 70%		[149]
$\%ON_b$	Effective runtime of the uncontrolled motor	Site-specific, if unknown use 97.8%	N/A	[146]
$\%ON_q$	Effective runtime of the controlled motor	Site-specific, if unknown look up in Table 3-304	N/A	[146]
IF_e	Interactive effects factor for energy to account for cooling savings from offset refrigeration load	Look up in Table 3-305	N/A	[146]
CF	Electric coincidence factor	Look up in Table 3-306	N/A	[146]
Hrs	Hours of operation	8,760	Hrs	
EUL	Effective useful life	See Measure Life Section	Years	

Table 3-304 Effective run time of controlled motors

Control Type	Value	Ref
ON/OFF style controls	63.6%	[146]
Multi-speed style controls	69.2%	[146]

Table 3-305 Interactive Effects Factor for Energy[135]

System Type	IF_e Value	Ref
Cooler or Refrigerator	1.38	[146]
Freezer	1.76	[146]

Coincidence Factor

Table 3-306 Coincidence Factors[136]

Control Type	CF Value	Ref
ON/OFF control style	0.087	[146]
Micropulse control style	0.102	[146]
Unknown control style	0.094	[146]

ECM 11 – Retro-commissioning

Vineland Public Schools
ECM Matrix

✓	ECM was evaluated
✓	ECM evaluated & included in the project

ECM #	ECM DESCRIPTION	Vineland High School North	Vineland High School South	Thomas Wallace Middle School	SGT Dominick Pilla Middle Schoool	Veterans Memorial Intermediate School	Anthony Rossi Intermediate School	Gloria M. Sabater Elementary School	D'Ippolito Elementary School	Petway Elementary School	Dr. William Mennies Elementary School	Johnstone Elementary School	Dr. John H. Winslow Elementary School	Marie Durand Elementary School	Dane Barse Elementary School	Cunningham School	Landis Administrative Building	Maintenance/Transportation Building	Central Warehouse
11	Retro-Commissioning	✓				✓	✓		✓			✓			✓	✓	✓		

Due to the complexity of today's HVAC systems and controls, it is likely for systems to be operating incorrectly or not as efficiently as they could be. Retro-commissioning studies reveal hidden deficiencies and highlight operational & maintenance (O&M) issues that could have been avoided as well as expose hidden control system problems. There are valuable benefits to retro-commissioning in existing buildings. It is a detailed and specialized process that reviews how an HVAC system is controlled and designed to operate. Applying retro-commissioning to existing facilities includes planning, discovering root causes of inefficiencies, development of cost-effective project delivery and a focus on optimizing value to the building owner. The study includes functional system testing under various modes, such as heating or cooling loads, occupied and unoccupied modes, varying outside air temperature and space temperatures.

This is a systematic process to ensure that the building energy systems perform interactively according to the original design intent and the current operational needs of the facility. Retro-commissioning is a common practice recommended by the American Society of Heating Refrigeration and Energy (ASHRAE) to be revisited every couple of years. We recommend that an engineering firm who specializes in energy control systems and retro-commissioning be contacted for a detailed evaluation and implementation costs. Facility operations personnel would work with the engineers to develop goals and objectives. During on-site testing, the qualified personnel conducting the study would immediately make any no/low-cost improvements as identified. Furthermore, if there are any suggested corrective actions which require the purchase of material, a contractor who specializes in that scope of work would be contacted to implement the remaining improvements. DCO Energy is budgeting $117,000 for on-site testing and to resolve district building system deficiencies.

Energy Savings Calculations

According to a Lawrence Berkeley National Laboratory study, *The Cost-Effectiveness of Commercial Buildings Commissioning*, "For existing buildings… whole-building energy savings of 15 percent, and payback times of 0.7 years." Savings are conservatively estimated to be 4% of existing site electric and 2% of the existing natural gas use:

Retro-Commissioning Savings		
BUILDING	kWh SAVINGS	THERMS SAVINGS
Vineland High School North	92,383	749
Veterans Memorial Intermediate School	63,094	1,193
Anthony Rossi Intermediate School	41,394	
D'Ippolito Elementary School	43,025	
Johnstone Elementary School	28,685	505
Cunningham School	12,045	152
Landis Administrative Building	28,183	469

kWh % SAVINGS	THERMS % SAVINGS
4.0%	2.0%

ECM 12 – Combined Heat & Power

Vineland Public Schools ECM Matrix

✔	ECM was evaluated
✔	ECM evaluated & included in the project

ECM #	ECM DESCRIPTION	Vineland High School North	Vineland High School South	Thomas Wallace Middle School	SGT Dominick Pilla Middle Schoool	Veterans Memorial Intermediate School	Anthony Rossi Intermediate School	Gloria M. Sabater Elementary School	D'Ippolito Elementary School	Petway Elementary School	Dr. William Mennies Elementary School	Johnstone Elementary School	Dr. John H. Winslow Elementary School	Marie Durand Elementary School	Dane Barse Elementary School	Cunningham School	Landis Administrative Building	Maintenance/Transportation Building	Central Warehouse
12	Combined Heating & Power	✔	✔																

CHP offers energy and environmental benefits over electric-only and thermal-only systems in both central and distributed power generation applications. CHP systems have the potential for a wide range of applications and the higher efficiencies result in lower emissions than separate heat and power generation.

4.4kW Axiom CHP

The simultaneous production of useful thermal and electrical energy in CHP systems leads to increased fuel efficiency. CHP units can be strategically located at the point of energy use. Such onsite generation avoids the transmission and distribution losses associated with electricity purchased via the grid from central stations. CHP is versatile and can be coupled with existing and planned technologies for many different applications in the industrial, commercial, and residential sectors.

Scope of Work

- Obtain all necessary permits required by local authorities.
- Ensure the installation plan complies with local building codes, fire codes, and safety standards.
- Apply for the Interconnection application (if required).
- Furnish and install a new 4.4 KW CHP and 120-gallon buffer tank.
- Furnish and install HW supply piping, HW return piping, mixing valve, and circulation pump per manufacturer's installation manual.
- Provide concrete housekeeping pads for CHP Equipment
- Connect CHP CW line to existing building CW line.
- Connect CHP HW line to existing building domestic HWR.
- Furnish and install gas piping to the new CHP.
- Furnish and install exhaust venting pipe to exterior of building and terminate with a gooseneck.
- Furnish and install combustion air intake pipe and terminate with galvanized wire mesh screen.
- Insulate newly installed piping where applicable.
- Furnish and install all electrical power and control wiring.
- Perform system start-up and testing
- Remove all debris and old equipment from the site.
- Support system commissioning and testing.
- Provide DCO Energy with all manuals, warranty information, and a detailed report on the installation process, including any modifications made to existing systems.
- Provide Owner training for new equipment and systems.

ECM Calculations

The CHP will act as the first stage of heating for the domestic water heating re-circulation loop. The CHP is estimated to run at full load for over 3,800 hours per year.. The installed CHP will be available year-round and will operate when adequate heating load exists. If necessary, heat can be rejected through a radiator when the full heating load is not required.

CHP Input Data		
Number of units	1	
Electrical output	4.4	kW
Thermal output	42,000	BTU/hr
Gas input (HHV)	65,000	Btu/hr
Overall efficiency	87.7%	

Runtime Analysis	
Run hours	3,870

		Fuel Usage Without CHP		4.4 kW Cogen Plant Thermal Operation						
Month	Days	Total Building Gas Natural Use	Existing DHW Efficiency	Combined Cogen Run Hours	% Heat Load Displaced by CHP	Utilized Cogen Heat Therms	Max Cogen Heat Therms	Avoided DHW Gas Therms	Full Load Run Hours	System Operating Efficiency
Jan	31	9,412	90.0%	365	2%	153	153	170	365	88%
Feb	28	7,757	90.0%	330	2%	138	138	154	330	88%
Mar	31	4,652	90.0%	365	4%	153	153	170	365	88%
Apr	30	1,291	90.0%	353	13%	148	148	165	353	88%
May	31	795	90.0%	312	18%	131	131	145	312	88%
Jun	30	298	90.0%	246	38%	103	103	115	246	88%
Jul	31	298	90.0%	258	40%	108	108	120	258	88%
Aug	31	278	90.0%	258	43%	108	108	120	258	88%
Sep	30	700	90.0%	299	20%	126	126	140	299	88%
Oct	31	1,739	90.0%	365	10%	153	153	170	365	88%
Nov	30	6,136	90.0%	353	3%	148	148	165	353	88%
Dec	31	7,221	90.0%	365	2%	153	153	170	365	88%
Total:	365	40,577		3,870	4.5%	1,625	1,625	1,806	3,870	88%

		Fuel Usage With CHP			Electric Savings With CHP			
Month	Days	Supplemental DHW Gas Therms	Cogen Gas Therms	Total Gas	Run Hours	Avg Cogen Plant kW Output	kW Demand Savings	Cogen Electric Generation kWh
Jan	31	9,241	237	9,479	365	4	4	1,607
Feb	28	7,603	214	7,817	330	4	4	1,450
Mar	31	4,481	237	4,719	365	4	4	1,607
Apr	30	1,127	229	1,356	353	4	4	1,553
May	31	649	203	852	312	4	4	1,372
Jun	30	184	160	343	246	4	4	1,082
Jul	31	178	168	346	258	4	4	1,136
Aug	31	157	168	325	258	4	4	1,136
Sep	30	561	195	755	299	4	4	1,317
Oct	31	1,569	237	1,806	365	4	4	1,607
Nov	30	5,971	229	6,201	353	4	4	1,553
Dec	31	7,050	237	7,288	365	4	4	1,607
Total:	365	38,771	2,516	41,287	3,870		4	17,028

Combined Heat & Power Emission Reduction										
BUILDING	kW	Equivalent Full Load Electric Hours	NET GENERATION MWh	FUEL INPUT MMBTU	ELECTRIC SAVINGS FROM HEAT RECOVERY	FOSSIL FUEL SAVINGS FROM HEAT RECOVERY	CO2 EF ELECTRIC	CO2 EF CHP	CO2 EF GAS	CO2 EMISSION REDUCTION LBS
Vineland High School South	4.4	3,870	17.0	251.6	0	180.6	1,292.0	1,728.4	117.0	13,699.0

Combined Heat & Power Emission Reduction									
BUILDING	NOx EF ELECTRIC	NOx EF CHP	NOx EF GAS	NOx EMISSION REDUCTION LBS	SO2 EF ELECTRIC	SO2 EF CHP	SO2 EMISSION REDUCTION LBS	Hg EF ELECTRIC	Hg EMISSION REDUCTION LBS
Vineland High School South	0.83	1.36	0.092	7.6	0.67	0.00	11.4	0.67	0.0

Combined Heat & Power Emission Reduction								
BUILDING	CHP Gas Input (therms)	Pre-CHP DWH Gas Use (therms)	Post CHP DWH Gas Use (therms)	DWH Gas Savings (therms)	Net Building Gas Savings (therms)	DWH Efficiency	CHP Heat Recovered (MMBTU)	CHP Overall Efficiency
Vineland High School South	2,516	40,577	38,771	1,806	-710	90%	163	88%

The NJ Protocol is to follow the National Renewable Energy Laboratory's Combined Heat and Power, The Uniform Methods Project: Methods for Determining Energy-Efficiency Savings for Specific Measures [1]. The product should be all of the below outputs, as applicable:

a. Annual energy input to the generator, HHV basis (MMBtu/yr)
b. Annual electricity generated, net of all parasitic loads (kWh/yr)
c. Annual fossil fuel energy savings from heat recovery (MMBtu/yr)
d. Annual electric energy savings from heat recovery, including absorption chiller sourced savings if chiller installation is included as part of the system installation (kWh/yr)
e. Annual overall CHP fuel conversion efficiency, HHV basis (%)
f. Annual electric conversion efficiency, net of parasitics, HHV basis (%)

CHP Emissions Reduction Associated with PJM Grid

(Assuming that the useful thermal output will displace natural gas)

Algorithms

CO_2 ER (lbs) = (CO_2 EF_{elec} – CO_2 EF_{CHP}) * Net Electricity Generation (MWh) + CO_2 EF_{elec} * Electric Energy Savings (MWh) + CO_2 EF_{NG} * Gas Energy Savings (MMBtu) * 10

NO_x ER (tons) = (NO_x EF_{elec} – NO_x EF_{CHP}) * Net Electricity Generation (MWh) + NO_x EF_{elec} * Electric Energy Savings (MWh) + NO_x EF_{NG} * Gas Energy Savings (MMBtu) * 10

SO_2 ER (lbs) = (SO_2 EF_{elec} – SO_2 EF_{CHP}) * Net Electricity Generation (MWh) + SO_2 EF_{elec} * Electric Energy Savings (MWh)

Hg (grams) = (Electric Energy Savings (MWh) * Hg EF_{elec})/1,000

Definition of Variables

CO_2 EF_{elec} = CO_2 Electric Emissions Factor – see emissions tables summarized in Introduction section of Protocols

NO_x EF_{elec} = NO_x Electric Emissions Factor – see emissions tables summarized in Introduction section of Protocols

SO_2 EF_{elec} = SO_2 Electric Emissions Factor – see emissions tables summarized in Introduction section of Protocols

Hg EF_{elec} = Hg Electric Emissions Factor – see emissions tables summarized in Introduction section of Protocols

CO_2 EF_{CHP} = CO_2 Emissions Factor of the CHP system (in lbs/MWh), which will vary with different projects based on the types of prime movers and emission control devices used

NO_x EF_{CHP} = NO_x Emissions Factor of the CHP system (in lbs/MWh), which will vary with different projects based on the types of prime movers and emission control devices used

SO_2 EF_{CHP} = SO_2 Emissions Factor of the CHP system (in lbs/MWh), which will vary with different projects based on the types of prime movers and emission control devices used

CO_2 EF_{NG} = CO_2 Natural Gas Emissions Factor associated with boiler fuel displacement – see emissions tables summarized in Introduction section of Protocols

NO_x EF_{NG} = NO_x Natural Gas Emissions Factor associated with boiler fuel displacement – see emissions tables summarized in Introduction section of Protocols

10 = Conversion from MMBtu to therms (1 MMBtu = 10 therms)

Calculation of Clean Air Impacts

The amount of air emission reductions resulting from the energy savings is calculated using the energy savings at the system level and multiplying them by factors provided by the New Jersey Department of Environmental Protection, Office of Air and Energy Advisor, on June 25, 2019.

Using Weighted Average of 2018 PJM On-Peak and Off-Peak annual data:

Electric Emission Factors

Emissions Product	Pounds per MWh[7]
CO_2	1,292
NOx	0.83
SO_2	0.67
Hg	1.1 mg/MWh[8]

Natural Gas Emission Factors

Emissions Product	Current
CO_2	11.7 lbs per therm saved
NOx	0.0092 lbs per therm saved

<u>Note:</u> CHP emission factors for CO2 and NOx were calculated using nameplate electric generation and natural gas input capacity as seen in the ECM calculation. Per BPU Protocols, natural gas does not require SO2 or Hg emission factors.

ECM 13 – Make-Up Air Unit Replacement

Vineland Public Schools ECM Matrix

✔	ECM was evaluated
✔	ECM evaluated & included in the project

ECM #	ECM DESCRIPTION	Vineland High School North	Vineland High School South	Thomas Wallace Middle School	SGT Dominick Pilla Middle Schoool	Veterans Memorial Intermediate School	Anthony Rossi Intermediate School	Gloria M. Sabater Elementary School	D'Ippolito Elementary School	Petway Elementary School	Dr. William Mennies Elementary School	Johnstone Elementary School	Dr. John H. Winslow Elementary School	Marie Durand Elementary School	Dane Barse Elementary School	Cunningham School	Landis Administrative Building	Maintenance/Transportation Building	Central Warehouse
13	Make-Up Air Unit Replacement			✔				✔		✔									

Replacing make-up air units (MAUs), which provide ventilation for the heat-pump systems, is a vital step toward improving energy efficiency and reducing operational costs. Older units often operate with outdated technology, leading to higher energy consumption and inefficiencies in heating, cooling, and ventilation. Modern MAUs are designed with advanced features such as variable speed motors, high-efficiency heat exchangers, and better insulation, which significantly reduce energy waste. Upgrading to newer units can lower utility costs by optimizing how fresh air is tempered and distributed throughout the building, ensuring consistent performance even during peak demand.

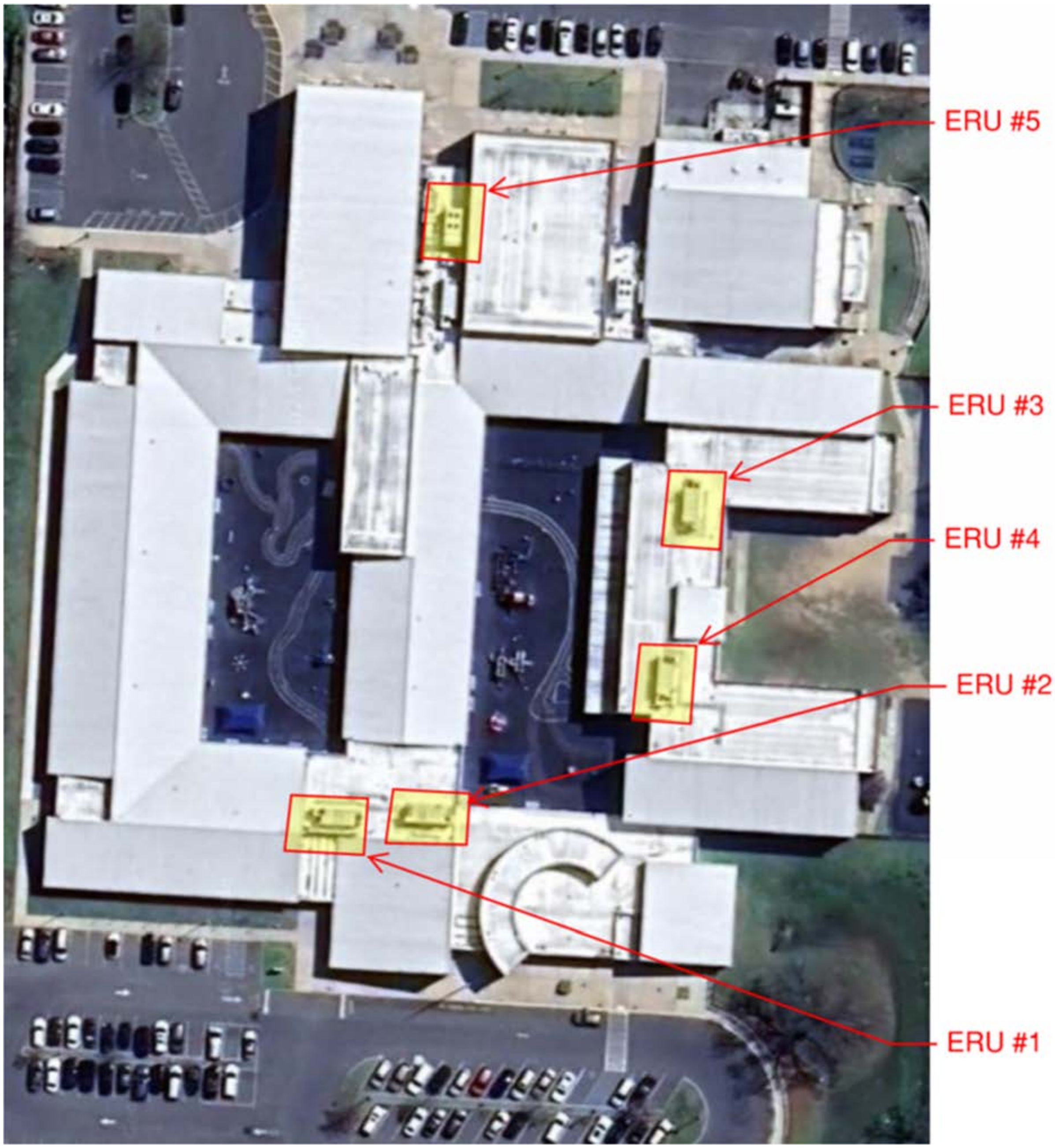
Existing Conditions

Scope of Work

Gloria M. Sabater ES

- Disconnect existing electrical wiring, gas piping, and supply/ return ductwork
- Demolition and removal of existing MAUs
- Modify roof-curb as required for new MAUs
- Furnish and install structural steel (if required)
- Furnish and install new MAUs
- Reconnect existing supply and return ductwork
- Reconnect existing electrical wiring and natural gas piping
- BACnet controllers to be field mounted as part of ECM: 5 &6 scope
- Testing and balancing of the system

Gloria M. Sabater ES - MAU			
Unit #	**Manufacturer**	**Model Number**	**Serial Number**
ERU-1	Des Champs	PV-W8P-WPD	63263
ERU-2	Des Champs	PV-W8P-WPD	63264
ERU-3	Des Champs	HTD-400	83
ERU-4	Des Champs	PV-W8P-WPD	63266
ERU-5	Des Champs	PV-W8P-WPD	63265



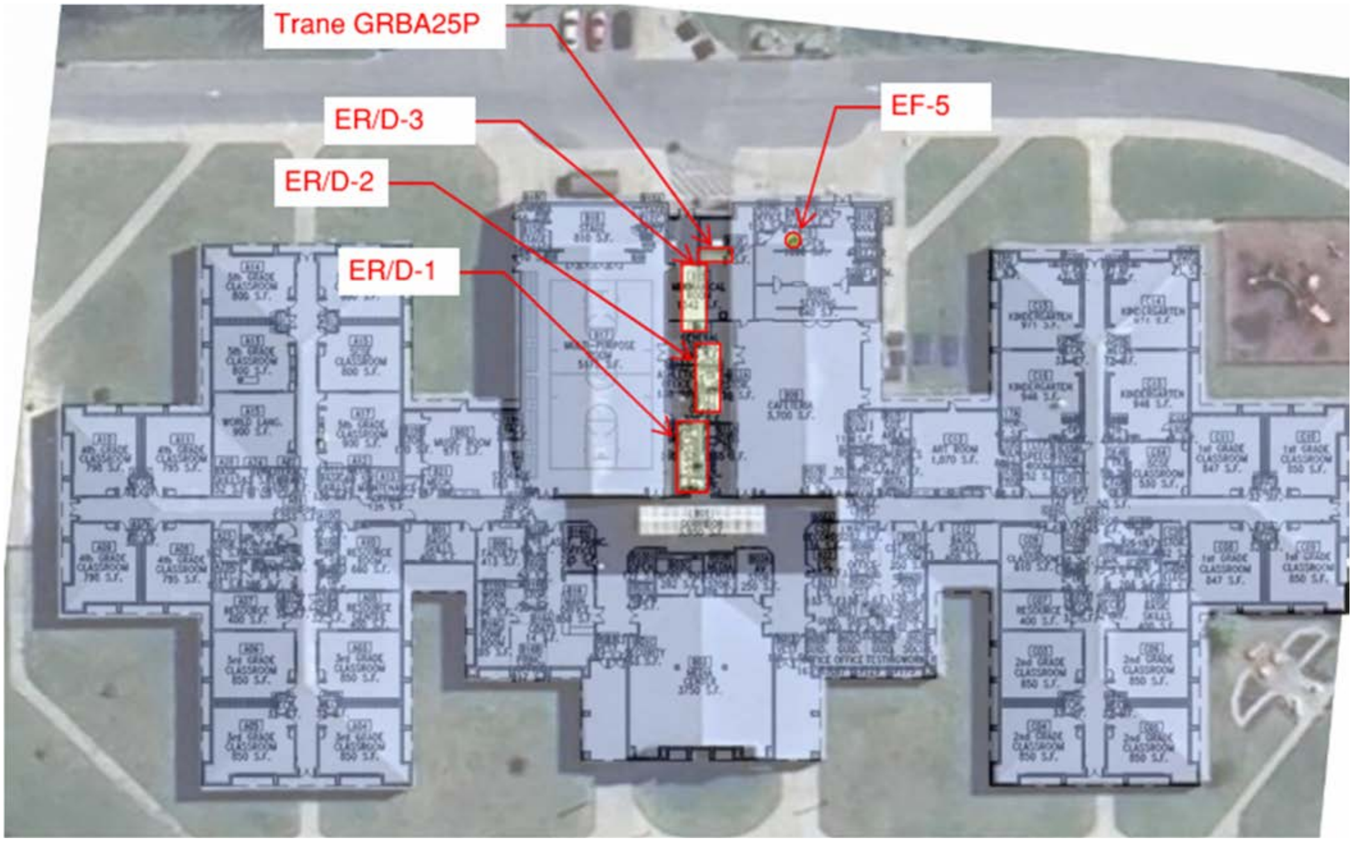
Gloria M. Sabater ES

Petway ES

- Disconnect existing electrical wiring, gas piping, and supply/ return ductwork
- Demolition and removal of existing MAUs
- Modify roof-curb as required for new MAUs
- Furnish and install structural steel (if required)
- Furnish and install new MAUs
- Reconnect existing supply and return ductwork
- Reconnect existing electrical wiring and natural gas piping
- BACnet controllers to be field mounted for ER/D 1-3 as part of ECM: 5 &6 scope
- Kitchen MAU to come with factory-installed BACnet controller
- New EF-5 to be interlocked with replacement kitchen MAU
- Testing and balancing of the system

Petway - MAU			
Unit #	Manufacturer	Model Number	Serial Number
ER/D-3	Des Champs	PV-W10P-WPD	61275
ER/D-2	Des Champs	PV-W10P-WPD	61274
ER/D-1	Des Champs	PV-W10P-WPD	61273
Kitchen	Trane	GRBA25PF	

Petway - Exhaust Fan			
Unit #	Manufacturer	Model Number	CFM
EF-5	Greenheck	CUBE220 HP-10	3375



Petway ES

ECM Calculations

*Note: Make-Up Air Unit Replacement was evaluated at Thomas Wallace MS but due to poor financial payback, installation is not included in the ESIP project. Savings are not shown below but can be reviewed on Form II in Section 4 of the Energy Savings Plan.

Cooling - HRV - kWh Savings

Building	Unit	Constant	CFM	$Eff_{hx\ sensB}$	$Eff_{hx\ sensQ}$	Toutdoor,c	Tindoor,c	hrs_c (NJ Climate Zone: Pine Barrens)	$Eff_{elec,c}$ Existing	$kWh_{cooling}$ Base	$kWh_{cooling}$ Replacement	$kWh_{cooling}$ Savings
Petway Elementary School	ER/D-1	1.08	3144	0.7	0.8	73.7	72	1828	12.9	573	654	82
Petway Elementary School	ER/D-2	1.08	3144	0.7	0.8	73.7	72	1828	12.9	573	654	82
Petway Elementary School	ER/D-3	1.08	3144	0.7	0.8	73.7	72	1828	12.9	573	654	82

Cooling - ERV - kWh Savings

Building	Unit	Constant	CFM	$Eff_{hx\ totalB}$	$Eff_{hx\ totalQ}$	$H_{outdoor,c}$	$H_{indoor,c}$	hrs_c (NJ Climate Zone: Pine Barrens)	hrsc	$Eff_{elec,c}$ Existing	$kWh_{cooling}$ Base	$kWh_{cooling}$ Replacement	$kWh_{cooling}$ Savings
Gloria M. Sabater Elementary School	ERU-4 - 63266	4.5	7529	0.6	0.7	32.33	26.4	1828	1828	12.9	17,082.14	19,929.16	2,847.02
Gloria M. Sabater Elementary School	ERU-3 63263	4.5	8019	0.6	0.7	32.33	26.4	1828	1828	12.9	18,193.87	21,226.18	3,032.31
Gloria M. Sabater Elementary School	ERU-2 63264	4.5	7289	0.6	0.7	32.33	26.4	1828	1828	12.9	16,537.62	19,293.88	2,756.27
Gloria M. Sabater Elementary School	ERU-5	4.5	7000	0.6	0.7	32.33	26.4	1828	1828	12.9	15,881.92	18,528.91	2,646.99
Gloria M. Sabater Elementary School	ERU - 63265	4.5	5796	0.6	0.7	32.33	26.4	1828	1828	12.9	13,150.23	15,341.93	2,191.70

Heating - kWh Savings

Building	Unit	Constant	CFM	$Eff_{hx\ sensible}$	$Eff_{hx\ sensible}$	$T_{indoor,h}$	$T_{outdoor,h}$	HSPF Existing	$F_{ElecHeat}$	hrs_h (NJ Climate Zone: Pine Barrens)	$kWh_{heating}$ Base	$kWh_{heating}$ Replacement	$kWh_{heating}$ Savings
Petway Elementary School	ER/D-1	1.08	3144	0.7	0.8	70	43.4	13.07	1	4899	23,697.73	27,083.11	3,385.39
Petway Elementary School	ER/D-2	1.08	3144	0.7	0.8	70	43.4	13.07	1	4899	23,697.73	27,083.11	3,385.39
Petway Elementary School	ER/D-3	1.08	3144	0.7	0.8	70	43.4	13.07	1	4899	23,697.73	27,083.11	3,385.39
Gloria M. Sabater Elementary School	ERU-4 - 63266	1.08	7529	0.7	0.8	70	43.4	10.42	1	4899	71,166.64	81,333.30	10,166.66
Gloria M. Sabater Elementary School	ERU-3 63263	1.08	8019	0.7	0.8	70	43.4	10.42	1	4899	75,798.29	86,626.61	10,828.33
Gloria M. Sabater Elementary School	ERU-2 63264	1.08	7289	0.7	0.8	70	43.4	10.42	1	4899	68,898.08	78,740.66	9,842.58
Gloria M. Sabater Elementary School	ERU-5	1.08	7000	0.7	0.8	70	43.4	10.42	1	4899	66,166.35	75,618.69	9,452.34
Gloria M. Sabater Elementary School	ERU - 63265	1.08	5796	0.7	0.8	70	43.4	10.42	1	4899	54,785.74	62,612.28	7,826.53

Supply and Exhaust Fan - kWh Savings

Building	Unit	Supply + Exhaus	LF	$Eff_{fan,motor}$ Existing	$Eff_{fan,motor}$ Replacement	Constant	kW Existing	kW Replacement	hrs_c (NJ Climate Zone: Pine Barrens)	hrs_h (NJ Climate Zone: Pine Barrens)	kWh_{fan} savings
Petway Elementary School	ER/D-1	30	0.75	0.887	0.917	0.746	18.92333709	18.304253	1828	4899	4165
Petway Elementary School	ER/D-2	30	0.75	0.887	0.917	0.746	18.92333709	18.304253	1828	4899	4165
Petway Elementary School	ER/D-3	30	0.75	0.887	0.917	0.746	18.92333709	18.304253	1828	4899	4165
Gloria M. Sabater Elementary School	ERU-4 - 63266	20	0.75	0.887	0.917	0.746	12.61555806	12.20283533	1828	4899	2776
Gloria M. Sabater Elementary School	ERU-3 63263	20	0.75	0.887	0.917	0.746	12.61555806	12.20283533	1828	4899	2776
Gloria M. Sabater Elementary School	ERU-2 63264	20	0.75	0.887	0.917	0.746	12.61555806	12.20283533	1828	4899	2776
Gloria M. Sabater Elementary School	ERU-5	20	0.75	0.887	0.917	0.746	12.61555806	12.20283533	1828	4899	2776
Gloria M. Sabater Elementary School	ERU - 63265	20	0.75	0.887	0.917	0.746	12.61555806	12.20283533	1828	4899	2776

Supply and Exhaust Fan - kW Savings

Building	Unit	CFM	Constant	$CFM/Watt_B$	$CFM/Watt_Q$	Fan kW Savings
Petway Elementary School	ER/D-1	3144	1000	1.2	1.4	0.37
Petway Elementary School	ER/D-2	3144	1000	1.2	1.4	0.37
Petway Elementary School	ER/D-3	3144	1000	1.2	1.4	0.37
Gloria M. Sabater Elementary School	ERU-4 - 63266	7529	1000	1.2	1.4	0.90
Gloria M. Sabater Elementary School	ERU-3 63263	8019	1000	1.2	1.4	0.95
Gloria M. Sabater Elementary School	ERU-2 63264	7289	1000	1.2	1.4	0.87
Gloria M. Sabater Elementary School	ERU-5	7000	1000	1.2	1.4	0.83
Gloria M. Sabater Elementary School	ERU - 63265	5796	1000	1.2	1.4	0.69

Annual Energy Savings Algorithms

Annual Electric Energy Savings

$$\Delta kWh = \Delta kWh_c + \Delta kWh_h + \Delta kWh_{fan}$$

Cooling energy savings:

For ERVs:

$$\Delta kWh_c = \frac{4.5 \times CFM \times Eff_{hx,total} \times (H_{outdoor,c} - H_{indoor,c})}{1{,}000 \times Eff_{elec,c}} \times hrs_c$$

For HRVs:

$$\Delta kWh_c = \frac{1.08 \times CFM \times Eff_{hx,sens} \times (T_{outdoor,c} - T_{indoor,c})}{1{,}000 \times Eff_{elec,c}} \times hrs_c$$

Heating energy savings (both ERVs and HRVs):

$$\Delta kWh_h = \frac{1.08 \times CFM \times Eff_{hx,sens} \times (T_{indoor,h} - T_{outdoor,h})}{1{,}000 \times HSPF} \times F_{ElecHeat} \times hrs_h$$

Fan energy savings:

$$\Delta kWh_{fan} = (kW_{fan,b} - kW_{fan,q}) \times (hrs_h + hrs_c)$$

Calculate baseline and qualifying fan kW as follows.[90] Use first equation if values are known, otherwise use second equation:

$$kW_{fan} = \sum\left(\frac{CFM \times \Delta P}{33{,}013/5.202 \times Eff_{fan,mech} \times Eff_{fan,motor}} \times 0.746\right)$$

$$kW_{fan} = \sum\left(\frac{HP \times LF}{Eff_{fan,motor}} \times 0.746\right)$$

Annual Fuel Savings

$$\Delta Therms = \frac{1.08 \times CFM \times Eff_{hx,sens} \times (T_{indoor,h} - T_{oudoor,h})}{100{,}000 \times Eff_{fuel,h}} \times F_{FuelHeat} \times hrs_h$$

Summer Peak Demand Savings

For ERVs:

$$\Delta kW_{Peak} = \left(\frac{4.5 \times CFM \times Eff_{hx,total} \times (H_{outdoor,c,peak} - H_{indoor,c})}{1{,}000 \times EER} + (kW_{fan,b} - kW_{fan,q})\right) \times CF$$

For HRVs:

$$\Delta kW_{Peak} = \left(\frac{1.08 \times CFM \times Eff_{hx,sense} \times (T_{outdoor,c,peak} - T_{indoor,c})}{1{,}000 \times EER} + (kW_{fan,b} - kW_{fan,q})\right) \times CF$$

Daily Peak Fuel Savings

$$\Delta Therms_{Peak} = \Delta Therms \times PDF$$

Lifetime Energy Savings Algorithms

Lifetime Electric Energy Savings

$$\Delta kWh_{Life} = \Delta kWh \times EUL$$

Lifetime Fuel Savings

$$\Delta Therms_{Life} = \Delta Therms \times EUL$$

Calculation Parameters

Table 3-149 Calculation Parameters

Variable	Description	Value	Units	Ref
ΔkWh	Annual electric energy savings	Calculated	kWh/yr	
$\Delta Therms$	Annual fuel savings	Calculated	Therms/yr	
ΔkW_{Peak}	Peak Demand Savings	Calculated	kW	
$\Delta therms_{Peak}$	Daily peak fuel savings	Calculated	Therms/day	
ΔkWh_{Life}	Lifetime electric energy savings	Calculated	kWh	
$\Delta therms_{Life}$	Lifetime fuel savings	Calculated	Therms	
ΔkWh_{c}	Annual electric energy savings during cooling season	Calculated	kWh	
ΔkWh_{h}	Annual electric energy savings during heating season	Calculated	kWh	
ΔkWh_{fan}	Annual electric energy savings due to fan operation	Calculated	kWh	
$kW_{fan,b}$	Total electric power of baseline supply and exhaust fans	Calculated	kW	
$kW_{fan,q}$	Total electric power of efficient supply and exhaust fans	Calculated	kW	
CFM	Volume of supply air	Site-specific	Ft^3/min	
$Eff_{hx,total}$	Total effectiveness of heat exchanger per rating in accordance with AHRI Standard 1060	Site-specific	N/A	[483]

Variable	Description	Value	Units	Ref
$Eff_{hx,sens}$	Sensible effectiveness of heat exchanger per rating in accordance with AHRI Standard	Site-specific	N/A	[483]
$Eff_{elec,c}$	Seasonal average energy efficiency of electric cooling equipment (SEER or IEER)	Site-specific, if unknown look up in Appendix E: Code-Compliant Efficiencies for equipment type and size	Btu/watt-hour	[484]
EER	Energy efficiency ratio of electric cooling equipment[91]	Site-specific, if unknown look up in Appendix E: Code-Compliant Efficiencies for equipment type and size	Btu/watt-hour	
HSPF	Heating seasonal performance factor of electric heating equipment[92]	Site-specific, if unknown look up in Appendix E: Code-Compliant Efficiencies for equipment type and size	Btu/watt-hour	
$Eff_{fuel,h}$	Efficiency of fossil fuel heating equipment (AFUE, E_t or E_c)	Site-specific, if unknown look up in Appendix E: Code-Compliant Efficiencies for equipment type and size	N/A	
$T_{indoor,h}$	Indoor heating setpoint temperature	Site-specific, if unknown use 70°F	°F	
$T_{indoor,c}$	Indoor cooling setpoint temperature	Site-specific, if unknown use 70°F	°F	
H_{indoor}	Enthalpy of indoor air	Look up in Table 3-150 based on T_{indoor}	Btu/lb	
$Eff_{fan,mech}$	Mechanical efficiency of ERV fans	Site-specific, if unknown use 0.67	N/A	[485]
$Eff_{fan,motor}$	Efficiency of ERV fan motors	Site-specific, if unknown use 0.7[93]	N/A	[486]
ΔP	Pressure drop at nominal airflow in the ERV as rated in accordance with AHRI Standard 1060	Site-specific	Inches of H_2O	
HP	Total fan horsepower	Site-specific	HP	
LF	Load factor	Site-specific, if unknown use 0.92	N/A	[491]
hrs_c	Operating hours in the cooling season	Look up in Table 3-151	hrs	[489]
hrs_h	Operating hours in the heating season	Look up in Table 3-151	hrs	[489][125]

Variable	Description	Value	Units	Ref
$H_{outdoor,c}$	Enthalpy of outside air during cooling	**Look up in** Table 3-152	Btu/lb	[490]
$H_{outdoor,h}$	Enthalpy of outside air during heating	**Look up in** Table 3-152	Btu/lb	[490]
$T_{outdoor,c}$	Avg. outdoor temperature during cooling season.	**Look up in** Table 3-152	°F	[490]
$T_{outdoor,h}$	Avg. outdoor temperature during heating season	**Look up in** Table 3-152	°F	[490]
$T_{outdoor,c,peak}$	Peak outdoor temperature during cooling season	Look up in Table 3-153	°F	[492]
$H_{outdoor,c,peak}$	Peak Enthalpy of outdoor air during cooling season	Look up in Table 3-153	°F	[492]
$F_{ElecHeat}$	Electric heating factor, to account for presence of electric heat	Use 1 if electric heat, otherwise use 0	N/A	
$F_{FuelHeat}$	Fuel heating factor, to account for presence of fuel heat	Use 1 if fuel heat, otherwise use 0	N/A	
1.08	Specific heat of air × density of inlet air @ 70°F × 60 min/hr	1.08	BTU/h.°F.CFM	
4.5	Density of inlet air at 70 °F x 60 min/hr	4.5	Lb.min/ft³.hr	
60	Minutes per hour	60	Min/hr	
1,000	Conversion factor, one kW equals 1,000 Watts	1,000	kW/W	
100,000	Conversion from Btu to therms	100,000	Btu/therm	
0.746	Conversion from horsepower to kW	0.746	kW/HP	
33,013	Conversion factor from horsepower to ft.lb/min	33,013	(ft.lb/min)/ hp	
5.202	Conversion factor from inches of water to pounds per square ft	5.202	lb/ft²)/ inH_2O	
CF	Electric coincidence factor	Look up in Table 3-154	N/A	
PDF	Gas peak day factor	Look up in Table 3-154	N/A	
EUL	Effective useful life	See Measure Life Section	Years	

Table 3-150 Indoor Enthalpy

Temperature, T_{indoor} (°F)	Enthalpy, H_{indoor} at 50% Relative Humidity (Btu/lb)
65	22.7
66	23.2
67	23.7
68	24.2
69	24.8
70	25.3
71	25.8
72	26.4
73	27.0
74	27.5
75	28.1
76	28.7
77	29.3
78	29.9

Table 3-151 Heating and Cooling Hours[94]

NJ Climate Region	Heating Hours, hrs_h	Cooling Hours, hrs_c
Northern	4,970	1,670
Southern	4,896	1,783
Coastal	4,981	1,954
Central	4,969	1,810
Pine Zones	4,899	1,828
Statewide Average	4,953	1,820

Table 3-152 Outdoor Air Temperature and Enthalpy[95]

NJ Climate Region	Relative Humidity[96] (%)	Avg. outdoor temperature[97] during cooling season, $T_{outdoor,c}$ (°F)	Avg. outdoor temperature[97] during heating season, $T_{outdoor,h}$ (°F)	Avg enthalpy[98] of outdoor air at duing cooling season, $H_{outdoor,c}$ (Btu/lb)	Avg enthalpy[98] of outdoor air at duing cooling season, $H_{outdoor,c}$ (Btu/lb)
Northern	69.77	74.60	42.10	32.05	14.39
Southern	67.39	74.50	42.70	31.51	14.49
Coastal	74.63	73.00	46.20	31.87	16.47
Central	75.77	74.30	43.20	33.09	15.23
Pine Barrens	74.34	73.70	43.40	32.33	15.22
Statewide Average	72.61	73.91	43.82	32.14	15.31

Table 3-153 Peak Outdoor Air Temperature and Enthalpy

NJ Climate Region	Peak outdoor temperature during cooling season, $T_{outdoor,c,peak}$ (°F)	Peak Enthalpy of outdoor air at duing cooling season, $H_{outdoor,c,peak}$ (Btu/lb)
Northern	89	40.24
Southern	93	42.28
Coastal	90	41.26
Central	93	42.28
Pine Barrens	94	41.22
Statewide Average	91	41.32

Peak Factors

Table 3-154 Peak Factors

Peak Factor	Value	Ref
Electric coincidence factor (CF)	0.69	[123]
Natural gas peak day factor (PDF)	N/A	

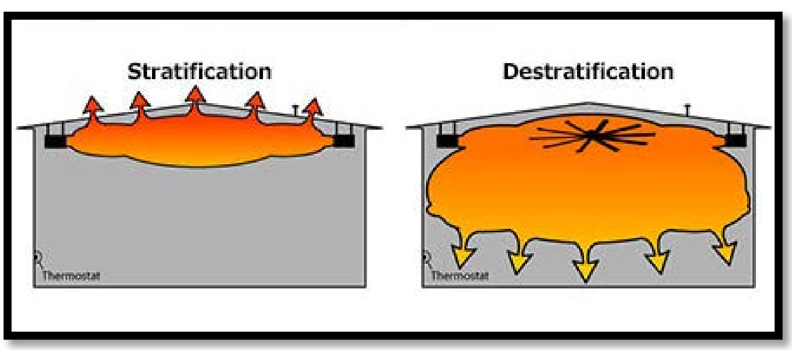
ECM 14 – Destratification Fans

Vineland Public Schools ECM Matrix

✔	ECM was evaluated
✔	ECM evaluated & included in the project

ECM #	ECM DESCRIPTION	Vineland High School North	Vineland High School South	Thomas Wallace Middle School	SGT Dominick Pilla Middle Schoool	Veterans Memorial Intermediate School	Anthony Rossi Intermediate School	Gloria M. Sabater Elementary School	D'Ippolito Elementary School	Petway Elementary School	Dr. William Mennies Elementary School	Johnstone Elementary School	Dr. John H. Winslow Elementary School	Marie Durand Elementary School	Dane Barse Elementary School	Cunningham School	Landis Administrative Building	Maintenance/Transportation Building	Central Warehouse
14	Destratification Fans	✔	✔	✔	✔	✔	✔	✔	✔										

Large indoor spaces with high ceilings such as a gymnasium are prone to a condition called stratification. Stratification is a common property of air to separate due to temperature difference. Typically, a layer of warm air will sit on top of a layer of cold air. The lower cold air causes discomfort for occupants of the space as well as increased energy usage of air handling systems to overcome this condition. A destratification fan can efficiently heat large spaces by slowly moving large volumes of warm air off the ceiling without creating a draft. The steady mixing of air creates a uniform temperature throughout the space which helps the HVAC maintain the same thermostat setpoint with less effort, resulting in energy savings.



Scope of Work

Destratification Fans Savings			
Building	Area in Building	Fan Type	QTY
Gloria M. Sabater Elementary School	Gym	E-ONYX-P4-STD-120-X	3
Gloria M. Sabater elementary School	Gym	E-ONYX-P4-STD-120-X	4
Vineland High School South	Gym	ESC-145P4	12
Vineland High School North	Gym	E-ONYX-P4-STD-120-X	5
Veterans Memorial Intermediate School	Gym	E-ONYX-P4-STD-120-X	3
Thomas Wallace Middle School	Gym	E-ONYX-P4-STD-120-X	4
SGT Dominick Pilla Middle Schoool	Gym	E-ONYX-P4-STD-120-X	4
D'Ippolito Elementary School	Gym	E-ONYX-P4-STD-120-X	4
Anthony Rossi Intermediate School	Gym	E-ONYX-P4-STD-120-X	4

ECM Calculations

Destratification Fans Savings										
Building	Heating Type	Area in Building	Ceiling Height (ft.)	Area (sq.ft.)	Heating Usage (therms)	Heating Usage (kWh)	Temp Differential (°F)	Estimated Savings (%)	Heating kWh Savings	Heating Therm Savings
Gloria M. Sabater Elementary School	Gas-Fired	Gym	28	5,084	7,093.34		12.00	21%		1,475
Gloria M. Sabater elementary School	Gas-Fired	Gym	28	6,930	7,097.67		12.00	21%		1,476
Vineland High School South	Heat Pump	Gym	31	14,400	5,374.70	157,523.4	13.00	22%	34,655.15	1,182
Vineland High School North	Gas-Fired	Gym	27	10,000	13,653.74		12.00	21%		2,867
Veterans Memorial Intermediate School	Gas-Fired	Gym	24	4,720	5,318.63		11.00	18%		957
Thomas Wallace Middle School	Electric	Gym	36	7,200		126,854.9	15.00	26%	32,982.27	
SGT Dominick Pilla Middle Schoool	Gas-Fired	Gym	32	6,204	3,922.80		14.00	22%		863
D'Ippolito Elementary School	Electric	Gym	25	7,128		171,769.7	11.00	18%	30,918.54	
Anthony Rossi Intermediate School	Electric	Gym	26	7,128		193,806.5	12.00	21%	40,699.36	

Destratification Fans Savings							
Building	Heating Type	Yearly Fan Operating Hours	Fan Type	QTY	kW Draw Per Fan	Fan kWh Savings	Total kWh Savings
Gloria M. Sabater Elementary School	Gas-Fired	4000	E-ONYX-P4-STD-120-X	3	0.076	-912	(912.00)
Gloria M. Sabater elementary School	Gas-Fired	4000	E-ONYX-P4-STD-120-X	4	0.076	-1,216	(1,216.00)
Vineland High School South	Heat Pump	4000	ESC-145P4	12	0.046	-2,208	32,447.15
Vineland High School North	Gas-Fired	4000	E-ONYX-P4-STD-120-X	5	0.076	-1,520	(1,520.00)
Veterans Memorial Intermediate School	Gas-Fired	4000	E-ONYX-P4-STD-120-X	3	0.076	-912	(912.00)
Thomas Wallace Middle School	Electric	4000	E-ONYX-P4-STD-120-X	4	0.076	-1,216	31,766.27
SGT Dominick Pilla Middle Schoool	Gas-Fired	4000	E-ONYX-P4-STD-120-X	4	0.076	-1,216	(1,216.00)
D'Ippolito Elementary School	Electric	4000	E-ONYX-P4-STD-120-X	4	0.076	-1,216	29,702.54
Anthony Rossi Intermediate School	Electric	4000	E-ONYX-P4-STD-120-X	4	0.076	-1,216	39,483.36

Savings Table

Temp Differential (°F)

Ceiling Height (ft.)	5.4	7.2	9	10.8	16.2	18	19.8
20	12.7	14.7	16.2	17.5	21	22	23
26	15.8	17.6	19	20.8	24.4	26	27
33	18	20	21.8	23.2	27.6	28.8	30.5
40	20	22	23.6	25.6	30	31.8	33.2

% savings

Source: Building Scientific Research Information Association, UK, 1997. Computational Fluid Dynamics for a 100' x 165' x 26' building with a 100kW gas heater at 3,600cfm. Insulation and lighting remain constant.

ECM 18 – High Efficiency Transformers w/ Harmonic Mitigation

Vineland Public Schools ECM Matrix

✓	ECM was evaluated
✓ (green)	ECM evaluated & included in the project

ECM #	ECM DESCRIPTION	Vineland High School North	Vineland High School South	Thomas Wallace Middle School	SGT Dominick Pilla Middle Schoool	Veterans Memorial Intermediate School	Anthony Rossi Intermediate School	Gloria M. Sabater Elementary School	D'Ippolito Elementary School	Petway Elementary School	Dr. William Mennies Elementary School	Johnstone Elementary School	Dr. John H. Winslow Elementary School	Marie Durand Elementary School	Dane Barse Elementary School	Cunningham School	Landis Administrative Building	Maintenance/Transportation Building	Central Warehouse
18	High Efficiency Transformers with Harmonic Mitigation	✓	✓	✓		✓	✓	✓ (green)	✓ (green)	✓	✓	✓							

High efficiency transformers are designed to improve power quality and reduce electricity waste. Optimized for lowest life cycle cost, the high efficiency transformer reduces waste by as much as 74% while treating power system harmonics in the electrical current that can disrupt equipment operation. They also enhance equipment reliability; lower operating costs and facilitate compliance with IEEE-519 in commercial and industrial facilities.

Quiet operation is ensured through the combination of imbedded structural and acoustic treatments. High efficiency transformers generate lower losses, they reduce power drawn from generating stations resulting in less smog and lower greenhouse gas emissions.

The facility will realize energy savings and increased reliability from the installation of new, high efficiency transformers. Benefits include:

- Exceeds NEMA TP 1-2002 and CSA C802.2-12 efficiency requirements
- Exceeds NEMA Premium® Efficiency Transformer Program qualification requirements
- Exceeds pre-2016 [10 CFR §431.196 (a)(1)] and post- Jan 1, 2016 [10 CFR §431.196 (a)(2)] U.S. DOE efficiency legislation
- Meets or exceeds previously proposed U.S. DOE efficiency legislation including Candidate Standard Level / Trial Standard Level (CSL/TSL) 3 or 4 efficiencies
- Ultra-low Excitation (no-load) Losses provide high efficiency during periods of light-loading (<15% FL)

- Significantly lower Impedance (load) Losses provide high efficiency, and reduce temperature rise and A/C loading during periods of heavier loading (>15% FL)
- Peak efficiency can be matched to anticipated or measured average

Scope of Work

BUILDING	QUANTITY	kVA
Thomas Wallace Middle School	2	30
Thomas Wallace Middle School	1	150
Thomas Wallace Middle School	1	225
Thomas Wallace Middle School	1	300
Veterans Memorial Intermediate School	1	30
Veterans Memorial Intermediate School	1	45
Veterans Memorial Intermediate School	2	225
Veterans Memorial Intermediate School	1	300

ECM Calculations

Estimated baseline efficiency was assumed to be 3.5% less than NEMA TP1 2002 rating. This is conservative given the age and loading of the existing transformers. The new, harmonic mitigating transformers are designed to perform at low load conditions.

Required vs. PQI Energy Efficiencies [1]

kVA Rating CSA C802.2	NEMA TP 1 2002 [2]	NEMA Premium [3]	DOE 2016 [3]	PQI Z3 exceeds CSL 3 [4]	PQI Z3+	PQI Z4 exceeds CSL 4 [4]
15	97.00	97.90	97.89	97.97	98.25	98.43
30	97.50	98.25	98.23	98.29	98.52	98.68
45	97.70	98.39	98.40	98.45	98.66	98.81
75	98.00	98.60	98.60	98.64	98.82	98.95
112.5	98.20	98.74	98.74	98.77	98.93	99.05
150	98.30	98.81	98.83	98.86	99.01	99.12
225	98.50	98.95	98.94	98.97	99.10	99.20
300	98.60	99.02	99.02	99.04	99.16	99.26
500	98.70	99.09	99.14	99.16	99.26	99.35
750	98.80	99.16	99.23	99.24	99.33	99.41
1000	98.90	99.23	99.28	99.29	99.38	99.45

Notes:

[1] Efficiency values are measured at 35% of nameplate rating.

[2] The efficiency of transformers manufactured after January 1, 2007, but before January 1, 2016 must meet the efficiency requirements of NEMA TP 1-2002 (US) or CSA C802.2-12 (Canada).

[3] The efficiency of transformers manufactured after January 1, 2016 must meet the US DOE 2016 efficiency requirements.

[4] PQI Z3 & Z4 efficiencies exceed the requirements of DOE Candidate Standard Level 3 & 4 (CSL 3 & CSL 4) respectively.

High Efficiency Transformer Savings

BUILDING	QUANTITY	kVA	Average % LOAD	NEMA TP 1 2002 EFFICIENCY	% LESS THAN NEMA EFFICIENCY	ESTIMATED BASELINE EFFICIENCY	PROPOSED EFFICIENCY	BASELINE ELECTRIC USE (kWh)	PROPOSED ELECTRIC USE (kWh)	HIGH EFFICIENCY ENERGY SAVINGS (kWh)	Harmonic Load Savings Factor	HARMONIC LOAD ELECTRIC SAVINGS (kWh)	Total Savings (kWh)
Thomas Wallace Middle School	2	30	20%	97.50%	3.50%	94.00%	98.23%	111,830	107,014	4,816	0.74	3,564	8,379
Thomas Wallace Middle School	1	150	20%	98.30%	3.50%	94.80%	98.83%	277,215	265,911	11,304	0.74	8,365	19,669
Thomas Wallace Middle School	1	225	20%	98.50%	3.50%	95.00%	98.94%	414,947	398,423	16,524	0.74	12,228	28,752
Thomas Wallace Middle School	1	300	20%	98.60%	3.50%	95.10%	99.02%	552,681	530,802	21,880	0.74	16,191	38,070
Veterans Memorial Intermediate School	1	30	23%	97.50%	3.50%	94.00%	98.23%	62,904	60,195	2,709	0.74	2,005	4,713
Veterans Memorial Intermediate School	1	45	23%	97.70%	3.50%	94.20%	98.40%	94,156	90,137	4,019	0.74	2,974	6,993
Veterans Memorial Intermediate School	2	225	23%	98.50%	3.50%	95.00%	98.94%	933,632	896,452	37,179	0.74	27,513	64,692
Veterans Memorial Intermediate School	1	300	23%	98.60%	3.50%	95.10%	99.02%	621,767	597,152	24,614	0.74	18,215	42,829

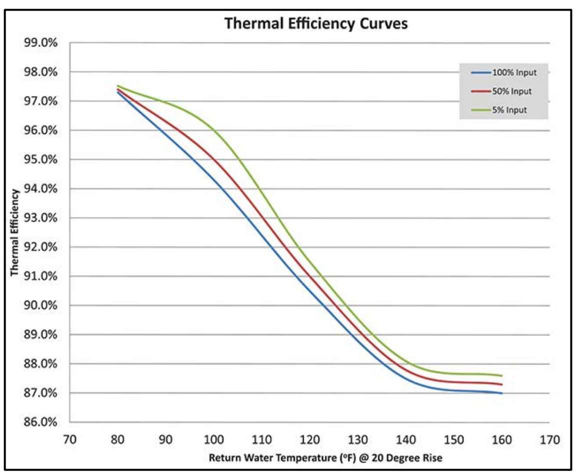
ECM 20 – Boiler Replacement

Vineland Public Schools
ECM Matrix

✔	ECM was evaluated
✔	ECM evaluated & included in the project

ECM #	ECM DESCRIPTION	Vineland High School North	Vineland High School South	Thomas Wallace Middle School	SGT Dominick Pilla Middle Schoool	Veterans Memorial Intermediate School	Anthony Rossi Intermediate School	Gloria M. Sabater Elementary School	D'Ippolito Elementary School	Petway Elementary School	Dr. William Mennies Elementary School	Johnstone Elementary School	Dr. John H. Winslow Elementary School	Marie Durand Elementary School	Dane Barse Elementary School	Cunningham School	Landis Administrative Building	Maintenance/Transportation Building	Central Warehouse
20	Boiler Replacement																✔		

Old, oversized boiler systems have efficiencies in the range of 56%–75%. A condensing boiler hot water heating system can achieve efficiencies as high as 97%, converting nearly all the fuel to useful heat. The efficiency of the boiler increases at lower return water temperature. Lower return water temperatures allow more water vapor from the exiting flue gas to condense, allowing its latent heat of vaporization to be recovered.



Premium efficiency electric motors will help optimize fan and pump efficiency, reduce electrical power consumption and improve system reliability. These motors are designed to run cooler, last longer, and require less maintenance than the existing standard efficiency motors. Premium efficiency motors can be as high as 95% efficient (as opposed to standard efficiency motors of 78% to 88%) and are capable of operating at varying speeds allowing Variable Frequency Drive (VFD) installations where applicable.

Existing Conditions

Scope of Work

Landis Administration Building

- Demolition and removal of 2 existing steam boilers
- Demolition and removal of 2 heating dual temp pumps
- Demolition and removal of existing heating hot water supply, return piping, and steam to hot water heat exchanger.
- Furnishing and installation of 3 Aerco Benchmark 2,000 MBH condensing hot water boilers.
- Furnishing and installation of 3 new dual temperature circulating pumps and VFDs.
- Furnishing and installation of new hot water and return piping required.
- Install new power wiring (incl. new conduit, wiring and circuit breakers) for new water condensing hot water boilers and dual-temp pumps from existing power panel(s). If adequate spare capacity is not available, provide a new sub-panel for electrical service to new equipment.
- Provide all valves, fittings, temperature/pressure sensors, meters and gauges required to complete the installation in accordance with the manufacturer's requirements and final design.

ECM Calculations

Boiler Plant Replacement Pump + VFD Savings

BUILDING	SYSTEM AND SERVICE	Quantity	Dual Temp Pump Effective Operational Quantity	MOTOR HP	EXISTING MOTOR EFFICIENCY (Nbase)	REPLACEMENT MOTOR EFFICIENCY (Nprem)	LF	CF	IFvfd	HRS	∆kW	PREM. MOTOR DEMAND SAVINGS (kW)	PREM. MOTOR ELECTRIC SAVINGS (kWh)
Landis Administrative Building	Heating Hot Water	2	1	7.5	86.5%	89.5%	0.75	0.74	0.9	2,745.00	0.20	0.29	402

Boiler Plant Replacement Pump + VFD Savings

BUILDING	SYSTEM AND SERVICE	Quantity	VFD ESF	VFD DSF	VFD DEMAND SAVINGS (kW)	VFD ELECTRIC SAVINGS (kWh)	TOTAL DEMAND SAVINGS (kW)	TOTAL ELECTRIC SAVINGS (kWh)
Landis Administrative Building	Heating Hot Water	2	1,548.00	0.096	1.44	11,610.00	1.73	12,012

Steam to Hot Water Heat Loss Savings

BUILDING	Savings %	Baseline Therms
Landis Administrative Building	2%	29,279.1

Algorithms

Fuel Savings (MMBtu/yr) = Cap_{in} * $EFLH_h$ * ((Eff_q/Eff_b)-1) / 1000 kBtu/MMBtu

Definition of Variables

Cap_{in} = Input capacity of qualifying unit in kBtu/hr

$EFLH_h$ = The Equivalent Full Load Hours of operation for the average unit during the heating season in hours

Eff_b = Boiler Baseline Efficiency

Eff_q = Boiler Proposed Efficiency

1000 = Conversion from kBtu to MMBtu

Summary of Inputs

Prescriptive Boilers

Component	Type	Value	Source
Cap_{in}	Variable		Application
$EFLH_h$	Fixed	See Table Below	1
Eff_b	Variable	See Table Below	2
Eff_q	Variable		Application

$EFLH_h$ Table

Facility Type	Heating EFLH
Assembly	603
Auto repair	1910
Dormitory	465
Hospital	3366
Light industrial	714
Lodging – Hotel	1077
Lodging – Motel	619
Office – large	2034
Office – small	431
Other	681
Religious worship	722

Facility Type	Heating EFLH
Restaurant – fast food	813
Restaurant – full service	821
Retail – big box	191
Retail – Grocery	191
Retail – small	545
Retail – large	2101
School – Community college	1431
School – postsecondary	1191
School – primary	840
School – secondary	901
Warehouse	452

Multi-family EFLH by Vintage

Facility Type	Prior to 1979	From 1979 to 2006	From 2007 through Present
Low-rise, Heating	757	723	503
High-rise, Heating	526	395	219

Baseline Boiler Efficiencies (Eff_b)

Boiler Type	Size Category (kBtu input)	Standard 90.1-2016
Hot Water – Gas fired	< 300 ≥ 300 and ≤ 2,500 > 2,500	82% AFUE 80% Et 82% Ec
Hot Water – Oil fired	< 300 ≥ 300 and ≤ 2,500 > 2,500	84% AFUE 82% Et 84% Ec
Steam – Gas fired	< 300	80% AFUE
Steam – Gas fired, all except natural draft	≥ 300 and ≤ 2,500	79% Et
Steam – Gas fired, all except	> 2,500	79% Ec

Boiler Type	Size Category (kBtu input)	Standard 90.1-2016
Steam – Gas fired, natural draft	≥ 300 and ≤ 2,500	79% Et
Steam – Gas fired, natural draft	> 2,500	79% Ec
Steam – Oil fired	< 300 ≥ 300 and ≤ 2,500 > 2,500	82% AFUE 81% Et 81% Ec

Sources

1. New York State Joint Utilities, *New York Standard Approach for Estimating Energy Savings from Energy Efficiency Programs*, V7, April 2019. Appendix G – Equivalent Full-Load Hours (EFLH), For Heating and Cooling. P. 675-680. EFLH values for NYC due to proximity to NJ.
2. ASHRAE Standards 90.1-2016. *Energy Standard for Buildings Except Low Rise Residential Buildings*; available at: https://www.ashrae.org/standards-research--technology/standards--guidelines. Table 6.8.1-6

Algorithms

From application form calculate ΔkW where:

$$\Delta kW = 0.746 * HP * IF_{VFD} * (1/\eta_{base} - 1/\eta_{prem})$$

Demand Savings = (ΔkW) * CF

Energy Savings = (ΔkW)*HRS * LF

Definition of Variables

ΔkW = kW Savings at full load
HP = Rated horsepower of qualifying motor, from nameplate/manufacturer specs.
LF = Load Factor, percent of full load at typical operating condition
IF_{VFD} = VFD Interaction Factor, 1.0 without VFD, 0.9 with VFD
η_{base} = Efficiency of the baseline motor
η_{prem} = Efficiency of the energy-efficient motor
HRS = Annual operating hours
CF = Coincidence Factor

NEMA ASHRAE 90.1-2016 Motor Efficiency Table – General Purpose Subtype I (Adapted from Table 10.8-1)

Motor Horsepower	1200 RPM (6 pole)		1800 RPM (4 pole)		3600 RPM (2 pole)	
	ODP	TEFC	ODP	TEFC	ODP	TEFC
1	.825	.825	.855	.855	.77	.77
1.5	.865	.875	.865	.865	.84	.84
2	.875	.885	.865	.865	.855	.855
3	.885	.895	.895	.895	.855	.865
5	.895	.895	.895	.895	.865	.885
7.5	.902	.91	.91	.917	.885	.895
10	.917	.91	.917	.917	.895	.902
15	.917	.917	.93	.924	.902	.91
20	.924	.917	.93	.930	.91	.91
25	.93	.93	.936	.936	.917	.917
30	.936	.93	.941	.936	.917	.917
40	.941	.941	.941	.941	.924	.924
50	.941	.941	.945	.945	.93	.93
60	.945	.945	.95	.950	.936	.936
75	.945	.945	.95	.954	.936	.936
100	.95	.95	.954	.954	.936	.941
125	.95	.95	.954	.954	.941	.95
150	.954	.958	.958	.958	.941	.95
200	.954	.958	.958	.962	.95	.954

Annual Operating Hours Table

Motor Horsepower	Operating Hours, HRS
1 to 5 HP	2,745
6 to 20 HP	3,391
21 to 50 HP	4,067
51 to 100 HP	5,329
101 to 200 HP	5,200

Algorithms

Energy Savings (kWh/yr) = N * HP * ESF

Peak Demand Savings (kW) = N * HP * DSF

Definitions of Variables

N = Number of motors controlled by VFD(s) per application

HP = Nameplate motor horsepower or manufacturer specification sheet per application

ESF = Energy Savings Factor (kWh/year per HP)

DSF = Demand Savings Factor (kW per HP)

Summary of Inputs

Variable Frequency Drives

Component	Type	Value	Source
HP	Variable	Nameplate/Manufacturer Spec. Sheet	Application
ESF	Variable	See Table Below	Derived value based on the following sources: 1, 2, 3
DSF	Variable	See Table Below	Derived value based on the following sources: 1, 2, 3

The ESF for the supply and return fans and circulating pumps are derived from a 2014 NEEP-funded study of 400 VFD installations in eight northeast states. The derived values are based on actual logged input power data and reflect average operating hours, load factors, and motor efficiencies for the sample. Savings factors representing cooling tower fans and boiler feed water pumps are not reflected in the NEEP report. Values representing these applications are taken from April 2018 New York TRM, Appendix K, and represent average values derived from DOE2.2 simulation of various building types

VFD Savings Factors

Application	ESF (kWh/Year-HP)	DSF (kW/HP)	Source
Supply Air Fan	2,033	0.286	1
Return Air Fan	1,788	0.297	1
CHW or CW Pump	1,633	0.185	1
HHW Pump	1,548	0.096	1
WSHP Pump	2,562	0.234	1
CT Fan	290	-0.025	2, 3
Boiler Feedwater Pump	1,588	0.498	2, 3

DCO Energy Efficiency Division
100 Lenox Drive
Lawrenceville, NJ 08648

ECM 23 – HVAC Armor

Vineland Public Schools ECM Matrix

✔	ECM was evaluated
✔ (green)	ECM evaluated & included in the project

ECM #	ECM DESCRIPTION	Vineland High School North	Vineland High School South	Thomas Wallace Middle School	SGT Dominick Pilla Middle Schoool	Veterans Memorial Intermediate School	Anthony Rossi Intermediate School	Gloria M. Sabater Elementary School	D'Ippolito Elementary School	Petway Elementary School	Dr. William Mennies Elementary School	Johnstone Elementary School	Dr. John H. Winslow Elementary School	Marie Durand Elementary School	Dane Barse Elementary School	Cunningham School	Landis Administrative Building	Maintenance/Transportation Building	Central Warehouse
23	HVAC Armor	✔ (evaluated & included)	✔ (evaluated & included)	✔ (evaluated & included)	✔ (evaluated & included)	✔ (evaluated & included)		✔ (evaluated & included)			✔ (evaluated & included)		✔ (evaluated & included)	✔ (evaluated & included)		✔ (evaluated)	✔ (evaluated & included)		

Before *After*

Over time, condenser coils accumulate contaminants such as dust, dirt, and grime. These deposits act as thermal insulators, obstructing the heat exchange process and forcing the system to operate at higher pressures and temperatures to achieve the desired cooling output. This increased workload leads to higher energy consumption. By employing a thorough cleaning process, these contaminants are removed, restoring the coils to their optimal thermal conductivity. Following the cleaning, the application of a specialized coating further enhances efficiency by improving the surface's thermal properties. The combined effect of cleaning and coating ensures that the air conditioner operates at peak efficiency, lowering the required energy by 10-15%.

Scope of Work

HVAC Armor DX (coil rejuvenation)

- General clean up of overall unit and wash-down of coils
- Deep clean condenser coils to remove final materials in coils, and corrosion
- Disassemble equipment to perform deep clean of condenser coils, removing final materials in coils and corrosion
- Straighten aluminum fins
- Spray each condenser coil with HVAC Armor from both outside-in and inside-out, applying an even coverage.
- Assemble and ensure equipment is operating.

Scope of Work

Building	Manufacturer	Model	Serial	Type	Nominal Tons
Landis Administrative Building	Fujitsu	UNREADABLE	1	Split-System	2
Landis Administrative Building	Samsung	UNREADABLE	2	Split-System	2
Landis Administrative Building	Trane	RTAC2004UKONUNAR	1105M04519	Air-cooled Chiller	200
Landis Administrative Building	Trane	RTAC2004UKONUNAR	1105M04520	Air-cooled Chiller	200
Landis Administrative Building	UNREADABLE	UNREADABLE	3	Split-System	3
Landis Administrative Building	York	UNREADABLE	4	Package Unit	5
Landis Administrative Building	York	UNREADABLE	5	Package Unit	5
Landis Administrative Building	Liebert	UNREADABLE	6	Split-System	2
Landis Administrative Building	Trane	UNREADABLE	7	Split-System	2
Dr. William Mennies Elementary School	Mitsubshi	NTXMMX36A142BA	8	Split-System	2
Dr. William Mennies Elementary School	Trane	TTA24044DAA01A	22212432TA	Package Unit	20
Dr. William Mennies Elementary School	Trane	TTA24044DAA01A	22182224TA	Package Unit	20
Dr. William Mennies Elementary School	Fujitsu	UNREADABLE	9	Split-System	2
Dr. William Mennies Elementary School	Trane	YHC036E4RH27	221811535L	Package Unit	3
Dr. William Mennies Elementary School	Trane	YZC102F4RH27GEE	222710005L	Package Unit	8.5
Dr. William Mennies Elementary School	Fujitsu	UNREADABLE	10	Split-System	2
Dr. William Mennies Elementary School	Fujitsu	UNREADABLE	11	Split-System	2
Dr. William Mennies Elementary School	Fujitsu	UNREADABLE	12	Split-System	2
Dr. William Mennies Elementary School	Trane	YZD150F4RVE1	223110436D	Package Unit	12.5
Dr. William Mennies Elementary School	Trane	YHH240G4RVD1A	223310711D	Package Unit	20
Dr. William Mennies Elementary School	Trane	YHC48E4RHA27G	222312768L	Package Unit	4
Dr. William Mennies Elementary School	Trane	YHH240G4RVD1A	223310716D	Package Unit	20
Dr. William Mennies Elementary School	Trane	YCD420B4P16D3G	C22C02153	Package Unit	40
Dr. William Mennies Elementary School	Trane	YHH240G4RVD1A	223310715D	Package Unit	20
Dr. William Mennies Elementary School	Trane	YHH240G4RVD1A	233310397D	Package Unit	20
Dr. William Mennies Elementary School	Trane	YHH240G4RVD1A	223310181D	Package Unit	20
SGT Dominick Pilla Middle Schoool	Aaon	RN-016-3-0-EA09-349	201708-BNGM63309	Package Unit	16
SGT Dominick Pilla Middle Schoool	Aaon	RN-007-3-0EA09-3K9	201708-ANGG63298	Package Unit	7
SGT Dominick Pilla Middle Schoool	Aaon	RQ003-3-V-EA09-339	201708-AYGC117734	Package Unit	3
SGT Dominick Pilla Middle Schoool	Aaon	RN-011-3-0-EA09-3F9	201708-ANGZ63264	Package Unit	11
SGT Dominick Pilla Middle Schoool	Aaon	RN-011-3-0-EA09-3F9	201708-ANGZ63263	Package Unit	11
SGT Dominick Pilla Middle Schoool	Aaon	RQ003-3-V-EA09-339	201708-AYGC17735	Package Unit	3
SGT Dominick Pilla Middle Schoool	Aaon	RN-016-3-0-EA09-349	201708-BNGM63307	Package Unit	16
SGT Dominick Pilla Middle Schoool	Aaon	RQ003-3-V-EA09-339	13	Package Unit	3
SGT Dominick Pilla Middle Schoool	Aaon	RN-006-3-0-EA09-329	201708-ANGF63297	Package Unit	6
SGT Dominick Pilla Middle Schoool	Aaon	RN-025-3-0-EA09-389	201708-BNGR6311	Package Unit	25
SGT Dominick Pilla Middle Schoool	Aaon	RN-011-3-0-EA09-3F9	201708-ANGZ63265	Package Unit	11
SGT Dominick Pilla Middle Schoool	Aaon	RN-018-3-0-EA09-389	201708-BNGN63309	Package Unit	18
SGT Dominick Pilla Middle Schoool	Aaon	RN-025-3-0-EA09-389	201708-BNGR63310	Package Unit	25
Veterans Memorial Intermediate School	Liebert	UNREADABLE	14	Split-System	4
Veterans Memorial Intermediate School	Liebert	UNREADABLE	15	Split-System	4
Veterans Memorial Intermediate School	Trane	UNREADABLE	16	Package Unit	25
Thomas Wallace Middle School	UNREADABLE	UNREADABLE	17	Air-cooled Chiller	100
Thomas Wallace Middle School	Trane	UNREADABLE	F05J09843	Package Unit	10
Thomas Wallace Middle School	Trane	WSC120A4R	544100753L	Package Unit	10
Thomas Wallace Middle School	Trane	WSC120A4R	544100866L	Package Unit	10
Thomas Wallace Middle School	Trane	WSC120A4R	18	Package Unit	10
Thomas Wallace Middle School	Liebert	UNREADABLE	19	Split-System	4
Thomas Wallace Middle School	Liebert	UNREADABLE	20	Split-System	4
Thomas Wallace Middle School	Liebert	UNREADABLE	21	Split-System	4
Thomas Wallace Middle School	Trane	GERA12041C01A	WO5L56535	Package Unit	10
Thomas Wallace Middle School	Trane	WSC120A4R	544100683L	Package Unit	10
Thomas Wallace Middle School	Trane	WSC120A4R	544100825L	Package Unit	10
Thomas Wallace Middle School	Trane	WSC120A4R	22	Package Unit	10
Thomas Wallace Middle School	Trane	WCD180B40FHA	545100786D	Package Unit	15
Thomas Wallace Middle School	Trane	WCD180B40FHA	545100445D	Package Unit	15
Thomas Wallace Middle School	Trane	WSC120A4R	544100539L	Package Unit	10
Thomas Wallace Middle School	Trane	WSC120A4R	544100681L	Package Unit	10
Thomas Wallace Middle School	Trane	WSC090A4RG	544100693L	Package Unit	7.5
Thomas Wallace Middle School	Liebert	UNREADABLE	23	Split-System	4
Thomas Wallace Middle School	Trane	WSC090A4RG	544100771L	Package Unit	7.5
Dr. John H. Winslow Elementary School	Fujitsu	AOUH18LPAS1	25	Split-System	1.5
Dr. John H. Winslow Elementary School	Trane	YHC036E3RZA2	233210274L	Package Unit	3
Dr. John H. Winslow Elementary School	Trane	YHC036E3RZA2	233210304L	Package Unit	3
Dr. John H. Winslow Elementary School	Trane	YHC036E3RZA2	233114670	Package Unit	3
Dr. John H. Winslow Elementary School	Trane	YHC048E3RZA2	232911863L	Package Unit	4
Dr. John H. Winslow Elementary School	Trane	YHC048E3RZA2	232911853L	Package Unit	4
Dr. John H. Winslow Elementary School	Trane	YHC036E3RZA2	233114666L	Package Unit	3
Dr. John H. Winslow Elementary School	Trane	YHC048E3RZA2	233210296L	Package Unit	4
Dr. John H. Winslow Elementary School	Trane	YHC036E3RZA2	233114662L	Package Unit	3
Dr. John H. Winslow Elementary School	Trane	YHC036E3RZA2	233210292L	Package Unit	3
Dr. John H. Winslow Elementary School	Trane	YHC036E3RZA2	233210280L	Package Unit	3
Dr. John H. Winslow Elementary School	Trane	YHC036E3RZA2	233210288L	Package Unit	3
Dr. John H. Winslow Elementary School	Trane	YHC036E3RZA2	233210308L	Package Unit	3
Dr. John H. Winslow Elementary School	Trane	YHC036E3RZA2	233210300L	Package Unit	3
Dr. John H. Winslow Elementary School	Fujitsu	UNREADABLE	26	Split-System	2
Dr. John H. Winslow Elementary School	Samsung	AR24TSFYBWKY	27	Split-System	2
Dr. John H. Winslow Elementary School	Fujitsu	AOU24HLXQ	4237	Split-System	2
Dr. John H. Winslow Elementary School	Samsung	UNREADABLE	28	Split-System	2
Dr. John H. Winslow Elementary School	Trane	TCZGE-151CLB250B	FO51602158	Package Unit	12.5
Dr. John H. Winslow Elementary School	Trane	TCZGE-151CLB250B	FO51602157	Package Unit	12.5
Dr. John H. Winslow Elementary School	Trane	UNREADABLE	29	Package Unit	100
Dr. John H. Winslow Elementary School	Trane	CGAM060A2W02	U2M104321	Package Unit	5

Building	Manufacturer	Model	Serial	Type	Nominal Tons
Gloria M. Sabater Elementary School	Fisen	YPAL105GVB46BBDX	RLSM000087	Package Unit	9
Marie Durand Elementary School	Mitsubshi	TRUZA0241HA70NA	33	Split-System	2
Marie Durand Elementary School	Mitsubshi	TRUZA0241HA70NA	34	Split-System	2
Marie Durand Elementary School	Mitsubshi	TURYH1204AN40AN	35	Split-System	2
Marie Durand Elementary School	Trane	YHC048E3RZA2	222312794L	Package Unit	4
Marie Durand Elementary School	Trane	YHC048E3RZA2	222312740L	Package Unit	4
Marie Durand Elementary School	Trane	YHC048E3RZA2	222312818L	Package Unit	4
Marie Durand Elementary School	Trane	YHC048E3RZA2	222312878L	Package Unit	4
Marie Durand Elementary School	Mitsubshi	NTXMMX30A132BA	36	Split-System	3
Marie Durand Elementary School	Trane	YZD210F4RVE190GE	221411394D	Package Unit	17.5
Marie Durand Elementary School	Trane	YZD210F4RVE5500	221411390D	Package Unit	17.5
Marie Durand Elementary School	Trane	YZD210F4RVE5500	221411395D	Package Unit	17.5
Marie Durand Elementary School	Trane	YZD210F4RVE190GE	221411393D	Package Unit	17.5
Marie Durand Elementary School	Trane	YZE180F4RVE190GE	221411392D	Package Unit	15
Marie Durand Elementary School	Trane	YZE180F4RVE190GE	221411391D	Package Unit	15
Marie Durand Elementary School	Trane	YZD210F4RVE190GE	221411396D	Package Unit	17.5
Marie Durand Elementary School	Trane	YZD120F4RVE	221811960L	Package Unit	10
Marie Durand Elementary School	Trane	YHD150G4RVD	221411398D	Package Unit	12.5
Marie Durand Elementary School	Mitsubshi	MXZ-2C20NA3	37	Split-System	2
Marie Durand Elementary School	Trane	YHD210G4RVD	221411399D	Package Unit	17.5
Marie Durand Elementary School	Trane	YHD210G4RVD	221411397D	Package Unit	17.5
Vineland High School North	Trane	HSC120E3RGA1	33710304L	Package Unit	10
Vineland High School North	Aaon	RN-009-3-0-E709	201609-ANCQ11639	Package Unit	9
Vineland High School North	Aaon	RN-009-3-0-E709	201609-ANCQ11628	Package Unit	9
Vineland High School North	Aaon	BQ-005-3-V-E709	38	Package Unit	5
Vineland High School North	Aaon	BQ-005-3-V-E709	AYCE02814	Package Unit	5
Vineland High School North	Aaon	RN-015-3-0-E709	ANCL11633	Package Unit	15
Vineland High School North	Aaon	RN-031-3-0-E709	39	Package Unit	31
Vineland High School North	Aaon	RN-025-3-0-E709	BNCR11632	Package Unit	25
Vineland High School North	Aaon	SA-030-3-A-E809	201606-BSCL00651	Package Unit	30
Vineland High School North	Aaon	SA-030-3-A-E809	201606-BSCL00652	Package Unit	30
Vineland High School North	Aaon	SA-030-3-A-E809	201606-BSCL00653	Package Unit	30
Vineland High School North	Aaon	RN-010-3-0-E709	201609-ANCJ11638	Package Unit	10
Vineland High School North	EVCON	GAW14L36C23SA	W2N1809416R407C	Package Unit	3
Vineland High School North	Aaon	RQ-005-3-V-E709	201609-AYCE02815	Package Unit	5
Vineland High School North	Goodman	GRH660XXX	1011001357	Package Unit	5
Vineland High School North	Goodman	GRH660XXX	40	Package Unit	5
Vineland High School North	Aaon	RQ-005-3-V-E709	201609-AYCE02637	Package Unit	5
Vineland High School North	Trane	WSCO048H4R0A	214314388L	Package Unit	4
Vineland High School North	Trane	WSCO048H4R0A	214314386L	Package Unit	4
Vineland High School North	Trane	WSCO048H4R0A	162013509L	Package Unit	4
Vineland High School North	Trane	WSCO048H4R0A	162013519L	Package Unit	4
Vineland High School North	Aaon	RN-007-3-0-E709	201609ANCG11636	Package Unit	7
Vineland High School North	Aaon	RN-007-3-0-E709	201609ANCG11630	Package Unit	7
Vineland High School North	Aaon	SA-030-3-A-E809	41	Package Unit	30
Vineland High School North	Aaon	RN-010-3-0-E709	42	Package Unit	10
Vineland High School North	Aaon	BQ-005-3-V-E709	43	Package Unit	5
Vineland High School South	LAVATA	LCS8212-018-10	K1440000079	Package Unit	18
Vineland High School South	Desert Air	40EG4MMH65014	4914E23056	Package Unit	40
Vineland High School South	Daikin	DWV0188JJNKKN0B	STNU211200081	Air-cooled Chiller	188

ECM Calculations

Energy Savings from application of HVAC Armor are calculated on the following pages:

*Note: HVAC Armor was evaluated at Cunningham School but due to poor financial payback, installation is not included in the ESIP project. Savings are not shown below but can be reviewed on Form II in Section 4 of the Energy Savings Plan.

HVAC ARMOR - SAVINGS

Building	Manufacturer	Model	Serial	Type	Nominal Tons	EFLH	Avg ECAT °F	Baseline							HVAC Armor								Savings	
								Avg Cond Temp	Derated Cooling Capacity	Condenser Fan	Evap Fan	Compressor	Derated Avg EER	Annual Usage	Avg Cond Temp	Net Cooling Capacity	Condenser Fan	Evap Fan	Compressor	Net Avg EER	Runtime Adjust	Annual Usage		
								°F	[ton]	[kW]	[kW]	[kW]	BTU/W	[kWh]	°F	[ton]	[kW]	[kW]	[kW]			[kWh]	[kWh]	[kW]
Landis Administrative Building	Fujitsu	UNREADABLE	1	Split-System	2	394	78.3	127.6	1.97	0.10	0.30	2.06	9.61	969	117.9	2.13	0.10	0.30	1.83	11.45	93.9%	826	143	0.23
Landis Administrative Building	Samsung	UNREADABLE	2	Split-System	2	394	78.3	130.5	1.94	0.10	0.30	2.13	9.17	998	120.8	2.09	0.10	0.30	1.90	10.93	95.6%	865	133	0.24
Landis Administrative Building	Trane	RTAC2004UKONUNAR	1105M04519	Air-cooled Chiller	200	394	78.3	123.8	201.81	10.00	30.00	197.05	10.22	93,399	116.3	217.96	10.00	30.00	181.42	11.81	91.8%	80,052	13,346	15.63
Landis Administrative Building	Trane	RTAC2004UKONUNAR	1105M04520	Air-cooled Chiller	200	394	78.3	123.8	201.81	10.00	30.00	197.05	10.22	93,399	116.3	217.96	10.00	30.00	181.42	11.81	91.8%	80,052	13,346	15.63
Landis Administrative Building	UNREADABLE	UNREADABLE	3	Split-System	3	394	78.3	127.6	2.96	0.15	0.45	3.09	9.61	1,454	117.9	3.19	0.15	0.45	2.75	11.45	93.9%	1,239	215	0.34
Landis Administrative Building	York	UNREADABLE	4	Package Unit	5	394	78.3	127.6	4.93	0.25	0.75	5.15	9.61	2,423	117.9	5.32	0.25	0.75	4.58	11.45	93.9%	2,065	358	0.57
Landis Administrative Building	York	UNREADABLE	5	Package Unit	5	394	78.3	127.6	4.93	0.25	0.75	5.15	9.61	2,423	117.9	5.32	0.25	0.75	4.58	11.45	93.9%	2,065	358	0.57
Landis Administrative Building	Liebert	UNREADABLE	6	Split-System	2	394	78.3	127.6	1.97	0.10	0.30	2.06	9.61	969	117.9	2.13	0.10	0.30	1.83	11.45	93.9%	826	143	0.23
Landis Administrative Building	Trane	UNREADABLE	7	Split-System	2	394	78.3	127.6	1.97	0.10	0.30	2.06	9.61	969	117.9	2.13	0.10	0.30	1.83	11.45	93.9%	826	143	0.23
Dr. William Mennies Elementary School	Mitsubshi	NTXMMX36A142BA	8	Split-System	2	394	78.3	127.6	1.95	0.10	0.30	2.09	9.43	980	117.9	2.11	0.10	0.30	1.81	11.45	94.8%	826	154	0.27
Dr. William Mennies Elementary School	Trane	TTA24044DAA01A	22212432TA	Package Unit	20	394	78.3	124.6	20.02	1.00	3.00	19.99	10.01	9,452	115.0	21.62	1.00	3.00	17.36	12.15	92.5%	7,784	1,668	2.63
Dr. William Mennies Elementary School	Trane	TTA24044DAA01A	22182224TA	Package Unit	20	394	78.3	125.5	19.88	1.00	3.00	20.25	9.84	9,554	115.8	21.47	1.00	3.00	17.58	11.94	93.2%	7,923	1,632	2.67
Dr. William Mennies Elementary School	Fujitsu	UNREADABLE	9	Split-System	2	394	78.3	125.5	1.99	0.10	0.30	2.02	9.84	955	115.8	2.15	0.10	0.30	1.76	11.94	93.2%	792	163	0.27
Dr. William Mennies Elementary School	Trane	YHC036E4RH27	221811535L	Package Unit	3	394	78.3	125.5	2.98	0.15	0.45	3.04	9.84	1,433	115.8	3.22	0.15	0.45	2.64	11.94	93.2%	1,188	245	0.40
Dr. William Mennies Elementary School	Trane	YZC102F4RH27GEE	222710005L	Package Unit	8.5	394	78.3	124.3	8.53	0.43	1.28	8.45	10.09	4,000	114.6	9.21	0.43	1.28	7.34	12.24	92.2%	3,284	715	1.11
Dr. William Mennies Elementary School	Fujitsu	UNREADABLE	10	Split-System	2	394	78.3	125.5	1.99	0.10	0.30	2.02	9.84	955	115.8	2.15	0.10	0.30	1.76	11.94	93.2%	792	163	0.27
Dr. William Mennies Elementary School	Fujitsu	UNREADABLE	11	Split-System	2	394	78.3	125.5	1.99	0.10	0.30	2.02	9.84	955	115.8	2.15	0.10	0.30	1.76	11.94	93.2%	792	163	0.27
Dr. William Mennies Elementary School	Fujitsu	UNREADABLE	12	Split-System	2	394	78.3	125.5	1.99	0.10	0.30	2.02	9.84	955	115.8	2.15	0.10	0.30	1.76	11.94	93.2%	792	163	0.27
Dr. William Mennies Elementary School	Trane	YZD150F4RVE1	223110436D	Package Unit	12.5	394	78.3	122.9	12.68	0.63	1.88	12.18	10.37	5,784	114.0	13.70	0.63	1.88	10.70	12.45	91.3%	4,747	1,037	1.48
Dr. William Mennies Elementary School	Trane	YHH240G4RVD1A	223310711D	Package Unit	20	394	78.3	122.9	20.29	1.00	3.00	19.49	10.37	9,255	114.0	21.92	1.00	3.00	17.13	12.45	91.3%	7,596	1,659	2.36
Dr. William Mennies Elementary School	Trane	YHC48E4RHA27G	222312768L	Package Unit	4	394	78.3	122.9	4.06	0.20	0.60	3.90	10.37	1,851	114.0	4.38	0.20	0.60	3.43	12.45	91.3%	1,519	332	0.47
Dr. William Mennies Elementary School	Trane	YHH240G4RVD1A	223310716D	Package Unit	20	394	78.3	122.9	20.29	1.00	3.00	19.49	10.37	9,255	114.0	21.92	1.00	3.00	17.13	12.45	91.3%	7,596	1,659	2.36
Dr. William Mennies Elementary School	Trane	YCD420B4P16D3G	C22C02153	Package Unit	40	394	78.3	122.9	40.59	2.00	6.00	38.98	10.37	18,509	114.0	43.84	2.00	6.00	34.25	12.45	91.3%	15,191	3,318	4.72
Dr. William Mennies Elementary School	Trane	YHH240G4RVD1A	223310715D	Package Unit	20	394	78.3	122.9	20.29	1.00	3.00	19.49	10.37	9,255	114.0	21.92	1.00	3.00	17.13	12.45	91.3%	7,596	1,659	2.36
Dr. William Mennies Elementary School	Trane	YHH240G4RVD1A	233310397D	Package Unit	20	394	78.3	122.9	20.29	1.00	3.00	19.49	10.37	9,255	114.0	21.92	1.00	3.00	17.13	12.45	91.3%	7,596	1,659	2.36
Dr. William Mennies Elementary School	Trane	YHH240G4RVD1A	223310181D	Package Unit	20	394	78.3	122.9	20.29	1.00	3.00	19.49	10.37	9,255	114.0	21.92	1.00	3.00	17.13	12.45	91.3%	7,596	1,659	2.36
SGT Dominick Pilla Middle Schoool	Aaon	RN-016-3-0-EA09-349	201708-BNGM63309	Package Unit	16	466	78.3	125.8	15.87	0.80	2.40	16.27	9.78	9,071	116.1	17.14	0.80	2.40	14.12	11.87	93.4%	7,538	1,533	2.14
SGT Dominick Pilla Middle Schoool	Aaon	RN-007-3-0EA09-3K9	201708-ANGG63298	Package Unit	7	466	78.3	125.8	6.94	0.35	1.05	7.12	9.78	3,969	116.1	7.50	0.35	1.05	6.18	11.87	93.4%	3,298	671	0.94
SGT Dominick Pilla Middle Schoool	Aaon	RQ003-3-V-EA09-339	201708-AYGC117734	Package Unit	3	466	78.3	125.8	2.97	0.15	0.45	3.05	9.78	1,701	116.1	3.21	0.15	0.45	2.65	11.87	93.4%	1,413	287	0.40
SGT Dominick Pilla Middle Schoool	Aaon	RN-011-3-0-EA09-3F9	201708-ANGZ63264	Package Unit	11	466	78.3	125.8	10.91	0.55	1.65	11.18	9.78	6,236	116.1	11.78	0.55	1.65	9.71	11.87	93.4%	5,182	1,054	1.47
SGT Dominick Pilla Middle Schoool	Aaon	RN-011-3-0-EA09-3F9	201708-ANGZ63263	Package Unit	11	466	78.3	125.8	10.91	0.55	1.65	11.18	9.78	6,236	116.1	11.78	0.55	1.65	9.71	11.87	93.4%	5,182	1,054	1.47
SGT Dominick Pilla Middle Schoool	Aaon	RQ003-3-V-EA09-339	201708-AYGC17735	Package Unit	3	466	78.3	125.8	2.97	0.15	0.45	3.05	9.78	1,701	116.1	3.21	0.15	0.45	2.65	11.87	93.4%	1,413	287	0.40
SGT Dominick Pilla Middle Schoool	Aaon	RN-016-3-0-EA09-349	201708-BNGM63307	Package Unit	16	466	78.3	125.8	15.87	0.80	2.40	16.27	9.78	9,071	116.1	17.14	0.80	2.40	14.12	11.87	93.4%	7,538	1,533	2.14
SGT Dominick Pilla Middle Schoool	Aaon	RQ003-3-V-EA09-339	13	Package Unit	3	466	78.3	125.8	2.97	0.15	0.45	3.05	9.78	1,701	116.1	3.21	0.15	0.45	2.65	11.87	93.4%	1,413	287	0.40
SGT Dominick Pilla Middle Schoool	Aaon	RN-006-3-0-EA09-329	201708-ANGF63297	Package Unit	6	466	78.3	125.8	5.95	0.30	0.90	6.10	9.78	3,402	116.1	6.43	0.30	0.90	5.30	11.87	93.4%	2,827	575	0.80
SGT Dominick Pilla Middle Schoool	Aaon	RN-025-3-0-EA09-389	201708-BNGR6311	Package Unit	25	466	78.3	125.8	24.79	1.25	3.75	25.41	9.78	14,173	116.1	26.77	1.25	3.75	22.07	11.87	93.4%	11,778	2,395	3.35
SGT Dominick Pilla Middle Schoool	Aaon	RN-011-3-0-EA09-3F9	201708-ANGZ63265	Package Unit	11	466	78.3	125.8	10.91	0.55	1.65	11.18	9.78	6,236	116.1	11.78	0.55	1.65	9.71	11.87	93.4%	5,182	1,054	1.47
SGT Dominick Pilla Middle Schoool	Aaon	RN-018-3-0-EA09-389	201708-BNGN63309	Package Unit	18	466	78.3	125.8	17.85	0.90	2.70	18.30	9.78	10,205	116.1	19.28	0.90	2.70	15.89	11.87	93.4%	8,480	1,725	2.41
SGT Dominick Pilla Middle Schoool	Aaon	RN-025-3-0-EA09-389	201708-BNGR63310	Package Unit	25	466	78.3	125.8	24.79	1.25	3.75	25.41	9.78	14,173	116.1	26.77	1.25	3.75	22.07	11.87	93.4%	11,778	2,395	3.35
Veterans Memorial Intermediate School	Liebert	UNREADABLE	14	Split-System	4	466	78.3	127.3	3.92	0.20	0.60	4.15	9.50	2,308	118.0	4.23	0.20	0.60	3.63	11.47	94.5%	1,950	358	0.52
Veterans Memorial Intermediate School	Liebert	UNREADABLE	15	Split-System	4	466	78.3	127.3	3.92	0.20	0.60	4.15	9.50	2,308	118.0	4.23	0.20	0.60	3.63	11.47	94.5%	1,950	358	0.52
Veterans Memorial Intermediate School	Trane	UNREADABLE	16	Package Unit	25	466	78.3	127.3	24.50	1.25	3.75	25.96	9.50	14,426	118.0	26.46	1.25	3.75	22.68	11.47	94.5%	12,190	2,237	3.27
Thomas Wallace Middle School	UNREADABLE	UNREADABLE	17	Air-cooled Chiller	100	466	78.3	124.1	100.56	5.00	15.00	99.10	10.13	55,500	116.6	108.60	5.00	15.00	88.90	11.97	92.1%	46,730	8,770	10.19
Thomas Wallace Middle School	Trane	UNREADABLE	F05J09843	Package Unit	10	466	78.3	128.8	9.68	0.50	1.50	10.61	9.21	5,876	119.9	10.45	0.50	1.50	9.33	11.07	95.7%	5,051	825	1.28
Thomas Wallace Middle School	Trane	WSC120A4R	544100753L	Package Unit	10	466	78.3	129.5	9.62	0.50	1.50	10.71	9.08	5,925	120.2	10.39	0.50	1.50	9.37	10.97	96.2%	5,096	829	1.35
Thomas Wallace Middle School	Trane	WSC120A4R	544100866L	Package Unit	10	466.0	78.3	129.5	9.62	0.50	1.50	10.71	9.08	5924.9	120.2	10.39	0.50	1.50	9.37	10.97	96.2%	5,096	828.80	1.35
Thomas Wallace Middle School	Trane	WSC120A4R	18	Package Unit	10	466.0	78.3	129.5	9.62	0.50	1.50	10.71	9.08	5924.9	120.2	10.39	0.50	1.50	9.37	10.97	96.2%	5,096	828.80	1.35
Thomas Wallace Middle School	Liebert	UNREADABLE	19	Split-System	4	466.0	78.3	128.8	3.87	0.20	0.60	4.24	9.21	2350.5	119.9	4.18	0.20	0.60	3.73	11.07	95.7%	2,021	330.04	0.51
Thomas Wallace Middle School	Liebert	UNREADABLE	20	Split-System	4	466.0	78.3	128.8	3.87	0.20	0.60	4.24	9.21	2350.5	119.9	4.18	0.20	0.60	3.73	11.07	95.7%	2,021	330.04	0.51
Thomas Wallace Middle School	Liebert	UNREADABLE	21	Split-System	4	466.0	78.3	128.8	3.87	0.20	0.60	4.24	9.21	2350.5	119.9	4.18	0.20	0.60	3.73	11.07	95.7%	2,021	330.04	0.51
Thomas Wallace Middle School	Trane	GERA12041C01A	WO5L56535	Package Unit	10	466.0	78.3	128.8	9.79	0.50	1.50	10.45	9.44	5799.7	119.9	10.57	0.50	1.50	9.38	11.15	94.6%	5,017	782.41	1.06
Thomas Wallace Middle School	Trane	WSC120A4R	544100683L	Package Unit	10	466.0	78.3	128.8	9.79	0.50	1.50	10.45	9.44	5799.7	119.9	10.57	0.50	1.50	9.38	11.15	94.6%	5,017	782.41	1.06
Thomas Wallace Middle School	Trane	WSC120A4R	544100825L	Package Unit	10	466.0	78.3	128.8	9.79	0.50	1.50	10.45	9.44	5799.7	119.9	10.57	0.50	1.50	9.38	11.15	94.6%	5,017	782.41	1.06
Thomas Wallace Middle School	Trane	WSC120A4R	22	Package Unit	10	466.0	78.3	128.8	9.79	0.50	1.50	10.45	9.44	5799.7	119.9	10.57	0.50	1.50	9.38	11.15	94.6%	5,017	782.41	1.06
Thomas Wallace Middle School	Trane	WCD180B40FHA	545100786D	Package Unit	15	466.0	78.3	128.8	14.68	0.75	2.25	15.67	9.44	8699.6	119.9	15.86	0.75	2.25	14.07	11.15	94.6%	7,526	1,173.62	1.60
Thomas Wallace Middle School	Trane	WCD180B40FHA	545100445D	Package Unit	15	466.0	78.3	128.8	14.68	0.75	2.25	15.67	9.44	8699.6	119.9	15.86	0.75	2.25	14.07	11.15	94.6%	7,526	1,173.62	1.60
Thomas Wallace Middle School	Trane	WSC120A4R	544100539L	Package Unit	10	466.0	78.3	128.8	9.79	0.50	1.50	10.45	9.44	5799.7	119.9	10.57	0.50	1.50	9.38	11.15	94.6%	5,017	782.41	1.06
Thomas Wallace Middle School	Trane	WSC120A4R	544100681L	Package Unit	10	466.0	78.3	128.8	9.79	0.50	1.50	10.45	9.44	5799.7	119.9	10.57	0.50	1.50	9.38	11.15	94.6%	5,017	782.41	1.06
Thomas Wallace Middle School	Trane	WSC090A4RG	544100693L	Package Unit	7.5	466.0	78.3	128.8	7.34	0.38	1.13	7.83	9.44	4349.8	119.9	7.93	0.38	1.13	7.04	11.15	94.6%	3,763	586.81	0.80
Thomas Wallace Middle School	Liebert	UNREADABLE	23	Split-System	4	466.0	78.3	128.8	3.92	0.20	0.60	4.18	9.44	2319.9	119.9	4.23	0.20	0.60	3.75	11.15	94.6%	2,007	312.97	0.43
Thomas Wallace Middle School	Trane	WSC090A4RG	544100771L	Package Unit	7.5	466.0	78.3	128.8	7.34	0.38	1.13	7.83	9.44	4349.8	119.9	7.93	0.38	1.13	7.04	11.15	94.6%	3,763	586.81	0.80

HVAC ARMOR - SAVINGS

								Baseline							HVAC Armor									
Building	Manufacturer	Model	Serial	Type	Nominal Tons	EFLH	Avg ECAT °F	Avg Cond Temp °F	Derated Cooling Capacity [ton]	Condenser Fan [kW]	Evap Fan [kW]	Compressor [kW]	Derated Avg EER BTU/W	Annual Usage [kWh]	Avg Cond Temp °F	Net Cooling Capacity [ton]	Condenser Fan [kW]	Evap Fan [kW]	Compressor [kW]	Net Avg EER	Runtime Adjust	Annual Usage [kWh]	Savings [kWh]	Savings [kW]
Dr. John H. Winslow Elementary School	Fujitsu	AOUH18LPAS1	25	Split-System	1.5	394.0	78.3	128.8	1.46	0.08	0.23	1.56	9.41	733.3	119.9	1.58	0.08	0.23	1.42	11.02	95.2%	644	89.75	0.15
Dr. John H. Winslow Elementary School	Trane	YHC036E3RZA2	233210274L	Package Unit	3	394.0	78.3	122.4	3.06	0.15	0.45	2.91	10.45	1383.1	113.6	3.30	0.15	0.45	2.64	12.23	90.8%	1,160	223.03	0.27
Dr. John H. Winslow Elementary School	Trane	YHC036E3RZA2	233210304L	Package Unit	3	394.0	78.3	122.4	3.06	0.15	0.45	2.91	10.45	1383.1	113.6	3.30	0.15	0.45	2.64	12.23	90.8%	1,160	223.03	0.27
Dr. John H. Winslow Elementary School	Trane	YHC036E3RZA2	233114670	Package Unit	3	394.0	78.3	122.4	3.06	0.15	0.45	2.91	10.45	1383.1	113.6	3.30	0.15	0.45	2.64	12.23	90.8%	1,160	223.03	0.27
Dr. John H. Winslow Elementary School	Trane	YHC048E3RZA2	232911863L	Package Unit	4	394.0	78.3	122.4	4.08	0.20	0.60	3.88	10.45	1844.2	113.6	4.40	0.20	0.60	3.52	12.23	90.8%	1,547	297.37	0.36
Dr. John H. Winslow Elementary School	Trane	YHC048E3RZA2	232911853L	Package Unit	4	394.0	78.3	122.4	4.08	0.20	0.60	3.88	10.45	1844.2	113.6	4.40	0.20	0.60	3.52	12.23	90.8%	1,547	297.37	0.36
Dr. John H. Winslow Elementary School	Trane	YHC036E3RZA2	233114666L	Package Unit	3	394.0	78.3	122.4	3.06	0.15	0.45	2.91	10.45	1383.1	113.6	3.30	0.15	0.45	2.64	12.23	90.8%	1,160	223.03	0.27
Dr. John H. Winslow Elementary School	Trane	YHC048E3RZA2	233210296L	Package Unit	4	394.0	78.3	122.4	4.08	0.20	0.60	3.88	10.45	1844.2	113.6	4.40	0.20	0.60	3.52	12.23	90.8%	1,547	297.37	0.36
Dr. John H. Winslow Elementary School	Trane	YHC036E3RZA2	233114662L	Package Unit	3	394.0	78.3	122.4	3.06	0.15	0.45	2.91	10.45	1383.1	113.6	3.30	0.15	0.45	2.64	12.23	90.8%	1,160	223.03	0.27
Dr. John H. Winslow Elementary School	Trane	YHC036E3RZA2	233210292L	Package Unit	3	394.0	78.3	122.4	3.06	0.15	0.45	2.91	10.45	1383.1	113.6	3.30	0.15	0.45	2.64	12.23	90.8%	1,160	223.03	0.27
Dr. John H. Winslow Elementary School	Trane	YHC036E3RZA2	233210280L	Package Unit	3	394.0	78.3	122.4	3.06	0.15	0.45	2.91	10.45	1383.1	113.6	3.30	0.15	0.45	2.64	12.23	90.8%	1,160	223.03	0.27
Dr. John H. Winslow Elementary School	Trane	YHC036E3RZA2	233210288L	Package Unit	3	394.0	78.3	122.4	3.06	0.15	0.45	2.91	10.45	1383.1	113.6	3.30	0.15	0.45	2.64	12.23	90.8%	1,160	223.03	0.27
Dr. John H. Winslow Elementary School	Trane	YHC036E3RZA2	233210308L	Package Unit	3	394.0	78.3	122.4	3.06	0.15	0.45	2.91	10.45	1383.1	113.6	3.30	0.15	0.45	2.64	12.23	90.8%	1,160	223.03	0.27
Dr. John H. Winslow Elementary School	Trane	YHC036E3RZA2	233210300L	Package Unit	3	394.0	78.3	122.4	3.06	0.15	0.45	2.91	10.45	1383.1	113.6	3.30	0.15	0.45	2.64	12.23	90.8%	1,160	223.03	0.27
Dr. John H. Winslow Elementary School	Fujitsu	UNREADABLE	26	Split-System	2	394.0	78.3	126.6	1.98	0.10	0.30	2.03	9.76	958.2	117.7	2.14	0.10	0.30	1.84	11.43	93.6%	828	130.58	0.19
Dr. John H. Winslow Elementary School	Samsung	AR24TSFYBWKY	27	Split-System	2	394.0	78.3	126.6	1.98	0.10	0.30	2.03	9.76	958.2	117.7	2.14	0.10	0.30	1.84	11.43	93.6%	828	130.58	0.19
Dr. John H. Winslow Elementary School	Fujitsu	AOU24HLXQ	4237	Split-System	2	394.0	78.3	126.6	1.98	0.10	0.30	2.03	9.76	958.2	117.7	2.14	0.10	0.30	1.84	11.43	93.6%	828	130.58	0.19
Dr. John H. Winslow Elementary School	Samsung	UNREADABLE	28	Split-System	2	394.0	78.3	126.6	1.98	0.10	0.30	2.03	9.76	958.2	117.7	2.14	0.10	0.30	1.84	11.43	93.6%	828	130.58	0.19
Dr. John H. Winslow Elementary School	Trane	TCZGE-151CLB250B	FO51602158	Package Unit	12.5	394.0	78.3	126.1	12.41	0.63	1.88	12.63	9.84	5961.1	116.4	13.40	0.63	1.88	11.35	11.61	93.3%	5,092	869.52	1.28
Dr. John H. Winslow Elementary School	Trane	TCZGE-151CLB250B	FO51602157	Package Unit	12.5	394.0	78.3	126.1	12.41	0.63	1.88	12.63	9.84	5961.1	116.4	13.40	0.63	1.88	11.35	11.61	93.3%	5,092	869.52	1.28
Dr. John H. Winslow Elementary School	Trane	UNREADABLE	29	Package Unit	100	394.0	78.3	123.9	100.78	5.00	15.00	98.39	10.22	46646.6	115.3	108.84	5.00	15.00	88.74	12.01	91.9%	39,361	7,285.62	9.66
Dr. John H. Winslow Elementary School	Trane	CGAM060A2W02	U2M104321	Package Unit	5	394.0	78.3	128.0	4.89	0.25	0.75	5.16	9.53	2426.3	118.3	5.28	0.25	0.75	4.64	11.25	94.6%	2,101	325.47	0.52
Cunningham School	Sanyo	C09V	7722	Split-System	2	394.0	78.3	126.6	1.98	0.10	0.30	2.03	9.78	959.2	117.7	2.14	0.10	0.30	1.83	11.54	93.4%	819	139.88	0.21
Cunningham School	EMI	UNREADABLE	30	Split-System	2	394.0	78.3	126.6	1.98	0.10	0.30	2.03	9.78	959.2	117.7	2.14	0.10	0.30	1.83	11.54	93.4%	819	139.88	0.21
Cunningham School	Fujitsu	UNREADABLE	31	Split-System	2	394.0	78.3	126.6	1.98	0.10	0.30	2.03	9.78	959.2	117.7	2.14	0.10	0.30	1.83	11.54	93.4%	819	139.88	0.21
Cunningham School	EMI	MC4D992CAAA000F	32	Package Unit	8	394.0	78.3	126.6	7.93	0.40	1.20	8.14	9.78	3836.9	117.7	8.57	0.40	1.20	7.31	11.54	93.4%	3,277	559.52	0.83
Gloria M. Sabater Elementary School	Fisen	YPAL105GVB46BBDX	RLSM000087	Package Unit	9	394.0	78.3	129.2	8.79	0.45	1.35	9.45	9.37	4432.9	120.4	9.49	0.45	1.35	8.49	11.07	94.9%	3,845	588.11	0.96
Marie Durand Elementary School	Mitsubshi	TRUZA0241HA70NA	33	Split-System	2	394.0	78.3	126.6	1.97	0.10	0.30	2.06	9.63	967.8	117.7	2.13	0.10	0.30	1.81	11.57	94.0%	817	150.42	0.25
Marie Durand Elementary School	Mitsubshi	TRUZA0241HA70NA	34	Split-System	2	394.0	78.3	126.6	1.97	0.10	0.30	2.06	9.63	967.8	117.7	2.13	0.10	0.30	1.81	11.57	94.0%	817	150.42	0.25
Marie Durand Elementary School	Mitsubshi	TURYH1204AN40AN	35	Split-System	2	394.0	78.3	126.6	1.97	0.10	0.30	2.06	9.63	967.8	117.7	2.13	0.10	0.30	1.81	11.57	94.0%	817	150.42	0.25
Marie Durand Elementary School	Trane	YHC048E3RZA2	222312794L	Package Unit	4	394.0	78.3	123.1	4.05	0.20	0.60	3.91	10.33	1855.3	113.8	4.38	0.20	0.60	3.41	12.46	91.4%	1,517	337.83	0.49
Marie Durand Elementary School	Trane	YHC048E3RZA2	222312740L	Package Unit	4	394.0	78.3	123.1	4.05	0.20	0.60	3.91	10.33	1855.3	113.8	4.38	0.20	0.60	3.41	12.46	91.4%	1,517	337.83	0.49
Marie Durand Elementary School	Trane	YHC048E3RZA2	222312818L	Package Unit	4	394.0	78.3	123.1	4.05	0.20	0.60	3.91	10.33	1855.3	113.8	4.38	0.20	0.60	3.41	12.46	91.4%	1,517	337.83	0.49
Marie Durand Elementary School	Trane	YHC048E3RZA2	222312878L	Package Unit	4	394.0	78.3	123.1	4.05	0.20	0.60	3.91	10.33	1855.3	113.8	4.38	0.20	0.60	3.41	12.46	91.4%	1,517	337.83	0.49
Marie Durand Elementary School	Mitsubshi	NTXMMX30A132BA	36	Split-System	3	394.0	78.3	126.6	2.96	0.15	0.45	3.08	9.63	1451.7	117.7	3.19	0.15	0.45	2.71	11.57	94.0%	1,226	225.63	0.37
Marie Durand Elementary School	Trane	YZD210F4RVE190GE	221411394D	Package Unit	17.5	394.0	78.3	126.0	17.33	0.88	2.63	17.83	9.75	8404.0	116.7	18.72	0.88	2.63	15.58	11.77	93.5%	7,028	1,376.40	2.25
Marie Durand Elementary School	Trane	YZD210F4RVE5500	221411390D	Package Unit	17.5	394.0	78.3	126.0	17.33	0.88	2.63	17.83	9.75	8404.0	116.7	18.72	0.88	2.63	15.58	11.77	93.5%	7,028	1,376.40	2.25
Marie Durand Elementary School	Trane	YZD210F4RVE5500	221411395D	Package Unit	17.5	394.0	78.3	126.0	17.33	0.88	2.63	17.83	9.75	8404.0	116.7	18.72	0.88	2.63	15.58	11.77	93.5%	7,028	1,376.40	2.25
Marie Durand Elementary School	Trane	YZD210F4RVE190GE	221411393D	Package Unit	17.5	394.0	78.3	126.0	17.33	0.88	2.63	17.83	9.75	8404.0	116.7	18.72	0.88	2.63	15.58	11.77	93.5%	7,028	1,376.40	2.25
Marie Durand Elementary School	Trane	YZE180F4RVE190GE	221411392D	Package Unit	15	394.0	78.3	126.0	14.86	0.75	2.25	15.28	9.75	7203.4	116.7	16.04	0.75	2.25	13.35	11.77	93.5%	6,024	1,179.77	1.93
Marie Durand Elementary School	Trane	YZE180F4RVE190GE	221411391D	Package Unit	15	394.0	78.3	126.0	14.86	0.75	2.25	15.28	9.75	7203.4	116.7	16.04	0.75	2.25	13.35	11.77	93.5%	6,024	1,179.77	1.93
Marie Durand Elementary School	Trane	YZD210F4RVE190GE	221411396D	Package Unit	17.5	394.0	78.3	126.0	17.33	0.88	2.63	17.83	9.75	8404.0	116.7	18.72	0.88	2.63	15.58	11.77	93.5%	7,028	1,376.40	2.25
Marie Durand Elementary School	Trane	YZD120F4RVE	221811960L	Package Unit	10	394.0	78.3	124.8	9.99	0.50	1.50	10.02	9.98	4736.7	115.6	10.79	0.50	1.50	8.76	12.04	92.6%	3,926	810.73	1.27
Marie Durand Elementary School	Trane	YHD150G4RVD	221411398D	Package Unit	12.5	394.0	78.3	126.0	12.38	0.63	1.88	12.74	9.75	6002.8	116.7	13.37	0.63	1.88	11.13	11.77	93.5%	5,020	983.14	1.61
Marie Durand Elementary School	Mitsubshi	MXZ-2C20NA3	37	Split-System	2	394.0	78.3	125.3	1.99	0.10	0.30	2.02	9.89	952.6	116.4	2.15	0.10	0.30	1.77	11.88	93.0%	796	156.31	0.24
Marie Durand Elementary School	Trane	YHD210G4RVD	221411399D	Package Unit	17.5	394.0	78.3	126.0	17.33	0.88	2.63	17.83	9.75	8404.0	116.7	18.72	0.88	2.63	15.58	11.77	93.5%	7,028	1,376.40	2.25
Marie Durand Elementary School	Trane	YHD210G4RVD	221411397D	Package Unit	17.5	394.0	78.3	126.0	17.33	0.88	2.63	17.83	9.75	8404.0	116.7	18.72	0.88	2.63	15.58	11.77	93.5%	7,028	1,376.40	2.25
Vineland High School North	Trane	HSC120E3RGA1	33710304L	Package Unit	10	466.0	78.3	127.3	9.88	0.50	1.50	10.26	9.67	5711.9	118.0	10.67	0.50	1.50	9.17	11.46	93.7%	4,878	833.99	1.09
Vineland High School North	Aaon	RN-009-3-0-E709	201609-ANCQ11639	Package Unit	9	466.0	78.3	124.7	9.00	0.45	1.35	9.00	10.00	5034.7	115.9	9.72	0.45	1.35	7.91	12.01	92.6%	4,190	844.97	1.09
Vineland High School North	Aaon	RN-009-3-0-E709	201609-ANCQ11628	Package Unit	9	466.0	78.3	124.7	9.00	0.45	1.35	9.00	10.00	5034.7	115.9	9.72	0.45	1.35	7.91	12.01	92.6%	4,190	844.97	1.09
Vineland High School North	Aaon	BQ-005-3-V-E709	38	Package Unit	5	466.0	78.3	124.7	5.00	0.25	0.75	5.00	10.00	2797.1	115.9	5.40	0.25	0.75	4.40	12.01	92.6%	2,328	469.43	0.61
Vineland High School North	Aaon	BQ-005-3-V-E709	AYCE02814	Package Unit	5	466.0	78.3	125.3	4.98	0.25	0.75	5.04	9.89	2816.7	116.4	5.38	0.25	0.75	4.43	11.88	93.0%	2,355	462.17	0.61
Vineland High School North	Aaon	RN-015-3-0-E709	ANCL11633	Package Unit	15	466.0	78.3	126.2	14.82	0.75	2.25	15.34	9.70	8548.3	117.4	16.01	0.75	2.25	13.49	11.65	93.7%	7,199	1,348.80	1.86
Vineland High School North	Aaon	RN-031-3-0-E709	39	Package Unit	31	466.0	78.3	126.6	30.55	1.55	4.65	31.87	9.63	17742.1	117.7	32.99	1.55	4.65	28.02	11.57	94.0%	14,985	2,757.53	3.85
Vineland High School North	Aaon	RN-025-3-0-E709	BNCR11632	Package Unit	25	466.0	78.3	126.2	24.71	1.25	3.75	25.57	9.70	14247.1	117.4	26.68	1.25	3.75	22.48	11.65	93.7%	11,999	2,248.00	3.09
Vineland High School North	Aaon	SA-030-3-A-E809	201606-BSCL00651	Package Unit	30	466.0	78.3	124.7	30.01	1.50	4.50	30.01	10.00	16782.4	115.9	32.41	1.50	4.50	26.38	12.01	92.6%	13,966	2,816.56	3.63
Vineland High School North	Aaon	SA-030-3-A-E809	201606-BSCL00652	Package Unit	30	466.0	78.3	124.7	30.01	1.50	4.50	30.01	10.00	16782.4	115.9	32.41	1.50	4.50	26.38	12.01	92.6%	13,966	2,816.56	3.63
Vineland High School North	Aaon	SA-030-3-A-E809	201606-BSCL00653	Package Unit	30	466.0	78.3	124.7	30.01	1.50	4.50	30.01	10.00	16782.4	115.9	32.41	1.50	4.50	26.38	12.01	92.6%	13,966	2,816.56	3.63
Vineland High School North	Aaon	RN-010-3-0-E709	201609-ANCJ11638	Package Unit	10	466.0	78.3	124.7	10.00	0.50	1.50	10.00	10.00	5594.1	115.9	10.80	0.50	1.50	8.79	12.01	92.6%	4,655	938.85	1.21
Vineland High School North	EVCON	GAW14L36C23SA	W2N1809416R407C	Package Unit	3	466.0	78.3	124.2	3.01	0.15	0.45	2.98	10.11	1666.9	115.3	3.26	0.15	0.45	2.62	12.15	92.1%	1,381	285.71	0.36
Vineland High School North	Aaon	RQ-005-3-V-E709	201609-AYCE02815	Package Unit	5	466.0	78.3	124.7	5.00	0.25	0.75	5.00	10.00	2797.1	115.9	5.40	0.25	0.75	4.40	12.01	92.6%	2,328	469.43	0.61
Vineland High School North	Goodman	GRH660XXX	1011001357	Package Unit	5	466.0	78.3	126.6	4.93	0.25	0.75	5.14	9.63	2861.6	117.7	5.32	0.25	0.75	4.52	11.57	94.0%	2,417	444.76	0.62
Vineland High School North	Goodman	GRH660XXX	40	Package Unit	5	466.0	78.3	126.6	4.93	0.25	0.75	5.14	9.63	2861.6	117.7	5.32	0.25	0.75	4.52	11.57	94.0%	2,417	444.76	0.62
Vineland High School North	Aaon	RQ-005-3-V-E709	201609-AYCE02637	Package Unit	5	466.0	78.3	124.7	5.00	0.25	0.75	5.00	10.00	2797.1	115.9	5.40	0.25	0.75	4.40	12.01	92.6%	2,328	469.43	0.61
Vineland High School North	Trane	WSCO048H4R0A	214314388L	Package Unit	4	466.0	78.3	126.0	3.96	0.20	0.60	4.08	9.75	2271.9	116.7	4.28	0.20	0.60	3.56	11.77	93.5%	1,900	372.10	0.51
Vineland High School North	Trane	WSCO048H4R0A	214314386L	Package Unit	4	466.0	78.3	126.0	3.96	0.20	0.60	4.08	9.75	2271.9	116.7	4.28	0.20	0.60	3.56	11.77	93.5%	1,900	372.10	0.51
Vineland High School North	Trane	WSCO048H4R0A	162013509L	Package Unit	4	466.0	78.3	125.4	3.98	0.20	0.60	4.04	9.86	2256.1	116.1	4.30	0.20	0.60	3.53	11.91	93.1%	1,878	378.03	0.51
Vineland High School North	Trane	WSCO048H4R0A	162013519L	Package Unit	4	466.0	78.3	125.4	3.98	0.20	0.60	4.04	9.86	2256.1	116.1	4.30	0.20	0.60	3.53	11.91	93.1%	1,878	378.03	0.51
Vineland High School North	Aaon	RN-007-3-0-E709	201609ANCG11636	Package Unit	7	466.0	78.3	124.7	7.00	0.35	1.05	7.00	10.00	3915.9	115.9	7.56	0.35	1.05	6.16	12.01	92.6%	3,259	657.20	0.85
Vineland High School North	Aaon	RN-007-3-0-E709	201609ANCG11630	Package Unit	7	466.0	78.3	124.7	7.00	0.35	1.05	7.00	10.00	3915.9	115.9	7.56	0.35	1.05	6.16	12.01	92.6%	3,259	657.20	0.85
Vineland High School North	Aaon	SA-030-3-A-E809	41	Package Unit	30	466.0	78.3	124.7	30.01	1.50	4.50	30.01	10.00	16782.4	115.9	32.41	1.50	4.50	26.38	12.01	92.6%	13,966	2,816.56	3.63
Vineland High School North	Aaon	RN-010-3-0-E709	42	Package Unit	10	466.0	78.3	124.7	10.00	0.50	1.50	10.00	10.00	5594.1	115.9	10.80	0.50	1.50	8.79	12.01	92.6%	4,655	938.85	1.21
Vineland High School North	Aaon	BQ-005-3-V-E709	43	Package Unit	5	466.0	78.3	124.7	5.00	0.25	0.75	5.00	10.00	2797.1	115.9	5.40	0.25	0.75	4.40	12.01	92.6%	2,328	469.43	0.61
Vineland High School South	LAVATA	LCS8212-018-10	K1440000079	Package Unit	18	466.0	78.3	125.3	17.99	0.90	2.70	18.02	9.98	10076.2	116.4	19.43	0.90	2.70	16.19	11.78	92.6%	8,543	1,533.21	1.84
Vineland High School South	Desert Air	40EG4MMH65014	4914E23056	Package Unit	40	466.0	78.3	125.3	39.98	2.00	6.00	40.05	9.98	22391.6	116.4	43.17	2.00	6.00	35.97	11.78	92.6%	18,984	3,407.14	4.08
Vineland High School South	Daikin	DWV0188JJNKKN0B	STNU211200081	Air-cooled Chiller	188	466.0	78.3	123.8	189.51	9.40	28.20	184.90	10.22	103683.0	116.3	204.67	9.40	28.20	168.80	11.90	91.9%	88,347	15,336.04	16.10

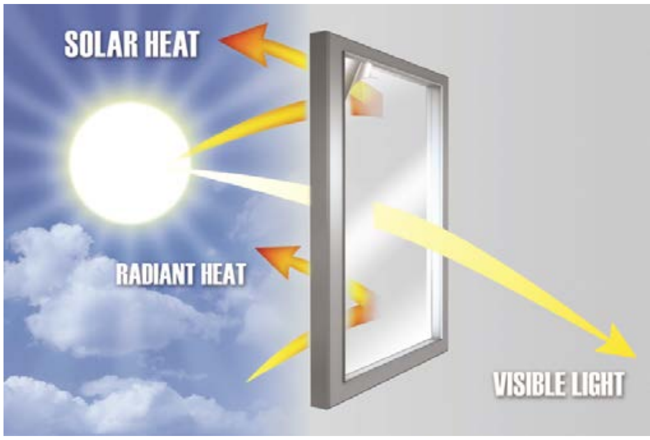
ECM 24 – Window Film

Vineland Public Schools ECM Matrix

✓	ECM was evaluated
✓ (green)	ECM evaluated & included in the project

ECM #	ECM DESCRIPTION	Vineland High School North	Vineland High School South	Thomas Wallace Middle School	SGT Dominick Pilla Middle Schoool	Veterans Memorial Intermediate School	Anthony Rossi Intermediate School	Gloria M. Sabater Elementary School	D'Ippolito Elementary School	Petway Elementary School	Dr. William Mennies Elementary School	Johnstone Elementary School	Dr. John H. Winslow Elementary School	Marie Durand Elementary School	Dane Barse Elementary School	Cunningham School	Landis Administrative Building	Maintenance/Transportation Building	Central Warehouse
24	Window Film	✓ (green)	✓ (green)	✓ (green)	✓	✓ (green)	✓	✓ (green)	✓	✓ (green)	✓ (green)	✓ (green)	✓ (green)	✓ (green)	✓	✓ (green)	✓		

Window film adheres to existing windows to reflect radiant infrared energy, thus tending to keep radiant heat on the side of the glass where it originated. This results in more efficient windows because radiant heat originating from indoors in winter is reflected back inside, while infrared heat radiation from the sun during summer is reflected away, keeping it cooler inside. Window film stills allow the natural light to shine through but reduces the window glare to allow occupants to see clearly without straining their eyes.



Scope of Work

The schools list below were evaluated to have low efficiency glazing. All schools will have the Affinity 15 solar window film installed.

BUILDING	Window Film Model
Vineland High School North	Affinity 15
Vineland High School South	Affinity 15
Thomas Wallace Middle School	Affinity 15
Veterans Memorial Intermediate School	Affinity 15
Gloria M. Sabater Elementary School	Affinity 15
Petway Elementary School	Affinity 15
Dr. William Mennies Elementary School	Affinity 15
Johnstone Elementary School	Affinity 15
Dr. John H. Winslow Elementary School	Affinity 15
Marie Durand Elementary School	Affinity 15
Cunningham School	Affinity 15

Specification	Affinity 15 on Clear 3mm IGU
Visible light transmittance %	9%
Visible light reflectance (exterior) %	58%
Visible light reflectance (interior) %	25%
Solar heat gain coefficient	0.21
Total solar energy rejected %	79%
UV Tdw-ISO @ 300 to 700 nm %	10%
UV light blocked (300 to 380 nm) %	>99%
Fade Reduction %	88%

Performance Notes:

- Performance results are calculated using NFRC methodology and LBNL Window software, applied to 1/4" (6mm) clear glass and are subject to variations within industry standards and only intended for estimating purposes. This data is provided for informational purposes only and subject to normal manufacturing variances.
- Performance results for glare and fade reduction are calculated by comparing filmed glass to that of untreated glazing.

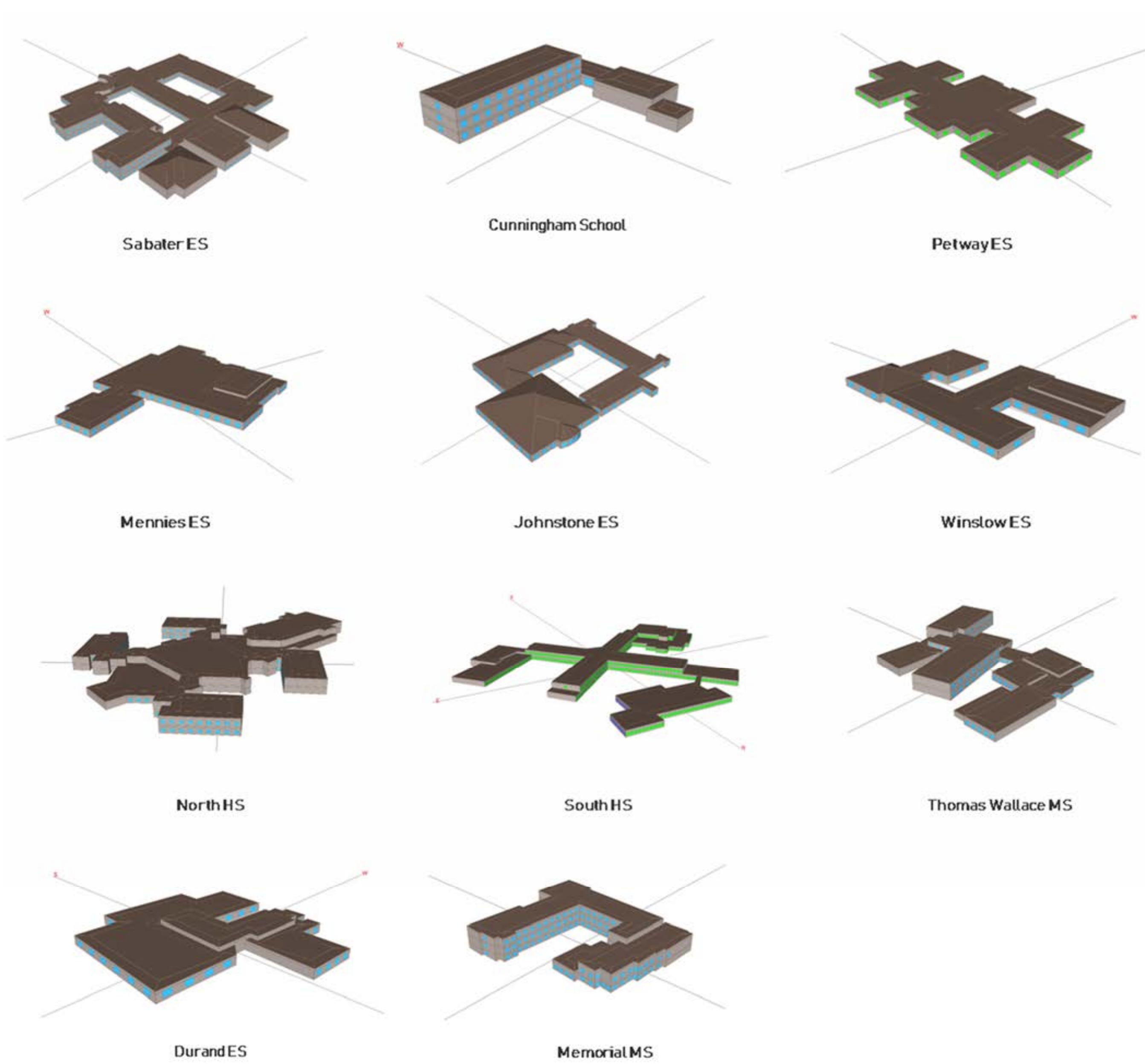
Existing Conditions

ECM Calculations

Energy Savings from the installation of Window Film was modeled in eQuest and the summary is shown below.

*Note: Window Film was evaluated at SGT Dominick Pilla MS, Anthoy Rossi IS, D'Ippolito ES, Dan Barse ES, and Landis Administration Building but due to poor financial payback, installation is not included in the ESIP project. Savings are not shown below but can be reviewed on Form II in Section 4 of the Energy Savings Plan.

Window Film Savings					
BUILDING	Window Film Model	kWh Savings	kW Savings	THERM Savings	Window Film Model
Vineland High School North	A15	55,405.9	32	(2,545)	Affinity 15
Vineland High School South	A15	102,904.0	49	(3,852)	Affinity 15
Thomas Wallace Middle School	A15	66,880.0	30	(3,044)	Affinity 15
Veterans Memorial Intermediate School	A15	101,292.8	49	(5,483)	Affinity 15
Gloria M. Sabater Elementary School	A15	51,147.1	20	(1,527)	Affinity 15
Petway Elementary School	A15	97,396.9	43	-	Affinity 15
Dr. William Mennies Elementary School	A15	23,142.0	12	(52)	Affinity 15
Johnstone Elementary School	A15	25,392.6	11	(862)	Affinity 15
Dr. John H. Winslow Elementary School	A15	26,436.6	9	(953)	Affinity 15
Marie Durand Elementary School	A15	9,444.9	4	(534)	Affinity 15
Cunningham School	A15	37,346.4	17	(1,343)	Affinity 15


Sabater ES
Cunningham School
Petway ES
Mennies ES
Johnstone ES
Winslow ES
North HS
South HS
Thomas Wallace MS
Durand ES
Memorial MS

ECM 26 – PC Power Management

Vineland Public Schools ECM Matrix

✔	ECM was evaluated
✔ (green)	ECM evaluated & included in the project

ECM #	ECM DESCRIPTION	Vineland High School North	Vineland High School South	Thomas Wallace Middle School	SGT Dominick Pilla Middle Schoool	Veterans Memorial Intermediate School	Anthony Rossi Intermediate School	Gloria M. Sabater Elementary School	D'Ippolito Elementary School	Petway Elementary School	Dr. William Mennies Elementary School	Johnstone Elementary School	Dr. John H. Winslow Elementary School	Marie Durand Elementary School	Dane Barse Elementary School	Cunningham School	Landis Administrative Building	Maintenance/Transportation Building	Central Warehouse
26	PC Power Management	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔		✔	✔	✔		✔

Background

PC power management refers to software-based mechanisms for controlling the power use of personal computer hardware. This is typically through the use of software that puts the hardware into the lowest power demand state available.

While most PCs allow low power settings, there are frequent situations, especially in a networked environment, where processes running on the computer will prevent the low power settings from taking effect. This can have a dramatic effect on energy use that is invisible to the user. Operational testing has shown that on any given day an average of over 50% of an organization's computers will fail to go to sleep, and over long periods of time this affects over 90% of machines.

Scope of Work

Add PC power management technology to computers located at the following locations:

BUILDING	System Type	QUANTITY
Vineland High School North	Desktop PC	164
	Imac	13
Vineland High School South	Desktop PC	95
	Imac	72
Thomas Wallace Middle School	Desktop PC	11
	Imac	7
SGT Dominick Pilla Middle Schoool	Desktop PC	1
	Imac	25
Veterans Memorial Intermediate School	Desktop PC	31
	Imac	13
Anthony Rossi Intermediate School	Desktop PC	18
	Imac	9
Gloria M. Sabater Elementary School	Desktop PC	20
	Imac	3
D'Ippilito Elementary School	Desktop PC	25
Petway Elementary School	Desktop PC	43
	Imac	5
Dr. William Mennies Elementary School	Desktop PC	28
	Imac	1
Johnstone Elementary School	Desktop PC	2
	Imac	2
Dr. John H. Winslow Elementary School	Desktop PC	18
	Imac	10
Dane Barse Elementary School	Desktop PC	8
Cunningham School	Desktop PC	24
Landis Administrative Building	Desktop PC	78
	Imac	11
Central Warehouse	Desktop PC	1
	Imac	2

ECM Calculations

Energy Savings from application of PC Power Management are calculated on the following pages:

PC Power Management Savings					
BUILDING	System Type	QUANTITY	Annual kWh Savings Per Device	kWh Savings	TOTAL Savings
Vineland High School North	Desktop PC	164	78.30	12,841.20	**13,859.10**
	Imac	13	78.30	1,017.90	
Vineland High School South	Desktop PC	95	78.30	7,438.50	**13,076.10**
	Imac	72	78.30	5,637.60	
Thomas Wallace Middle School	Desktop PC	11	78.30	861.30	**1,409.40**
	Imac	7	78.30	548.10	
SGT Dominick Pilla Middle Schoool	Desktop PC	1	78.30	78.30	**2,035.80**
	Imac	25	78.30	1,957.50	
Veterans Memorial Intermediate School	Desktop PC	31	78.30	2,427.30	**3,445.20**
	Imac	13	78.30	1,017.90	
Anthony Rossi Intermediate School	Desktop PC	18	78.30	1,409.40	**2,114.10**
	Imac	9	78.30	704.70	
Gloria M. Sabater Elementary School	Desktop PC	20	78.30	1,566.00	**1,800.90**
	Imac	3	78.30	234.90	
D'Ippilito Elementary School	Desktop PC	25	78.30	1,957.50	**1,957.50**
Petway Elementary School	Desktop PC	43	78.30	3,366.90	**3,758.40**
	Imac	5	78.30	391.50	
Dr. William Mennies Elementary School	Desktop PC	28	78.30	2,192.40	**2,270.70**
	Imac	1	78.30	78.30	
Johnstone Elementary School	Desktop PC	2	78.30	156.60	**313.20**
	Imac	2	78.30	156.60	
Dr. John H. Winslow Elementary School	Desktop PC	18	78.30	1,409.40	**2,192.40**
	Imac	10	78.30	783.00	
Dane Barse Elementary School	Desktop PC	8	78.30	626.40	**626.40**
Cunningham School	Desktop PC	24	78.30	1,879.20	**1,879.20**
Landis Administrative Building	Desktop PC	78	78.30	6,107.40	**6,968.70**
	Imac	11	78.30	861.30	
Central Warehouse	Desktop PC	1	78.30	78.30	**234.90**
	Imac	2	78.30	156.60	

Vineland Power State Bar Chart

	Per PC
Avg Baseline Rate:	265.69 kWh
Avg WakeSMART Rate:	178.44 kWh
Average Energy Savings:	87.25 kWh

Results of the two-week trial of the PC power management software at Vineland Public Schools

ECMs Evaluated but Not Included

The energy conservation measures highlighted in this section were each evaluated during the investment grade audit. Due to high capital costs compared to annual energy savings and district priorities, these measures have not been included in the Energy Savings Plan.

ECM 2 – LED Lighting Volumetric Kit Retrofit

Due to poor payback and VPSD priorities, this ECM is not included in the ESIP Project

Vineland Public Schools
ECM Matrix

✔	ECM was evaluated
✔ (green)	ECM evaluated & included in the project

ECM #	ECM DESCRIPTION	Vineland High School North	Vineland High School South	Thomas Wallace Middle School	SGT Dominick Pilla Middle Schoool	Veterans Memorial Intermediate School	Anthony Rossi Intermediate School	Gloria M. Sabater Elementary School	D'Ippolito Elementary School	Petway Elementary School	Dr. William Mennies Elementary School	Johnstone Elementary School	Dr. John H. Winslow Elementary School	Marie Durand Elementary School	Dane Barse Elementary School	Cunningham School	Landis Administrative Building	Maintenance/Transportation Building	Central Warehouse
2	LED Lighting Volumetric Kit Retrofit	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔		✔	✔	✔	✔

Background, Scope of Work, and ECM Calculations not provided. Cost and savings can be reviewed on Form II in Section 4 of the Energy Savings Plan.

ECM 15 – Common Area HVAC Upgrades

Due to poor payback and VPSD priorities, this ECM is not included in the ESIP Project

Vineland Public Schools
ECM Matrix

✔	ECM was evaluated
✔	ECM evaluated & included in the project

ECM #	ECM DESCRIPTION	Vineland High School North	Vineland High School South	Thomas Wallace Middle School	SGT Dominick Pilla Middle Schoool	Veterans Memorial Intermediate School	Anthony Rossi Intermediate School	Gloria M. Sabater Elementary School	D'Ippolito Elementary School	Petway Elementary School	Dr. William Mennies Elementary School	Johnstone Elementary School	Dr. John H. Winslow Elementary School	Marie Durand Elementary School	Dane Barse Elementary School	Cunningham School	Landis Administrative Building	Maintenance/Transportation Building	Central Warehouse
15	Common Area HVAC Upgrades	✔																	

Background, Scope of Work, and ECM Calculations not provided. Cost and savings can be reviewed on Form II in Section 4 of the Energy Savings Plan.

DCO Energy Efficiency Division
100 Lenox Drive
Lawrenceville, NJ 08648

ECM 16 – VHSN Central Hub Upgrades

Due to poor payback and VPSD priorities, this ECM is not included in the ESIP Project

Vineland Public Schools ECM Matrix

✔	ECM was evaluated
✔ (green)	ECM evaluated & included in the project

ECM #	ECM DESCRIPTION	Vineland High School North	Vineland High School South	Thomas Wallace Middle School	SGT Dominick Pilla Middle Schoool	Veterans Memorial Intermediate School	Anthony Rossi Intermediate School	Gloria M. Sabater Elementary School	D'Ippolito Elementary School	Petway Elementary School	Dr. William Mennies Elementary School	Johnstone Elementary School	Dr. John H. Winslow Elementary School	Marie Durand Elementary School	Dane Barse Elementary School	Cunningham School	Landis Administrative Building	Maintenance/Transportation Building	Central Warehouse
16	VHSN Central Hub Upgrades	✔																	

Background, Scope of Work, and ECM Calculations not provided. Cost and savings can be reviewed on Form II in Section 4 of the Energy Savings Plan.

ECM 17 – Winslow HVAC Upgrades- Phase 2A

Due to poor payback and VPSD priorities, this ECM is not included in the ESIP Project

Vineland Public Schools ECM Matrix

✓	ECM was evaluated
✓ (green)	ECM evaluated & included in the project

ECM #	ECM DESCRIPTION	Vineland High School North	Vineland High School South	Thomas Wallace Middle School	SGT Dominick Pilla Middle Schoool	Veterans Memorial Intermediate School	Anthony Rossi Intermediate School	Gloria M. Sabater Elementary School	D'Ippolito Elementary School	Petway Elementary School	Dr. William Mennies Elementary School	Johnstone Elementary School	Dr. John H. Winslow Elementary School	Marie Durand Elementary School	Dane Barse Elementary School	Cunningham School	Landis Administrative Building	Maintenance/Transportation Building	Central Warehouse
17	Winslow HVAC Upgrades - Phase 2A												✓						

Background, Scope of Work, and ECM Calculations not provided. Cost and savings can be reviewed on Form II in Section 4 of the Energy Savings Plan.

DCO Energy Efficiency Division
100 Lenox Drive
Lawrenceville, NJ 08648

ECM 19 – Domestic Water Heater Conversion to Natural Gas

Due to poor payback and VPSD priorities, this ECM is not included in the ESIP Project

Vineland Public Schools ECM Matrix

✔	ECM was evaluated
✔ (green)	ECM evaluated & included in the project

ECM #	ECM DESCRIPTION	Vineland High School North	Vineland High School South	Thomas Wallace Middle School	SGT Dominick Pilla Middle Schoool	Veterans Memorial Intermediate School	Anthony Rossi Intermediate School	Gloria M. Sabater Elementary School	D'Ippolito Elementary School	Petway Elementary School	Dr. William Mennies Elementary School	Johnstone Elementary School	Dr. John H. Winslow Elementary School	Marie Durand Elementary School	Dane Barse Elementary School	Cunningham School	Landis Administrative Building	Maintenance/Transportation Building	Central Warehouse
19	Domestic Water Heater Conversion to Natural Gas						✔		✔		✔								

Background, Scope of Work, and ECM Calculations not provided. Cost and savings can be reviewed on Form II in Section 4 of the Energy Savings Plan.

ECM 21 – Unit Ventilator Replacement

Due to poor payback and VPSD priorities, this ECM is not included in the ESIP Project

Vineland Public Schools ECM Matrix

✔	ECM was evaluated
✔ (green)	ECM evaluated & included in the project

ECM #	ECM DESCRIPTION	Vineland High School North	Vineland High School South	Thomas Wallace Middle School	SGT Dominick Pilla Middle Schoool	Veterans Memorial Intermediate School	Anthony Rossi Intermediate School	Gloria M. Sabater Elementary School	D'Ippolito Elementary School	Petway Elementary School	Dr. William Mennies Elementary School	Johnstone Elementary School	Dr. John H. Winslow Elementary School	Marie Durand Elementary School	Dane Barse Elementary School	Cunningham School	Landis Administrative Building	Maintenance/Transportation Building	Central Warehouse
21	Unit Ventilator Replacement						✔		✔										

Background, Scope of Work, and ECM Calculations not provided. Cost and savings can be reviewed on Form II in Section 4 of the Energy Savings Plan.

ECM 22 – Chiller Replacement

Due to poor payback and VPSD priorities, this ECM is not included in the ESIP Project

Vineland Public Schools ECM Matrix

✓	ECM was evaluated
✓ (green)	ECM evaluated & included in the project

ECM #	ECM DESCRIPTION	Vineland High School North	Vineland High School South	Thomas Wallace Middle School	SGT Dominick Pilla Middle Schoool	Veterans Memorial Intermediate School	Anthony Rossi Intermediate School	Gloria M. Sabater Elementary School	D'Ippolito Elementary School	Petway Elementary School	Dr. William Mennies Elementary School	Johnstone Elementary School	Dr. John H. Winslow Elementary School	Marie Durand Elementary School	Dane Barse Elementary School	Cunningham School	Landis Administrative Building	Maintenance/Transportation Building	Central Warehouse
22	Chiller Replacement											✓							

Background, Scope of Work, and ECM Calculations not provided. Cost and savings can be reviewed on Form II in Section 4 of the Energy Savings Plan.

ECM 25 – Field Lighting Replacement

Due to poor payback and VPSD priorities, this ECM is not included in the ESIP Project

Vineland Public Schools ECM Matrix

✔	ECM was evaluated
✔ (green)	ECM evaluated & included in the project

ECM #	ECM DESCRIPTION	Vineland High School North	Vineland High School South	Thomas Wallace Middle School	SGT Dominick Pilla Middle Schoool	Veterans Memorial Intermediate School	Anthony Rossi Intermediate School	Gloria M. Sabater Elementary School	D'Ippolito Elementary School	Petway Elementary School	Dr. William Mennies Elementary School	Johnstone Elementary School	Dr. John H. Winslow Elementary School	Marie Durand Elementary School	Dane Barse Elementary School	Cunningham School	Landis Administrative Building	Maintenance/Transportation Building	Central Warehouse
25	Field Lighting Replacement		✔														✔		

Background, Scope of Work, and ECM Calculations not provided. Cost and savings can be reviewed on Form II in Section 4 of the Energy Savings Plan.

ENERGY SAVINGS PLAN

SECTION 4 – FINANCIAL ANALYSIS

Form II – Energy Conservation Measures Summary Form

FORM II - 20 Years @ 4.25% Interest

ESCO's PRELIMINARY ENERGY SAVINGS PLAN (ESP):
ENERGY CONSERVATION MEASURES (ECMs) SUMMARY FORM
Vineland Public Schools
ENERGY SAVINGS IMPROVEMENT PROGRAM

ESCO Name: DCO Energy

Proposed Preliminary Energy Savings Plan		Estimated Installed Hard Costs(1) $	Estimated Annual Savings $	Est. Simple Payback (Years)
ECM Number	Energy Conservation Measure			
1	LED Lighting Tube Retrofit	$3,097,865	$460,287	6.7
3	LED Lighting Flat Panel Replacement	$244,836	$78,656	3.1
4	Lighting Controls	$441,727	$28,154	15.7
5	Energy Management System Upgrades	$729,420	$15,981	45.6
6	Energy Management System Replacement	$2,029,332	$22,670	89.5
7	Pipe and Valve Insulation	$102,612	$42,395	2.4
8	Building Envelope Weatherization	$586,400	$82,051	7.1
9	Plug Load Controls	$486,000	$36,885	13.2
10	Refrigeration Controls	$278,915	$30,323	9.2
11	Retro-Commissioning	$309,600	$46,060	6.7
12	Combined Heating & Power	$208,026	$1,471	141.4
13	Make-Up Air Unit Replacement	$3,584,716	$13,653	262.6
14	Destratification Fans	$174,400	$32,785	5.3
18	High Efficiency Transformers with Harmonic Mitigation	$350,000	$34,582	10.1
20	Boiler Replacement	$1,450,000	$6,762	214.4
23	HVAC Armor	$366,872	$48,441	7.6
24	Window Film	$537,072	$82,121	6.5
26	PC Power Management	$24,531	$7,658	3.2
	Project Summary:	**$15,002,324**	**$1,070,933**	**14.0**

Optional ECMs *Considered, but not included with base project at this time*		Estimated Installed Hard Costs(1) $	Estimated Annual Savings $	Est. Simple Payback (Years)
ECM Number	Energy Conservation Measure			
1	LED Lighting Tube Retrofit	$162,769	$22,358	7.3
2	LED Lighting Volumetric Kit Retrofit	$4,302,602	$493,259	8.7
3	LED Lighting Flat Panel Replacement	$5,516,670	$430,965	12.8
6	Energy Management System Replacement	$212,489	$2,467	86.1
8	Building Envelope Weatherization	$21,000	$4,264	4.9
12	Combined Heating & Power	$208,026	$1,601	129.9
13	Make-Up Air Unit Replacement	$583,175	$3,696	157.8
15	Common Area HVAC Upgrades	$3,131,987	$39,032	80.2
16	VHSN Central Hub Upgrades	$2,924,359	$2,792	1047.5
17	Winslow HVAC Upgrades - Phase 2A	$1,865,111	$30,042	62.1
18	High Efficiency Transformers with Harmonic Mitigation	$1,296,892	$70,347	18.4
19	Domestic Water Heater Conversion to Natural Gas	$695,495	$4,334	160.5
21	Unit Ventilator Replacement	$3,413,250	$20,305	168.1
22	Chiller Replacement	$521,282	$980	531.8
23	HVAC Armor	$7,633	$316	24.2
24	Window Film	$105,704	$5,552	19.0
25	Field Lighting Replacement	$706,995	$5,799	121.9
*Add additional lines as needed**	**Optional ECMs Summary:**	**$25,675,438**	**$1,138,108**	**22.6**

Proposed Energy Related Capital Improvements		Supporting ECM	Estimated Cost $	Percentage of Total Project Cost (Not to Exceed 15%)
ECM Number	Energy Conservation Measure			
*Add additional lines as needed**	**Optional ECMs Summary:**	**-**	**$0**	**0.0%**

(1) 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, Profit, etc.

Form V – ESCO Construction and Service Fees

FORM V - 20 Years @ 4.25% Interest		
ESCO's PRELIMINARY ENERGY SAVINGS PLAN (ESP): ESCOs PROPOSED FINAL PROJECT COST FORM FOR BASE CASE PROJECT Vineland Public Schools ENERGY SAVING IMPROVEMENT PROGRAM		
ESCO Name: DCO Energy		
PROPOSED CONSTRUCTION FEES:		
Fee Category	Fees (1) Dollar ($) Value	Percentage of Hard Costs
Estimated Value of Hard Costs	$ 15,002,324	
Contingency	$ 762,118	
Estimated Value of Hard Costs	$ 15,764,442	
Project Service Fees		
Investment Grade Energy Audit	$ 267,996	1.70%
Design Engineering Fees	$ 906,455	5.75%
Construction Management & Project Administration	$ 1,237,509	7.85%
System Commissioning	$ 102,469	0.65%
Equipment Initial Training Fees	$ 157,644	1.00%
ESCO Overhead	$ 472,933	3.00%
ESCO Profit	$ 630,578	4.00%
Project Service Fees Sub Total	$ 2,672,073	16.95%
TOTAL FINANCED PROJECT COSTS(4):	$ 19,540,025	23.95%
PROPOSED ANNUAL SERVICE FEES		
First Year Annual Service Fees	Fees (1) Dollar ($) Value	Percentage of Hard Costs
SAVINGS GUARANTEE *(OPTION)*	$0	0.00%
Measurement & Verification *(Associated w/ Savings Guarantee Option)*	$75,000	FLAT FEE
ENERGY STAR Services *(optional)*	$0	0.00%
Post Construction Services *(if applicable)*	$0	0.00%
Performance Monitoring	w/ M&V	0.00%
On-going Training Services	w/ M&V	0.00%
Verification Reports	w/ M&V	0.00%
TOTAL FIRST YEAR ANNUAL SERVICES	$75,000	FLAT FEE

Form VI – Project Cash Flow Analysis

FORM VI - 20 Years @ 4.25% Interest

ESCO's PRELIMINARY ENERGY SAVINGS PLAN (ESP):

ESCO's PRELIMINARY ANNUAL CASH FLOW ANALYSIS FORM
Vineland Public Schools - ENERGY SAVING IMPROVEMENT PROGRAM

ESCO Name: DCO Energy

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

1. Term of Agreement: **20 Years**
2. Construction Period (months): 24 Months
3. Cash Flow Analysis Format:

Project Cost[1]: **$19,540,025**
Misc Costs Financed: **$265,000**
Financed Amount: **$19,805,025**

Interest Rate: **4.25%**

Miscellaneous Costs Financed:	
Cost of Issuance	$265,000
Total	$265,000

Year	Annual Energy Savings [4]	Annual Operational Savings	Energy Rebates / Incentives Value	Utility	Total Annual Savings	Annual Project Costs	Net Cash-Flow to Client	Cumulative Cash Flow
Installation (2 Years)	$ 1,402,550				$ 1,402,550	$ (715,457)		
Year 1	$ 1,168,926	$ 149,237	$ 32,700	South Jersey Gas Prescriptive	$ 1,350,863	$ (2,035,475)	$ 2,482	$ 2,482
Year 2	$ 1,194,795	$ 149,237			$ 1,344,032	$ (1,341,551)	$ 2,482	$ 4,963
Year 3	$ 1,221,237	$ 60,662			$ 1,281,899	$ (1,279,417)	$ 2,482	$ 7,445
Year 4	$ 1,248,264	$ 60,662			$ 1,308,926	$ (1,306,445)	$ 2,482	$ 9,926
Year 5	$ 1,275,890	$ 60,662			$ 1,336,552	$ (1,334,070)	$ 2,482	$ 12,408
Year 6	$ 1,304,127				$ 1,304,127	$ (1,301,646)	$ 2,482	$ 14,889
Year 7	$ 1,332,990				$ 1,332,990	$ (1,330,508)	$ 2,482	$ 17,371
Year 8	$ 1,362,492				$ 1,362,492	$ (1,360,010)	$ 2,482	$ 19,852
Year 9	$ 1,392,647				$ 1,392,647	$ (1,390,165)	$ 2,482	$ 22,334
Year 10	$ 1,423,469				$ 1,423,469	$ (1,420,988)	$ 2,482	$ 24,816
Year 11	$ 1,454,975				$ 1,454,975	$ (1,452,493)	$ 2,482	$ 27,297
Year 12	$ 1,487,177				$ 1,487,177	$ (1,484,696)	$ 2,482	$ 29,779
Year 13	$ 1,520,094				$ 1,520,094	$ (1,517,612)	$ 2,482	$ 32,260
Year 14	$ 1,553,738				$ 1,553,738	$ (1,551,257)	$ 2,482	$ 34,742
Year 15	$ 1,588,128				$ 1,588,128	$ (1,585,647)	$ 2,482	$ 37,223
Year 16	$ 1,623,280				$ 1,623,280	$ (1,620,798)	$ 2,482	$ 39,705
Year 17	$ 1,659,210				$ 1,659,210	$ (1,656,728)	$ 2,482	$ 42,187
Year 18	$ 1,695,936				$ 1,695,936	$ (1,693,454)	$ 2,482	$ 44,668
Year 19	$ 1,733,475				$ 1,733,475	$ (1,730,993)	$ 2,482	$ 47,150
Year 20	$ 1,771,845				$ 1,771,845	$ (1,769,364)	$ 2,482	$ 49,631
Totals	**$ 30,415,244**	**$ 480,461**	**$ 32,700**	**$ -**	**$ 30,928,405**	**$ (30,878,774)**	**$ 49,631**	

Utility Inflation Details

Per Form VI, the annual inflation rate is 2.2% for electric and 2.4% for natural gas.

Utility Inflation Worksheet		
Year	ANNUAL ELECTRIC COST SAVINGS	ANNUAL NATURAL GAS COST SAVINGS
1	$1,092,608.12	$76,317.84
2	$1,116,645.50	$78,149.47
3	$1,141,211.70	$80,025.06
4	$1,166,318.35	$81,945.66
5	$1,191,977.36	$83,912.35
6	$1,218,200.86	$85,926.25
7	$1,245,001.28	$87,988.48
8	$1,272,391.31	$90,100.20
9	$1,300,383.92	$92,262.61
10	$1,328,992.36	$94,476.91
11	$1,358,230.19	$96,744.36
12	$1,388,111.26	$99,066.22
13	$1,418,649.71	$101,443.81
14	$1,449,860.00	$103,878.46
15	$1,481,756.92	$106,371.54
16	$1,514,355.57	$108,924.46
17	$1,547,671.39	$111,538.65
18	$1,581,720.16	$114,215.58
19	$1,616,518.01	$116,956.75

ENERGY SAVINGS PLAN

SECTION 5 – RISK, DESIGN, & COMPLIANCE

Assessment of Risks, Design & Compliance Issues

Moving from a conceptual design to engineered documents, DCO has identified areas of the project that could change during the detailed design. The table below represents potential conceptual areas of concern that will need to be investigated further with a corresponding party responsible for the compliance of each item.

Issue	Category	Responsible Party
Alteration of expected Maintenance and Operational Savings	Risk	Vineland Public School District
Disposition of Abandoned Equipment (Steam Piping, Condensate Piping, Oil Tanks, etc.)	Risk	Vineland Public School District
New Natural Gas Distribution	Risk	Vineland Public School District
Integrity of re-used Infrastructure	Risk	Vineland Public School District
Life Safety System Coordination	Risk	Vineland Public School District
Coordination with Vineland Public School District Information Technology Department	Risk	Vineland Public School District
Ventilation Compliance with Code	Compliance	Consulting Engineer
Temperature, Humidity and Air Change Compliance with Code	Compliance	Consulting Engineer
Boiler Capacity and Turndown	Design	Consulting Engineer
Natural Gas Regulator Compliance with Code	Compliance	Consulting Engineer
Undocumented Underground Utilities	Risk	Consulting Engineer
Code Compliance of Existing Electrical Infrastructure	Compliance	Consulting Engineer
Lighting Levels	Compliance	Consulting Engineer
Design Light Consortium rating for bulbs	Compliance	Consulting Engineer

Underwriters Laboratory Testing for retrofitted LED Lighting Systems	Compliance	Consulting Engineer
Lighting Retrofits within hard ceilings for fixtures and occupancy sensors	Risk	Consulting Engineer
Street/Parking Lot Pole Structural Integrity	Risk	Consulting Engineer
Unrealized Energy Savings 1. Energy Modeling 2. Performance Monitoring 3. Capacity of Equipment 4. Efficiency of Equipment 5. Run Hours of Equipment	Risk	DCO/ Consulting Engineer 1. DCO 2. DCO 3. Consulting Engineer / Basis of Design Vendor 4. Consulting Engineer / Basis of Design Vendor 5. Vineland Public School District
Existing Plumbing Infrastructure with New Low Flow Devices	Design	Consulting Engineer
Adaptation to New RTUs (Curb, Electric, Ductwork, Condensate)	Design	Consulting Engineer / Basis of Design Manufacture
Structural Loads for Rooftop Equipment Replacement	Design	Consulting Engineer
Transformer Loading	Risk	Consulting Engineer
Site Work for Equipment	Design	Consulting Engineer
Condition of Roof Under Units	Risk	Consulting Engineer
Adequate Crane Lifts & Clearances	Design	Consulting Engineer / Rigger
Physical Space Constraints and Clearance for Equipment Replacement	Design	Consulting Engineer
Refrigerant Reclaim / Refrigerant Disposal	Compliance	Contractor
Existing Tie in Locations	Design	Consulting Engineer

Schedule Oversight	Risk	DCO Energy
Impact of Boiler Flue	Design	Consulting Engineer
Impact of Space Usage During Construction	Risk	Consulting Engineer & Vineland Public School District
Scope changes relating to requests by Authorities Having Jurisdiction.	Risk	Vineland Public School District (via contingency)
Department of Environmental Protection Permitting	Risk	Consulting Engineer
Modifications of Energy Saving Control Sequences and Setpoints impacting Energy Savings and Incentives	Risk	Vineland Public School District
Post Construction Calibration of Sensors, Meters, & Safety Devices	Risk	Vineland Public School District
Adequate time and access for bidding contractor site surveys	Risk	Vineland Public School District
Utility Interconnection approval for the CHP Unit	Risk	Contractor

Measurement & Verification (M&V) Plan

Our approach to M&V of energy savings aligns with the International Performance Measurement & Verification Protocol. More detailed information may be found below. It's most cost-effective to perform M&V using the least costly option that still adequately documents system performance and permits analysis of savings. This approach lowers the total cost of the program, leaving more dollars available to perform more facility improvements. Depending upon which ECMs are implemented by Vineland Public School District, the M&V plan proposed by DCO would incorporate one or more of the following options which outlines the four most common approaches for M&V:

Option A – Retrofit Isolation with Key Parameter Measurement	This option is based on a combination of measured and estimated factors when variations in factors are not expected. Measurements are spot or short-term and are taken at the component or system level, both in the baseline and post-installation cases. Measurements should include the key performance parameter(s) which define the energy use of the ECM. Estimated factors are supported by historical or manufacturer's data. Savings are determined by means of engineering calculations of baseline and post-installation energy use based on measured and estimated values.	Direct measurements and estimated values, engineering calculations and/or component or system models often developed through regression analysis. Adjustments to models are not typically required.
Option B – Retrofit Isolation with Parameter Measurement	This option is based on periodic or continuous measurements of energy use taken at the component or system level when variations in factors are expected. Energy or proxies of energy use are measured continuously. Periodic spot or short-term measurements may suffice when variations in factors are not expected. Savings are determined form analysis of baseline and reporting period energy use of proxies of energy use.	Direct measurements, engineering calculations, and/or component or system models often developed through regression analysis. Adjustments to models may be required.
Option C – Utility Data Analysis	This option is based on long-term, continuous, whole-building utility meter, facility level, or sub-meter energy (or water) data. Savings are determined from analysis of baseline and reporting period energy data. Typically, regression analysis is conducted to correlate with and adjust energy use to independent variables such as weather, but simple comparisons may also be used.	Based on regression analysis of utility meter data to account for factors that drive energy use. Adjustments to models are typically required.
Option D – Calibrated Computer Simulation	Computer simulation software is used to model energy performance of a whole facility (or sub-facility). Models must be calibrated with actual hourly or monthly billing data from the facility. Implementation of simulation modeling requires engineering expertise. Inputs to the model include facility	Based on computer simulation model calibrated with whole-building or end-use metered data or both.

	characteristics; performance specifications of new and existing equipment or systems; engineering estimates, spot-, short-term, or long-term measurements of system components; and long-term whole-building utility meter data. After the model has been calibrated, savings are determined by comparing a simulation of the baseline with either a simulation of the performance period or actual utility data	Adjustments to models are required.

Each of the options can be used for a wide array of energy efficiency upgrades and each has different costs and complexities associated with it. When selecting an M&V approach, the following general rule of thumb can be applied:

OPTION A

- When magnitude of savings is low for the entire project or a portion of the project
- The risk of not achieving savings is low.

OPTION B

- For simple equipment replacement projects
- When energy savings values per individual measure are desired
- When interactive effects are to be ignored or are estimated using estimating methods that do not involve long term measurements
- When sub-meters already exist that record the energy use of subsystems under consideration

OPTION C

- For complex equipment replacement and controls projects
- When predicted energy savings are in excess of 10 to 20 percent as compared with the record energy use
- When energy savings per individual measure are not desired
- When interactive effects are to be included
- When the independent variables that affect energy, use are complex and excessively difficult or expensive.

OPTION D

- When new construction projects are involved
- When energy savings values per measure are desired
- When Option C tools cannot cost effectively evaluate particular measures or their interactions with the building when complex baseline adjustments are anticipated

DCO will perform measurement and verification of the energy unit's savings at the conclusion of each month in the first year of the energy units guarantee. After the first year, M&V will be performed and presented within 30 days of the year end. Vineland Public School District will work with DCO to provide necessary information and provide access to any buildings to allow DCO to properly verify and measure energy savings. DCO's energy guarantee will be based on units of energy saved as determined from the baseline provided in the RFP, or adjusted baseline if original baseline is determined by both parties to be inaccurate.

Adjustments to the baseline and associated savings will be taken for weather, hours of operation, building usage, utility rate increases, code or statute changes, requirements listed in Table 1, and any other actions that adversely affect the savings beyond the control of DCO. Any savings discrepancies will be resolved to the satisfaction of both Vineland Public School District and DCO in a timely manner.

As part of the optional energy guarantee, DCO uses weather normalization procedures to correct the effect of weather variance on energy savings in subsequent years. Baseline energy and weather data are used to establish an algorithm to predict how the baseline building uses energy as a function of weather. The algorithm is then applied to subsequent years to correct for the impact weather may have on future building energy use. The weather normalization procedure and algorithms will be covered in detail as part of the optional energy guarantee contract provided to Vineland Public School District.

Maintenance Plan

Owner Tasks and Responsibilities:

As a general statement, Vineland Public School District or its 3rd party service providers shall be responsible for providing ongoing maintenance through the duration of the M&V period. DCO will review operational procedures and schedules associated with such things as the building automation/control upgrades as well as the manufacturers' published requirements for all installed equipment be it: quarterly, semi-annually or annually. In most cases, Vineland Public School District is already aware of or self-implementing similar maintenance practices on campus or has contracted a 3rd party for such services. Failure to properly maintain the equipment may cause energy savings goals to fall short.

Specific Areas of Consideration:

In order to sustain energy savings Vineland Public School District's Staff will be required to implement new maintenance tasks and even modify existing policies and practices. Outlined are two examples of specific instances.

Example 1. Advanced Building Operations Programming:

Vineland Public School District will be given specific training on the changes and advancements in environmental operations and energy savings strategies. Vineland Public School District will be responsible for following the agreed upon guidelines associated with programmed schedules and any use of override functions.

Example 2. Verification of Proper Operations: Mechanical Equipment

Vineland Public School District will be required to assure that proper mechanical maintenance continues to be implemented on their mechanical equipment. Example: outside air dampers will require proper operation with the appropriate seals in order to maintain ECM(s) such as demand ventilation. DCO will periodically spot check system operations to verify the Owner or its 3rd party representative is implementing proper maintenance. Any deficiencies that may be identified will be brought to Vineland Public School District' attention for correction.

VINELAND PUBLIC SCHOOLS
Working Together for a Bright Future

ENERGY SAVINGS PLAN

SECTION 6 – OPERATION & MAINTENANCE

It is critical to the success of achieving continued energy savings that Vineland Public School District develop and implement an Operation and Maintenance Plan. In this section are some recommendations for Vineland Public School District and/or 3rd party maintenance contractors.

Air Handling Units

Comprehensive Annual Inspection

1. Record and report abnormal conditions, measurements taken, etc.
2. Review logs for operational problems and trends.
3. General Assembly
   a) Inspect the unit for cleanliness.
   b) Inspect the fan wheel and shaft for wear and clearance.
   c) Check the sheaves and pulleys for wear and alignment.
   d) Check the belts for tension, wear, cracks, and glazing.
   e) Verify tight bolts, set screws, and locking collars.
   f) Check dampers for wear, security and linkage adjustment.
   g) Verify clean condensate pan.
   h) Verify proper operation of the condensate drain.
   i) Verify clean air filters.
   j) Verify clean coils.
   k) Verify proper operation of the spray pump, if applicable.
   l) Verify smooth fan operation.
   m) Log operating conditions after system has stabilized.
   n) Provide a written report of completed work, operating log, and indicate any uncorrected deficiencies detected.
4. Lubrication
   a) Lubricate the fan shaft bearings, if applicable.
   b) Lubricate the motor bearings, if applicable.
5. Controls and Safeties
   a) Test the operation of the low temperature safety device, if applicable.
   b) Test the operation of the high static pressure safety device, if applicable.
   c) Test the operation of the low static pressure safety device, if applicable.
   d) Check the thermal cutout on electric heaters, if applicable.
   e) Check the step controller, if applicable.
   f) Check and record supply air and control air pressure, if applicable.
   g) Verify the operation of the control system and dampers while the fan is operating.

6. Motor and Starter
   a) Clean the starter and cabinet.
   b) Inspect the wiring and connections for tightness and signs of overheating and discoloration. This includes wiring to the electric heat, if applicable.
   c) Check the condition of the contacts for wear and pitting.
   d) Check the contactors for free and smooth operation.
   e) Meg the motor and record readings.

Heating Inspection

1. Gas Heat Option
   a) Visually inspect the heat exchanger.
   b) Inspect the combustion air blower fan, and clean, if required.
   c) Lubricate the combustion air blower fan motor, if applicable.
   d) Verify the operation of the combustion air flow-proving device.
   e) Test the operation of the high gas pressure safety device, if applicable. Calibrate, if necessary.
   f) Test the operation of the low gas pressure safety device, if applicable. Calibrate, if necessary.
   g) Verify the operation of the flame detection device.
   h) Test the operation of the high temperature limit switch.
   i) Verify the integrity of the flue system.
   j) Verify the operation of the operating controls.
   k) Verify the burner sequence of operation.
   l) Verify proper gas pressure to the unit and/or at the manifold, if applicable.
   m) Perform combustion test. Make adjustments as necessary.
2. Electric Heat Option
   a) Inspect wiring and connections for tightness and signs of overheating and discoloration.
   b) Check and calibrate operating and safety controls, if applicable.
   c) Verify the operation of the heating elements.
   d) Check voltage and amperage and compare readings with the watt rating on the heater.
3. Hot Water / Steam Heat Option
   a) Inspect control valves and traps.
   b) Check and calibrate all operating and safety controls.
   c) Verify the operation of the heating coils.
   d) Verify the operation of the unit low temperature safety device.

Scheduled Running Inspection

1. Check the general condition of the fan.
2. Verify smooth fan operation.

3. Check and record supply and control air pressure, if applicable.
4. Verify the operation of the control system.
5. Log the operating conditions after the system has stabilized.
6. Review operating procedures with operating personnel.
7. Provide a written report of completed work, operating log, and indicate uncorrected deficiencies detected.

Oil Sample/Spectrographic Analysis

1. Pull oil sample for spectrographic analysis.

Refrigerant Sample/Analysis

1. Pull refrigerant sample for spectrographic analysis for contaminants (oil, water, and acid), using approved containers

Boilers

Comprehensive Annual Inspection

1. Record and report abnormal conditions, measurements taken, etc.
2. Review logs for operational problems and trends.
3. General Assembly
    a) Secure and drain the boiler.
    b) Open the fire and water side for cleaning and inspection.
    c) Check heating surfaces and water side for corrosion, pitting, scale, blisters, bulges, and soot.
    d) Inspect refractory.
    e) Clean fire inspection glass.
    f) Check blow-down valve packing, and lubricate.
    g) Check and test boiler blow-down valve.
    h) Perform hydrostatic test, if required.
    i) Verify proper operation of the level float.
    j) Gas Train Burner Assembly
        1. Check the gas train isolation valves for leaks.
        2. Check the gas supply piping for leaks.

3. Check the gas pilot solenoid valve for wear and leaks.
4. Check the main gas and the pilot gas regulators for wear and leaks.
5. Test the low gas pressure switch. Calibrate and record setting.
6. Test the high gas pressure switch. Calibrate and record setting.
7. Verify the operation of the burner fan air flow switch.
8. Inspect and clean the burner assembly.
9. Inspect and clean the pilot igniter assembly.
10. Inspect and clean the burner fan.
11. Run the fan and check for vibration.
12. Inspect the flue and flue damper.
13. Burner Control Panel:
    a) Inspect the panel for cleanliness.
    b) Inspect wiring and connections for tightness and signs of overheating and discoloration.

k) Clean burner fan wheel and air dampers. Check fan for vibration.
l) Verify tightness on linkage set screws.
m) Check gas valves for leakage (where test cocks are provided).
n) Verify proper operation of the feed water pump.
o) Verify proper operation of the feed water treating equipment.

4. Controls and Safeties
   a) Disassemble and inspect low water cutoff safety device.
   b) Reassemble boiler low water cutoff safety device with new gaskets.
   c) Clean contacts in program timer, if applicable.
   d) Check the operation of the low water cutoff safety device and feed controls.
   e) Verify the setting and test the operation of the operating and limit controls.
   f) Verify the operation of the water level control.

Startup/Checkout Procedure

1. Verify proper water level in the boiler
2. Test the safety/relief valve after startup (full pressure test).
3. Clean or replace fuel filters.
4. Clean fuel nozzles.
5. Inspect clean, and functionally test the flame scanner and flame safeguard relay.
6. Clean and adjust the ignition electrode.
7. Replace the vacuum tube in the flame safeguard control, if applicable.
8. Perform pilot turn down test.
9. Verify proper steam pressure.

10. Perform combustion test and adjust the burner for maximum efficiency.
11. Test the following items:
    a) Firing rate
    b) Fuel/air ratio
    c) CO2
    d) CO
    e) NOX
    f) Perform smoke test.
12. Review operating procedures
13. Provide a written report of completed work, operating log, and indicate any uncorrected deficiencies detected.

Mid-Season Running Inspection

1. Check the general condition of the unit.
2. Inspect the burner.
3. Adjust the burner controls to obtain proper combustion.
4. Check the operation of the pressure relief valve.
5. Check the operation of the low water cutoff and feed controls.
6. Check the setting and test the operation of the operating and limit controls.
7. Check the operation of the modulating motor.
8. Lift the safety/relief valves with at least 70% of rated pressure.
9. Blow down and try gauge cocks to confirm glass water level.
10. Check and test boiler blow down valve.
11. Log operating conditions after the system has stabilized.
12. Review operating procedures
13. Provide a written report of completed work, operating log, and indicate uncorrected deficiencies detected.

Seasonal Shut-down Procedure

1. Shut down boiler at boiler controls.
2. Shut off fuel lines at main valves.
3. Review operating procedures
4. Provide a written report of completed work, operating log, and indicate any uncorrected deficiencies detected.

Burners

Gas Train

1. Check the gas train isolation valves for leaks.
2. Check the gas supply piping for leaks.
3. Check the gas pilot solenoid valve for wear and leaks.
4. Check the main gas and the pilot gas regulators for wear and leaks.
5. Test the low gas pressure switch. Calibrate and record setting.
6. Test the high gas pressure switch. Calibrate and record setting.
7. Verify the operation of the burner fan air flow switch.
8. Inspect and clean the burner assembly.
9. Inspect and clean the pilot ignitor assembly.
10. Inspect and clean the burner fan.
11. Run the fan and check for vibration.
12. Inspect the flue and flue damper.
13. Burner Control Panel:
    a) Inspect the panel for cleanliness.
    b) Inspect wiring and connections for tightness and signs of overheating.
14. Clean burner fan wheel and air dampers. Check the fan for vibration.
15. Verify tightness of the linkage set screws.
16. Check the gas valves against leakage (where test cocks are provided

Oil Train

1. Check the gas train isolation valves for leaks.
2. Check the gas supply piping for leaks.
3. Check the gas pilot solenoid valve for wear and leaks.
4. Check the main gas and the pilot gas regulators for wear and leaks.
5. Test the low gas pressure switch. Calibrate and record setting.
6. Test the high gas pressure switch. Calibrate and record setting.
7. Verify the operation of the burner fan air flow switch.
8. Inspect and clean the burner assembly.
9. Inspect and clean the pilot ignitor assembly.
10. Inspect and clean the burner fan.
11. Run the fan and check for vibration.
12. Inspect the flue and flue damper.
13. Burner Control Panel:

a) Inspect the panel for cleanliness.
b) Inspect wiring and connections for tightness and signs of overheating.

14. Clean burner fan wheel and air dampers. Check the fan for vibration.
15. Verify tightness of the linkage set screws.
16. Check the gas valves against leakage (where test cocks are provided).

Dual Fuel Train

1. Check the gas train isolation valves for leaks.
2. Check the gas supply piping for leaks.
3. Check the gas pilot solenoid valve for wear and leaks.
4. Check the main gas and the pilot gas regulators for wear and leaks.
5. Test the low gas pressure switch. Calibrate and record setting.
6. Test the high gas pressure switch. Calibrate and record setting.
7. Verify the operation of the burner fan air flow switch.
8. Inspect and clean the burner assembly.
9. Inspect and clean the pilot ignitor assembly.
10. Inspect and clean the burner fan.
11. Run the fan and check for vibration.
12. Inspect the flue and flue damper.
13. Burner Control Panel:
    a) Inspect the panel for cleanliness.
    b) Inspect wiring and connections for tightness and signs of overheating.
14. Clean burner fan wheel and air dampers. Check the fan for vibration.
15. Verify tightness of the linkage set screws.
16. Check the gas valves against leakage (where test cocks are provided)

Cooling Towers

Startup/Checkout Procedure

1. Fill the basin and verify the float level.
2. Verify the operation of the basin heaters
3. Verify the operation, setpoint, and sensitivity of the basin heater temperature control device.
4. Start the condenser water pumps.

5. Verify the balance of the return water through the distribution boxes.
6. Verify proper operation of the bypass valve(s), if applicable.
7. Operate fan and verify smooth operation.
8. Log operation after system has stabilized.
9. Review operating procedures
10. Provide a written report of completed work, operating log, and indicate uncorrected deficiencies detected.

Comprehensive Bi-Annual Inspection

1. Perform following inspection and cleaning before starting the tower for the cooling season and during shutdown at end of season.
2. Record and report abnormal conditions, measurements taken, etc.
3. Review logs for operational problems and trends.
4. General Assembly
   a) Structure
      1. Disassemble all screens and access panels for inspection.
      2. Inspect the conditions of the slats, if applicable.
      3. Inspect the condition of the tower fill.
      4. Inspect the condition of the support structure.
      5. Inspect the condition of the basins (upper and lower) and/or spray nozzles.
      6. Verify clean basins and strainer(s).
      7. Verify the condition and operation of the basin fill valve system.
   b) Mechanical
      1. Inspect belts for wear, cracks, and glazing.
      2. Verify correct belt tension. Adjust the tension as necessary.
      3. Inspect sheaves and pulleys for wear, condition, and alignment.
      4. Inspect fan shaft and bearings for condition.
      5. Inspect fan assembly for condition, security, and clearances. (e.g. blade tip clearance).
4. Lubrication System
   a) Lubricate motor bearings.
   b) Lubricate fan shaft bearings.
5. Motor And Starter
   a) Clean the starter and cabinet.
   b) Inspect wiring and connections for tightness and signs of overheating and discoloration.
   c) Check the condition of the contacts for wear and pitting.
   d) Check the contactor(s) for free and smooth operation.

e) Meg the motor(s) and record readings.
f) Check disconnect terminal block for wear, tightness and signs of overheating and discoloration.
g) Check the condition and operation of the basin heater contactor(s).

Shut-Down Procedure

1. Check the general condition of the tower.
2. Turn off electrical power to basin heaters, tower fans, and pipe heaters as necessary.
3. Drain tower and condenser water piping.
4. Review operating procedures
5. Provide a written report of completed work, operating log, and indicate any uncorrected deficiencies detected.

Energy Management System

Maintenance Inspection

1. Review reports for operational problems and trends.
2. Make a back-up copy of the BAS program.
3. Check for loose or damaged parts or wiring.
4. Check for any accumulation of dirt or moisture. Clean if required.
5. Verify proper electrical grounding.
6. Verify control panel power supplies for proper output voltages.
7. Inspect interconnecting cables and electrical connections.
8. Verify that manual override switches are in the desired positions.
9. Check the operation of all binary and analog outputs, if applicable.
10. Calibrate control devices, if applicable.
11. Verify the correct time and date.
12. Check and update the holiday schedules and daylight savings time.
13. Via terminal mode, view the event log and input/output points for any unusual status or override conditions.
14. Clean the external surfaces of the panel enclosure.
15. Review operating program and parameters.
16. Check cable connections for security.

17. Review operating procedures
18. Provide a written report of completed work, and indicate any uncorrected deficiencies detected.

Maintenance Inspection (Control Panels)

1. Control Panel
   a) Verify secure connections on all internal wiring, LAN, and communication links.
   b) Check for loose or damaged parts or wiring.
   c) Check for any accumulation of dirt or moisture. Clean if required.
   d) Remove excessive dust from heat sink surfaces
   e) Verify proper system electrical grounding.
   f) Verify proper output voltages on control panel power supplies.
   g) Check LED Indications to verify proper operation
   h) Verify LAN communications
   i) Verify that cards are seated and secured.
   j) Check wiring trunks and check for possible Error Code Indications
   k) Check voltage level of
   l) Verify the proper operation of critical control processes and points associated with this unit an make adjustments if necessary.
   m) Check Volatile memory available
   n) Cheek Non volatile memory available
   o) Check Processor idle time
   p) Clean external surfaces of the panel enclosure.
   q) Check modem operation, if applicable.
   r) View the event log and input/output points for any unusual status or override conditions.
   s) Verify correct time and date.
   t) Check and update holiday schedules, if applicable, and daylight savings time.
   u) Review operating procedures with operating personnel.
   v) Provide a written report of completed work, and indicate any uncorrected deficiencies detected.

Maintenance Inspection (EMS - Sequence of Operations)

Central Plant

In order to assure effective environmental conditioning while minimizing the cost to operate the equipment, technicians will review operating sequences and practices for the chiller plant. An initial survey of current equipment operating parameters will be conducted within the first 60 days of the contract term during cooling season. This survey will include:

1. Chiller(s) operation
2. Cooling tower(s) operation
3. Pump(s) operation
4. Economizer operation (where applicable)
5. Environmental safety

A detailed report of findings and recommendations for changes, if any, will be made. Agreed upon operational changes which require only adjustment of controls or programming will be made during regularly scheduled maintenance visits as part of this agreement at no additional cost. Any recommended alterations that require addition of devices or equipment will be accompanied by a guaranteed cost proposal reflecting the applicable discounts determined by this agreement.

Building Systems

In order to assure effective environmental conditioning while minimizing the cost to operate the equipment, technicians will review operating sequences and practices for covered airside systems. An initial survey of current systems operating parameters will be conducted within the first 60 days of the contract term, except seasonally operated systems, which will be surveyed during the appropriate operating season. This survey will include:

1. Time schedule(s)
2. Reset schedule(s)
3. Economizer changeover (where applicable)
4. Setpoints
5. Energy Management routines

A detailed report of findings and recommendations for changes, if any, will be made. Agreed upon operational changes which require only adjustment of controls or programming will be made during regularly scheduled maintenance visits as part of this agreement at no additional cost. Any recommended alterations that require addition of devices or equipment will be accompanied by a guaranteed cost proposal reflecting the applicable discounts determined by this agreement.

Fans

Maintenance Procedure

1. Record and report abnormal conditions, measurements taken, etc.
2. Review logs for operational problems and trends.
3. General Assembly
   a) Check the general condition of the unit.
   b) Verify tightness of the fan, fan guards, louvers, etc.
   c) Verify clean burner assembly.
   d) Check sheaves and pulleys for wear and alignment, if applicable.
   e) Check belts for tension, wear, cracks, and/or glazing.
4. Lubrication
   a) Lubricate the fan motor, if applicable.
   b) Lubricate the fan bearings as necessary.
5. Controls and Safeties
   a) Verify proper operation of the temperature control device.
   b) Verify proper operation of the high temperature control device.
   c) Verify proper operation of the fan switch.
   d) Verify proper operation of the pilot safety device, if applicable.
6. Electrical
   a) Inspect wiring and connections for tightness and signs of overheating and discoloration.
7. Startup and Checkout
   a) Start the unit.
   b) Verify proper combustion air to the burner.
   c) Verify proper gas pressure to the burner.
   d) Check the flame for proper combustion.

Comprehensive Annual Inspection

1. Record and report abnormal conditions, measurements taken, etc.
2. Review logs for operational problems and trends.
3. General Assembly
   a) Disassemble all screens and panels necessary to gain access to the fan mechanism.
   b) Disassemble the control mechanism (AVPB only).
   c) Clean all accessible rotor components to include control pitch mechanism (AVPB only).
   d) Inspect blades for wear.
   e) Inspect blade arms for wear (AVPB only).

   f) Check blade tip clearance.
   g) Check for oil leak on the blade bearing housing (AVPB only).
   h) Clean motor and fan housing.
   i) Reassemble all removed screens and plates.
4. Lubrication
   a) Lubricate the motor bearings.
   b) Lubricate the shaft bearings (AVPA only).
5. Controls and Safeties
   a) Test the operation of the high static safety device. Calibrate and record setting.
   b) Test the operation of the low static safety device. Calibrate and record setting.
   c) Test the operation of the vibration safety device. Calibrate and record setting.
   d) Verify the operation of the phase monitor, if applicable.
   e) Inspect pneumatic and electrical controls for condition and calibration.
   f) Verify proper operation.
6. Motor and Starter
   a) Clean the starter and cabinet.
   b) Clean the disconnect switch and cabinet at the fan, if applicable.
   c) Inspect the wiring and connections for tightness and signs of overheating and discoloration.
   d) Check the condition of the contacts for wear and pitting.
   e) Check the contactors for free and smooth operation.
   f) Meg the motor and record readings.
7. Startup / Checkout Procedure
   a) Start the fan.
   b) Verify the operation of the starter.
   c) Check and record supply and control air pressure.
   d) Verify the operation of the control system while the fan is operating.
   e) Log the operating conditions after the system has stabilized.
   f) Review operating procedures with operating personnel.
   g) Provide a written report of completed work, operating log, and indicate any uncorrected deficiencies detected.

Scheduled Running Inspection (fans)

1. Check the general operation of the fan.
2. Check and record supply and control air pressure.
3. Verify the operation of the control system.
4. Log the operating conditions after the system has stabilized.
5. Review operating procedures with operating personnel.

6. Provide a written report of completed work, operating log, and indicate any uncorrected deficiencies detected.

Comprehensive Annual Inspection (fans)

1. Record and report abnormal conditions, measurements taken, etc.
2. Review logs for operational problems and trends.
3. General Assembly
   a) Verify tight bolts, set screws, and locking collars.
   b) Inspect sheaves and pulleys for wear and alignment.
   c) Inspect belts for tension, wear, cracks, and glazing.
   d) Inspect dampers for wear, security, and clearances, if applicable.
   e) Verify clean air filters.
   f) Provide a written report of completed work, operating log, and indicate any uncorrected deficiencies detected.
4. Lubrication
   a) Lubricate fan bearings.
   b) Lubricate motor bearings, if applicable.
5. Controls and Safeties
   a) Verify the operation of the control system while the fan is operating.
   b) Verify the setting of the low temperature safety device, if applicable.
   c) Verify the operation of the pre-heat control device, if applicable.
   d) Verify the operation of the cooling control device, if applicable.
   e) Verify the operation of the re-heat control device, if applicable.
   f) Verify the operation of the humidity control device, if applicable.
6. Motor and Starter
   a) Clean the starter and cabinet.
   b) Inspect the wiring and connections for tightness and signs of overheating and discoloration.
   c) Check the condition of the contacts for wear and pitting.
   d) Check the contactors for free and smooth operation.
   e) Meg the motor and record readings.
   f) Check volts and amps of the motor.

Lubricate/Grease Bearings

1. Lubricate and/or grease bearings according to manufacturer's specifications

MEG Motor

1. Check the integrity of the insulation on the motor windings and the motor leads, using a megohm meter.

Coils

Maintenance Procedure

1. Record and report abnormal conditions.
2. Visually inspect the coil for leaks.
3. Inspect the coil for cleanliness.

Pumps

Annual Inspection

1. Record and report abnormal conditions, measurements taken, etc.
2. Review logs for operational problems and trends.
3. General Assembly
   a) Check motor shaft and pump shaft for alignment, if applicable.
   b) Inspect the coupling for wear.
   c) Verify that the shaft guard is in place and tight, if applicable.
   d) Verify water flow through the pump.

   e) Check for leaks on the mechanical pump seals, if applicable.
   f) Verify proper drip rate on the pump seal packing, if applicable.
   g) Verify smooth operation of the pump.
   h) Provide a written report of completed work, operating log, and indicate any uncorrected deficiencies detected.
4. Lubrication
   a) Lubricate the motor bearings as necessary.
   b) Lubricate the pump bearings as necessary.
5. Motor and Starter

a) Clean the starter and cabinet.
b) Inspect wiring and connections for tightness and signs of overheating and discoloration.
c) Meg the motor.
d) Verify tight connections on the motor terminals.
e) Check the condition of the contacts for wear and pitting, if applicable.
f) Check the contactors for free and smooth operation.
g) Verify proper volts and amps.

Pump Run Inspection

1. Verify smooth operation of the pump.
2. Check for leaks on the mechanical pump seals, if applicable.
3. Verify proper drip rate on the pump seal packing, if applicable.
4. Provide a written report of completed work, operating log, and indicate any uncorrected deficiencies detected.

Mechanical Starters with Electronic Controls

Comprehensive Annual Maintenance

1. Clean the starter and cabinet.
2. Inspect wiring and connections for tightness and signs of overheating and discoloration.
3. Check condition of the contacts for wear and pitting.
4. Check contactors for free and smooth operation.
5. Check the mechanical linkages for wear, security, and clearances.
6. Verify the overload settings.

VFD Starters

Comprehensive Annual Maintenance

1. Clean the starter and cabinet.
2. Inspect wiring and connections for tightness and signs of overheating and discoloration.
3. Check the tightness of the motor terminal connections.

4. Verify the operation of the cooling loop.
5. Verify proper operation of the frequency drive.

Rooftop Units

Comprehensive Annual Maintenance

1. Record and report abnormal conditions, measurements taken, etc.
2. Review logs for operational problems and trends.
3. General Assembly
   a) Inspect for leaks and report results.
   b) Calculate refrigerant loss rate and report to the customer.
   c) Repair minor leaks as required (e.g. valve packing, flare nuts).
   d) Visually inspect condenser tubes for cleanliness.
4. Controls and Safeties
   a) Inspect the control panel for cleanliness.
   b) Inspect wiring and connections for tightness and signs of overheating and discoloration.
   c) Verify the working condition of all indicator/alarm lights, if applicable.
   d) Test the low water temperature control device. Calibrate and record setting.
   e) Test the low evaporator pressure safety device. Calibrate and record setting.
   f) Test the oil pressure safety device. Calibrate and record setting, if applicable.
   g) Check programmed parameters of RCM control, if applicable.
5. Lubrication System
   a) Check oil level in the compressor.
   b) Test oil for acid content and discoloration. Make recommendations to the customer based on the results of the test.
   c) Verify the operation of the oil heater. Measure amps and compare reading with the watt rating of the heater.

6. Motor and Starter
   a) Clean the starter and cabinet.
   b) Inspect wiring and connections for tightness and signs of overheating and discoloration.
   c) Check condition of the contacts for wear and pitting.
   d) Check the contactors for free and smooth operation.
   e) Check the tightness of the motor terminal connections.
   f) Meg the motor and record readings.

   g) Verify the operation of the electrical interlocks.
   h) Measure voltage and record. Voltage should be nominal voltage ± 10%.

Comprehensive Maintenance Inspection (RTU Heating Cycle)

1. Perform heating inspection/maintenance applicable to the unit (steam/hot water, gas, electric).
2. Verify smooth operation of the fans.
3. Check the belts for tension, wear, cracks, and glazing.
4. Verify clean air filters.
5. Gas Heat Option
   a) Visually inspect the heat exchanger.
   b) Inspect the combustion air blower fan, and clean, if required.
   c) Lubricate the combustion air blower fan motor, if applicable.
   d) Verify the operation of the combustion air flow-proving device.
   e) Test the operation of the high gas pressure safety device, if applicable. Calibrate, if necessary.
   f) Test the operation of the low gas pressure safety device, if applicable. Calibrate, if necessary.
   g) Verify the operation of the flame detection device.
   h) Test the operation of the high temperature limit switch. i.. Verify the integrity of the flue system.
   i) Verify the operation of the operating controls.
   j) Verify the burner sequence of operation.
   k) Verify proper gas pressure to the unit and/or at the manifold, if applicable.
   l) Perform combustion test. Make adjustments as necessary.
6. Electric Heat Option
   a) Inspect wiring and connections for tightness and signs of overheating and discoloration.
   b) Check and calibrate operating and safety controls, if applicable.
   c) Verify the operation of the heating elements.
   d) Check voltage and amperage and compare readings with the watt rating on the heater.

7. Hot Water / Steam Heat Option
   a) Inspect control valves and traps.
   b) Check and calibrate all operating and safety controls.
   c) Verify the operation of the heating coils.
   d) Verify the operation of the unit low temperature safety device.

Mid-Season Cooling Inspection (RTU)

1. Check the general condition of the unit.
2. Log the operating condition after system has stabilized.
3. Verify the operation of the control circuits.
4. Analyze the recorded data. Compare the data to the original design conditions.
5. Review operating procedures with operating personnel.
6. Provide a written report of completed work, operating log, and indicate any uncorrected deficiencies detected.

Comprehensive Maintenance Inspection (RTU - Cooling Cycle)

1. Record and report abnormal conditions, measurements taken, etc.
2. Review logs for operational problems and trends.
3. General Assembly
   a) Inspect for leaks and report results.
   b) Calculate refrigerant loss rate and report to the customer.
   c) Repair minor leaks as required (e.g. valve packing, flare nuts).
   d) Check pulleys and sheaves for wear and alignment.
   e) Check belts for tension, wear, cracks, and glazing.
   f) Verify clean evaporator coil, blower wheel, and condensate pan.
   g) Verify clean air filters.
   h) Verify proper operation of the condensate drain.
   i) Verify proper operation of the dampers and/or inlet guide vanes, if applicable.
4. Controls and Safeties
   a) Inspect the control panel for cleanliness.
   b) Inspect wiring and connections for tightness and signs of overheating and discoloration.
   c) Verify the working condition of all indicator/alarm lights, if applicable.
   d) Test the low evaporator pressure safety device. Calibrate and record setting, if applicable.
   e) Test the high condenser pressure safety device. Calibrate and record setting, applicable.
   f) Test the oil pressure safety device, if applicable. Calibrate and record setting.
   g) Test the high static pressure safety device, if applicable. Calibrate and record setting.
   h) Verify the operation of the static pressure control device, if applicable.
5. Lubrication
   a) Verify the operation of the oil heater, if applicable.
   b) Lubricate the fan bearings as required.
   c) Lubricate the fan motor bearings as required.

   d) Lubricate the damper bearings, if applicable.

6. Motor and Starter
   a) Clean the starter and cabinet.
   b) Inspect wiring and connections for tightness and signs of overheating and discoloration.
   c) Check the condition of the contacts for wear and pitting.
   d) Check the contactors for free and smooth operation.
7. Startup /Checkout Procedure
   a) Verify the operation of the oil heater.
   b) Verify full water system, including the cooling tower and the condenser.
   c) Verify clean cooling tower and strainers.
   d) Test all flow-proving devices on the condenser water circuit.
   e) Start the condenser water pump and the cooling tower fan(s).
   f) Verify flow rate through the condenser.
   g) Start the unit.
   h) Verify smooth operation of the compressor(s) and fan(s).
   i) Check the setpoint and sensitivity of the temperature control device.
   j) Verify the operation of the condenser water temperature control device.
   k) Verify clean condenser using pressure and temperature.
   l) Check operation and setup of the Unit Control Module.
   m) Check the superheat and subcooling on the refrigeration circuit(s).
   n) Log the operating conditions after the system has stabilized.
   o) Review operating procedures with operating personnel.
   p) Provide a written report of completed work, operating log, and indicate any uncorrected deficiencies detected.

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VINELAND PUBLIC SCHOOLS
Working Together for a Bright Future

ENERGY SAVINGS PLAN

SECTION 7 – OPTIONAL ENERGY GUARANTEE

OPTIONAL ENERGY GUARANTEE OVERVIEW

NOTE: *The following is meant only to serve as a description of an optional energy guarantee and does not constitute any contractual obligations between the Vineland Public School District and DCO. If Vineland Public School District chooses to implement an energy guarantee contract, a separate document will be used based on mutual agreement and acceptance of all parties of its terms and conditions.*

A successful energy project consists of a partnership between an ESCO and Owner. Both parties have defined roles and accept their individual responsibilities as well as support any joint initiatives of the program as defined in this document. Both DCO and the Vineland Public School District will have a role in ongoing maintenance and operations as defined in the agreed-upon energy guarantee contractual documents. Both parties will be required to meet their obligations for the guaranteed energy units savings (referred to as "guarantee or savings") to be achieved and to ensure the guarantee stays intact.

DCO will guarantee Vineland Public School District will achieve the energy unit savings per the provisions of the agreed-upon energy guarantee contractual documents based on the final selection of ECMs and their associated energy savings as measured and verified by the Owner's third-party, independent firm. The energy savings will be in energy units, not dollars as DCO has no control over the costs of utilities. The energy units guarantee contract shall commence thirty (30) days after the start-up and commissioning of the last Energy Conservation Measure (ECM) and be enforced for a period of one (1) year or until terminated by Vineland Public School District.

SAVINGS VERIFICATION

There are events that cause energy savings to change. Vineland Public School District and DCO will agree to baseline energy consumption that represents the facility's energy use and cost prior to the date of any Agreement (the "Base Year") and parameters, which affect the energy usage and cost of the facility, including but not limited to, utility rates, local weather profile, facility square footage, environmental conditions, schedules (e.g., lighting, HVAC) and an inventory of equipment in the facility. Energy savings are determined by comparing measured energy use or demand before and after implementation of an energy savings program.

ECM ENERGY SAVINGS = BASELINE ENERGY USE – POST INSTALLATION ENERGY USE +/- ADJUSTMENTS

Changes in estimated energy savings fall into two categories. These categories are Routine Adjustments and Non-Routine Adjustments. Routine Adjustments are expected changes during the savings reporting period to energy governing factors (e.g. weather). DCO uses IPMVP approved mathematical techniques to determine adjustments. Non-Routine Adjustments include energy-governing factors which are not usually expected to change, such as the facility size, the design and operation of installed equipment, occupancy and the type of occupants or any physical changes to the building or equipment that impact the facilities' utility use. These factors will be monitored for change throughout the reporting period.

DCO will perform monthly utility bill analysis and audit reports which compare the current year with base year energy consumption and costs. DCO will perform periodic on-site analysis to determine whether mechanical and electrical systems are operating at optimal efficiency and to assess the occupancy and operational schedules of the buildings.

As part of the optional energy guarantee, DCO uses weather normalization procedures to correct the effect of weather variance on energy savings in subsequent years. Baseline energy and weather data are used to establish an algorithm to predict how the baseline building uses energy as a function of weather. The algorithm is then applied to subsequent years to correct for the impact weather may have on future building energy use. The weather normalization procedure and algorithms will be covered in detail as part of the optional energy guarantee contract provided to Vineland Public School District.

VINELAND PUBLIC SCHOOLS
Working Together for a Bright Future

ENERGY SAVINGS PLAN

APPENDICIES

APPENDIX LIST	
APPENDIX A	Construction Contingency Allowance
APPENDIX B	Design Bid Build Procedures
APPENDIX C	Operations & Maintenance Savings
APPENDIX D	Project Changes in Financing
APPENDIX E	Incentives in Debt Service
APPENDIX F	ECM Breakdown by Building
APPENDIX G	Energy Savings Supplemental Information
APPENDIX H	Local Government Energy Audits

ENERGY SAVINGS PLAN

APPENDIX A – CONSTRUCTION CONTINGENCY ALLOWANCE

Appendix A – Construction Contingency Allowance

Experience shows that during the construction phase there are four major categories of potential change of scope issues that benefit from having an appropriate Construction Contingency Allowance (CCA).

- Unknown conditions
- Building inspector's modifications
- Project owner requested changes.
- Design clarifications or modifications

Unknown Conditions

Renovations to older facilities have greater potential for revealing the unknown. Missing or inaccurate Blueprints, deviations from the original blueprints by the original builder and unknown or undocumented modifications during the life of the facility.

Areas such as behind a wall/roof/equipment or under the slab can bring unforeseen conditions which can delay the new construction and change the anticipated scope of the work. Therefore, it is advisable to dedicate a CCA that is higher than that for new construction.

Building Inspection Modifications

A plan review for the local building jurisdiction reviews the construction documents prior to issuing a building permit. However, there remains the likelihood that the building inspector will request modifications to the plans based upon experience and their interpretation of the applicable building code.

While we can ask for code review and documentation, if you hope to get a Certificate of Occupancy under a tight schedule from this same inspector requested modifications will need to be implemented as successfully appeals take time.

Whether it is adding an extra exit sign, smoke detector or fire extinguisher, or whether it is something more significant, it may require more work from the contractor, thus adding expense. The CCA is intended to be the source of funds necessary for these requested modifications.

Project Owner Requested Changes

It is nearly impossible to express your every desire during the design phase. You will always see something during construction that you would like to change.

There is nothing necessarily wrong with that.

The CCA is intended to be the source of funds necessary for these requested changes.

Design Clarifications or Modifications

No designer has ever developed the perfect set of construction documents.

There are always items that can be detailed better or more clearly. The design intent should be adequately reflected in the drawings and specifications so that the contractor can bid and build the ECM to meet the design intent.

However, there will be times during construction when the builder will not be readily able to identify the exact intent of particular details or systems. At that time the builder will submit a Request for Information (RFI) to the designer for clarification or more information. The designer will issue clarifications or directives so that the builder can continue to meet the design intent.

On occasion, the RFI will reveal that something more than was shown in the construction documents is necessary to fulfill the design intent. The clarification or modification may impact the scope of the work to a degree that additional construction costs become necessary.

As long as the design omission is not negligent, the CCA is intended to be the source of funds necessary for these design clarifications or modifications.

Allowance Method

Detailed plans, schematics and specifications for Vineland Public School District were not available to deliver a cost estimate for each ECM. The budgetary costs carried out in the project are based on good faith estimates, contractor supplied budgets for similar ECMs on other recent projects and a database of actual installed costs for various ECMs.

a. Allowance Amount (5.08% of Hard Costs)

BID PACKAGE ALLOWANCE		
ENERGY CONSERVATION MEASURE	ESTIMATED INSTALLED HARD COSTS $	CONTINGENCY AMOUNT(5.08%)
LED Lighting Tube Retrofit	$3,097,865	$157,372
LED Lighting Flat Panel Replacement	$244,836	$12,438
Lighting Controls	$441,727	$22,440
Energy Management System Upgrades	$729,420	$37,055
Energy Management System Replacement	$2,029,332	$103,090
Pipe and Valve Insulation	$102,612	$5,213
Building Envelope Weatherization	$586,400	$29,789
Plug Load Controls	$486,000	$24,689
Refrigeration Controls	$278,915	$14,169
Retro-Commissioning	$309,600	$15,728
Combined Heating & Power	$208,026	$10,568
Make-Up Air Unit Replacement	$3,584,716	$182,104
Destratification Fans	$174,400	$8,860
High Efficiency Transformers with Harmonic Mitigation	$350,000	$17,780
Boiler Replacement	$1,450,000	$73,660
HVAC Armor	$366,872	$18,637
Window Film	$537,072	$27,283
PC Power Management	$24,531	$1,246
TOTALS	$15,002,324	$762,118

VINELAND PUBLIC SCHOOLS
Working Together for a Bright Future

ENERGY SAVINGS PLAN

APPENDIX B – DESIGN BID BUILD

Appendix B – Design Bid Build Procedures

Design–bid–build (or **design/bid/build**, and abbreviated **D–B–B** or **D/B/B** accordingly), also known as **Design–tender** (or "design/tender") **traditional method** or **hard bid** is the method of delivery for this project.

Design–bid–build is the traditional method for project delivery and differs in several substantial aspects from design–build.

There are three main sequential phases to the design–bid–build delivery method:

- The design phase.
- The bidding (or tender) phase
- The construction phase.

Design Phase

In this phase DCO will design and produce bid documents, including construction drawings and technical specifications, on which various contractors will in turn bid to construct the project.

The Energy Savings Plan (ESP) is intended to document the owner's project requirements and provide a conceptual and/or schematic design and good faith estimates.

With the ESP DCO will bring in other design professionals including mechanical, electrical, and plumbing engineers (MEP specifications engineers), a fire protection engineer, structural engineer, sometimes a civil engineer and a landscape architect to help complete the construction drawings and technical.

The design document should reflect the intent of the energy savings plan for scope, price, savings, operations & maintenance savings, incentive and schedule.

The finished bid documents are coordinated by the DCO and owner for issuance to contractors during the bid phase.

Bid (or tender) phase

Bidding is according to NJ Public Bid Law and is "open", in which any qualified bidder may participate.

The various contractors bidding obtains bid documents, and then put them out to multiple subcontractors for bids on sub-components of the project.

Questions may arise during the bid period, and DCO will issue clarifications or corrections to the bid documents in the form of addenda.

From these elements, the contractor compiles a complete bid for submission by the established closing date and time bid date.

Bids are to be based on a base bid lump sum plus alternates, bid requirements and alternates are elucidated within the bid documents.

Once bids are received, DCO reviews the bids, seeks any clarifications required of the bidders, investigates contractor qualifications, ensures all documentation is in order (including bonding if required), and advises the owner as to the ranking of the bids.

If the bids fall in a range acceptable to the owner, the project is awarded to the contractor with the lowest reasonable bid.

In the event that all of the bids do not satisfy the needs of the owner the following options become available to DCO:

- Rebid the construction of the project in the future when monies become available and/or construction costs go down.
- Revise the design of that ECM (at no cost to the client) so as to make the project smaller or reduce features or elements of the project to bring the cost down. The revised bid documents can then be issued again for bid.
    - DCO will provide guidance on energy savings, operation and maintenance savings and incentives to ensure the project is self-funding.
- Revise the design of future ECM(s) (at no cost to the client) so as to make the project smaller or reduce features or elements of the project to bring the cost down. The current bid package can then be contracted.
    - DCO will provide guidance on energy savings, operation and maintenance savings and incentives to ensure the project is self-funding.

Construction phase

Once the construction of the project has been awarded to the contractor, the bid documents (e.g., approved construction drawings and technical specifications) may not be altered.

The necessary permits (for example, a building permit) must be achieved from all jurisdictional authorities in order for the construction process to begin.

Should design changes be necessary during construction, whether initiated by the contractor, owner, or as discovered by the architect, DCO will issue sketches or written clarifications and handle the project through allowance (See Appendix A).

The contractor may be required to document "as built" conditions to the owner.

Bidding Method

1. To achieve energy savings and fund debt service payments as rapidly as possible the bid packages will be bid in the following order:

BID METHOD SCHEDULE		
ENERGY CONSERVATION MEASURE	Cost + Allowance	SAVINGS
LED Lighting Tube Retrofit	$3,255,237	$460,287
LED Lighting Flat Panel Replacement	$257,274	$78,656
Pipe and Valve Insulation	$107,825	$42,395
Building Envelope Weatherization	$616,189	$82,051
Plug Load Controls	$510,689	$36,885
Refrigeration Controls	$293,084	$30,323
Retro-Commissioning	$325,328	$46,060
PC Power Management	$25,777	$7,658
Lighting Controls	$464,166	$28,154
Energy Management System Upgrades	$766,475	$15,981
Energy Management System Replacement	$2,132,422	$22,670
Combined Heating & Power	$218,594	$1,471
HVAC Armor	$385,509	$48,441
Window Film	$564,355	$82,121
Make-Up Air Unit Replacement	$3,766,820	$13,653
Destratification Fans	$183,260	$32,785
High Efficiency Transformers with Harmonic Mitigation	$367,780	$34,582
Boiler Replacement	$1,523,660	$6,762
TOTALS	$15,764,441.7	$1,070,933

2. Bids in group 1 (Green) are within 15% of the budget value they will be awarded.
3. Bids in group 2 (Yellow) may be value engineered from the project to meet budget.
    a. DCO will provide the impact of ECMs value engineered:
        i. Energy Savings
        ii. Operations and Maintenance Savings
        iii. Incentive
4. Bids in group 3 (Red) may be value engineered **or removed** from the project to meet budget.
    a. DCO will provide the impact of ECMs value engineered or removed:
        i. Energy Savings
        ii. Operations and Maintenance Savings
        iii. Incentive
5. As per ESIP law DCO fee will be applied to the ECM hard cost.
    a. DCO will receive no compensation for bids that are under budget.
    b. DCO will receive no penalty for bids that are over budget.
6. If the budget overruns make savings unachievable at the current budget, DCO will provide additional ECMs above the budget to meet the required energy savings.

ENERGY SAVINGS PLAN

APPENDIX C – OPERATIONS AND MAINTENANCE SAVINGS

Appendix C – Operation & Maintenance Savings

Operations and Maintenance and other non-energy-related cost savings are allowable in NJ ESIPs, and are defined as reduction in expenses (other than energy cost savings) related to energy and water consuming equipment:

Energy-related cost savings can result from avoided expenditures for operations, maintenance, equipment repair, or equipment replacement due to the ESIP project.

Sources of O&M savings include:

- Termination of service personnel
- Lower maintenance service contract costs
- Decrease in repair costs.
    - Avoided repair and replacement costs as a result of replacing old and unreliable equipment.
    - Material savings due to new equipment warranties
    - Material savings due to the longer life items not needing replacement.
        - In particular, reduction in florescent bulbs due to LED

Termination of service personnel

As a result of the ESIP, a number of the client's maintenance staff members may no longer be required. If there is a reduction in the government's maintenance staff, O&M savings can be claimed.

A problem could arise if the maintenance staff is not reduced. Then it would be necessary to determine what new O&M responsibilities the facility has taken on, or savings should not be claimed. For example, it could be that a new building was constructed. During the performance period, it is important to establish that any increased maintenance was not due to the equipment installed under the ESIP.

Lower maintenance service contract costs

Prior to the implementation of the ESIP mechanical and electrical equipment was maintained by a third party under a maintenance contract. The ESIP replaces the aging equipment with newer, more efficient equipment, which can reduce the service costs to the client.

Decrease in repair costs.

The client is responsible for maintenance both before and after the equipment installation. Although there is no reduction in staff for which to claim labor savings, there will be cost savings on replacement materials.

Material-related savings frequently result from lighting and lighting controls projects.

For this project, lighting maintenance savings will result from the following:

1. Reduced material requirements (e.g., lamps)
2. Reduced operating time — Control measures increase equipment life by reducing the burn time of lamps and ballasts.
3. Warranty-related savings — newly installed lamps, and fixtures come with a manufacturer warranty of 10 years.

Year 1 O&M Savings

Vineland Public Schools		ANNUAL O&M COST SAVINGS
ECM #	ENERGY CONSERVATION MEASURE	$
1	LED Lighting Tube Retrofit	$58,065
3	LED Lighting Flat Panel Replacement	$2,597
5	Energy Management System Upgrades	$37,541
6	Energy Management System Replacement	$33,983
11	Retro-Commissioning	$9,676
13	Make-Up Air Unit Replacement	$6,365
18	High Efficiency Transformers with Harmonic Mitigation	$1,009
	TOTALS	$149,237

ENERGY SAVINGS PLAN

APPENDIX D – PROJECT CHANGES IN FINANCING

Appendix D – Project Changes in Financing

The Energy savings plan has been approved using:

Interest rate of 4.25%
Term: .... 20 Years
Construction Term .... 24 Months
Construction Interest Only Payment of .... TBD by Vineland Public School District financial advisor
Annual Surplus of no less than $2,400

During financing DCO will provide assistance but does not guarantee the timing of savings or incentives.

While beneficial to the client financing changes are the responsibility of the client, bond counsel and/or financial advisor. DCO represents in no way advice on these financial items

Financial items may include but are not limited to:

- Timing of payments
- Splitting payments into bi-annual, tri-annual, etc.
- Coordination with the client's fiscal year
- Local finance board material, forms and presentations
- Multiple tiered interest rates

ENERGY SAVINGS PLAN

APPENDIX E – INCENTIVES IN DEBT SERVICE

Appendix E – Incentives in Debt Service

As part of the Energy Savings Plan for Vineland Public School District, prescriptive rebates through South Jersey Gas were investigated. The estimated incentive amount is listed below. Upon final selection of the project scope and award of subcontractor bids, the incentive applications will be filed.

Incentive Calculations

BUILDING/FACILITY	ENERGY CONSERVATION MEASURE	Estimated Incentive $
Gloria M. Sabater Elementary School	Make-Up Air Unit Replacement	$12,000
Petway Elementary School	Make-Up Air Unit Replacement	$8,700
Landis Administrative Building	Boiler Replacement	$12,000

All estimated incentive values for the Vineland Public School District ESIP project were calculated using South Jersey Gas prescriptive rebates. The total incentive amount was calculated to be $32,700

No implied and/or written guarantee is made regarding the receipt of incentives. All incentives estimates carry inherent risks that may jeopardize the receipt of them. Therefore, Vineland Public School District acknowledges and accepts that any project proposed should not rely on the receipt of incentives as a reason to implement it.

ENERGY SAVINGS PLAN

APPENDIX F – ECM BREAKDOWN BY BUILDING

Vineland Public Schools % SAVINGS BY BUILDING (T.O.R.)

Vineland Public Schools BUILDINGS/FACILITIES		UTILITY ELECTRIC CONSUMPTION SAVINGS	ELECTRIC DEMAND SAVINGS	ONSITE ELECTRIC SAVINGS	NATURAL GAS SAVINGS
BUILDING/FACILITY NAME	SQFT	kWh	kW	kWh	Therms
Vineland High School North	229,580	23.1%	22.1%	23.1%	23.1%
Vineland High School South	232,550	23.0%	23.9%	23.0%	-8.3%
Thomas Wallace Middle School	119,380	36.4%	33.3%	36.4%	0.0%
SGT Dominick Pilla Middle Schoool	99,000	19.2%	23.4%	19.2%	8.1%
Veterans Memorial Intermediate School	113,150	30.5%	17.3%	30.5%	2.1%
Anthony Rossi Intermediate School	76,000	27.7%	8.7%	27.7%	0.0%
Gloria M. Sabater Elementary School	141,585	32.5%	34.4%	32.5%	26.4%
D'Ippolito Elementary School	75,860	25.0%	10.5%	25.0%	0.0%
Petway Elementary School	74,300	30.9%	29.4%	30.9%	21.4%
Dr. William Mennies Elementary School	71,747	17.7%	20.7%	17.7%	42.3%
Johnstone Elementary School	63,890	24.0%	15.0%	24.0%	13.9%
Dr. John H. Winslow Elementary School	57,397	35.7%	25.3%	35.7%	18.0%
Marie Durand Elementary School	46,158	14.8%	13.9%	14.8%	21.3%
Dane Barse Elementary School	40,030	21.8%	14.7%	21.8%	13.6%
Cunningham School	36,405	31.9%	10.6%	31.9%	-8.8%
Landis Administrative Building	92,320	27.3%	14.1%	27.3%	33.1%
Maintenance/Transportation Building	22,036	23.3%	19.1%	23.3%	-2.2%
Central Warehouse	23,000	22.8%	13.1%	22.8%	-4.0%
TOTALS	**1,614,388**	**26.1%**	**19.7%**	**26.1%**	**11.0%**

Vineland Public Schools SAVINGS BY BUILDING BY UTILITY FROM SMART SELECT

Vineland Public Schools BUILDINGS/FACILITIES		ELECTRIC CONSUMPTION SAVINGS	ELECTRIC DEMAND SAVINGS	ONSITE ELECTRIC SAVINGS	NATURAL GAS SAVINGS
BUILDING/FACILITY NAME	SQFT	kWh	kW	kWh	Therms
Vineland High School North	229,580	667,837	173	667,837	11,047
Vineland High School South	232,550	662,861	187	662,861	(3,379)
Thomas Wallace Middle School	119,380	679,329	135	679,329	(2)
SGT Dominick Pilla Middle Schoool	99,000	194,087	70	194,087	1,965
Veterans Memorial Intermediate School	113,150	664,467	133	664,467	1,255
Anthony Rossi Intermediate School	76,000	380,350	51	380,350	0
Gloria M. Sabater Elementary School	141,585	645,532	139	645,532	4,222
D'Ippolito Elementary School	75,860	343,396	56	343,396	0
Petway Elementary School	74,300	300,431	78	300,431	589
Dr. William Mennies Elementary School	71,747	236,900	78	236,900	1,976
Johnstone Elementary School	63,890	217,428	45	217,428	4,002
Dr. John H. Winslow Elementary School	57,397	178,913	54	178,913	4,434
Marie Durand Elementary School	46,158	167,730	64	167,730	2,445
Dane Barse Elementary School	40,030	142,916	27	142,916	3,314
Cunningham School	36,405	135,331	17	135,331	(604)
Landis Administrative Building	92,320	253,479	34	253,479	11,389
Maintenance/Transportation Building	22,036	55,268	9	55,268	(370)
Central Warehouse	23,000	37,827	9	37,827	(352)
TOTALS	**1,614,388**	**5,964,082**	**1,359**	**5,964,082**	**41,932**

ECMs evaluated and included in the ESIP

DCO ENERGY

DCO Energy Efficiency Division
100 Lenox Drive
Lawrenceville, NJ 08648

Vineland Public Schools ECM #	BUILDING/FACILITY	INSTALLED COST $	ANNUAL ELECTRIC COST SAVINGS $	ANNUAL NATURAL GAS COST SAVINGS $	ANNUAL ENERGY COST SAVINGS $	ANNUAL O&M COST SAVINGS $	TOTAL ANNUAL COST SAVINGS $	SIMPLE PAYBACK WITHOUT INCENTIVES YEARS	ELECTRIC CONSUMPTION SAVINGS kWh	ELECTRIC DEMAND SAVINGS kW	NATURAL GAS SAVINGS THERMS	TOTAL SITE ENERGY SAVINGS MMBTU	TOTAL SOURCE ENERGY SAVINGS MMBTU	Reduction of CO_2 LBS	Reduction of NO_x LBS	Reduction of SO_2 LBS	Reduction of Hg mg
1	Vineland High School North	$326,311	$58,989	($1,069)	$57,919	$6,116	$64,036	5.6	386,397	85	(700)	1,248	3,618	522,716	422	379	425.04
4	Vineland High School North	$87,043	$5,550	($113)	$5,437	$0	$5,437	16.0	35,325	9	(74)	113	330	47,671.78	38.53	34.62	38.86
6	Vineland High School North	$454,591	$3,477	$3,396	$6,873	$7,613	$14,486	66.1	28,107	0	2,224	318	502	64,640	52	28	30.92
7	Vineland High School North	$13,700	$0	$4,055	$4,055	$0	$4,055	3.4	0	0	2,655	266	279	31,068	24	0	0.00
8	Vineland High School North	$68,900	$2,506	$8,965	$11,471	$0	$11,471	6.0	10,150	10	5,871	622	713	82,634	65	10	11.16
9	Vineland High School North	$21,500	$1,046	$0	$1,046	$0	$1,046	20.6	8,454	0	0	29	81	11,616	9	8	9.30
10	Vineland High School North	$24,460	$1,359	$0	$1,359	$0	$1,359	18.0	10,925	0	0	37	104	15,010	12	11	12.02
11	Vineland High School North	$103,400	$11,428	$1,144	$12,572	$3,232	$15,803	8.2	92,383	0	749	390	961	135,699	109	91	101.62
14	Vineland High School North	$19,975	($188)	$4,379	$4,190	$0	$4,190	4.8	(1,520)	0	2,867	282	287	31,459	25	-1	-1.67
23	Vineland High School North	$62,686	$8,425	$0	$8,425	$0	$8,425	7.4	28,352	37	0	97	271	38,955.56	31.47	27.78	31.19
24	Vineland High School North	$36,312	$11,060	($3,886)	$7,174	$0	$7,174	5.1	55,406	32	(2,545)	(65)	262	46,351.21	38.09	54.30	60.95
26	Vineland High School North	$5,868	$1,714	$0	$1,714	$0	$1,714	3.4	13,859	0	0	47	132	19,042.40	15.38	13.58	15.25
1	Vineland High School South	$479,696	$57,414	$0	$57,414	$8,991	$66,405	8.4	368,214	90	0	1,256	3,518	505,926	409	361	405.04
4	Vineland High School South	$86,380	$4,163	$0	$4,163	$0	$4,163	20.8	25,697	7	0	88	245	35,307.32	28.52	25.18	28.27
5	Vineland High School South	$72,770	$0	$0	$0	$3,745	$3,745		0	0	0	0	0	0.00	0.00	0.00	0.00
8	Vineland High School South	$96,000	$8,421	$0	$8,421	$0	$8,421	11.4	53,005	14	0	181	506	72,829	59	52	58.31
9	Vineland High School South	$33,000	$1,625	$0	$1,625	$0	$1,625	20.3	13,133	0	0	45	125	18,045	15	13	14.45
10	Vineland High School South	$28,040	$2,119	$0	$2,119	$0	$2,119	13.2	17,080	0	0	58	163	23,468	19	17	18.79
12	Vineland High School South	$208,026	$2,685	($1,214)	$1,471	$0	$1,471	141.4	17,028	4	(710)	(13)	88	15,095.32	12.37	16.69	18.73
14	Vineland High School South	$51,750	$4,014	$2,022	$6,036	$0	$6,036	8.6	32,447	0	1,182	229	434	58,417	47	32	35.69
23	Vineland High School South	$25,553	$5,402	$0	$5,402	$0	$5,402	4.7	20,276	22	0	69	194	27,859.76	22.51	19.87	22.30
24	Vineland High School South	$150,472	$19,171	($6,589)	$12,582	$0	$12,582	12.0	102,904	49	(3,852)	(34)	579	96,321.70	78.79	100.85	113.19
26	Vineland High School South	$5,536	$1,618	$0	$1,618	$0	$1,618	3.4	13,076	0	0	45	125	17,966.56	14.51	12.81	14.38
1	Thomas Wallace Middle School	$351,081	$67,511	$0	$67,511	$6,581	$74,092	5.2	354,630	67	0	1,210	3,388	487,261	394	348	390.09
4	Thomas Wallace Middle School	$47,924	$3,642	$0	$3,642	$0	$3,642	13.2	19,132	6	0	65	183	26,286.82	21.24	18.75	21.04
5	Thomas Wallace Middle School	$61,800	$3,271	$1,412	$4,683	$3,181	$7,864	13.2	17,183	0	826	141	251	33,271.68	26.67	16.84	18.90
7	Thomas Wallace Middle School	$10,482	$0	$3,789	$3,789	$0	$3,789	2.8	0	0	2,216	222	233	25,931	20	0	0.00
8	Thomas Wallace Middle School	$21,400	$2,199	$0	$2,199	$0	$2,199	9.7	11,551	3	0	39	110	15,871	13	11	12.71
9	Thomas Wallace Middle School	$49,000	$3,132	$0	$3,132	$0	$3,132	15.6	16,453	0	0	56	157	22,606	18	16	18.10
10	Thomas Wallace Middle School	$31,396	$8,349	$0	$8,349	$0	$8,349	3.8	43,855	0	0	150	419	60,256.32	48.68	42.98	48.24
14	Thomas Wallace Middle School	$15,850	$6,047	$0	$6,047	$0	$6,047	2.6	31,766	0	0	108	303	43,647	35	31	34.94
18	Thomas Wallace Middle School	$170,000	$18,061	$0	$18,061	$490	$18,551	9.4	94,871	0	0	324	906	130,352.07	105.31	92.97	104.36
23	Thomas Wallace Middle School	$51,719	$4,112	$0	$4,112	$0	$4,112	12.6	21,600	29	0	74	206	29,678.41	23.98	21.17	23.76
24	Thomas Wallace Middle School	$51,872	$12,732	($5,205)	$7,528	$0	$7,528	6.9	66,880	30	(3,044)	(76)	319	56,278.32	46.23	65.54	73.57
26	Thomas Wallace Middle School	$597	$268	$0	$268	$0	$268	2.2	1,409	0	0	5	13	1,936.52	1.56	1.38	1.55
1	SGT Dominick Pilla Middle Schoool	$233,772	$28,162	$0	$28,162	$4,382	$32,544	8.3	161,199	47	0	550	1,540	221,488	179	158	177.32
5	SGT Dominick Pilla Middle Schoool	$4,120	$0	$0	$0	$212	$212		0	0	0	0	0	0.00	0.00	0.00	0.00
8	SGT Dominick Pilla Middle Schoool	$17,200	$652	$1,884	$2,536	$0	$2,536	6.8	2,558	2	1,102	119	140	16,413	13	3	2.81
9	SGT Dominick Pilla Middle Schoool	$10,800	$642	$0	$642	$0	$642	16.8	4,635	0	0	16	44	6,369	5	5	5.10
10	SGT Dominick Pilla Middle Schoool	$26,612	$1,395	$0	$1,395	$0	$1,395	19.1	10,024	0	0	34	96	13,773.50	11.13	9.82	11.03
14	SGT Dominick Pilla Middle Schoool	$15,675	($169)	$1,475	$1,306	$0	$1,306	12.0	(1,216)	0	863	82	79	8,426	7	-1	-1.34
23	SGT Dominick Pilla Middle Schoool	$31,638	$4,631	$0	$4,631	$0	$4,631	6.8	14,850	21	0	51	142	20,404.46	16.48	14.55	16.34
26	SGT Dominick Pilla Middle Schoool	$862	$282	$0	$282	$0	$282	3.1	2,036	0	0	7	19	2,797.19	2.26	2.00	2.24
1	Veterans Memorial Intermediate School	$315,889	$53,611	($1,005)	$52,606	$5,921	$58,527	6.0	321,711	71	(581)	1,040	3,012	435,229	352	315	353.88
4	Veterans Memorial Intermediate School	$46,613	$3,906	($83)	$3,824	$0	$3,824	12.2	22,836	6	(48)	73	213	30,817.43	24.91	22.38	25.12
5	Veterans Memorial Intermediate School	$229,561	$971	$4,345	$5,316	$11,815	$17,131	43.2	7,005	0	2,514	275	331	39,040.15	30.91	6.87	7.71
7	Veterans Memorial Intermediate School	$5,251	$0	$1,771	$1,771	$0	$1,771	3.0	0	0	1,025	102	108	11,987.71	9.43	0.00	0.00
8	Veterans Memorial Intermediate School	$23,800	$904	$2,900	$3,803	$0	$3,803	6.3	3,498	3	1,678	180	210	24,435	19	3	3.85
9	Veterans Memorial Intermediate School	$19,500	$1,023	$0	$1,023	$0	$1,023	19.1	7,380	0	0	25	71	10,140	8	7	8.12
10	Veterans Memorial Intermediate School	$4,896	$1,793	$0	$1,793	$0	$1,793	2.7	12,938	0	0	44	124	17,776.13	14.36	12.68	14.23
11	Veterans Memorial Intermediate School	$51,000	$8,743	$2,063	$10,805	$1,594	$12,399	4.7	63,094	0	1,193	335	728	100,655	81	62	69.40
14	Veterans Memorial Intermediate School	$11,800	($126)	$1,655	$1,528	$0	$1,528	7.7	(912)	0	957	93	92	9,948	8	-1	-1.00
18	Veterans Memorial Intermediate School	$180,000	$16,521	$0	$16,521	$519	$17,040	10.9	119,227	0	0	407	1,139	163,818.00	132.34	116.84	131.15
23	Veterans Memorial Intermediate School	$7,744	$961	$0	$961	$0	$961	8.1	2,952	4	0	10	28	4,056.56	3.28	2.89	3.25
24	Veterans Memorial Intermediate School	$51,720	$20,298	($9,477)	$10,822	$0	$10,822	4.8	101,293	49	(5,483)	(203)	392	75,025.21	61.99	99.27	111.42
26	Veterans Memorial Intermediate School	$1,459	$477	$0	$477	$0	$477	3.1	3,445	0	0	12	33	4,733.70	3.82	3.38	3.79
1	Anthony Rossi Intermediate School	$152,527	$23,292	$0	$23,292	$2,859	$26,151	6.5	143,723	38	0	490	1,373	197,476	160	141	158.10
4	Anthony Rossi Intermediate School	$34,065	$2,149	$0	$2,149	$0	$2,149	15.8	12,973	4	0	44	124	17,824.47	14.40	12.71	14.27
6	Anthony Rossi Intermediate School	$308,743	$1,931	$0	$1,931	$5,170	$7,101	159.9	15,157	0	0	52	145	20,826	17	15	16.67
7	Anthony Rossi Intermediate School	$8,080	$7,813	$0	$7,813	$0	$7,813	1.0	61,346	0	0	209	586	84,290	68	60	67.48
8	Anthony Rossi Intermediate School	$46,600	$6,969	$0	$6,969	$0	$6,969	6.7	44,919	9	0	153	429	61,718	50	44	49.41
9	Anthony Rossi Intermediate School	$13,300	$540	$0	$540	$0	$540	24.6	4,238	0	0	14	40	5,823	5	4	4.66
10	Anthony Rossi Intermediate School	$20,003	$1,914	$0	$1,914	$0	$1,914	10.5	15,002	0	0	51	143	20,612.96	16.65	14.70	16.50
11	Anthony Rossi Intermediate School	$34,200	$5,272	$0	$5,272	$1,069	$6,341	6.5	41,394	0	0	141	395	56,875	46	41	45.53
14	Anthony Rossi Intermediate School	$15,850	$5,029	$0	$5,029	$0	$5,029	3.2	39,483	0	0	135	377	54,250	44	39	43.43
26	Anthony Rossi Intermediate School	$895	$269	$0	$269	$0	$269	3.3	2,114	0	0	7	20	2,904.77	2.35	2.07	2.33

ECMs evaluated and included in the ESIP

DCO Energy Efficiency Division
100 Lenox Drive
Lawrenceville, NJ 08648

Vineland Public Schools		INSTALLED COST	ANNUAL ELECTRIC COST SAVINGS	ANNUAL NATURAL GAS COST SAVINGS	ANNUAL ENERGY COST SAVINGS	ANNUAL O&M COST SAVINGS	TOTAL ANNUAL COST SAVINGS	SIMPLE PAYBACK WITHOUT INCENTIVES	ELECTRIC CONSUMPTION SAVINGS	ELECTRIC DEMAND SAVINGS	NATURAL GAS SAVINGS	TOTAL SITE ENERGY SAVINGS	TOTAL SOURCE ENERGY SAVINGS	Reduction of CO_2	Reduction of NO_x	Reduction of SO_2	Reduction of Hg
ECM #	BUILDING/FACILITY	$	$	$	$	$	$	YEARS	kWh	kW	THERMS	MMBTU	MMBTU	LBS	LBS	LBS	mg
1	Gloria M. Sabater Elementary School	$484,793	$69,019	$0	$69,019	$9,087	$78,106	7.0	408,136	99	0	1,393	3,899	560,778	453	400	448.95
4	Gloria M. Sabater Elementary School	$13,504	$995	$0	$995	$0	$995	13.6	5,610	2	0	19	54	7,707.56	6.23	5.50	6.17
5	Gloria M. Sabater Elementary School	$273,620	$2,512	$1,678	$4,190	$14,083	$18,273	65.3	19,727	0	1,031	170	297	39,168.73	31.38	19.33	21.70
7	Gloria M. Sabater Elementary School	$7,733	$0	$2,873	$2,873	$0	$2,873	2.7	0	0	1,766	177	185	20,664.18	16.25	0.00	0.00
8	Gloria M. Sabater Elementary School	$66,400	$9,094	$0	$9,094	$0	$9,094	7.3	53,742	13	0	183	513	73,842	60	53	59.12
9	Gloria M. Sabater Elementary School	$47,500	$2,909	$0	$2,909	$0	$2,909	16.3	22,843	0	0	78	218	31,387	25	22	25.13
10	Gloria M. Sabater Elementary School	$22,441	$1,101	$0	$1,101	$0	$1,101	20.4	8,594	0	0	29	82	11,808.17	9.54	8.42	9.45
13	Gloria M. Sabater Elementary School	$2,135,367	$10,340	$0	$10,340	$3,791	$14,132	206.5	75,473	4	0	258	721	103,699.45	83.77	73.96	83.02
14	Gloria M. Sabater Elementary School	$27,650	($271)	$4,802	$4,531	$0	$4,531	6.1	(2,128)	0	2,952	288	290	31,611.35	24.79	-2.09	-2.34
23	Gloria M. Sabater Elementary School	$3,020	$240	$0	$240	$0	$240	12.6	588	1	0	2	6	808.06	0.65	0.58	0.65
24	Gloria M. Sabater Elementary School	$65,472	$9,946	($2,484)	$7,461	$0	$7,461	8.8	51,147	20	(1,527)	22	328	52,410.15	42.72	50.12	56.26
26	Gloria M. Sabater Elementary School	$762	$229	$0	$229	$0	$229	3.3	1,801	0	0	6	17	2,474.44	2.00	1.76	1.98
1	D'Ippolito Elementary School	$167,806	$27,391	$0	$27,391	$3,145	$30,536	6.1	160,107	42	0	546	1,530	219,987.48	177.72	156.91	176.12
4	D'Ippolito Elementary School	$36,987	$2,438	$0	$2,438	$0	$2,438	15.2	13,952	4	0	48	133	19,170.11	15.49	13.67	15.35
6	D'Ippolito Elementary School	$285,465	$2,303	$0	$2,303	$4,780	$7,083	124.0	16,620	0	0	57	159	22,836.41	18.45	16.29	18.28
8	D'Ippolito Elementary School	$60,100	$7,600	$0	$7,600	$0	$7,600	7.9	46,011	10	0	157	440	63,219.58	51.07	45.09	50.61
9	D'Ippolito Elementary School	$53,800	$2,991	$0	$2,991	$0	$2,991	18.0	21,586	0	0	74	206	29,659.22	23.96	21.15	23.74
10	D'Ippolito Elementary School	$23,359	$1,451	$0	$1,451	$0	$1,451	16.1	10,434	0	0	36	100	14,336.25	11.58	10.23	11.48
11	D'Ippolito Elementary School	$34,200	$5,962	$0	$5,962	$1,069	$7,031	5.7	43,025	0	0	147	411	59,116.56	47.76	42.16	47.33
14	D'Ippolito Elementary School	$15,850	$4,116	$0	$4,116	$0	$4,116	3.9	29,703	0	0	101	284	40,811.29	32.97	29.11	32.67
26	D'Ippolito Elementary School	$829	$271	$0	$271	$0	$271	3.1	1,958	0	0	7	19	2,689.61	2.17	1.92	2.15
1	Petway Elementary School	$196,221	$22,248	$0	$22,248	$3,678	$25,926	8.8	130,998	33	0	447	1,252	179,991.28	145.41	128.38	144.10
5	Petway Elementary School	$87,550	$792	$1,000	$1,792	$4,506	$6,298	48.9	5,716	0	589	78	116	14,744.10	11.76	5.60	6.29
8	Petway Elementary School	$13,900	$1,007	$0	$1,007	$0	$1,007	13.8	6,192	1	0	21	59	8,507.54	6.87	6.07	6.81
9	Petway Elementary School	$27,000	$2,231	$0	$2,231	$0	$2,231	12.1	16,098	0	0	55	154	22,118.29	17.87	15.78	17.71
10	Petway Elementary School	$22,022	$2,414	$0	$2,414	$0	$2,414	9.1	17,377	0	0	59	166	23,876.42	19.29	17.03	19.12
13	Petway Elementary School	$1,449,349	$3,313	$0	$3,313	$2,573	$5,886	437.5	22,895	1	0	78	219	31,458.14	25.41	22.44	25.18
24	Petway Elementary School	$52,624	$18,871	$0	$18,871	$0	$18,871	2.8	97,397	43	0	332	930	133,823.27	108.11	95.45	107.14
26	Petway Elementary School	$1,591	$521	$0	$521	$0	$521	3.1	3,758	0	0	13	36	5,164.04	4.17	3.68	4.13
3	Dr. William Mennies Elementary School	$24,604	$27,479	($474)	$27,005	$261	$27,265	0.9	168,028	34	(278)	545	1,576	227,613.92	183.95	164.67	184.83
8	Dr. William Mennies Elementary School	$34,500	$1,487	$3,930	$5,417	$0	$5,417	6.4	5,834	5	2,307	251	298	35,005.84	27.70	5.72	6.42
9	Dr. William Mennies Elementary School	$34,500	$1,431	$0	$1,431	$0	$1,431	24.1	10,326	0	0	35	99	14,187.57	11.46	10.12	11.36
10	Dr. William Mennies Elementary School	$25,093	$1,286	$0	$1,286	$0	$1,286	19.5	9,251	0	0	32	88	12,710.60	10.27	9.07	10.18
23	Dr. William Mennies Elementary School	$41,793	$5,804	$0	$5,804	$0	$5,804	7.2	18,048	27	0	62	172	24,798.44	20.03	17.69	19.85
24	Dr. William Mennies Elementary School	$17,272	$4,695	($89)	$4,606	$0	$4,606	3.7	23,142	12	(52)	74	216	31,188.71	25.21	22.68	25.46
26	Dr. William Mennies Elementary School	$961	$315	$0	$315	$0	$315	3.1	2,271	0	0	8	22	3,119.94	2.52	2.23	2.50
1	Johnstone Elementary School	$148,559	$19,553	$0	$19,553	$2,785	$22,337	7.6	108,256	27	0	369	1,034	148,743.52	120.16	106.09	119.08
4	Johnstone Elementary School	$32,267	$1,922	$0	$1,922	$0	$1,922	16.8	10,284	3	0	35	98	14,130.13	11.42	10.08	11.31
6	Johnstone Elementary School	$302,666	$1,441	$3,192	$4,633	$5,068	$9,701	65.3	10,400	0	1,866	222	295	36,126.32	28.71	10.19	11.44
7	Johnstone Elementary School	$10,713	$0	$4,262	$4,262	$0	$4,262	2.5	0	0	2,492	249	262	29,155.26	22.93	0.00	0.00
8	Johnstone Elementary School	$26,100	$3,006	$0	$3,006	$0	$3,006	8.7	17,900	3	0	61	171	24,594.71	19.87	17.54	19.69
9	Johnstone Elementary School	$9,700	$710	$0	$710	$0	$710	13.7	5,123	0	0	17	49	7,038.36	5.69	5.02	5.63
10	Johnstone Elementary School	$3,672	$1,535	$0	$1,535	$0	$1,535	2.4	11,075	0	0	38	106	15,216.36	12.29	10.85	12.18
11	Johnstone Elementary School	$28,800	$3,975	$864	$4,839	$900	$5,739	6.0	28,685	0	505	148	327	45,324.96	36.49	28.11	31.55
24	Johnstone Elementary School	$35,592	$5,343	($1,474)	$3,868	$0	$3,868	9.2	25,393	11	(862)	0	152	24,803.96	20.26	24.88	27.93
26	Johnstone Elementary School	$133	$43	$0	$43	$0	$43	3.1	313	0	0	1	3	430.34	0.35	0.31	0.34
3	Dr. John H. Winslow Elementary School	$209,764	$17,363	($296)	$17,067	$2,225	$19,292	12.3	106,465	21	(173)	346	999	144,257.23	116.58	104.34	117.11
4	Dr. John H. Winslow Elementary School	$19,531	$1,248	($26)	$1,222	$0	$1,222	16.0	7,338	2	(15)	24	68	9,903.47	8.00	7.19	8.07
7	Dr. John H. Winslow Elementary School	$14,980	$0	$5,996	$5,996	$0	$5,996	2.5	0	0	3,503	350	368	40,987.91	32.23	0.00	0.00
8	Dr. John H. Winslow Elementary School	$25,200	$1,173	$3,547	$4,720	$0	$4,720	5.3	4,604	4	2,072	223	262	30,570.82	24.17	4.51	5.06
9	Dr. John H. Winslow Elementary School	$18,300	$1,158	$0	$1,158	$0	$1,158	15.8	8,358	0	0	29	80	11,483.63	9.28	8.19	9.19
10	Dr. John H. Winslow Elementary School	$23,563	$1,451	$0	$1,451	$0	$1,451	16.2	10,434	0	0	36	100	14,336.25	11.58	10.23	11.48
23	Dr. John H. Winslow Elementary School	$47,390	$3,972	$0	$3,972	$0	$3,972	11.9	13,085	17	0	45	125	17,978.29	14.52	12.82	14.39
24	Dr. John H. Winslow Elementary School	$36,848	$4,779	($1,631)	$3,148	$0	$3,148	11.7	26,437	9	(953)	(5)	152	25,173.79	20.58	25.91	29.08
26	Dr. John H. Winslow Elementary School	$928	$304	$0	$304	$0	$304	3.1	2,192	0	0	7	21	3,012.36	2.43	2.15	2.41
3	Marie Durand Elementary School	$10,469	$18,600	($377)	$18,223	$111	$18,334	0.6	117,577	27	(224)	379	1,100	158,934.36	128.45	115.23	129.34
8	Marie Durand Elementary School	$38,400	$1,769	$5,400	$7,169	$0	$7,169	5.4	7,011	7	3,203	344	403	47,108.29	37.25	6.87	7.71
9	Marie Durand Elementary School	$7,200	$451	$0	$451	$0	$451	15.9	3,545	0	0	12	34	4,870.64	3.93	3.47	3.90
10	Marie Durand Elementary School	$9,486	$1,806	$0	$1,806	$0	$1,806	5.3	14,180	0	0	48	135	19,482.63	15.74	13.90	15.60
23	Marie Durand Elementary School	$45,426	$5,478	$0	$5,478	$0	$5,478	8.3	15,973	26	0	54	153	21,946.51	17.73	15.65	17.57
24	Marie Durand Elementary School	$8,656	$1,736	($900)	$836	$0	$836	10.4	9,445	4	(534)	(21)	34	6,729.49	5.57	9.26	10.39
3	Dane Barse Elementary School	$0	$18,147	($1,786)	$16,362	$0	$16,362	0.0	106,695	27	(1,043)	260	910	134,398.84	108.84	104.56	117.36
6	Dane Barse Elementary School	$317,369	$1,021	$2,878	$3,899	$5,315	$9,213	81.4	7,368	0	1,680	193	247	29,782.96	23.64	7.22	8.10
8	Dane Barse Elementary School	$30,400	$1,391	$4,584	$5,976	$0	$5,976	5.1	5,462	5	2,677	286	333	38,822.42	30.69	5.35	6.01
9	Dane Barse Elementary School	$23,900	$1,563	$0	$1,563	$0	$1,563	15.3	11,278	0	0	38	108	15,495.40	12.52	11.05	12.41
10	Dane Barse Elementary School	$7,242	$1,592	$0	$1,592	$0	$1,592	4.5	11,489	0	0	39	110	15,785.20	12.75	11.26	12.64
26	Dane Barse Elementary School	$265	$87	$0	$87	$0	$87	3.1	626	0	0	2	6	860.67	0.70	0.61	0.69

ECMs evaluated and included in the ESIP

Vineland Public Schools		INSTALLED COST	ANNUAL ELECTRIC COST SAVINGS	ANNUAL NATURAL GAS COST SAVINGS	ANNUAL ENERGY COST SAVINGS	ANNUAL O&M COST SAVINGS	TOTAL ANNUAL COST SAVINGS	SIMPLE PAYBACK WITHOUT INCENTIVES	ELECTRIC CONSUMPTION SAVINGS	ELECTRIC DEMAND SAVINGS	NATURAL GAS SAVINGS	TOTAL SITE ENERGY SAVINGS	TOTAL SOURCE ENERGY SAVINGS	Reduction of CO_2	Reduction of NO_x	Reduction of SO_2	Reduction of Hg
ECM #	BUILDING/FACILITY	$	$	$	$	$	$	YEARS	kWh	kW	THERMS	MMBTU	MMBTU	LBS	LBS	LBS	mg
1	Cunningham School	$58,106	$9,807	$0	$9,807	$1,089	$10,896	5.9	58,091	14	0	198	555	79,816.89	64.48	56.93	63.90
4	Cunningham School	$20,197	$871	$0	$871	$0	$871	23.2	4,984	1	0	17	48	6,847.58	5.53	4.88	5.48
7	Cunningham School	$2,699	$0	$899	$899	$0	$899	3.0	0	0	587	59	62	6,864.77	5.40	0.00	0.00
8	Cunningham School	$5,500	$791	$0	$791	$0	$791	7.0	4,699	1	0	16	45	6,456.10	5.22	4.60	5.17
9	Cunningham School	$22,500	$1,497	$0	$1,497	$0	$1,497	15.0	10,802	0	0	37	103	14,841.76	11.99	10.59	11.88
10	Cunningham School	$6,630	$760	$0	$760	$0	$760	8.7	5,486	0	0	19	52	7,537.08	6.09	5.38	6.03
11	Cunningham School	$16,400	$1,669	$233	$1,902	$513	$2,414	8.6	12,045	0	152	56	131	18,325.18	14.77	11.80	13.25
24	Cunningham School	$30,232	$7,283	($2,058)	$5,225	$0	$5,225	5.8	37,346	17	(1,343)	(7)	216	35,600.85	29.10	36.60	41.08
26	Cunningham School	$796	$260	$0	$260	$0	$260	3.1	1,879	0	0	6	18	2,582.02	2.09	1.84	2.07
1	Landis Administrative Building	$99,324	$13,994	($235)	$13,759	$1,862	$15,621	7.2	81,311	17	(137)	264	762	110,117.97	88.99	79.68	89.44
4	Landis Administrative Building	$11,262	$962	($19)	$943	$0	$943	11.9	5,341	1	(11)	17	50	7,208.44	5.83	5.23	5.88
6	Landis Administrative Building	$360,500	$1,170	$1,862	$3,032	$6,037	$9,069	118.9	8,441	0	1,088	138	195	24,327.88	19.38	8.27	9.28
7	Landis Administrative Building	$28,974	$0	$10,937	$10,937	$0	$10,937	2.6	0	0	6,390	639	671	74,768.28	58.79	0.00	0.00
8	Landis Administrative Building	$12,000	$546	$1,328	$1,874	$0	$1,874	6.4	1,869	2	776	84	99	11,648.26	9.21	1.83	2.06
9	Landis Administrative Building	$68,000	$11,247	$0	$11,247	$0	$11,247	6.0	81,167	0	0	277	775	111,523.17	90.10	79.54	89.28
11	Landis Administrative Building	$41,600	$3,905	$803	$4,708	$1,300	$6,008	8.8	28,183	0	469	143	319	44,212.19	35.60	27.62	31.00
20	Landis Administrative Building	$1,450,000	$1,947	$4,814	$6,762	$0	$6,762	214.4	12,012	2	2,813	322	410	49,415.86	39.21	11.77	13.21
23	Landis Administrative Building	$49,902	$9,416	$0	$9,416	$0	$9,416	5.3	28,187	34	0	96	269	38,728.73	31.29	27.62	31.01
26	Landis Administrative Building	$2,950	$966	$0	$966	$0	$966	3.1	6,969	0	0	24	67	9,574.99	7.74	6.83	7.67
1	Maintenance/Transportation Building	$29,046	$6,533	($580)	$5,953	$544	$6,497	4.9	34,644	9	(339)	84	295	43,640.02	35.34	33.95	38.11
4	Maintenance/Transportation Building	$5,953	$602	($53)	$548	$0	$548	10.9	3,192	1	(31)	8	27	4,020.69	3.26	3.13	3.51
9	Maintenance/Transportation Building	$21,000	$2,474	$0	$2,474	$0	$2,474	8.5	17,432	0	0	59	167	23,951.71	19.35	17.08	19.18
1	Central Warehouse	$54,733	$6,255	($602)	$5,652	$1,026	$6,678	9.7	36,066	9	(352)	88	308	45,431.15	36.79	35.34	39.67
9	Central Warehouse	$5,500	$217	$0	$217	$0	$217	25.4	1,526	0	0	5	15	2,096.59	1.69	1.50	1.68
26	Central Warehouse	$99	$33	$0	$33	$0	$33	3.0	235	0	0	1	2	322.75	0.26	0.23	0.26

ECMs evaluated but NOT included in the ESIP

DCO Energy Efficiency Division
100 Lenox Drive
Lawrenceville, NJ 08648

Vineland Public Schools		INSTALLED COST	ANNUAL ELECTRIC COST SAVINGS	ANNUAL NATURAL GAS COST SAVINGS	ANNUAL ENERGY COST SAVINGS	ANNUAL O&M COST SAVINGS	TOTAL ANNUAL COST SAVINGS	SIMPLE PAYBACK WITHOUT INCENTIVES	ELECTRIC CONSUMPTION SAVINGS	ELECTRIC DEMAND SAVINGS	NATURAL GAS SAVINGS	TOTAL SITE ENERGY SAVINGS	TOTAL SOURCE ENERGY SAVINGS	Reduction of CO_2	Reduction of NO_x	Reduction of SO_2	Reduction of Hg
ECM #	BUILDING/FACILITY	$	$	$	$	$	$	YEARS	kWh	kW	THERMS	MMBTU	MMBTU	LBS	LBS	LBS	mg
2	Vineland High School North	$521,210	$55,366	($996)	$54,370	$0	$54,370	9.6	363,341	79	(652)	1,175	3,403	491,600	397	356	399.67
3	Vineland High School North	$800,276	$55,366	($996)	$54,370	$8,489	$62,859	14.7	363,341	79	(652)	1,175	3,403	491,600	397	356	399.67
12	Vineland High School North	$208,026	$2,685	($1,083)	$1,601	$0	$1,601	129.9	17,028	4	(710)	(13)	88	15,095	12	17	18.73
15	Vineland High School North	$3,131,987	$36,839	$2,194	$39,032	$0	$39,032	80.2	258,144	37	1,437	1,024	2,617	371,498	300	253	284
16	Vineland High School North	$2,924,359	$1,949	$842	$2,792	$3,245	$6,037	1047.5	15,453	0	552	108	206	27,687	22	15	17
18	Vineland High School North	$295,000	$20,691	$0	$20,691	$851	$21,541	14.3	167,264	0	0	571	1,598	229,820.90	185.66	163.92	183.99
2	Vineland High School South	$611,468	$50,435	$0	$50,435	$0	$50,435	12.1	321,388	81	0	1,097	3,070	441,587	357	315	353.53
3	Vineland High School South	$814,067	$50,435	$0	$50,435	$8,635	$59,070	16.1	321,388	81	0	1,097	3,070	441,587	357	315	353.53
18	Vineland High School South	$34,000	$536	$0	$536	$98	$634	63.4	4,332	0	0	15	41	5,952.41	4.81	4.25	4.77
25	Vineland High School South	$351,995	$4,552	$0	$4,552	$0	$4,552	77.3	36,800	0	0	126	352	50,563.20	40.85	36.06	40.48
2	Thomas Wallace Middle School	$498,681	$62,462	$0	$62,462	$0	$62,462	8.0	328,106	60	0	1,119	3,135	450,818	364	322	360.92
3	Thomas Wallace Middle School	$698,986	$62,462	$0	$62,462	$7,415	$69,877	11.2	328,106	60	0	1,119	3,135	450,818	364	322	360.92
13	Thomas Wallace Middle School	$583,175	$118	$3,578	$3,696	$1,035	$4,731	157.8	621	0	2,093	211	226	25,336.00	19.94	0.61	0.68
2	SGT Dominick Pilla Middle Schoool	$280,495	$26,811	$0	$26,811	$0	$26,811	10.5	153,464	45	0	524	1,466	210,860	170	150	168.81
3	SGT Dominick Pilla Middle Schoool	$339,064	$26,811	$0	$26,811	$3,597	$30,407	12.6	153,464	45	0	524	1,466	210,860	170	150	168.81
24	SGT Dominick Pilla Middle Schoool	$13,968	$859	($783)	$76	$0	$76	183.4	4,496	2	(458)	(30)	(5)	820.55	0.78	4.41	4.95
2	Veterans Memorial Intermediate School	$492,479	$47,210	($870)	$46,341	$0	$46,341	10.6	284,291	61	(503)	920	2,663	384,729	311	279	312.72
3	Veterans Memorial Intermediate School	$730,424	$47,210	($870)	$46,341	$7,748	$54,089	15.8	284,291	61	(503)	920	2,663	384,729	311	279	312.72
2	Anthony Rossi Intermediate School	$191,403	$22,624	$0	$22,624	$0	$22,624	8.5	139,692	37	0	477	1,335	191,936	155	137	153.66
3	Anthony Rossi Intermediate School	$242,783	$22,624	$0	$22,624	$2,575	$25,199	10.7	139,692	37	0	477	1,335	191,936	155	137	153.66
18	Anthony Rossi Intermediate School	$108,000	$7,281	$0	$7,281	$311	$7,593	14.8	57,169	0	0	195	546	78,550.48	63.46	56.03	62.89
19	Anthony Rossi Intermediate School	$226,910	$2,326	($1,126)	$1,200	$0	$1,200	189.0	18,056	0	(636)	(2)	106	17,373.53	14.20	17.70	19.86
21	Anthony Rossi Intermediate School	$1,929,410	$11,882	$0	$11,882	$0	$11,882	162.4	46,985	45	0	160	449	64,557.67	52.15	46.05	51.68
24	Anthony Rossi Intermediate School	$25,896	$515	$0	$515	$0	$515	50.3	18,764	(14)	0	64	179	25,782.29	20.83	18.39	20.64
2	Gloria M. Sabater Elementary School	$581,891	$68,709	$0	$68,709	$0	$68,709	8.5	406,387	99	0	1,387	3,882	558,375	451	398	447.03
3	Gloria M. Sabater Elementary School	$700,299	$68,709	$0	$68,709	$7,429	$76,137	10.2	406,387	99	0	1,387	3,882	558,375	451	398	447.03
18	Gloria M. Sabater Elementary School	$218,000	$12,610	$0	$12,610	$629	$13,239	17.3	99,009	0	0	338	946	136,038.17	109.90	97.03	108.91
2	D'Ippolito Elementary School	$197,899	$26,893	$0	$26,893	$0	$26,893	7.4	157,261	41	0	537	1,502	216,076.38	174.56	154.12	172.99
3	D'Ippolito Elementary School	$235,176	$26,893	$0	$26,893	$2,495	$29,388	8.7	157,261	41	0	537	1,502	216,076.38	174.56	154.12	172.99
18	D'Ippolito Elementary School	$121,000	$8,830	$0	$8,830	$349	$9,179	13.7	63,721	0	0	217	609	87,552.00	70.73	62.45	70.09
19	D'Ippolito Elementary School	$241,675	$2,527	($854)	$1,673	$0	$1,673	144.4	18,056	0	(500)	12	120	18,955.60	15.44	17.70	19.86
21	D'Ippolito Elementary School	$1,483,841	$8,423	$0	$8,423	$0	$8,423	176.2	33,660	30	0	115	322	46,249.17	37.36	32.99	37.03
24	D'Ippolito Elementary School	$17,240	$1,137	$0	$1,137	$0	$1,137	15.2	5,645	3	0	19	54	7,756.09	6.27	5.53	6.21
2	Petway Elementary School	$230,502	$21,072	$0	$21,072	$0	$21,072	10.9	124,274	31	0	424	1,187	170,752.73	137.94	121.79	136.70
3	Petway Elementary School	$274,616	$21,072	$0	$21,072	$2,913	$23,985	13.0	124,274	31	0	424	1,187	170,752.73	137.94	121.79	136.70
18	Petway Elementary School	$183,000	$5,929	$0	$5,929	$528	$6,457	30.9	42,791	0	0	146	409	58,794.29	47.50	41.93	47.07
1	Dr. William Mennies Elementary School	$23,915	$4,838	$0	$4,838	$448	$5,287	4.9	34,917	0	0	119	334	47,976.45	38.76	34.22	38.41
2	Dr. William Mennies Elementary School	$24,604	$27,479	($474)	$27,005	$0	$27,005	0.9	168,028	34	(278)	545	1,576	227,613.92	183.95	164.67	184.83
18	Dr. William Mennies Elementary School	$200,000	$8,426	$0	$8,426	$577	$9,003	23.7	60,812	0	0	207	581	83,555.50	67.50	59.60	66.89
19	Dr. William Mennies Elementary School	$226,910	$2,527	($1,067)	$1,460	$0	$1,460	155.4	18,056	0	(626)	(1)	107	17,483.05	14.28	17.70	19.86
2	Johnstone Elementary School	$197,152	$17,855	$0	$17,855	$0	$17,855	11.0	99,171	25	0	338	947	136,261.28	110.08	97.19	109.09
3	Johnstone Elementary School	$259,526	$17,855	$0	$17,855	$2,753	$20,608	14.5	99,171	25	0	338	947	136,261.28	110.08	97.19	109.09
18	Johnstone Elementary School	$137,892	$6,043	$0	$6,043	$398	$6,441	22.8	43,613	0	0	149	417	59,923.97	48.41	42.74	47.97
22	Johnstone Elementary School	$521,282	$980	$0	$980	$0	$980	531.8	2,340	4	0	8	22	3,215.24	2.60	2.29	2.57
1	Dr. John H. Winslow Elementary School	$128,677	$16,446	($277)	$16,169	$2,412	$18,581	8.0	101,075	20	(162)	329	949	136,982.90	110.70	99.05	111.18
2	Dr. John H. Winslow Elementary School	$164,396	$17,363	($296)	$17,067	$0	$17,067	9.6	106,465	21	(173)	346	999	144,257.23	116.58	104.34	117.11
6	Dr. John H. Winslow Elementary School	$212,489	$560	$1,907	$2,467	$3,558	$6,025	86.1	4,040	0	1,114	125	156	18,585.67	14.73	3.96	4.44
17	Dr. John H. Winslow Elementary School	$1,865,111	($505)	$30,546	$30,042	$0	$30,042	62.1	(2,875)	(1)	17,847	1,775	1,847	204,865.43	161.01	-2.82	-3.16
1	Marie Durand Elementary School	$10,176	$1,350	$0	$1,350	$191	$1,541	7.5	10,600	0	0	36	101	14,563.85	11.77	10.39	11.66
2	Marie Durand Elementary School	$10,469	$18,600	($377)	$18,223	$0	$18,223	0.6	117,577	27	(224)	379	1,100	158,934.36	128.45	115.23	129.34
24	Dane Barse Elementary School	$14,944	$1,839	($1,131)	$709	$0	$709	21.1	9,874	4	(660)	(32)	25	5,842.36	4.89	9.68	10.86
2	Cunningham School	$85,288	$9,333	$0	$9,333	$0	$9,333	9.1	55,382	13	0	189	529	76,094.30	61.47	54.27	60.92
3	Cunningham School	$123,088	$9,333	$0	$9,333	$1,306	$10,639	13.2	55,382	13	0	189	529	76,094.30	61.47	54.27	60.92
23	Cunningham School	$7,633	$316	$0	$316	$0	$316	24.2	979	1	0	3	9	1,345.37	1.09	0.96	1.08
2	Landis Administrative Building	$106,335	$12,960	($214)	$12,746	$0	$12,746	8.3	75,574	15	(125)	245	709	102,375.37	82.74	74.06	83.13
3	Landis Administrative Building	$154,950	$12,960	($214)	$12,746	$1,644	$14,390	12.2	75,574	15	(125)	245	709	102,375.37	82.74	74.06	83.13
24	Landis Administrative Building	$33,656	$4,710	($1,594)	$3,115	$0	$3,115	10.8	23,357	9	(932)	(13)	125	21,193.69	17.36	22.89	25.69
25	Landis Administrative Building	$355,000	$1,247	$0	$1,247	$0	$1,247	284.7	9,000	0	0	31	86	12,366.00	9.99	8.82	9.90
2	Maintenance/Transportation Building	$42,300	$6,365	($565)	$5,800	$0	$5,800	7.3	33,752	9	(330)	82	288	42,516.10	34.43	33.08	37.13
3	Maintenance/Transportation Building	$62,055	$6,365	($565)	$5,800	$658	$6,458	10.7	33,752	9	(330)	82	288	42,516.10	34.43	33.08	37.13
8	Maintenance/Transportation Building	$9,700	$262	$585	$847	$0	$847	11.4	834	1	342	37	44	5,145.40	4.07	0.82	0.92
2	Central Warehouse	$66,031	$6,102	($588)	$5,514	$0	$5,514	12.0	35,185	9	(344)	86	300	44,321.50	35.89	34.48	38.70
3	Central Warehouse	$81,361	$6,102	($588)	$5,514	$863	$6,377	14.8	35,185	9	(344)	86	300	44,321.50	35.89	34.48	38.70
8	Central Warehouse	$11,300	$3,417	$0	$3,417	$0	$3,417	3.3	22,125	2	0	75	211	30,399.47	24.56	21.68	24.34

Vineland Public Schools		INSTALLED COST	ANNUAL ELECTRIC COST SAVINGS	ANNUAL NATURAL GAS COST SAVINGS	ANNUAL ENERGY COST SAVINGS	ANNUAL O&M COST SAVINGS	TOTAL ANNUAL COST SAVINGS	SIMPLE PAYBACK WITHOUT INCENTIVES	ELECTRIC CONSUMPTION SAVINGS	ELECTRIC DEMAND SAVINGS	NATURAL GAS SAVINGS	TOTAL SITE ENERGY SAVINGS	TOTAL SOURCE ENERGY SAVINGS	Reduction of CO_2	Reduction of NO_x	Reduction of SO_2	Reduction of Hg
ECM #	BUILDING/FACILITY	$	$	$	$	$	$	YEARS	kWh	kW	THERMS	MMBTU	MMBTU	LBS	LBS	LBS	mg
2	Vineland High School North	$521,210	$55,366	($996)	$54,370	$0	$54,370	9.6	363,341	79	(652)	1,175	3,403	491,600	397	356	399.67
3	Vineland High School North	$800,276	$55,366	($996)	$54,370	$8,489	$62,859	14.7	363,341	79	(652)	1,175	3,403	491,600	397	356	399.67
12	Vineland High School North	$208,026	$2,685	($1,083)	$1,601	$0	$1,601	129.9	17,028	4	(710)	(13)	88	15,095	12	17	18.73
15	Vineland High School North	$3,131,987	$36,839	$2,194	$39,032	$0	$39,032	80.2	258,144	37	1,437	1,024	2,617	371,498	300	253	284
16	Vineland High School North	$2,924,359	$1,949	$842	$2,792	$3,245	$6,037	1047.5	15,453	0	552	108	206	27,687	22	15	17
18	Vineland High School North	$295,000	$20,691	$0	$20,691	$851	$21,541	14.3	167,264	0	0	571	1,598	229,820.90	185.66	163.92	183.99
2	Vineland High School South	$611,468	$50,435	$0	$50,435	$0	$50,435	12.1	321,388	81	0	1,097	3,070	441,587	357	315	353.53
3	Vineland High School South	$814,067	$50,435	$0	$50,435	$8,635	$59,070	16.1	321,388	81	0	1,097	3,070	441,587	357	315	353.53
18	Vineland High School South	$34,000	$536	$0	$536	$98	$634	63.4	4,332	0	0	15	41	5,952.41	4.81	4.25	4.77
25	Vineland High School South	$351,995	$4,552	$0	$4,552	$0	$4,552	77.3	36,800	0	0	126	352	50,563.20	40.85	36.06	40.48
2	Thomas Wallace Middle School	$498,681	$62,462	$0	$62,462	$0	$62,462	8.0	328,106	60	0	1,119	3,135	450,818	364	322	360.92
3	Thomas Wallace Middle School	$698,986	$62,462	$0	$62,462	$7,415	$69,877	11.2	328,106	60	0	1,119	3,135	450,818	364	322	360.92
13	Thomas Wallace Middle School	$583,175	$118	$3,578	$3,696	$1,035	$4,731	157.8	621	0	2,093	211	226	25,336.00	19.94	0.61	0.68
2	SGT Dominick Pilla Middle Schoool	$280,495	$26,811	$0	$26,811	$0	$26,811	10.5	153,464	45	0	524	1,466	210,860	170	150	168.81
3	SGT Dominick Pilla Middle Schoool	$339,064	$26,811	$0	$26,811	$3,597	$30,407	12.6	153,464	45	0	524	1,466	210,860	170	150	168.81
24	SGT Dominick Pilla Middle Schoool	$13,968	$859	($783)	$76	$0	$76	183.4	4,496	2	(458)	(30)	(5)	820.55	0.78	4.41	4.95
2	Veterans Memorial Intermediate School	$492,479	$47,210	($870)	$46,341	$0	$46,341	10.6	284,291	61	(503)	920	2,663	384,729	311	279	312.72
3	Veterans Memorial Intermediate School	$730,424	$47,210	($870)	$46,341	$7,748	$54,089	15.8	284,291	61	(503)	920	2,663	384,729	311	279	312.72
2	Anthony Rossi Intermediate School	$191,403	$22,624	$0	$22,624	$0	$22,624	8.5	139,692	37	0	477	1,335	191,936	155	137	153.66
3	Anthony Rossi Intermediate School	$242,783	$22,624	$0	$22,624	$2,575	$25,199	10.7	139,692	37	0	477	1,335	191,936	155	137	153.66
18	Anthony Rossi Intermediate School	$108,000	$7,281	$0	$7,281	$311	$7,593	14.8	57,169	0	0	195	546	78,550.48	63.46	56.03	62.89
19	Anthony Rossi Intermediate School	$226,910	$2,326	($1,126)	$1,200	$0	$1,200	189.0	18,056	0	(636)	(2)	106	17,373.53	14.20	17.70	19.86
21	Anthony Rossi Intermediate School	$1,929,410	$11,882	$0	$11,882	$0	$11,882	162.4	46,985	45	0	160	449	64,557.67	52.15	46.05	51.68
24	Anthony Rossi Intermediate School	$25,896	$515	$0	$515	$0	$515	50.3	18,764	(14)	0	64	179	25,782.29	20.83	18.39	20.64
2	Gloria M. Sabater Elementary School	$581,891	$68,709	$0	$68,709	$0	$68,709	8.5	406,387	99	0	1,387	3,882	558,375	451	398	447.03
3	Gloria M. Sabater Elementary School	$700,299	$68,709	$0	$68,709	$7,429	$76,137	10.2	406,387	99	0	1,387	3,882	558,375	451	398	447.03
18	Gloria M. Sabater Elementary School	$218,000	$12,610	$0	$12,610	$629	$13,239	17.3	99,009	0	0	338	946	136,038.17	109.90	97.03	108.91
2	D'Ippolito Elementary School	$197,899	$26,893	$0	$26,893	$0	$26,893	7.4	157,261	41	0	537	1,502	216,076.38	174.56	154.12	172.99
3	D'Ippolito Elementary School	$235,176	$26,893	$0	$26,893	$2,495	$29,388	8.7	157,261	41	0	537	1,502	216,076.38	174.56	154.12	172.99
18	D'Ippolito Elementary School	$121,000	$8,830	$0	$8,830	$349	$9,179	13.7	63,721	0	0	217	609	87,552.00	70.73	62.45	70.09
19	D'Ippolito Elementary School	$241,675	$2,527	($854)	$1,673	$0	$1,673	144.4	18,056	0	(500)	12	120	18,955.60	15.44	17.70	19.86
21	D'Ippolito Elementary School	$1,483,841	$8,423	$0	$8,423	$0	$8,423	176.2	33,660	30	0	115	322	46,249.17	37.36	32.99	37.03
24	D'Ippolito Elementary School	$17,240	$1,137	$0	$1,137	$0	$1,137	15.2	5,645	3	0	19	54	7,756.09	6.27	5.53	6.21
2	Petway Elementary School	$230,502	$21,072	$0	$21,072	$0	$21,072	10.9	124,274	31	0	424	1,187	170,752.73	137.94	121.79	136.70
3	Petway Elementary School	$274,616	$21,072	$0	$21,072	$2,913	$23,985	13.0	124,274	31	0	424	1,187	170,752.73	137.94	121.79	136.70
18	Petway Elementary School	$183,000	$5,929	$0	$5,929	$528	$6,457	30.9	42,791	0	0	146	409	58,794.29	47.50	41.93	47.07
1	Dr. William Mennies Elementary School	$23,915	$4,838	$0	$4,838	$448	$5,287	4.9	34,917	0	0	119	334	47,976.45	38.76	34.22	38.41
2	Dr. William Mennies Elementary School	$24,604	$27,479	($474)	$27,005	$0	$27,005	0.9	168,028	34	(278)	545	1,576	227,613.92	183.95	164.67	184.83
18	Dr. William Mennies Elementary School	$200,000	$8,426	$0	$8,426	$577	$9,003	23.7	60,812	0	0	207	581	83,555.50	67.50	59.60	66.89
19	Dr. William Mennies Elementary School	$226,910	$2,527	($1,067)	$1,460	$0	$1,460	155.4	18,056	0	(626)	(1)	107	17,483.05	14.28	17.70	19.86
2	Johnstone Elementary School	$197,152	$17,855	$0	$17,855	$0	$17,855	11.0	99,171	25	0	338	947	136,261.28	110.08	97.19	109.09
3	Johnstone Elementary School	$259,526	$17,855	$0	$17,855	$2,753	$20,608	14.5	99,171	25	0	338	947	136,261.28	110.08	97.19	109.09
18	Johnstone Elementary School	$137,892	$6,043	$0	$6,043	$398	$6,441	22.8	43,613	0	0	149	417	59,923.97	48.41	42.74	47.97
22	Johnstone Elementary School	$521,282	$980	$0	$980	$0	$980	531.8	2,340	4	0	8	22	3,215.24	2.60	2.29	2.57
1	Dr. John H. Winslow Elementary School	$128,677	$16,446	($277)	$16,169	$2,412	$18,581	8.0	101,075	20	(162)	329	949	136,982.90	110.70	99.05	111.18
2	Dr. John H. Winslow Elementary School	$164,396	$17,363	($296)	$17,067	$0	$17,067	9.6	106,465	21	(173)	346	999	144,257.23	116.58	104.34	117.11
6	Dr. John H. Winslow Elementary School	$212,489	$560	$1,907	$2,467	$3,558	$6,025	86.1	4,040	0	1,114	125	156	18,585.67	14.73	3.96	4.44
17	Dr. John H. Winslow Elementary School	$1,865,111	($505)	$30,546	$30,042	$0	$30,042	62.1	(2,875)	(1)	17,847	1,775	1,847	204,865.43	161.01	-2.82	-3.16
1	Marie Durand Elementary School	$10,176	$1,350	$0	$1,350	$191	$1,541	7.5	10,600	0	0	36	101	14,563.85	11.77	10.39	11.66
2	Marie Durand Elementary School	$10,469	$18,600	($377)	$18,223	$0	$18,223	0.6	117,577	27	(224)	379	1,100	158,934.36	128.45	115.23	129.34
24	Dane Barse Elementary School	$14,944	$1,839	($1,131)	$709	$0	$709	21.1	9,874	4	(660)	(32)	25	5,842.36	4.89	9.68	10.86
2	Cunningham School	$85,288	$9,333	$0	$9,333	$0	$9,333	9.1	55,382	13	0	189	529	76,094.30	61.47	54.27	60.92
3	Cunningham School	$123,088	$9,333	$0	$9,333	$1,306	$10,639	13.2	55,382	13	0	189	529	76,094.30	61.47	54.27	60.92
23	Cunningham School	$7,633	$316	$0	$316	$0	$316	24.2	979	1	0	3	9	1,345.37	1.09	0.96	1.08
2	Landis Administrative Building	$106,335	$12,960	($214)	$12,746	$0	$12,746	8.3	75,574	15	(125)	245	709	102,375.37	82.74	74.06	83.13
3	Landis Administrative Building	$154,950	$12,960	($214)	$12,746	$1,644	$14,390	12.2	75,574	15	(125)	245	709	102,375.37	82.74	74.06	83.13
24	Landis Administrative Building	$33,656	$4,710	($1,594)	$3,115	$0	$3,115	10.8	23,357	9	(932)	(13)	125	21,193.69	17.36	22.89	25.69
25	Landis Administrative Building	$355,000	$1,247	$0	$1,247	$0	$1,247	284.7	9,000	0	0	31	86	12,366.00	9.99	8.82	9.90
2	Maintenance/Transportation Building	$42,300	$6,365	($565)	$5,800	$0	$5,800	7.3	33,752	9	(330)	82	288	42,516.10	34.43	33.08	37.13
3	Maintenance/Transportation Building	$62,055	$6,365	($565)	$5,800	$658	$6,458	10.7	33,752	9	(330)	82	288	42,516.10	34.43	33.08	37.13
8	Maintenance/Transportation Building	$9,700	$262	$585	$847	$0	$847	11.4	834	1	342	37	44	5,145.40	4.07	0.82	0.92
2	Central Warehouse	$66,031	$6,102	($588)	$5,514	$0	$5,514	12.0	35,185	9	(344)	86	300	44,321.50	35.89	34.48	38.70
3	Central Warehouse	$81,361	$6,102	($588)	$5,514	$863	$6,377	14.8	35,185	9	(344)	86	300	44,321.50	35.89	34.48	38.70
8	Central Warehouse	$11,300	$3,417	$0	$3,417	$0	$3,417	3.3	22,125	2	0	75	211	30,399.47	24.56	21.68	24.34

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Note:

- **Factors used to calculate Greenhouse Gas Reductions are as follows:**
  - ***CO_2 = (1.292*kWh Savings) + (11.7*Therm Savings)***
  - ***NO_x = (0.0083*kWh Savings) + (0.0092*Therm Savings)***
  - ***SO_2 = (0.0067*kWh Savings)***
  - ***Hg = (0.0000000243* kWh Savings)***

ENERGY SAVINGS PLAN

APPENDIX G – ENERGY SAVINGS SUPPLEMENTAL INFORMATION

*Refer to submission folder

ENERGY SAVINGS PLAN

APPENDIX H – LOCAL GOVERNMENT ENERGY AUDITS

*Refer to submission folder