ENERGY SAVINGS PLAN

SUBMITTED BY:
DCO Energy Efficiency Division
100 Lenox Drive
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Rev 3
6/13/2023

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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 Dumont Board of Education's 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 Dumont Board of Education the necessary information to decide which proposed ECMs to implement as part of your (ESIP) project. Dumont Board of Education has decided to implement the ESIP as part of the Do-It-Yourself-Model and is utilizing the services of Environetics (ENV) as the architect of record and DCO Energy as the ESCO. Rogut McCarthy LLC is the bond counsel, and Phoenix Advisors is the financial advisor. See organization relationship chart in the section below.

Working with the School District's staff, your selected ESIP project would:

1. Self-fund a $5,024,218 project
2. Generate $243,902 in annual energy savings and an additional $128,226 on solar PPA savings – 49% of current utility spend
3. Eligible for $68,678 in rebates and incentives
4. Reduce utility related annual CO2 emissions by 1,644 metric tons – a 54% reduction

NOTE: This submitted ESP doesn't constitute any contractual obligation between the Dumont Board of Education and DCO Energy (DCO). Any contractual obligations will be performed under separate legal documents per mutual 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)*

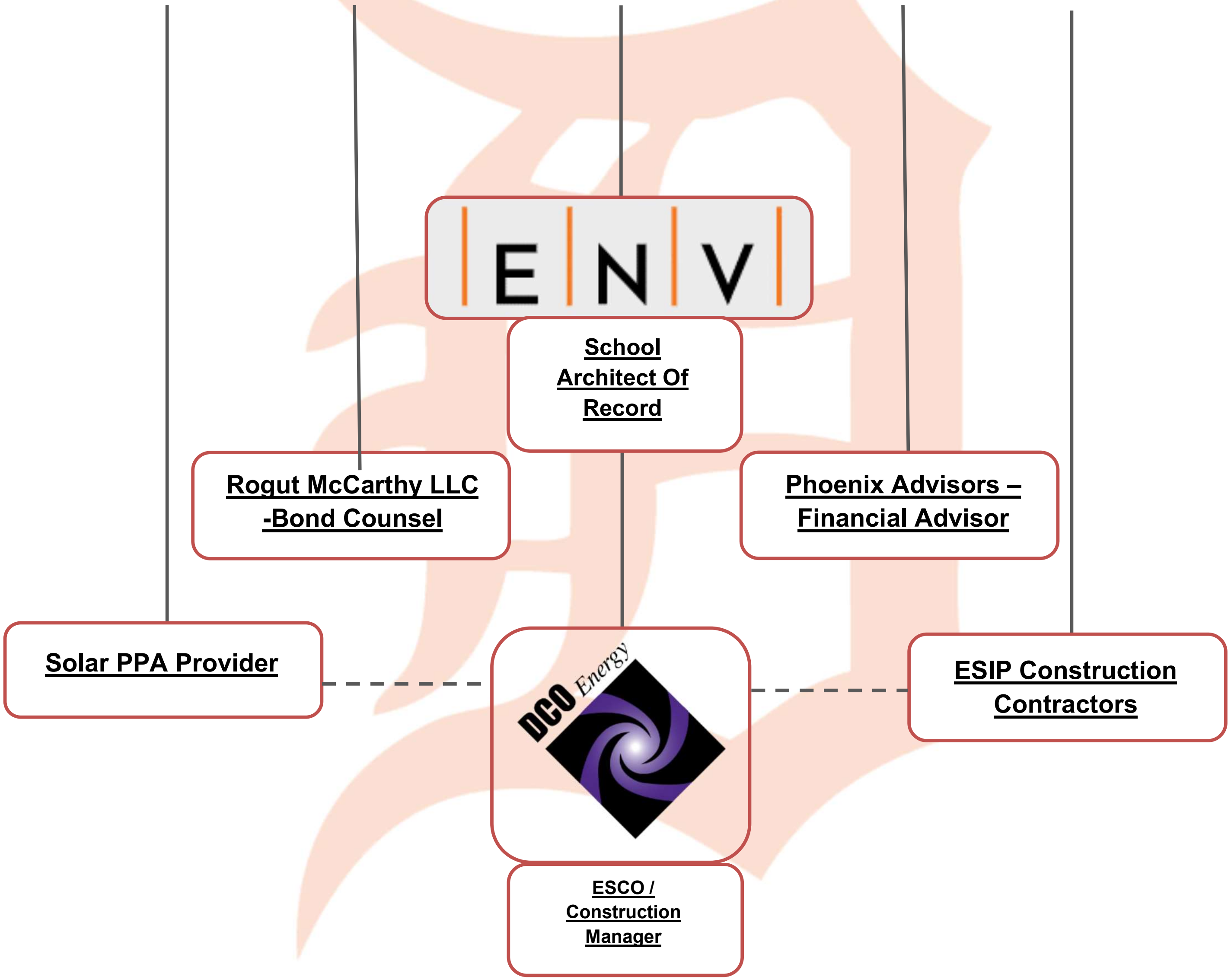
- *Identify the eligibility for, and costs and revenues associated with the PJM Independent System Operator for demand response and curtailable service activities; (Section 3)*
- *Schedules showing calculations of all costs of implementing the proposed energy conservation measures and the projected energy 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 or not 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.*

In the DIY method, the local government unit takes the lead. The local government unit may utilize in-house expertise; frequently, however, local government units retain an engineer (or an architectural firm with engineering capabilities). Retaining an engineer to assist with the ESIP authorizes the engineering firm to be responsible for procurement of services from different organizations to perform various elements of an ESIP including preparation of the Energy Savings Plan, development of construction plans, bids and specifications, making recommendations regarding the award of construction contracts, and managing the construction process. Local government units that choose to use the DIY Option are responsible for applying for NJCEP or other incentives and securing financing for the project.

Dumont Board of Education



Administration Building

Administration Building is a single story, 7,000 square foot building built in 1961. Spaces include offices, corridors, storage rooms, and a large conference room. The facility is occupied year-round. Typical weekday occupancy is 15 staff and 20 visitors. The buildings operating hours are from 8:30 a.m. – 5:00 p.m. on the weekdays.

Description of Building HVAC

The building is conditioned in part by packaged roof top units (RTUs). There are two gas-fired units providing 81 MBh output of heat and 5-tons of cooling. Additional, two 5-ton RTUs provide cooling only. One Thermoflo 202 MBh output hot water boiler serves most of the building heating load. Installed in 2018, it is in good condition. The boiler serves a primary-only distribution system with four constant speed ¼ hp heating hot water pumps. There are approximately 21 feet of 2-inch pipe and 12 feet of 1-inch noninsulated pipe. Hot water is produced by a 40 gallon 40 MBh gas-fired storage water heater with an efficiency rating of 80%

Description of Building Lighting

The primary interior lighting system uses 32-Watt linear fluorescent T8 lamps. Additionally, there are some compact fluorescent lamps (CFL) and LED general purpose lamps. Typically, T8 fluorescent lamps use electronic ballasts. Fixture types include 1- 2- 3- or 4-lamp, 4-foot-long recessed troffer, and surface mounted fixtures and 2- foot fixtures with linear tube lamps. In addition, the facility has LED 2x4 and 2x2 fixtures. Most fixtures are in fair condition. All exit signs are LED. Interior lighting levels were generally sufficient. Lighting fixtures are controlled by wall switches. Exterior fixtures include canopy lights with PAR30 LED lamps and pole mounted fixtures. The pole mounted fixtures incorporate LED sources. Exterior fixtures are controlled by timeclock or photocell.

Dumont High School

Dumont High School is a campus dominated by a multi-story; 165,469 square foot building built in 1929. Spaces include classrooms, gymnasium, auditorium, offices, cafeteria, corridors, stairwells, a commercial kitchen, and basement mechanical space. The campus includes a hut, a shed, and a concession stand built in 2004 for a total of 167,849 sf. The facility is occupied year-round, from September through June, etc. Typical weekday occupancy is 50 staff and 818 students. Summer occupancy includes a summer programs and continuing maintenance activities. Weekend activities vary by season. The operating hours are from 7 am – 7 pm.

Description of Building HVAC

Unit ventilators are equipped with supply fan motors and pneumatically controlled outside air dampers and fan coil valves connected to the hot water distribution system. They provide heating and ventilation to classrooms. This mode of heating to the building . Offices and some classrooms are cooled using window air conditioning (AC) units. These units vary in capacity between 0.54 and 2-tons of cooling. The server rooms and a few classrooms are conditioned by ductless mini split systems ranging in size from 0.75 to 2.56 tons of cooling. The band room, choir room, classrooms, media center, cafeteria, auditorium, and guidance offices are served with packaged rooftop units (RTUs). There are 13 gas-fired burner units ranging in size from 5 to 25-tons of cooling and 120 to 376 MBh of heating. The gymnasium, locker rooms, and a few classrooms are conditioned by air handling units. They are equipped with a supply fan motor and hot water heating coil. The AHU in classroom B50 and tech room provides cooling with a DX coil with a 4-ton and 5-ton capacity respectively. Science classrooms are connected to condensing units on the roof. Two 5093 MBh output steam boilers serve a portion of the building heating load. The burners are non-modulating with a nominal efficiency of 80 percent. The boilers are configured in a manual control scheme. Both boilers are required under high load conditions. Boilers are equipped with boiler feed water pumps, combustion air fans, and a condensate return system. The distribution system provides both steam and hot water for heating only. The boilers provide steam to cast iron radiators and a heat exchanger in the mechanical room near the cafeteria. One 10 hp and one 3 hp motor circulates water to unit ventilators and hot water heating coils.

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, and LED general purpose lamps. A few of the linear fixtures have been retrofit with LED tube lamps. Typically, T8 fluorescent lamps use electronic ballasts. Fixture types include 1- 2- 3- or 4-lamp, 2- or 4-foot long recessed and surface mounted troffers, surface mounted wrap fixtures and 2-foot fixtures with U-bend and linear tube lamps. Most fixtures are in fair condition. Fixtures in both gymnasiums are manually controlled, mainly using T5HO linear fluorescent high bay fixtures. Auditorium fixtures are manually controlled and use LED lamps. All exit signs are LED. Interior lighting levels were generally sufficient. The sports locker rooms were over lit at about 200 footcandles (FC), more than twice the recommended illuminance level. Interior lighting fixtures are controlled by manual wall switches. Exterior fixtures include wall packs, flood lights, canopy lights with LED lamps, and HID or CFL wall packs and are controlled by a time clock, switch, or photocell, depending on the fixture

Grant School

Grant Elementary School is a 3-story, 52,527 square foot building built in 1911. Sections have been subsequently added. Spaces include classrooms, gymnasium, offices, cafeteria, corridors, stairwells, offices, and mechanical space. The facility is occupied from September through June. Typical weekday occupancy is 25 staff and 352 students. Summer occupancy includes a summer day camp and continuing maintenance activities. The building is operated from 8:30 am – 5 pm on weekdays. Operating schedule on the weekend varies.

Description of Building HVAC

Unit ventilators (UV) are equipped with supply fan motors and pneumatically controlled outside air dampers and fan coil valves connected to either a steam or hot water distribution system, depending on location. UVs provide heating and ventilation mainly to classrooms and offices. A few offices and classrooms are cooled using window air conditioning (AC) units. The corridor is conditioned by an air handling unit. This unit is equipped with a supply fan motor, a hot water heating coil, and a refrigerant coil for cooling. This system includes an outdoor condensing unit that has a cooling capacity of 5 tons. . The heating coil is supplied by the boiler. Classroom 109 is conditioned by a 3-ton ductless mini split heat pump and Classrooms 110 and 114 are cooled by a 2-ton ductless mini split air conditioner. Addition classrooms, the media center, and the multipurpose room are served by four packaged roof top units (RTUs) with gas-fired burners ranging in size from 144 to 320 MBh heating output. Cooling capacities range from 8.25 to 20-tons. Two HB Smith (2,353 and 2,360 MBh) forced draft steam boilers serve the building heating load. The boilers are configured in a manual control scheme. Both boilers are required under high load conditions. The system includes a heat exchanger connected to a hot water loop driven by two 1.5 hp heating hot water pumps. They are constant speed and operate in an automatic control scheme. There is a separate steam loop. The boilers provide steam and hot water to unit ventilators and end uses as described. Hot water is produced by a 40 gallon 38 MBh gas-fired storage water heater with an efficiency rating of 80%

Description of Building Lighting

The primary interior lighting system uses 32-Watt linear fluorescent T8 lamps. Additionally, there are some compact fluorescent plug-in lamps (CFL), incandescent, and LED general purpose lamps. Typically, T8 fluorescent lamps use electronic ballasts. Fixture types include 2-3- or 4-lamp, 4-foot-long recessed troffer, chain and surface mounted fixtures and 2-foot fixtures with U-bend tube lamps. Most fixtures are in good condition. Multipurpose fixtures have manually controlled high bay T5HO lamps. All exit signs are LED. Interior lighting levels were generally sufficient. Light fixtures are controlled by wall switches. Exterior wall pack fixtures include LED fixtures and a fixture retrofit with an LED “corn bulb”. These are several LED flood light fixtures and a CFL fixture. Exterior fixtures are timer or photocell controlled.

Honiss School

Honiss Elementary School is a 3-story, 61,917 square foot building built in 1955. Spaces include classrooms, gymnasium, auditorium, offices, cafeteria, corridors, stairwells, and basement mechanical space. The facility is occupied from September through June. Typical weekday occupancy is 38 staff and 642 students. The buildings operating hours are from 8:30 am – 5 pm on weekdays. Operating hours on the weekend vary.

Description of Building HVAC

Unit ventilators (UV) are used to provide heating and ventilation to classrooms. They are equipped with supply fan motors, pneumatically controlled outside air dampers, and fan coil valves. They are connected variously to the steam or hot water distribution system. Offices and select classrooms are cooled by window air conditioning (AC) units. The gymnasium office is conditioned by a packaged terminal heat pump (PTHP) unit controlled by room thermostats. This 11.2 EER unit has a heating capacity of 81 MBh and a ¾-ton cooling capacity. The new gymnasium, media center, guidance offices and select classrooms are served by packaged roof top units (RTUs) ranging from 4 to 18 tons in capacity. Supply fan motors for these units range from 1.0 to 5.0 hp and operate at constant speed. Three of the units are equipped with gas-fired burners. The multipurpose room is heated by an air-handling unit (AHU) equipped with a hot water coil. The supply fan motor is a constant speed, 1.5 hp standard efficiency motor. The equipment is controlled by a manual dial thermostat located in the space. Two HB Smith 2,766 MBh output steam boilers serve a portion of the building heating load. The burners are non- modulating with a nominal efficiency of 78 percent. The boilers are configured in a manual control scheme. Both boilers are required under high load conditions. A two-pipe steam distribution system serves steam heating terminals units. A heat exchanger in the mechanical room transfers steam to hot water as part of a 3-pipe heating hydronic distribution system. Three 7.5 hp heating hot water pumps circulate water to terminal units. Hot water is produced by a 97 gallon 19 MBh gas-fired storage water heater with a nominal efficiency rating of 80%.

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 and LED general purpose lamps. Typically, T8 fluorescent lamps use electronic ballasts. Gymnasium and multipurpose room fixtures have manually controlled high bay (HO) linear fluorescent lamps. All exit signs are LED. Fixture types include 1- 2- 3- or 4-lamp, 4-foot-long recessed troffers surface mounted and pendent mount fixtures and 2-foot fixtures with U-bend tube lamps. 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, flood lights, pole mounted flood fixtures and canopy lights with LED lamps. There are also two high pressure sodium (HPS) wall packs. Exterior light fixtures are controlled by a time clock, switch, or photocell depending on the fixture.

Lincoln School

Dumont Public Schools is a 3-story, 34,130 square foot building built in 1911. Spaces include classrooms, gymnasium, auditorium, offices, cafeteria, corridors, stairwells, ballrooms, and basement mechanical space. The facility is occupied from September through June. Typical weekday occupancy is 18 staff and 213 students. Summer occupancy includes a summer day camp and continuing maintenance activities. There are no weekend activities. The building operating hours are from 8:30 am – 5:00 pm on weekdays.

Description of Building HVAC

Unit ventilators are equipped with supply fan motors and pneumatically controlled outside air dampers and fan coil valves. They are connected variously to the steam and hot water distribution systems and provide heating and ventilation to classrooms. Offices and select classrooms are cooled using window air conditioning (AC) units. The multipurpose room, multipurpose room corridor, music room, and media center are served by packaged roof top units (RTUs). There are five gas-fired burner units ranging in size from 4.75 to 20 tons of cooling and equipped with 100 to 320 MBh of heating. Classroom 111 and office 213 are both conditioned by split system air handling units. These units are each equipped with a supply fan motor, a hot water heating coil, and a refrigerant coil for cooling. The supply fan motor is assumed to be 1/2 hp. These systems each include an outdoor condensing unit that has a cooling capacity of 4 tons. The heating coil is supplied by the hot water from the heat exchanger. Two HB Smith gas-fired steam boilers serve the building heating load. The boilers are configured in a manual control scheme. Boilers are equipped with fractional horsepower combustion air fans and condensate return pumps. The boilers provide hot water via a heat exchanger to fin tube radiators, unit ventilators, and air handling units throughout the building. The hydronic distribution system is a 2- pipe heating only system. The hot water loop is configured in a constant flow primary distribution with two 1.5 hp constant speed hot water pumps operating with an automated control scheme. Hot water is produced by a 29 gallon 60 MBh gas-fired storage water heater with an 80% efficiency rating.

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, and LED general purpose lamps. Gymnasium fixtures have manually controlled high bay T5 (HO) linear fluorescent lamps. All exit signs are LED. Typically, T8 fluorescent lamps use electronic ballasts. Fixture types include 2- or 4-lamp, 4-foot-long recessed troffer surface mounted fixtures and 2-foot fixtures with U-bend tube lamps. 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 LED wall packs controlled by photocells.

Selzer School

Selzer Elementary School is a 2-story, 58,455 square foot building built in 1961. Spaces include classrooms, gymnasium, auditorium, offices, cafeteria, corridors, stairwells, and basement mechanical space. The facility is occupied from September through June. Typical weekday occupancy is 32 staff and 524 students. The buildings operating hours are from 8:30 am – 5:00 pm on weekdays. Weekend hours vary.

Description of Building HVAC

Unit ventilators are equipped with supply fan motors and pneumatically controlled outside air dampers and fan coil valves connected to the hot water distribution system. They provide heating and ventilation to classrooms. Offices and select classrooms use window air conditioning (AC) units. Two offices are conditioned by split air conditioning units. Their cooling capacities are 3 and 4 tons respectively. The multipurpose room, library and select classrooms are conditioned by packaged roof top units (RTUs) ranging in capacity from 8 to 20 tons. There are 4 gas-fired burner units ranging in size from 146 to 320 MBh output. Two HB Smith 3831 MBh hot water boilers serve a portion of the building heating load. The burners are non-modulating with a nominal efficiency of 83 percent. The boilers are configured in a manual lead-lag control scheme. Both boilers are required under high load conditions. The boilers are configured in a constant flow primary distribution with one 5 hp constant speed controlled hot water pump. The gymnasium and offices each have a 1 hp constant speed booster pump. The boilers provide hot water to fin tube radiators, unit ventilators, and air handlers throughout the building. Hot water is produced by a 40 gallon 40 MBh gas-fired storage water heater.

Description of Building Lighting

The primary interior lighting system uses 32-Watt linear fluorescent T8 lamps. Typically, T8 fluorescent lamps use electronic ballasts. Multipurpose fixtures have manually controlled high bay HO linear fluorescent lamps. The library contains some compact fluorescent fixtures (CFL). Additionally, there are a few LED general purpose lamps, several LED tube lamps and some LED fixtures. All exit signs are LED. Fixture types include 2- 3- or 4-lamp, 4-foot-long recessed troffer, surface mounted fixtures, and 2-foot fixtures with U-bend tube lamps. Most fixtures are in good condition. Interior lighting levels were generally sufficient. Most lighting fixtures are controlled manually and the remainder by wall switches. Exterior fixtures include wall packs, flood lights, and canopy lights using LED, HID, CFL and incandescent sources. Exterior fixtures are controlled by a time clock, switch, or photocell, depending on the fixture.

SECTION 2 – ENERGY BASELINE

Dumont Board of Education
25 Depew Street
Dumont, NJ 07628

Total Utility Consumption and Site EUI

The Dumont Board of Education Energy Savings Plan includes 6 buildings:1 high school, 1 administration building, and 4 elementary schools. To develop the ESP, DCO Energy was provided with all available utility data (electric, natural gas, fuel oil). DCO Energy tracked and documented this utility data from January 2022 thru December 2022. A listing of the buildings, the total utility consumption, and Energy Usage Index for the 6 sites are detailed below.

BUILDINGS & FACILITIES		
BUILDING #	BUILDING/FACILITY NAME	SQFT
1	Administration Building	7,000
2	Dumont High School	165,469
3	Grant School	52,527
4	Honiss School	61,917
5	Lincoln School	34,130
6	Selzer School	58,455

Dumont Board of Education - Energy Use Summary

Dumont Board of Education BUILDINGS/FACILITIES		ELECTRIC				
BUILDING/FACILITY NAME	SQFT	USAGE kWh	DEMAND kW	USAGE kWh / SQFT	USAGE BTU / SQFT	TOTAL COST $$
Administration Building	7,000	51,000	49	7.3	24,859	9,757.93
Dumont High School	165,469	980,840	612	5.9	20,225	129,600.23
Grant School	52,527	298,680	313	5.7	19,401	56,334.91
Honiss School	61,917	405,370	265	6.5	22,338	62,052.93
Lincoln School	34,130	247,704	176	7.3	24,763	37,378.79
Selzer School	58,455	386,110	305	6.6	22,537	$61,246
TOTALS	**379,498**	**2,369,704**	**1,719**	**6.2**	**21,306**	**$356,371**

Dumont Board of Education BUILDINGS/FACILITIES		NATURAL GAS		
BUILDING/FACILITY NAME	SQFT	USAGE THERMS	USAGE BTU / SQFT	TOTAL COST $$
Administration Building	7,000	3,310	47,283	$4,623
Dumont High School	165,469	136,953	82,767	$144,592
Grant School	52,527	22,665	43,150	$25,939
Honiss School	61,917	67,015	108,234	$78,546
Lincoln School	34,130	22,715	66,555	$29,474
Selzer School	58,455	38,456	65,787	$47,110
TOTALS	**379,498**	**291,114**	**76,710**	**$330,286**

Dumont Board of Education
25 Depew Street
Dumont, NJ 07628

Dumont Board of Education BUILDINGS/FACILITIES		Water & Sewer (Gal)		
BUILDING/FACILITY NAME	SQFT	USAGE Water & Sewer (Gal)	USAGE GAL / SQFT	TOTAL COST $$
Administration Building	7,000	700,876	100.13	$5,512
Dumont High School	165,469	2,684,572	16.22	$25,581
Grant School	52,527	675,444	12.86	$11,075
Honiss School	61,917	1,377,816	22.25	$13,757
Lincoln School	34,130	249,832	7.32	$6,336
Selzer School	58,455	639,540	10.94	$6,286
TOTALS	**379,498**	**6,328,080**	**0.00**	**$68,547**

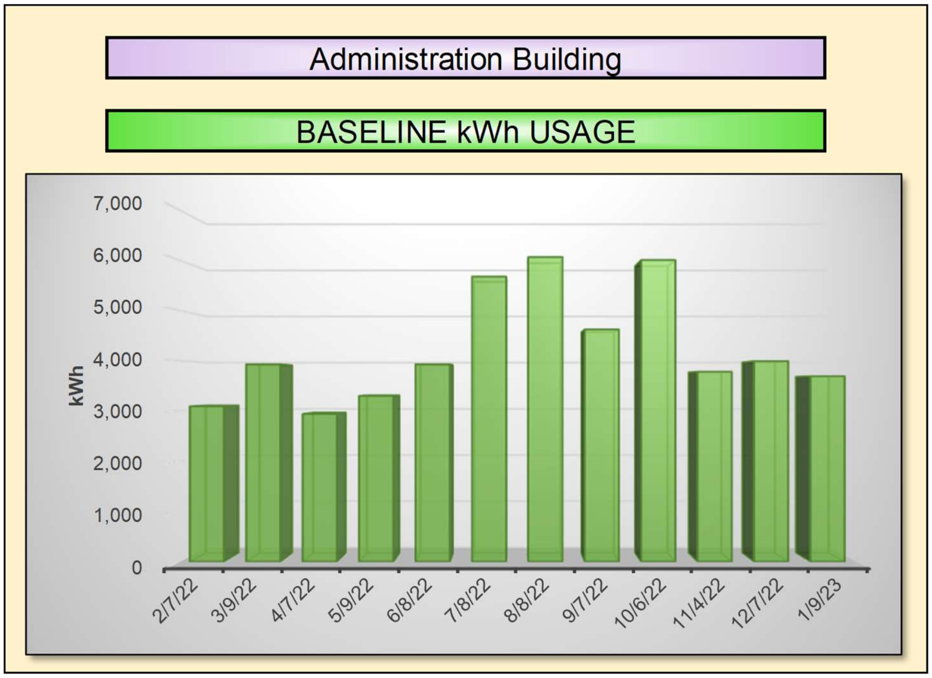
Dumont Board of Education BUILDINGS/FACILITIES		SITE ENERGY	SOURCE ENERGY	TOTAL COST
BUILDING/FACILITY NAME	SQFT	USAGE BTUs	USAGE BTUs	$$
Administration Building	7,000	504,994,727	834,765,463	$19,894
Dumont High School	165,469	17,041,931,018	23,750,625,772	$299,773
Grant School	52,527	3,285,641,160	5,233,341,498	$93,349
Honiss School	61,917	8,084,617,717	10,909,312,873	$154,356
Lincoln School	34,130	3,116,676,577	4,751,550,515	$73,189
Selzer School	58,455	5,163,001,520	7,726,614,406	$114,642
TOTALS	**379,498**	**37,196,862,718**	**53,206,210,527**	**$755,203**

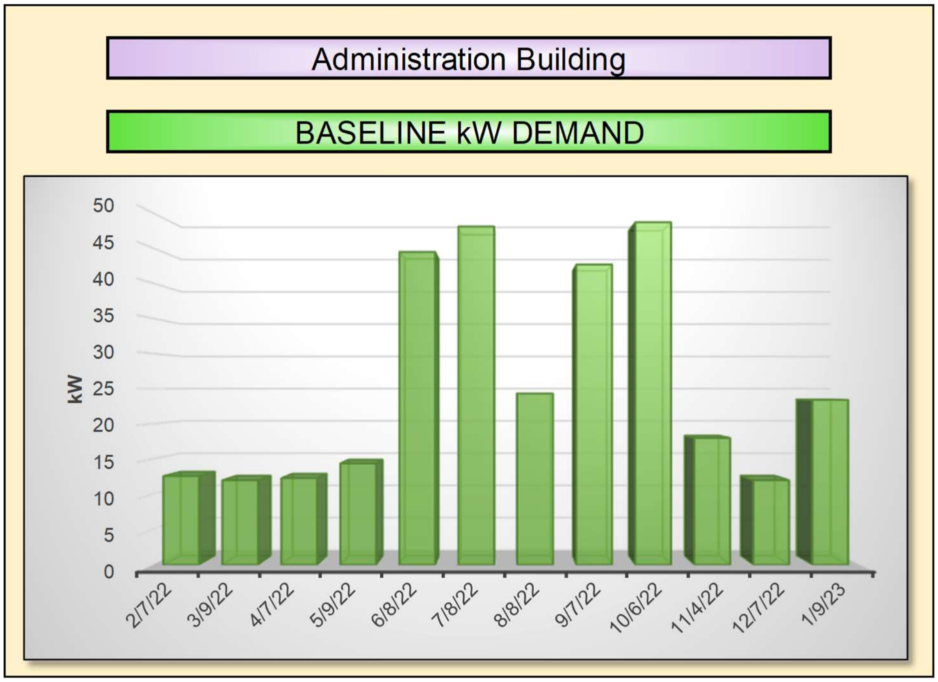
Dumont Board of Education – Energy Use & Cost Index

Dumont Board of Education BUILDINGS/FACILITIES		SITE EUI		
BUILDING/FACILITY NAME	SQFT	USAGE BTU / SQFT	NATIONAL MEDIAN BTU / SQFT	NATIONAL MEDIAN +/- %
Administration Building	7,000	72,142	65,600	-10%
Dumont High School	165,469	102,992	62,700	-64%
Grant School	52,527	62,551	62,700	0%
Honiss School	61,917	130,572	62,700	-108%
Lincoln School	34,130	91,318	62,700	-46%
Selzer School	58,455	88,324	62,700	-41%
TOTALS	**379,498**	**98,016**	**62,753**	**-56%**

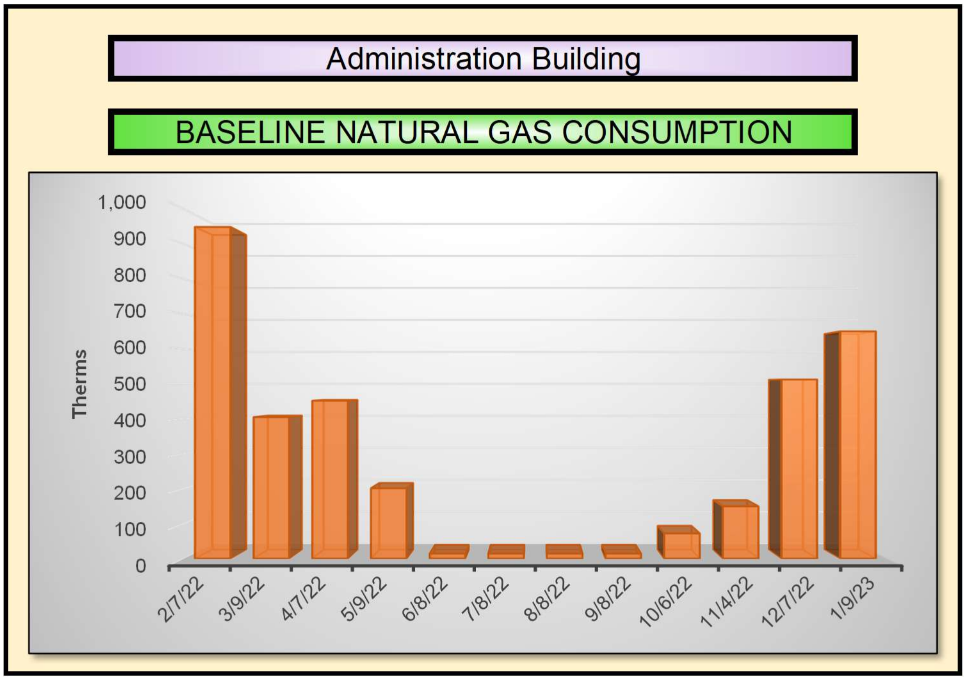
Dumont Board of Education BUILDINGS/FACILITIES		SITE ECI		
BUILDING/FACILITY NAME	SQFT	COST $$ / SQFT	NATIONAL MEDIAN $$ / SQFT	NATIONAL MEDIAN +/- %
Administration Building	7,000	$2.84	$1.63	-75%
Dumont High School	165,469	$1.81	$1.55	-17%
Grant School	52,527	$1.78	$1.55	-14%
Honiss School	61,917	$2.49	$1.55	-60%
Lincoln School	34,130	$2.14	$1.55	-38%
Selzer School	58,455	$1.96	$1.48	-33%
TOTALS	**379,498**	**$1.99**	**$1.54**	**-29%**

Administration Building Baseline Energy Use





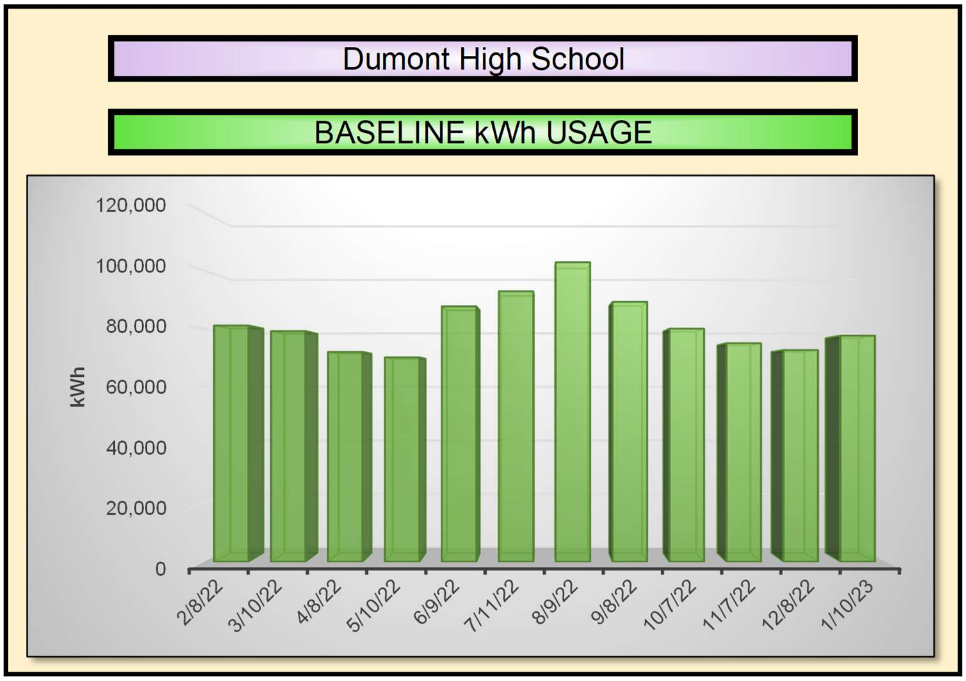
Administration Building							ELECTRIC METER #1					
Provider:	PSEG		Account #:	747794502				Meter #	678000617			
Commodity:			Commodity:	General Lighting & Power				Area Served	Building			
Billing Period Start Date	Actual Reading	Usage kWh	Demand kW	Electric Delivery Charges	Electric Commodity Charges	Electric Demand Charges	Fixed Customer Charge	Total Electric Charges	Marginal Rate $/kWh	Days	Load Factor	BTU
1/7/22	2/7/22	3,090	13	$69	$513	$50	$5	$636	$0.188	32	32%	10,543,080
2/8/22	3/9/22	3,930	12	87	539	47	5	$679	$0.159	30	45%	13,409,160
3/10/22	4/7/22	2,940	12	65	418	49	5	$537	$0.164	29	34%	10,031,280
4/8/22	5/9/22	3,300	14	$73	$534	$57	$5	$669	$0.184	32	30%	11,259,600
5/10/22	6/8/22	3,930	44	$68	$528	$309	$5	$910	$0.152	30	12%	13,409,160
6/9/22	7/8/22	5,670	48	$101	$575	$348	$5	$1,030	$0.119	30	16%	19,346,040
7/9/22	8/8/22	6,060	24	$109	$605	$356	$5	$1,075	$0.118	31	34%	20,676,720
8/9/22	9/7/22	4,620	43	$83	$984	$312	$5	$1,384	$0.231	30	15%	15,763,440
9/8/22	10/6/22	6,000	49	139	577	113	5	$834	$0.119	29	18%	20,472,000
10/7/22	11/4/22	3,780	18	$90	$478	$84	$5	$657	$0.150	29	30%	12,897,360
11/5/22	12/7/22	3,990	12	$95	$502	$56	$5	$658	$0.150	33	42%	13,613,880
12/8/22	1/9/23	3,690	23	$88	$542	$55	$5	$689	$0.171	33	20%	12,590,280
TOTALS		51,000	49	$1,070	$6,794	$1,835	$59	$9,758	$0.154	368	12%	174,012,000

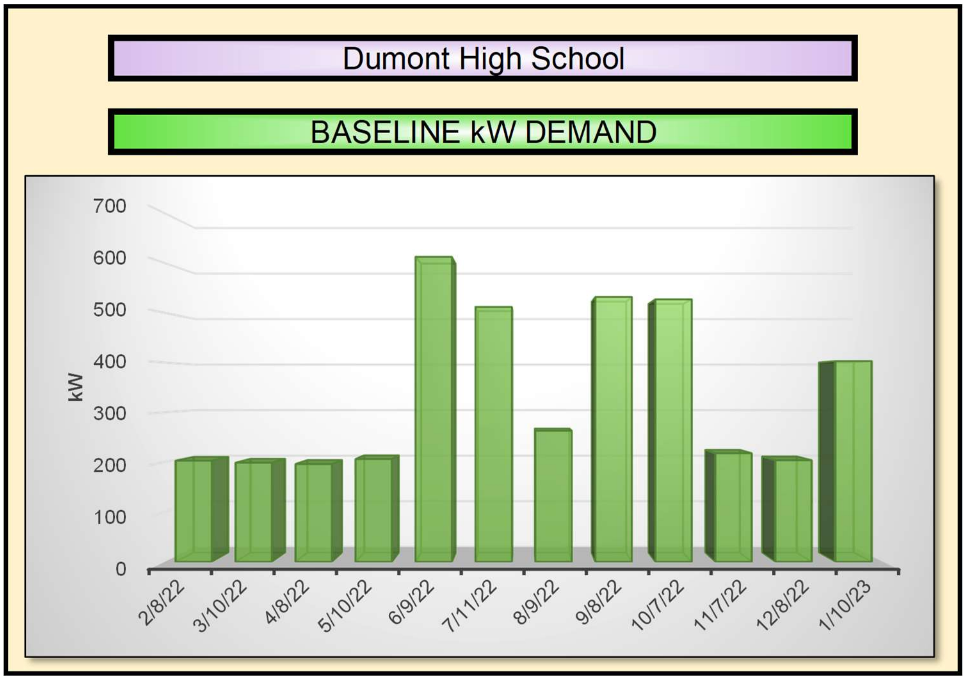


Administration Building							Natural Gas Meter #1		
Provider	PSE&G		Account #	747794502				Meter #	3597277
Commodity			Commodity					Area Served	Building
Billing Period Start Date	Actual Reading	Therms	Gas Delivery Charges	Gas Customer Charge	Gas Demand Charge	Gas Commodity Charges	Gas Total Charges	$/Therm Marginal Rate	BTU
1/7/22	2/7/22	949	$401	$19		$722	$1,142	$1.18	94,883,100
2/8/22	3/9/22	405	$170	$19		$321	$510	$1.21	40,469,500
3/10/22	4/7/22	452	$190	$19		$350	$558	$1.19	45,187,400
4/8/22	5/9/22	201	$84	$19		$172	$274	$1.27	20,129,900
5/10/22	6/8/22	15	$5	$19		$15	$38	$1.35	1,466,400
6/9/22	7/8/22	15	$5	$19		$15	$40	$1.39	1,463,600
7/9/22	8/8/22	15	$5	$19		$14	$38	$1.30	1,460,700
8/9/22	9/8/22	15	$5	$19		$16	$40	$1.44	1,462,100
9/9/22	10/6/22	72	$32	$19		$79	$130	$1.54	7,213,200
10/7/22	11/4/22	150	$70	$19		$137	$226	$1.38	14,963,600
11/5/22	12/7/22	513	$243	$19		$427	$690	$1.31	51,262,300
12/8/22	1/9/23	650	$312	$20		$605	$937	$1.41	65,023,600
TOTALS		3,450	$1,524	$228	$0	$2,872	$4,623	$1.27	344,985,400

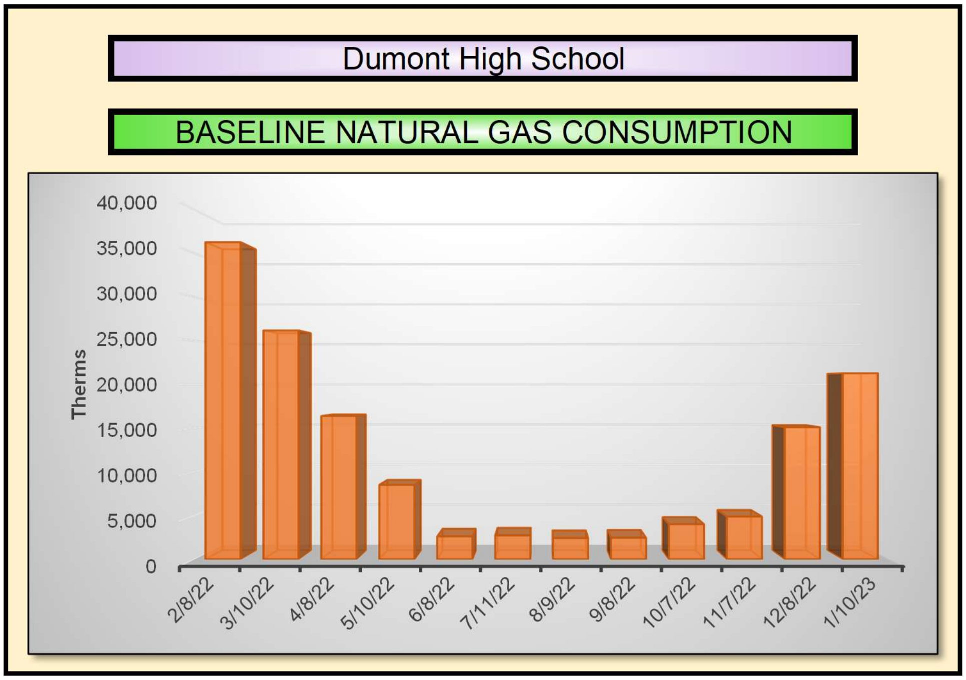
Administration Building							
Provider	SUEZ			Water & Sewer (Gal)			
Acct #	1.0002E+13						
Billing Period Start Date	Actual Reading	Water & Sewer (Gal)	Fixed Charges	Usage Charges	Total Charges	Cost / Unit Checksum	BTU
6/4/21	7/2/21	107,712	$81	$684	$765	$0.0063	0
7/3/21	8/2/21	133,144	$90	$845	$935	$0.0063	0
8/3/21	9/3/21	132,396	$93	$841	$933	$0.0063	0
9/4/21	10/1/21	115,940	$81	$736	$817	$0.0063	0
10/2/21	11/4/21	109,956	$98	$698	$797	$0.0063	0
11/5/21	12/3/21	3,740	$84	$24	$108	$0.0064	0
12/4/21	1/7/22	4,488	$101	$29	$130	$0.0064	0
1/8/22	2/2/22	4,488	$75	$29	$104	$0.0064	0
2/3/22	3/3/22	4,488	$84	$29	$112	$0.0064	0
3/4/22	4/1/22	8,228	$84	$52	$136	$0.0064	0
4/2/22	5/4/22	17,204	$95	$109	$205	$0.0063	0
5/5/22	6/6/22	59,092	$95	$375	$471	$0.0063	0
TOTALS		700,876	$1,062	$4,450	$5,512	$0.0063	0

Dumont High School Baseline Energy Use





Dumont High School							ELECTRIC METER #1					
Provider:	PSEG		Account #	4255450609				Meter #	9211608			
Commodity:			Rate	Large Power & Lighting Secondary (LPLS)				Area Served	HS Boiler Room			
Billing Period Start Date	Actual Reading	Usage kWh	Demand kW	Electric Delivery Charges	Electric Commodity Charges	Electric Demand Charges	Fixed Customer Charge	Total Electric Charges	Marginal Rate $/kWh	Days	Load Factor	BTU
1/7/22	2/8/22	81,041	203	$1,207	$7,174	$767	$371	$9,519	$0.103	33	50%	276,510,186
2/9/22	3/10/22	79,140	199	$1,177	$7,243	$753	$371	$9,544	$0.106	30	55%	270,025,680
3/11/22	4/8/22	71,996	196	$1,070	$6,276	$743	$371	$8,461	$0.102	29	53%	245,650,352
4/9/22	5/10/22	70,139	206	$1,045	$7,065	$781	$371	$9,261	$0.116	32	44%	239,314,268
5/11/22	6/9/22	87,624	612	$1,309	$7,586	$3,922	$371	$13,188	$0.102	30	20%	298,973,088
6/10/22	7/11/22	92,779	511	$1,433	$7,867	$3,438	$371	$13,109	$0.100	32	24%	316,561,948
7/12/22	8/9/22	102,733	263	$1,597	$8,021	$3,563	$371	$13,552	$0.094	29	56%	350,524,996
8/10/22	9/8/22	89,150	531	$1,386	$8,560	$3,600	$371	$13,916	$0.112	30	23%	304,179,800
9/9/22	10/7/22	79,965	527	$1,256	$6,955	$1,176	$371	$9,759	$0.103	29	22%	272,840,580
10/8/22	11/7/22	74,979	218	$1,225	$6,702	$974	$371	$9,272	$0.106	31	46%	255,828,348
11/8/22	12/8/22	72,623	204	$1,186	$6,948	$911	$371	$9,416	$0.112	31	48%	247,789,676
12/9/22	1/10/23	77,555	403	$1,267	$8,067	$900	$371	$10,604	$0.120	33	24%	264,617,660
TOTALS		979,724	612	$15,158	$88,464	$21,528	$4,450	$129,600	$0.106	369	18%	3,342,816,582



Dumont High School							Natural Gas Meter #1		
Provider	PSEG		Account #	4255450609				Meter #	Combined
Commodity			Commodity					Area Served	Whole Building
Billing Period Start Date	Actual Reading	Therms	Gas Delivery Charges	Gas Customer Charge	Gas Demand Charge	Gas Commodity Charges	Gas Total Charges	$/Therm Marginal Rate	BTU
1/7/22	2/8/22	36,268	$5,905	$164		$28,057	$34,126	$0.94	3,626,815,150
2/9/22	3/10/22	26,171	$4,204	$164		$20,733	$25,102	$0.95	2,617,102,400
3/11/22	4/8/22	16,388	$2,557	$164		$12,710	$15,432	$0.93	1,638,843,400
4/9/22	5/10/22	8,504	$1,204	$164		$7,306	$8,675	$1.00	850,387,800
5/11/22	6/8/22	2,614	$196	$166		$2,624	$2,986	$1.08	261,378,900
6/9/22	7/11/22	2,727	$219	$170		$2,806	$3,196	$1.11	272,721,600
7/12/22	8/9/22	2,417	$195	$170		$2,318	$2,683	$1.04	241,723,800
8/10/22	9/8/22	2,458	$199	$170		$2,683	$3,052	$1.17	245,790,500
9/9/22	10/7/22	4,006	$471	$170		$4,341	$4,983	$1.20	400,583,200
10/8/22	11/7/22	4,876	$623	$170		$4,403	$5,196	$1.03	487,621,000
11/8/22	12/8/22	15,101	$2,508	$172		$12,689	$15,369	$1.01	1,510,095,800
12/9/22	1/10/23	21,279	$3,656	$176		$19,720	$23,552	$1.10	2,127,862,800
TOTALS		142,809	$21,938	$2,022	$0	$120,391	$144,351	$1.00	14,280,926,350

Dumont High School								Natural Gas Meter #2		
Provider	PSEG		Account #	747794607				Meter #	4022324	
Commodity			Commodity	General Service Gas Heating (GSG) HTG				Area Served		
Billing Period Start Date	Actual Reading	Therms	Gas Delivery Charges	Gas Customer Charge	Gas Demand Charge	Gas Commodity Charges	Gas Total Charges	$/Therm Marginal Rate	BTU	
1/10/22	2/8/22	0		$19			$19	-	0	
2/9/22	3/10/22	0		$19			$19	-	0	
3/11/22	4/8/22	0		$19			$19	-	0	
4/9/22	5/10/22	0		$19			$19	-	0	
5/11/22	6/8/22	0		$19			$19	-	0	
6/9/22	7/8/22	0		$19			$19	-	0	
7/9/22	8/8/22	0		$19			$19	-	0	
8/9/22	9/7/22	1	$0	$19		$1	$21	$1.68	100,000	
9/8/22	10/6/22	3	$1	$19		$3	$24	$1.46	313,600	
10/7/22	11/4/22	5	$2	$19		$5	$27	$1.43	523,200	
11/5/22	12/7/22	0	$0	$19		$0	$19	-	0	
12/8/22	1/9/23	0	$0	$20		$0	$20	-	0	
TOTALS		9	$4	$228	$0	$9	$241	$1.47	936,800	

Dumont High School							
Provider	SUEZ			Water & Sewer (Gal)			
Acct #	10000645612222						
Billing Period Start Date	Actual Reading	Water & Sewer (Gal)	Fixed Charges	Usage Charges	Total Charges	Cost / Unit Checksum	BTU
6/4/21	7/1/21	2,244	$39	$14	$53	$0.0064	0
7/2/21	8/5/21	1,496	$51	$9	$60	$0.0064	0
8/6/21	9/3/21	3,740	$42	$24	$66	$0.0064	0
9/4/21	10/4/21	2,244	$45	$14	$59	$0.0064	0
10/5/21	11/5/21	3,740	$46	$24	$70	$0.0064	0
11/6/21	12/5/21	1,496	$43	$10	$53	$0.0064	0
12/6/21	1/7/22	1,496	$48	$9	$57	$0.0064	0
1/8/22	2/3/21	748	$39	$5	$44	$0.0064	0
2/4/21	3/7/22	1,496	$46	$10	$56	$0.0064	0
3/8/22	4/6/22	1,496	$43	$10	$53	$0.0064	0
4/7/22	5/5/22	1,496	$42	$10	$51	$0.0064	0
5/6/22	6/8/22	1,496	$49	$10	$59	$0.0064	0
TOTALS		23,188	$534	$147	$681	$0.0064	0

Dumont High School							
Provider	SUEZ			Water & Sewer (Gal)			
Acct #	10004720312222						
Billing Period Start Date	Actual Reading	Water & Sewer (Gal)	Fixed Charges	Usage Charges	Total Charges	Cost / Unit Checksum	BTU
6/4/21	7/2/21	748	$81	$5	$86	$0.0064	0
7/3/21	8/1/21	2,244	$84	$14	$98	$0.0063	0
8/2/21	9/1/21	748	$87	$5	$92	$0.0063	0
9/2/21	10/1/21	2,244	$84	$14	$98	$0.0063	0
10/2/21	11/4/21	2,992	$95	$19	$114	$0.0063	0
11/5/21	12/3/21	1,496	$84	$9	$93	$0.0064	0
12/4/21	1/4/22	2,244	$93	$14	$107	$0.0064	0
1/5/22	2/1/22	2,244	$81	$14	$95	$0.0064	0
2/2/22	3/2/22	2,992	$84	$19	$103	$0.0064	0
3/3/22	3/31/22	3,740	$84	$24	$108	$0.0064	0
4/1/22	5/1/22	5,236	$87	$33	$120	$0.0063	0
5/2/22	6/3/22	2,992	$93	$19	$112	$0.0064	0
TOTALS		29,920	$1,036	$190	$1,226	$0.0064	0

Dumont High School							
Provider	SUEZ		Water & Sewer (Gal)				
Acct #	10001451412222						
Billing Period Start Date	Actual Reading	Water & Sewer (Gal)	Fixed Charges	Usage Charges	Total Charges	Cost / Unit Checksum	BTU
6/7/21	7/6/21	273,768	$420	$1,738	$2,158	$0.0063	0
7/7/21	8/5/21	294,712	$434	$1,871	$2,305	$0.0063	0
8/6/21	9/8/21	318,648	$492	$2,023	$2,515	$0.0063	0
9/9/21	10/1/21	215,424	$333	$1,368	$1,701	$0.0063	0
10/2/21	11/9/21	322,388	$564	$2,047	$2,611	$0.0063	0
11/10/21	12/8/21	175,780	$420	$1,116	$1,536	$0.0063	0
12/9/21	1/12/22	152,592	$506	$969	$1,475	$0.0063	0
1/13/22	2/5/22	134,640	$347	$855	$1,202	$0.0063	0
2/6/22	3/8/22	157,828	$448	$1,002	$1,451	$0.0063	0
3/9/22	3/31/22	60,588	$333	$385	$717	$0.0063	0
4/1/22	5/6/22	258,060	$535	$1,639	$2,174	$0.0063	0
5/7/22	6/6/22	267,036	$434	$1,696	$2,130	$0.0063	0
TOTALS		2,631,464	$5,266	$16,709	$21,975	$0.0063	0

Dumont High School							
Provider	SUEZ		Water & Sewer (Gal)				
Acct #	10004720312222						
Billing Period Start Date	Actual Reading	Water & Sewer (Gal)	Fixed Charges	Usage Charges	Total Charges	Cost / Unit Checksum	BTU
6/4/21	7/2/21	748	$81	$5	$86	$0.0064	0
7/3/21	8/1/21	2,244	$84	$14	$98	$0.0063	0
8/2/21	9/1/21	748	$87	$5	$92	$0.0063	0
9/2/21	10/1/21	2,244	$84	$14	$98	$0.0063	0
10/2/21	11/4/21	2,992	$95	$19	$114	$0.0063	0
11/5/21	12/3/21	1,496	$84	$9	$93	$0.0064	0
12/4/21	1/4/22	2,244	$93	$14	$107	$0.0064	0
1/5/22	2/1/22	2,244	$81	$14	$95	$0.0064	0
2/2/22	3/2/22	2,992	$84	$19	$103	$0.0064	0
3/3/22	3/31/22	3,740	$84	$24	$108	$0.0064	0
4/1/22	5/1/22	5,236	$87	$33	$120	$0.0063	0
5/2/22	6/3/22	2,992	$93	$19	$112	$0.0064	0
TOTALS		29,920	$1,036	$190	$1,226	$0.0064	0

Dumont Board of Education
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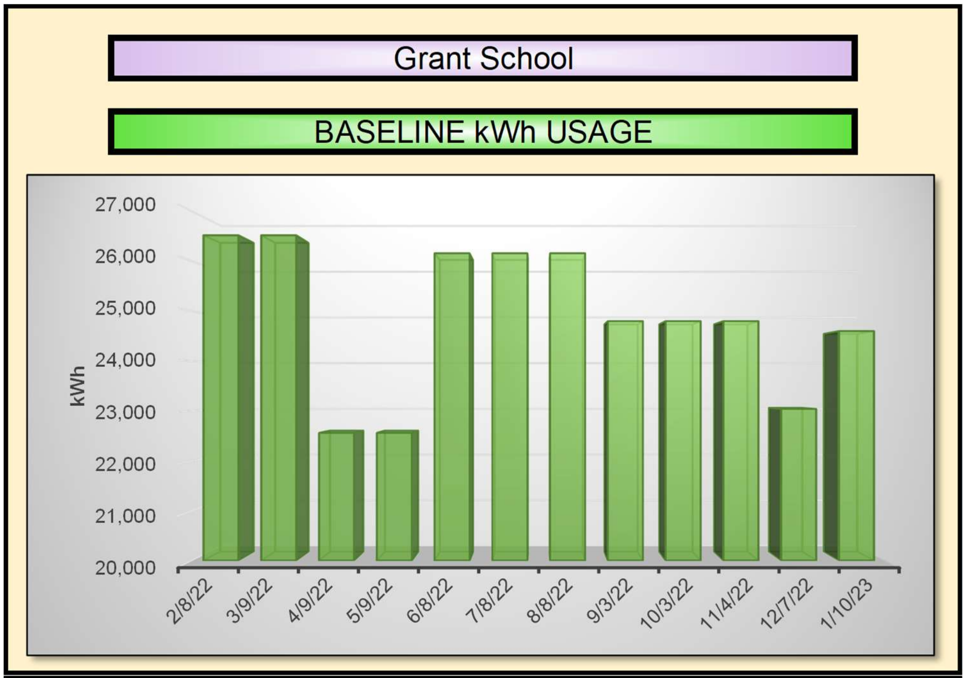
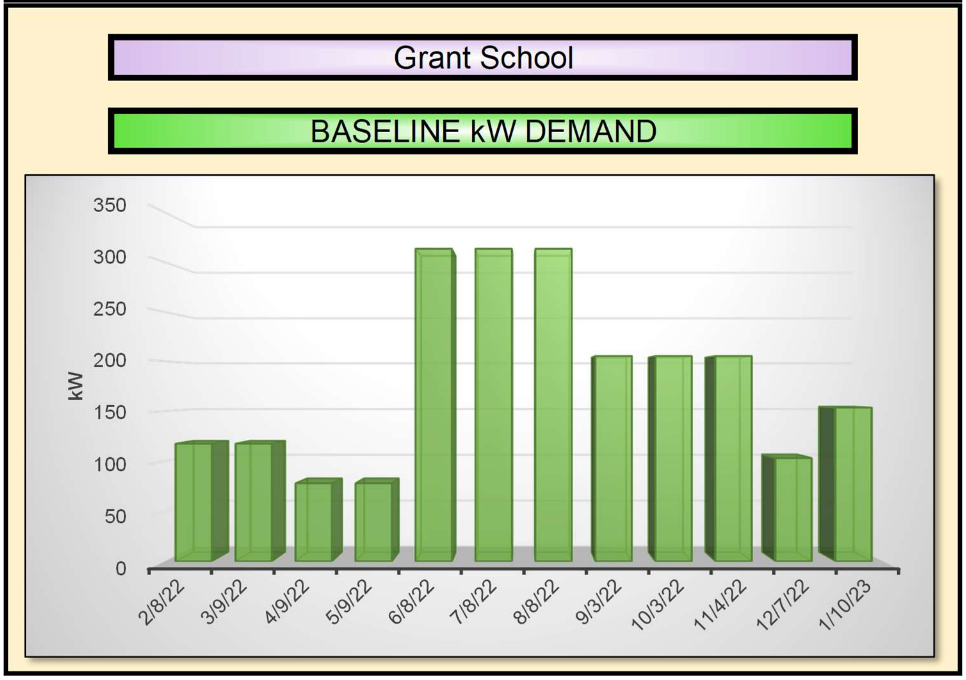
Dumont, NJ 07628

Dumont High School							
Provider	SUEZ		Water & Sewer (Gal)				
Acct #	10009605322222						
Billing Period Start Date	Actual Reading	Water & Sewer (Gal)	Fixed Charges	Usage Charges	Total Charges	Cost / Unit Checksum	BTU
6/4/21	7/2/21	0	$130	$0	$130	$0.00	0
7/3/21	8/2/21	0	$144	$0	$144	$0.00	0
8/3/21	9/3/21	0	$148	$0	$148	$0.00	0
9/4/21	10/1/21	0	$130	$0	$130	$0.00	0
10/2/21	11/4/21	0	$157	$0	$157	$0.00	0
11/5/21	12/3/21	0	$134	$0	$134	$0.00	0
12/4/21	1/7/22	0	$162	$0	$162	$0.00	0
1/8/22	2/2/22	0	$120	$0	$120	$0.00	0
2/3/22	3/3/22	0	$134	$0	$134	$0.00	0
3/4/22	4/1/22	0	$134	$0	$134	$0.00	0
4/2/22	5/4/22	0	$153	$0	$153	$0.00	0
5/5/22	6/6/22	0	$153	$0	$153	$0.00	0
TOTALS		0	$1,699	$0	$1,699	$0.00	0

Grant School Baseline Energy Use





Grant School							ELECTRIC METER #1						
Provider:	PSEG		Account #	4255450501				Meter #	778017443				
Commodity:			Rate	Large Power & Lighting Secondary (LPLS)				Area Served	Whole Building				
Billing Period Start Date	Actual Reading	Usage kWh	Demand kW	Electric Delivery Charges	Electric Commodity Charges	Electric Demand Charges	Fixed Customer Charge	Total Electric Charges	Marginal Rate $/kWh	Days	Load Factor	BTU	
1/7/22	2/8/22	26,520	118	$388	$2,842	$710	$371	$4,310	$0.122	33	28%	90,486,240	
2/9/22	3/9/22	26,520	118	$388	$2,842	$710	$371	$4,310	$0.122	29	32%	90,486,240	
3/10/22	4/9/22	22,560	78	$336	$3,240	$295	$371	$4,242	$0.159	31	39%	76,974,720	
4/10/22	5/9/22	22,560	78	$336	$3,240	$295	$371	$4,242	$0.159	30	40%	76,974,720	
5/10/22	6/8/22	26,160	313	$400	$3,392	$1,385	$371	$5,548	$0.145	30	12%	89,257,920	
6/9/22	7/8/22	26,160	313	$400	$3,392	$1,385	$371	$5,548	$0.145	30	12%	89,257,920	
7/9/22	8/8/22	26,160	313	$400	$3,392	$1,385	$371	$5,548	$0.145	31	11%	89,257,920	
8/9/22	9/3/22	24,800	205	$393	$3,408	$322	$371	$4,493	$0.153	26	19%	84,617,600	
9/4/22	10/3/22	24,800	205	$393	$3,408	$322	$371	$4,493	$0.153	30	17%	84,617,600	
10/4/22	11/4/22	24,800	205	$393	$3,408	$322	$371	$4,493	$0.153	32	16%	84,617,600	
11/5/22	12/7/22	23,040	103	$376	$3,285	$461	$371	$4,494	$0.159	33	28%	78,612,480	
12/8/22	1/10/23	24,600	154	$402	$3,495	$343	$371	$4,611	$0.158	34	20%	83,935,200	
TOTALS		298,680	313	$4,606	$39,345	$7,934	$4,450	$56,335	$0.147	369	11%	1,019,096,160	

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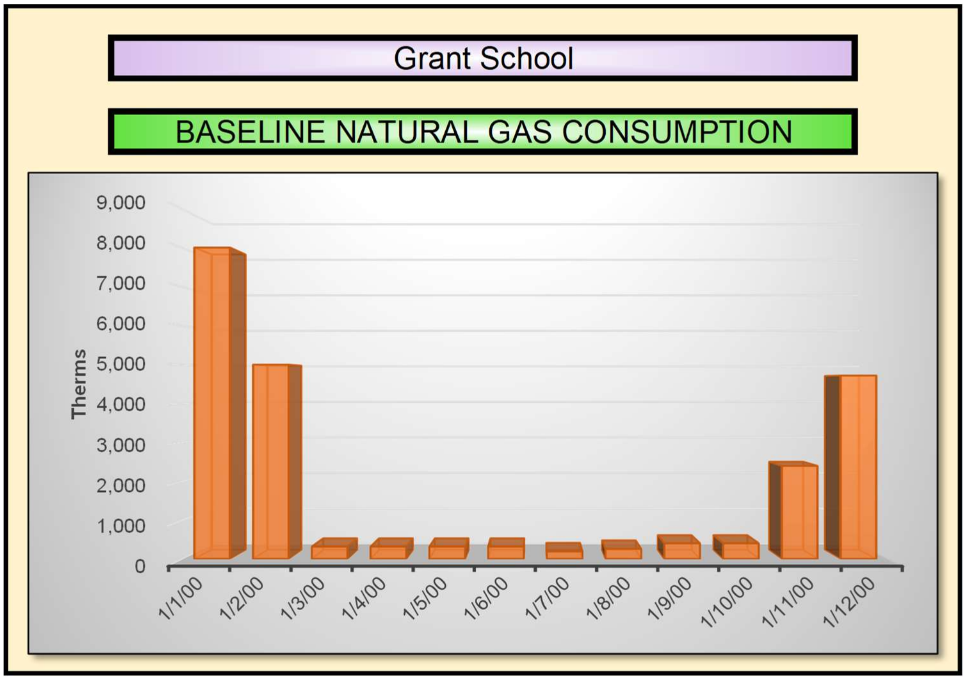
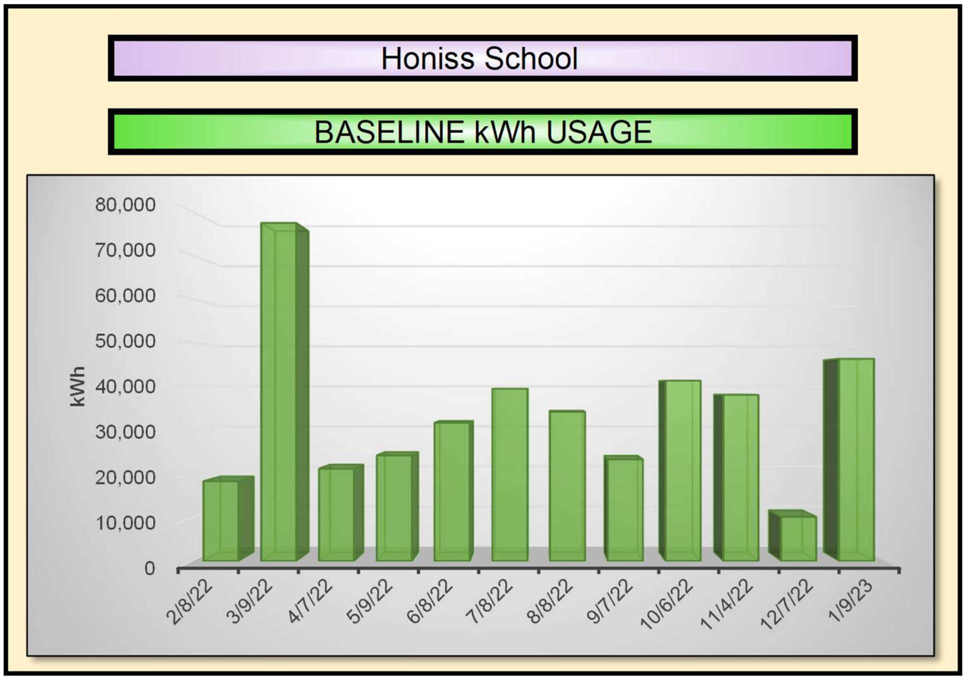


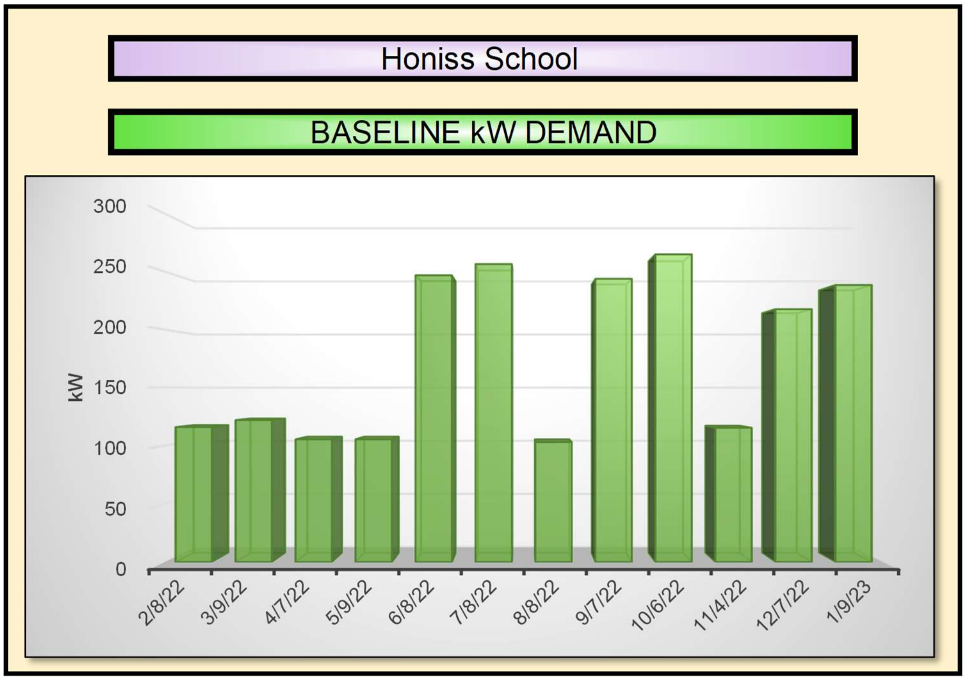
Grant School							Natural Gas Meter #1		
Provider	PSE&G		Account #	4255450501				Meter #	3275514
Commodity			Commodity	Large Volume Gas (LVG)				Area Served	Whole Building
Billing Period Start Date	Actual Reading	Therms	Gas Delivery Charges	Gas Customer Charge	Gas Demand Charge	Gas Commodity Charges	Gas Total Charges	$/Therm Marginal Rate	BTU
1/7/22	2/7/22	8,016.31	$1,386	$164		$6,101	$7,651	$0.93	801,631,100
2/8/22	3/9/22	5,002.69	$878	$164		$3,970	$5,013	$0.97	500,269,000
3/10/22	4/8/22	317.71	$24	$166		$277	$468	$0.95	31,770,825
4/9/22	5/8/22	317.71	$24	$166		$277	$468	$0.95	31,770,825
5/9/22	6/8/22	318	$24	$166		$277	$468	$0.95	31,770,825
6/9/22	7/8/22	318	$24	$166		$277	$468	$0.95	31,770,825
7/9/22	8/8/22	193	$14	$170		$183	$368	$1.02	19,302,400
8/9/22	9/9/22	260	$19	$170		$284	$473	$1.17	26,005,200
9/10/22	10/7/22	403	$93	$170		$681	$944	$1.92	40,272,300
10/8/22	11/4/22	403	$93	$170		$681	$944	$1.92	40,272,300
11/5/22	12/7/22	2,395	$747	$172		$1,995	$2,914	$1.14	239,504,000
12/8/22	1/10/23	4,722	$1,204	$176		$4,381	$5,761	$1.18	472,205,400
TOTALS		22,665	$4,534	$2,022	$0	$19,384	$25,939	$1.06	2,266,545,000

Grant School							
Provider	Suez		Water & Sewer (Gal)				
Acct #	10000965422222						
Billing Period Start Date	Actual Reading	Water & Sewer (Gal)	Fixed Charges	Usage Charges	Total Charges	Cost / Unit Checksum	BTU
6/3/21	7/1/21	0	$122	$0	$122	$0.00	0
7/2/21	8/1/21	0	$122	$0	$122	$0.00	0
8/2/21	9/1/21	0	$126	$0	$126	$0.00	0
9/2/21	10/1/21	0	$126	$0	$126	$0.00	0
10/2/21	11/1/21	0	$126	$0	$126	$0.00	0
11/2/21	12/2/21	0	$126	$0	$126	$0.00	0
12/3/21	1/5/22	0	$117	$0	$117	$0.00	0
1/6/22	2/2/22	0	$117	$0	$117	$0.00	0
2/3/22	3/3/22	0	$126	$0	$126	$0.00	0
3/4/22	4/1/22	0	$126	$0	$126	$0.00	0
4/2/22	5/4/22	0	$139	$0	$139	$0.00	0
5/5/22	6/6/22	0	$148	$0	$148	$0.00	0
TOTALS		0	$1,520	$0	$1,520	$0.00	0

Grant School							
Provider	Suez		Water & Sewer (Gal)				
Acct #	10004351412222						
Billing Period Start Date	Actual Reading	Water & Sewer (Gal)	Fixed Charges	Usage Charges	Total Charges	Cost / Unit Checksum	BTU
6/6/21	7/1/21	57,596	$362	$366	$727	$0.0063	0
7/2/21	8/2/21	62,084	$463	$394	$857	$0.0063	0
8/3/21	9/2/21	41,140	$448	$261	$710	$0.0063	0
9/3/21	10/1/21	87,516	$420	$556	$975	$0.0063	0
10/2/21	11/4/21	71,808	$492	$456	$948	$0.0063	0
11/5/21	12/3/21	47,124	$420	$299	$719	$0.0063	0
12/4/21	1/6/22	48,620	$492	$309	$801	$0.0063	0
1/7/22	2/2/22	40,392	$391	$256	$647	$0.0063	0
2/3/22	3/3/22	50,864	$420	$323	$742	$0.0063	0
3/4/22	4/1/22	56,100	$420	$356	$776	$0.0063	0
4/2/22	5/4/22	49,368	$477	$313	$791	$0.0063	0
5/5/22	6/5/22	62,832	$463	$399	$862	$0.0063	0
TOTALS		675,444	$5,266	$4,289	$9,555	$0.0063	0

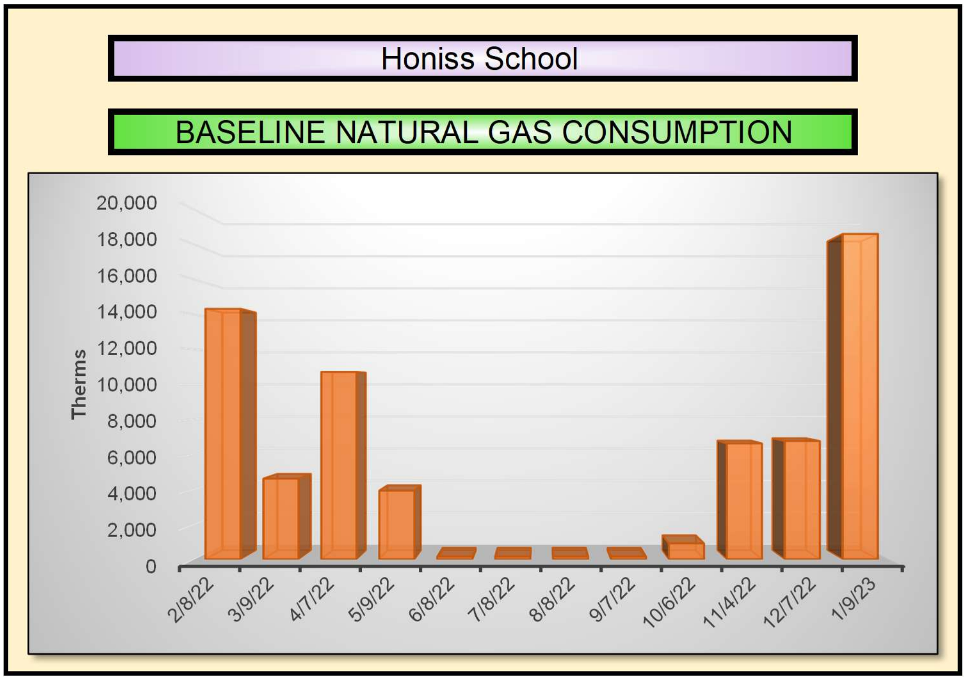
Honiss School Baseline Energy Use





Honiss School							ELECTRIC METER #1					
Provider:	PSE&G		Account #	7477945607				Meter #	278006126			
Commodity:			Rate	General Lighting & Power				Area Served	Gym			
Billing Period Start Date	Actual Reading	Usage kWh	Demand kW	Electric Delivery Charges	Electric Commodity Charges	Electric Demand Charges	Fixed Customer Charges	Total Electric Charges	Marginal Rate $/kWh	Days	Load Factor	BTU
1/7/22	2/8/22	890	23.1	$20	$426	$48	$5	$499	$0.501	33	5%	3,036,680
2/9/22	3/9/22	890	23.1	$20	$426	$48	$5	$499	$0.501	29	6%	3,036,680
3/10/22	4/7/22	750	6.6	$17	$415	$26	$5	$463	$0.576	29	16%	2,559,000
4/8/22	5/9/22	780	6.6	$17	$456	$26	$5	$504	$0.606	32	15%	2,661,360
5/10/22	6/8/22	2,280	36.6	$39	$478	$254	$5	$777	$0.227	30	9%	7,779,360
6/9/22	7/8/22	9,450	46.2	$169	$756	$335	$5	$1,265	$0.098	30	28%	32,243,400
7/9/22	8/8/22	7,140	25.2	$129	$658	$369	$5	$1,160	$0.110	31	38%	24,361,680
8/9/22	9/7/22	780	45.6	$14	$356	$334	$5	$709	$0.474	30	2%	2,661,360
9/8/22	10/6/22	5,310	48.6	$123	$548	$113	$5	$789	$0.126	29	16%	18,117,720
10/7/22	11/4/22	5,340	13.5	$127	$549	$63	$5	$745	$0.127	29	57%	18,220,080
11/5/22	12/7/22	3,840	7.5	$92	$497	$35	$5	$628	$0.153	33	65%	13,102,080
12/8/22	1/9/23	2,820	46.2	$67	$490	$108	$5	$670	$0.197	33	8%	9,621,840
TOTALS		40,270	49	$835	$6,055	$1,759	$59	$8,707	$0.171	368	9%	137,401,240

Honiss School							ELECTRIC METER #2					
Provider:	PSE&G		Account #	7477945801				Meter #	728012933			
Commodity:								Area Served	Main Building			
Billing Period Start Date	Actual Reading	Usage kWh	Demand kW	Electric Delivery Charges	Electric Commodity Charges	Electric Demand Charges	Fixed Customer Charges	Total Electric Charges	Marginal Rate $/kWh	Days	Load Factor	BTU
1/7/22	2/7/22	17,400	93	$387	$2,385	$368	$5	$3,145	$0.159	32	24%	59,368,800
2/8/22	3/9/22	76,500	99	$1,701	$5,125	$392	$5	$7,223	$0.089	30	107%	261,018,000
3/10/22	4/7/22	20,400	99	$454	$2,428	$392	$5	$3,278	$0.141	29	30%	69,604,800
4/8/22	5/9/22	23,400	99	$521	$2,718	$392	$5	$3,636	$0.138	32	31%	79,840,800
5/10/22	6/8/22	29,400	210	$508	$2,843	$1,459	$5	$4,816	$0.114	30	19%	100,312,800
6/9/22	7/8/22	30,000	210	$536	$2,705	$1,523	$5	$4,769	$0.108	30	20%	102,360,000
7/9/22	8/8/22	27,000	78	$487	$2,610	$1,142	$5	$4,243	$0.115	31	47%	92,124,000
8/9/22	9/7/22	22,500	198	$406	$2,629	$1,449	$5	$4,489	$0.135	30	16%	76,770,000
9/8/22	10/6/22	36,000	216	$837	$2,902	$503	$5	$4,247	$0.104	29	24%	122,832,000
10/7/22	11/4/22	32,700	102	$781	$2,757	$475	$5	$4,018	$0.108	29	46%	111,572,400
11/5/22	12/7/22	6,300	210	$150	$2,863	$979	$10	$4,001	$0.478	33	4%	21,495,600
12/8/22	1/9/23	43,500	192	$1,038	$3,990	$447	$5	$5,481	$0.116	33	29%	148,422,000
TOTALS		365,100	216	$7,807	$35,954	$9,521	$64	$53,346	$0.120	368	19%	1,245,721,200

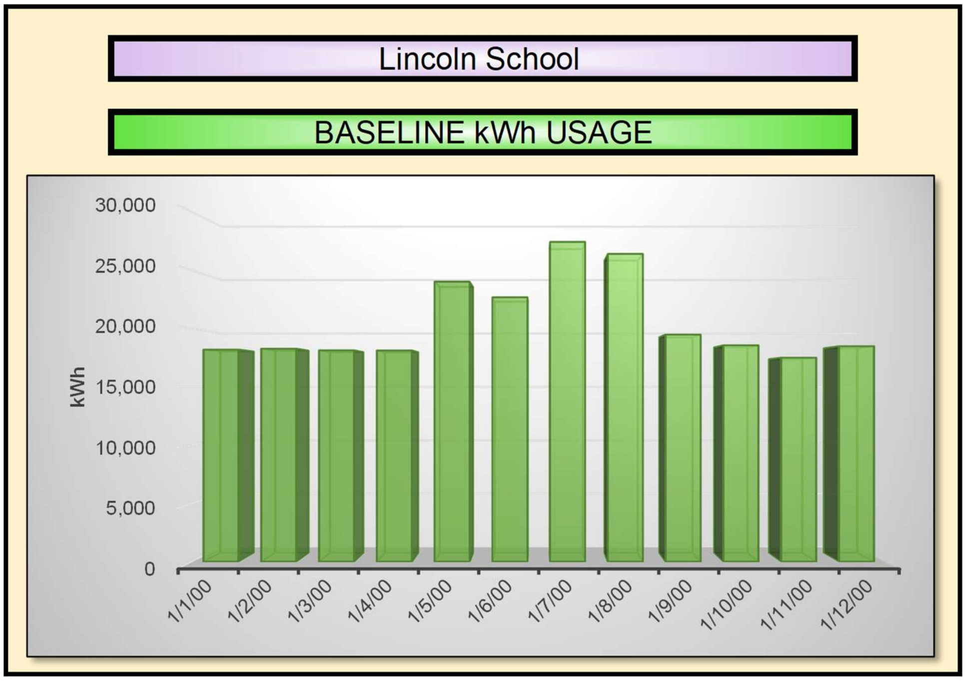


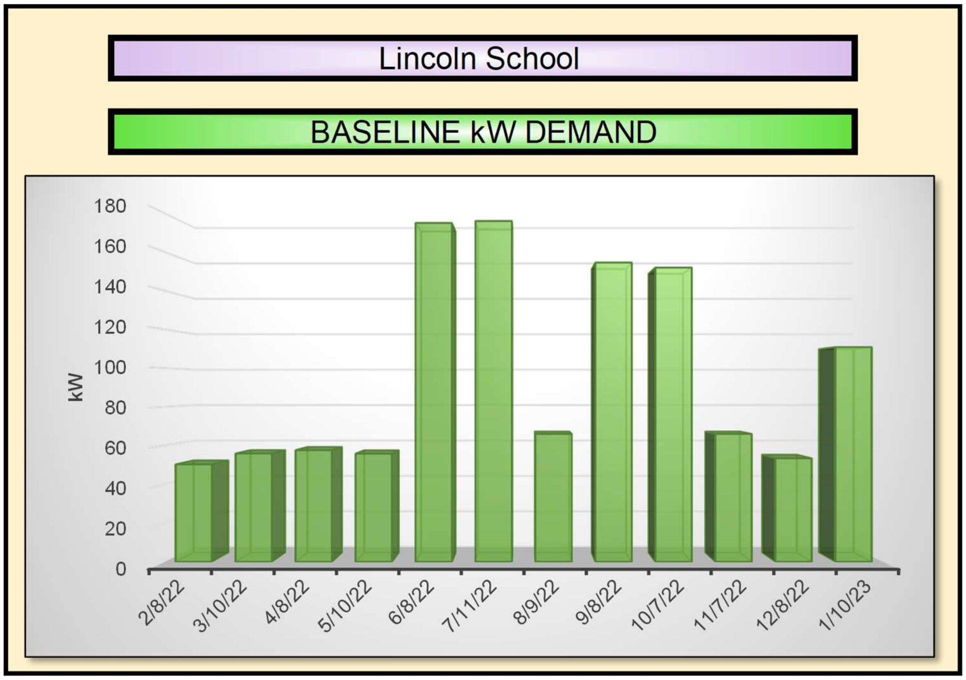
Honiss School							Natural Gas Meter #1		
Provider	PSE&G		Account #	7477945607				Meter #	2859992
Commodity	Direct Energy		Account #	General Service Gas Heating (GSG) HTG				Area Served	Gym
Billing Period Start Date	Actual Reading	Therms	Gas Delivery Charges	Gas Customer Charge	Gas Demand Charge	Gas Commodity Charges	Gas Total Charges	$/Therm Marginal Rate	BTU
1/7/22	2/8/22	390.34	$164	$19		$295	$478	$1.18	39,033,667
2/9/22	3/9/22	390.34	$164	$19		$295	$478	$1.18	39,033,667
3/10/22	4/7/22	304.05	$128	$19		$235	$382	$1.19	30,404,500
4/8/22	5/9/22	127.91	$53	$19		$109	$181	$1.27	12,790,900
5/10/22	6/8/22	0	$0	$19		$0	$19	-	0
6/9/22	7/8/22	0	$0	$19		$0	$19	-	0
7/9/22	8/8/22	0	$0	$19		$0	$19	-	0
8/9/22	9/7/22	0	$0	$19		$0	$19	-	0
9/8/22	10/6/22	53	$25	$19		$58	$102	$1.56	5,331,500
10/7/22	11/4/22	162	$77	$19		$148	$245	$1.39	16,219,300
11/5/22	12/7/22	301	$144	$19		$251	$415	$1.31	30,148,100
12/8/22	1/9/23	363	$175	$20		$337	$532	$1.41	36,275,200
TOTALS		2,092	$931	$228	$0	$1,730	$2,888	$1.27	209,236,833

Honiss School							Natural Gas Meter #2		
Provider	PSE&G		Account #	7477945801				Meter #	2523727
Commodity	Direct Energy		Rate	Large Volume Gas				Area Served	Main Building
Billing Period Start Date	Actual Reading	Therms	Gas Delivery Charges	Gas Customer Charge	Gas Demand Charge	Gas Commodity Charges	Gas Total Charges	$/Therm Marginal Rate	BTU
1/7/22	2/7/22	13,934	$4,350	$164		$10,605	$15,119	$1.07	1,393,420,500
2/8/22	3/9/22	4,222	$2,139	$164		$3,351	$5,655	$1.30	422,235,700
3/10/22	4/7/22	10,411	$1,741	$164		$8,057	$9,962	$0.94	1,041,129,000
4/8/22	5/9/22	3,796	$622	$164		$3,243	$4,029	$1.02	379,605,100
5/10/22	6/8/22	154	$11	$166		$154	$331	$1.07	15,409,200
6/9/22	7/8/22	155	$11	$170		$162	$343	$1.12	15,486,300
7/9/22	8/8/22	159	$12	$170		$151	$333	$1.02	15,882,700
8/9/22	9/7/22	154	$12	$170		$168	$349	$1.17	15,364,600
9/8/22	10/6/22	854	$137	$170		$932	$1,239	$1.25	85,441,500
10/7/22	11/7/22	6,458	$2,581	$171		$5,459	$8,211	$1.24	645,842,900
11/8/22	12/7/22	6,458	$2,581	$171		$5,459	$8,211	$1.24	645,842,900
12/8/22	1/9/23	18,242	$4,735	$176		$16,965	$21,876	$1.19	1,824,175,900
TOTALS		64,998	$18,931	$2,022	$0	$54,705	$75,658	$1.13	6,499,836,300

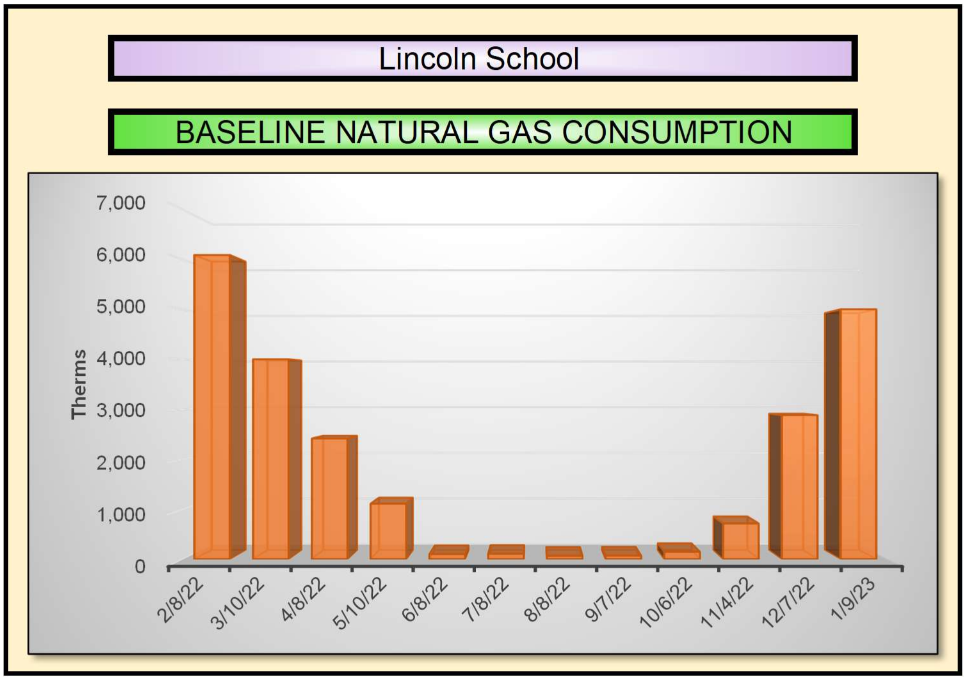
Honiss School							
Provider	SUEZ		Water & Sewer (Gal)				
Acct #	10001002412222						
Billing Period Start Date	Actual Reading	Water & Sewer (Gal)	Fixed Charges	Usage Charges	Total Charges	Cost / Unit Checksum	BTU
6/3/21	7/1/21	163,812	$405	$1,040	$1,445	$0.0063	0
7/2/21	8/1/21	173,536	$448	$1,102	$1,550	$0.0063	0
8/2/21	9/2/21	178,772	$463	$1,135	$1,598	$0.0063	0
9/3/21	9/30/21	124,168	$405	$788	$1,193	$0.0063	0
10/1/21	11/4/21	124,916	$506	$793	$1,300	$0.0063	0
11/5/21	12/3/21	15,708	$420	$100	$519	$0.0063	0
12/4/21	1/4/21	13,464	$463	$85	$548	$0.0063	0
1/5/21	2/1/22	119,680	$405	$760	$1,165	$0.0063	0
2/2/22	3/2/22	32,164	$420	$204	$624	$0.0063	0
3/3/22	3/31/22	224,400	$420	$1,425	$1,844	$0.0063	0
4/1/22	5/2/22	83,776	$147	$532	$679	$0.0063	0
5/3/22	6/6/22	123,420	$506	$784	$1,290	$0.0063	0
TOTALS		1,377,816	$5,008	$8,749	$13,757	$0.0063	0

Lincoln School Baseline Energy Use





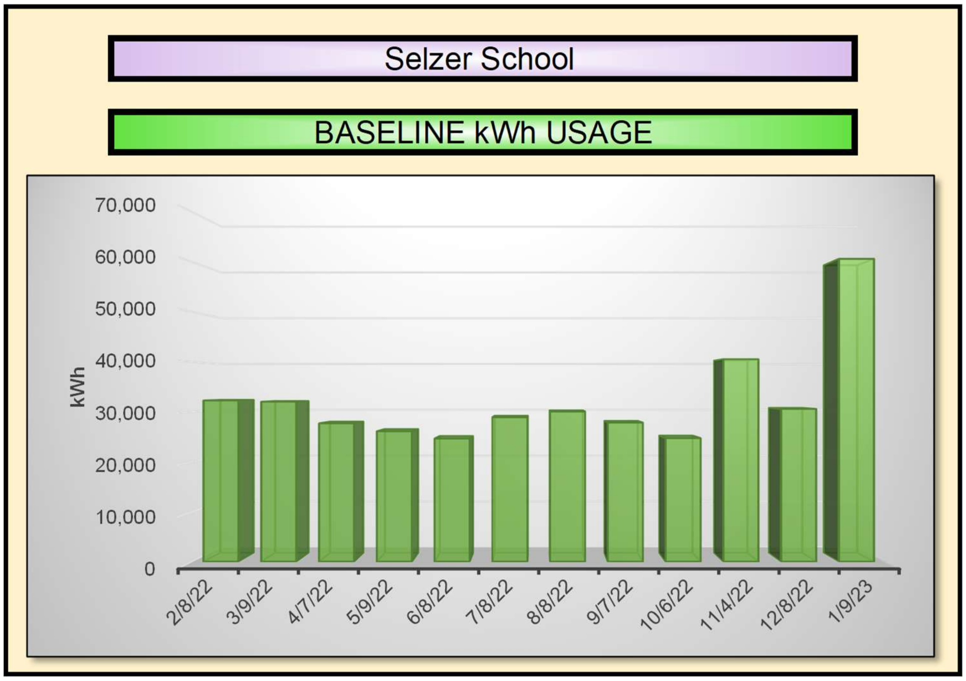
Lincoln School						ELECTRIC METER #1						
Provider:	PSEG		Account #	4255450404				Meter #	9204263			
Commodity:	PSE&G		Rate	Large Power & Lighting Secondary (LPLS)				Area Served	Whole Building			
Billing Period Start Date	Actual Reading	Usage kWh	Demand kW	Electric Delivery Charges	Electric Commodity Charges	Electric Demand Charges	Fixed Customer Charges	Total Electric Charges	Marginal Rate $/kWh	Days	Load Factor	BTU
1/11/22	2/8/22	18,198	50	$271	$1,778	$190	$371	$2,610	$0.113	29	52%	62,091,576
2/9/22	3/10/22	18,276	56	$287	$1,705	$212	$371	$2,574	$0.109	30	45%	62,357,712
3/11/22	4/8/22	18,138	58	$270	$1,776	$218	$371	$2,635	$0.113	29	45%	61,886,856
4/9/22	5/10/22	18,125	56	$270	$1,869	$211	$371	$2,721	$0.118	32	42%	61,842,500
5/11/22	6/8/22	24,021	175	$359	$2,056	$1,121	$371	$3,906	$0.101	29	20%	81,959,652
6/9/22	7/11/22	22,686	176	$350	$1,977	$1,182	$371	$3,879	$0.103	33	16%	77,404,632
7/12/22	8/9/22	27,434	66	$426	$2,119	$894	$371	$3,811	$0.093	29	60%	93,604,808
8/10/22	9/8/22	26,407	154	$411	$2,411	$1,046	$371	$4,238	$0.107	30	24%	90,100,684
9/9/22	10/7/22	19,484	152	$306	$1,751	$339	$371	$2,767	$0.106	29	18%	66,479,408
10/8/22	11/7/22	18,564	66	$303	$1,701	$295	$371	$2,670	$0.108	31	38%	63,340,368
11/8/22	12/8/22	17,505	53	$286	$1,736	$239	$371	$2,632	$0.116	31	44%	59,727,060
12/9/22	1/10/23	18,488	111	$302	$2,016	$248	$371	$2,936	$0.125	33	21%	63,081,056
TOTALS		247,326	176	$3,840	$22,895	$6,194	$4,450	$37,379	$0.108	365	16%	843,876,312

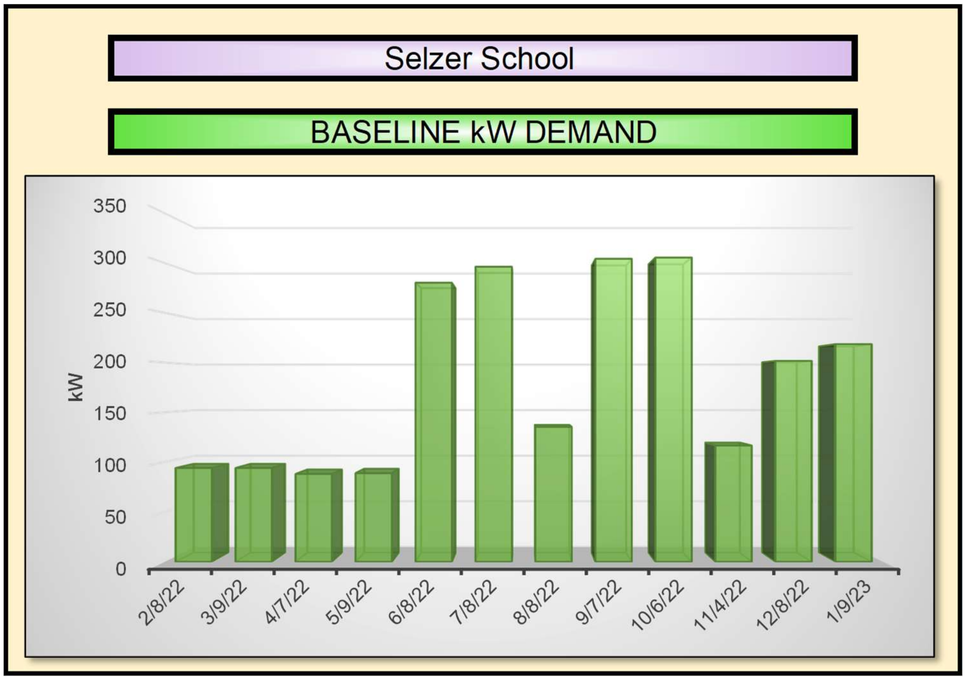


Lincoln School							Natural Gas Meter #1		
Provider	PSE&G		Account #	4255450404				Meter #	442634
Commodity	Direct Energy		Account #	Large Volume Gas (LVG)				Area Served	Whole Building
Billing Period Start Date	**Actual Reading**	**Therms**	**Gas Delivery Charges**	**Gas Customer Charge**	**Gas Delivery Constant**	**Gas Commodity Charges**	**Gas Total Charges**	**$/Therm Marginal Rate**	**BTU**
1/10/22	2/8/22	6,090	$1,907	$164		$4,653	$6,725	$1.08	609,034,100
2/9/22	3/10/22	4,004	$1,586	$164		$3,326	$5,075	$1.23	400,400,000
3/11/22	4/8/22	2,417	$355	$164		$1,874	$2,393	$0.92	241,663,600
4/9/22	5/10/22	1,110	$129	$164		$954	$1,247	$0.98	111,028,900
5/11/22	6/8/22	102	7	166		102	$275	$1.07	10,160,000
6/9/22	7/8/22	107	8	170		111	$289	$1.12	10,663,000
7/9/22	8/8/22	67	$5	$170		$63	$239	$1.02	6,677,600
8/9/22	9/7/22	71	$5	$170		$77	$253	$1.16	7,101,800
9/8/22	10/6/22	146	$16	$170		$160	$346	$1.20	14,635,500
10/7/22	11/4/22	714	$1,066	$170		$653	$1,890	$2.41	71,365,000
11/5/22	12/7/22	2,884	$1,465	$172		$2,402	$4,038	$1.34	288,350,200
12/8/22	1/9/23	5,004	$1,873	$176		$4,654	$6,703	$1.30	500,431,100
TOTALS		**22,715**	**$8,423**	**$2,022**	**$0**	**$19,029**	**$29,474**	**$1.21**	**2,271,510,800**

Lincoln School							
Provider	SUEZ		Water & Sewer (Gal)				
Acct #	10004177522222						
Billing Period Start Date	Actual Reading	Water & Sewer (Gal)	Fixed Charges	Usage Charges	Total Charges	Cost / Unit Checksum	BTU
6/4/21	7/2/21	22,440	$360	$142	$503	$0.0063	0
7/3/21	8/2/21	29,920	$391	$190	$581	$0.0063	0
8/3/21	9/3/21	11,968	$417	$76	$493	$0.0064	0
9/4/21	10/1/21	27,676	$365	$176	$540	$0.0063	0
10/2/21	11/4/21	26,180	$443	$166	$609	$0.0063	0
11/5/21	12/3/21	13,464	$378	$85	$463	$0.0063	0
12/4/21	1/6/22	19,448	$447	$123	$571	$0.0063	0
1/7/22	2/2/22	16,456	$343	$104	$447	$0.0063	0
2/3/22	3/3/22	20,196	$386	$128	$515	$0.0063	0
3/4/22	4/1/22	23,188	$373	$147	$521	$0.0063	0
4/2/22	5/4/22	16,456	$434	$104	$539	$0.0063	0
5/5/22	6/5/22	22,440	$412	$142	$555	$0.0063	0
TOTALS		249,832	$4,749	$1,586	$6,336	$0.0063	0

Selzer School Baseline Energy Use





DUMONT PUBLIC SCHOOLS

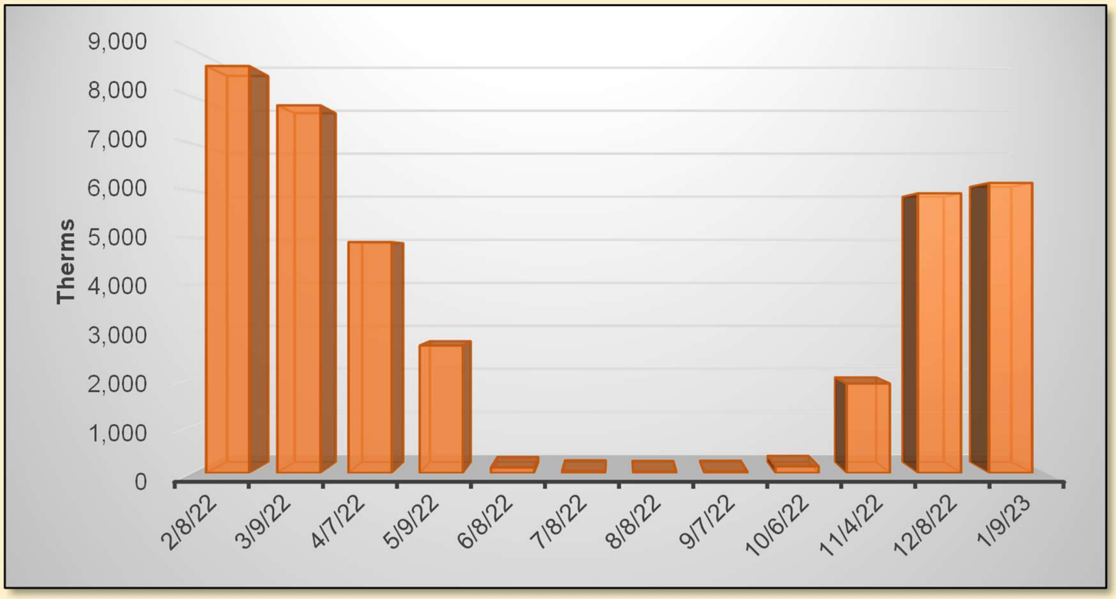
Dumont Board of Education
25 Depew Street
Dumont, NJ 07628

Selzer School								ELECTRIC METER #1				
Provider:	PSE&G		Account #	7477945909				Meter #	728012613			
Commodity:	PSE&G		Account #	General Lighting & Power (GLP)				Meter #	Main Building			
Billing Period Start Date	Actual Reading	Usage kWh	Demand kW	Electric Delivery Charges	Electric Commodity Charges	Electric Demand Charges	Fixed Customer Charges	Total Electric Charges	Marginal Rate $/kWh	Days	Load Factor	BTU
1/7/22	2/8/22	27,400	75.0	$609.8	$2,826	$297	$5	$3,737	$0.125	33	46%	93,488,800
2/9/22	3/9/22	27,400	75.0	$609.8	$2,826	$297	$5	$3,737	$0.125	29	52%	93,488,800
3/10/22	4/7/22	23,700	69.0	$527.0	$2,320	$273	$5	$3,125	$0.120	29	49%	80,864,400
4/8/22	5/9/22	22,200	69.0	$494.1	$2,676	$273	$5	$3,448	$0.143	32	42%	75,746,400
5/10/22	6/8/22	23,700	192.0	$409.8	$2,591	$1,334	$5	$4,341	$0.127	30	17%	80,864,400
6/9/22	7/8/22	24,600	216.0	$440.0	$2,480	$1,567	$5	$4,492	$0.119	30	16%	83,935,200
7/9/22	8/8/22	25,500	93.0	$459.8	$2,571	$1,362	$5	$4,397	$0.119	31	37%	87,006,000
8/9/22	9/7/22	20,400	216.0	$367.8	$2,537	$1,581	$5	$4,491	$0.142	30	13%	69,604,800
9/8/22	10/6/22	22,500	222.0	$523.1	$2,329	$517	$5	$3,374	$0.127	29	15%	76,770,000
10/7/22	11/4/22	20,700	78.0	$494.2	$2,250	$363	$5	$3,112	$0.133	29	38%	70,628,400
11/5/22	12/8/22	27,150	183.2	$648.2	$2,854	$370	$5	$3,878	$0.129	34	18%	92,635,800
12/9/22	1/9/23	54,300	183.2	$648.2	$2,854	$370	$5	$3,878	$0.064	32	39%	185,271,600
TOTALS		319,550	222	$6,232	$31,114	$8,605	$59	$46,009	$0.117	368	16%	1,090,304,600

Selzer School								ELECTRIC METER #2				
Provider:	PSE&G		Account #	7477945518				Meter #	728008221			
Commodity:	PSE&G		Account #	General Lighting & Power				Area Served	Addition			
Billing Period Start Date	Actual Reading	Usage kWh	Demand kW	Electric Delivery Charges	Electric Commodity Charges	Electric Demand Charges	Fixed Customer Charges	Total Electric Charges	Marginal Rate $/kWh	Days	Load Factor	BTU
1/7/22	2/7/22	4,880	19	$109	$910	$76	$5	$1,099	$0.209	32	33%	16,650,560
2/8/22	3/9/22	4,640	19	$103	$749	$76	$5	$933	$0.184	30	34%	15,831,680
3/10/22	4/7/22	4,000	19	$89	$825	$76	$5	$994	$0.228	29	30%	13,648,000
4/8/22	5/9/22	3,920	20	$87	$886	$79	$5	$1,057	$0.248	32	26%	13,375,040
5/10/22	6/8/22	960	88	$17	$676	$612	$5	$1,309	$0.721	30	2%	3,275,520
6/9/22	7/8/22	4,320	80	$77	$760	$580	$5	$1,423	$0.194	30	8%	14,739,840
7/9/22	8/8/22	4,560	42	$82	$792	$621	$5	$1,500	$0.192	31	14%	15,558,720
8/9/22	9/7/22	7,440	88	$134	$1,001	$644	$5	$1,785	$0.153	30	12%	25,385,280
9/8/22	10/6/22	2,240	83	$52	$659	$194	$5	$910	$0.317	29	4%	7,642,880
10/7/22	11/4/22	19,840	39	$474	$1,448	$227	$5	$2,154	$0.097	29	74%	67,694,080
11/5/22	12/7/22	3,440	18	$82	$712	$86	$5	$885	$0.231	33	24%	11,737,280
12/8/22	1/9/23	6,320	35	$151	$950	$82	$5	$1,188	$0.174	33	23%	21,563,840
TOTALS		66,560	88	$1,457	$10,368	$3,353	$59	$15,237	$0.178	368	9%	227,102,720

Selzer School

BASELINE NATURAL GAS CONSUMPTION



Selzer School							Natural Gas Meter #1		
Provider	PSE&G		Account #	7477945909				Meter #	2415294
Commodity	Direct Energy		Commodity	Large Volume Gas (LVG)				Area Served	Main Building
Billing Period Start Date	Actual Reading	Therms	Gas Delivery Charges	Gas Customer Charge	Gas Demand Charge	Gas Commodity Charges	Gas Total Charges	$/Therm Marginal Rate	BTU
1/7/22	2/8/22	7,332	2,133	164		5,814	$8,111	$1.08	733,186,600
2/9/22	3/9/22	7,332	$2,133	$164		$5,814	$8,111	$1.08	733,186,600
3/10/22	4/7/22	4,055	$667	$164		$3,138	$3,970	$0.94	405,526,200
4/8/22	5/9/22	2,175	$348	$164		$1,858	$2,371	$1.01	217,544,600
5/10/22	6/8/22	93	$7	$166		$93	$266	$1.07	9,309,800
6/9/22	7/8/22	41	$3	$170		$42	$216	$1.12	4,058,500
7/9/22	8/8/22	28	$2	$170		$26	$199	$1.03	2,771,500
8/9/22	9/7/22	32	$2	$170		$35	$208	$1.16	3,201,000
9/8/22	10/6/22	65	$6	$170		$71	$248	$1.19	6,514,900
10/7/22	11/4/22	1,657	$1,221	$170		$1,516	$2,908	$1.65	165,703,200
11/5/22	12/8/22	5,397	$1,875	$174		$5,019	$7,068	$1.28	539,730,900
12/9/22	1/9/23	5,397	$1,875	$174		$5,019	$7,068	$1.28	539,730,900
TOTALS		33,605	$10,273	$2,022	$0	$28,448	$40,743	$1.15	3,360,464,700

Selzer School							Natural Gas Meter #2		
Provider	PSE&G	Account #	7477945518				Meter #	3355925	
Commodity	Direct Energy	Commodity	General Service Gas Heating - GSG (HTG)				Area Served	Addition	
Billing Period Start Date	Actual Reading	Therms	Gas Delivery Charges	Gas Customer Charge	Gas Demand Charge	Gas Commodity Charges	Gas Total Charges	$/Therm Marginal Rate	BTU
1/7/22	2/7/22	1,319	$557	$19		$1,004	$1,579	$1.18	131,892,700
2/8/22	3/9/22	483	$202	$19		$384	$604	$1.21	48,332,700
3/10/22	4/7/22	853	$360	$19		$660	$1,038	$1.20	85,342,400
4/8/22	5/9/22	535	$224	$19		$457	$699	$1.27	53,470,000
5/10/22	6/8/22	24	$8	$19		$24	$51	$1.33	2,409,100
6/9/22	7/8/22	0	$0	$19		$0	$19	-	0
7/9/22	8/9/22	0	$0	$19		$0	$19	-	0
8/10/22	9/7/22	0	$0	$19		$0	$19	-	0
9/8/22	10/6/22	76	$35	$19		$83	$137	$1.55	7,631,400
10/7/22	11/4/22	244	$116	$19		$223	$358	$1.39	24,381,300
11/5/22	12/7/22	547	$261	$19		$456	$736	$1.31	54,728,800
12/8/22	1/9/23	769	$371	$20		$716	$1,106	$1.41	76,941,100
TOTALS		4,851	$2,133	$228	$0	$4,006	$6,367	$1.27	485,129,500

Selzer School							
Provider	SUEZ		Water & Sewer (Gal)				
Acct #	1000389142222.00						
Billing Period Start Date	Actual Reading	Water & Sewer (Gal)	Fixed Charges	Usage Charges	Total Charges	Cost / Unit Checksum	BTU
6/4/21	7/1/21	32,164	$125	$204	$329	$0.0063	0
7/2/21	8/1/21	23,188	$144	$147	$291	$0.0063	0
8/2/21	9/2/21	119,680	$148	$760	$908	$0.0063	0
9/3/21	10/1/21	52,360	$134	$332	$467	$0.0063	0
10/2/21	11/3/21	81,532	$153	$518	$670	$0.0063	0
11/4/21	12/2/21	29,172	$134	$185	$319	$0.0063	0
12/3/21	1/6/22	39,644	$162	$252	$414	$0.0063	0
1/7/22	2/1/22	36,652	$120	$233	$353	$0.0063	0
2/2/22	3/3/22	45,628	$139	$290	$429	$0.0063	0
3/4/22	3/31/22	54,604	$130	$347	$476	$0.0063	0
4/1/22	5/2/22	47,872	$148	$304	$452	$0.0063	0
5/3/22	6/6/22	74,800	$162	$475	$637	$0.0063	0
TOTALS		637,296	$1,699	$4,047	$5,746	$0.0063	0

Selzer School							
Provider	SUEZ		Water & Sewer (Gal)				
Acct #	1000389142222.00						
Billing Period Start Date	Actual Reading	Water & Sewer (Gal)	Fixed Charges	Usage Charges	Total Charges	Cost / Unit Checksum	BTU
6/4/21	7/1/21	32,164	$125	$204	$329	$0.0063	0
7/2/21	8/1/21	23,188	$144	$147	$291	$0.0063	0
8/2/21	9/2/21	119,680	$148	$760	$908	$0.0063	0
9/3/21	10/1/21	52,360	$134	$332	$467	$0.0063	0
10/2/21	11/3/21	81,532	$153	$518	$670	$0.0063	0
11/4/21	12/2/21	29,172	$134	$185	$319	$0.0063	0
12/3/21	1/6/22	39,644	$162	$252	$414	$0.0063	0
1/7/22	2/1/22	36,652	$120	$233	$353	$0.0063	0
2/2/22	3/3/22	45,628	$139	$290	$429	$0.0063	0
3/4/22	3/31/22	54,604	$130	$347	$476	$0.0063	0
4/1/22	5/2/22	47,872	$148	$304	$452	$0.0063	0
5/3/22	6/6/22	74,800	$162	$475	$637	$0.0063	0
TOTALS		637,296	$1,699	$4,047	$5,746	$0.0063	0

Selzer School							
Provider	SUEZ		Water & Sewer (Gal)				
Acct #	1000489142222						
Billing Period Start Date	Actual Reading	Water & Sewer (Gal)	Fixed Charges	Usage Charges	Total Charges	Cost / Unit Checksum	BTU
6/4/21	6/30/21	748	$38	$5	$42	$0.0064	0
7/1/21	8/3/21	0	$49	$0	$49	$0.00	0
8/4/21	9/3/21	0	$45	$0	$45	$0.00	0
9/4/21	10/1/21	0	$41	$0	$41	$0.00	0
10/2/21	11/3/21	0	$48	$0	$48	$0.00	0
11/4/21	12/6/21	0	$48	$0	$48	$0.00	0
12/7/21	1/4/22	0	$42	$0	$42	$0.00	0
1/5/22	2/3/22	0	$43	$0	$43	$0.00	0
2/4/22	3/3/22	0	$41	$0	$41	$0.00	0
3/4/22	3/31/22	0	$41	$0	$41	$0.00	0
4/1/22	5/4/22	748	$49	$5	$54	$0.0064	0
5/5/22	6/3/22	748	$43	$5	$48	$0.0064	0
TOTALS		2,244	$527	$14	$541	$0.0064	0

Dumont Board of Education
25 Depew Street
Dumont, NJ 07628

Energy Savings Utility Rates

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

CALCULATED BASELINE UTILITY MARGINAL RATES				
BUILDING/FACILITY	ELECTRIC		NATURAL GAS	Water & Sewer (Gal)
	$ / kW	$ / kWh Marginal Rate	$ / Therm Marginal Rate	$ / Gal Marginal Rate
Administration Building	$5.87	$0.154	$1.27	$0.00635
Dumont High School	$5.48	$0.106	$0.98	$0.00635
Grant School	$3.60	$0.147	$1.06	$0.00635
Honiss School	$6.25	$0.125	$1.14	$0.00635
Lincoln School	$5.28	$0.108	$1.21	$0.00635
Selzer School	$7.15	$0.127	$1.17	$0.00635

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.

Dumont Board of Education

✓ (white)	ECM evaluated but not included
✓ (green)	ECM included in the project

ECM #	ECM DESCRIPTION	Administration Building	Dumont High School	Grant School	Honiss School	Lincoln School	Selzer School
1	LED Lighting Retrofit	✓ (green)	✓ (green)	✓ (green)	✓ (green)	✓ (green)	✓ (green)
2	Lighting Controls	✓ (white)	✓ (white)	✓ (white)	✓ (white)	✓ (white)	✓ (white)
3	District Wide Energy Management System Tier 1 & 2	✓ (green)	✓ (green)	✓ (green)	✓ (green)	✓ (green)	✓ (green)
3A	District Wide Energy Management System Tier 3	✓ (white)	✓ (green)	✓ (green)	✓ (green)	✓ (green)	✓ (green)
4	Unit Ventilator Replacement		✓ (white)	✓ (white)	✓ (white)	✓ (white)	✓ (white)
5	Addition of Cooling		✓ (white)	✓ (white)	✓ (white)	✓ (white)	✓ (white)
6	Solar PPA	✓ (white)	✓ (green)	✓ (green)	✓ (green)	✓ (green)	✓ (green)
7	Rooftop Unit Replacement		✓ (white)	✓ (white)	✓ (white)	✓ (white)	✓ (white)
8	Air Handling Unit Replacement		✓ (white)		✓ (white)		
8A	Honiss Gymnasium - Addition of Cooling				✓ (white)		
9	Split System Air Conditioning Replacement		✓ (white)	✓ (white)	✓ (white)	✓ (white)	✓ (white)
10	Hybrid Boiler Plant Conversion		✓ (white)		✓ (white)		
11	Water Conservation	✓ (white)	✓ (green)	✓ (green)	✓ (green)	✓ (green)	✓ (green)
12	Plug Load Controls	✓ (green)	✓ (green)	✓ (green)	✓ (green)	✓ (green)	✓ (green)
13	Pipe and Valve Insulation	✓ (green)	✓ (green)	✓ (green)	✓ (green)	✓ (green)	✓ (green)
14	Steam Trap Replacement		✓ (green)	✓ (green)	✓ (green)	✓ (green)	
15	Combined Heat and Power		✓ (white)		✓ (white)		
16	Roofing Upgrades	✓ (white)	✓ (green)	✓ (green)	✓ (green)	✓ (green)	✓ (green)
17	Field Lighting Fixture Replacement		✓ (white)				
18	Exhaust Fan Replacement	✓ (white)	✓ (white)	✓ (white)	✓ (white)	✓ (white)	✓ (white)
19	Building Envelope Improvements	✓ (green)	✓ (green)	✓ (green)	✓ (green)	✓ (green)	✓ (green)
20	Needlepoint Bi-Polar Ionization	✓ (white)	✓ (white)	✓ (white)	✓ (white)	✓ (white)	✓ (white)

ECM Breakdown by Cost & Savings

Dumont Board of Education		INCLUDED IN PROJECT	INSTALLED COST	ANNUAL ELECTRIC COST SAVINGS	ANNUAL NATURAL GAS COST SAVINGS	ANNUAL Water & Sewer (Gal) COST SAVINGS
ECM #	ENERGY CONSERVATION MEASURE	"Y" OR "N"	$	$	$	$
1	LED Lighting Retrofit	Y	$624,828	$69,850	($1,147)	$0
3	District Wide Energy Management System Tier 1 & 2	Y	$783,641	$15,687	$62,649	$0
3A	District Wide Energy Management System Tier 3	Y	$261,272	$0	$0	$0
6	Solar PPA	Y	$0	$112,914	$0	$0
11	Water Conservation	Y	$134,929	$0	$1,776	$9,554
12	Plug Load Controls	Y	$38,244	$5,720	$0	$0
13	Pipe and Valve Insulation	Y	$135,550	$0	$16,038	$0
14	Steam Trap Replacement	Y	$136,000	$0	$17,586	$0
16	Roofing Upgrades	Y	$1,183,645	$91	$680	$0
19	Building Envelope Improvements	Y	$214,944	$4,424	$20,530	$0
TOTALS			$3,513,052	$208,687	$118,112	$9,554

Dumont Board of Education		INCLUDED IN PROJECT	ANNUAL ENERGY COST SAVINGS	ANNUAL O&M COST SAVINGS	TOTAL ANNUAL COST SAVINGS	SIMPLE PAYBACK WITHOUT INCENTIVES
ECM #	ENERGY CONSERVATION MEASURE	"Y" OR "N"	$	$	$	YEARS
1	LED Lighting Retrofit	Y	$68,703	$19,222	$87,926	7.1
3	District Wide Energy Management System Tier 1 & 2	Y	$78,336	$5,459	$83,795	9.4
3A	District Wide Energy Management System Tier 3	Y	$0	$0	$0	0.0
6	Solar PPA	Y	$112,914	$0	$112,914	0.0
11	Water Conservation	Y	$11,329	$0	$11,329	11.9
12	Plug Load Controls	Y	$5,720	$0	$5,720	6.7
13	Pipe and Valve Insulation	Y	$16,038	$0	$16,038	8.5
14	Steam Trap Replacement	Y	$17,586	$0	$17,586	7.7
16	Roofing Upgrades	Y	$771	$4,897	$5,667	208.8
19	Building Envelope Improvements	Y	$24,954	$0	$24,954	8.6
TOTALS			$336,352	$29,578	$365,930	9.6

Dumont Board of Education		INCLUDED IN PROJECT	ELECTRIC CONSUMPTION SAVINGS	ELECTRIC DEMAND SAVINGS	NATURAL GAS SAVINGS	Water & Sewer (Gal) SAVINGS	TOTAL SITE ENERGY SAVINGS	TOTAL SOURCE ENERGY SAVINGS
ECM #	ENERGY CONSERVATION MEASURE	"Y" OR "N"	kWh	kW	THERMS	Water & Sewer (Gal)	MMBTU	MMBTU
1	LED Lighting Retrofit	Y	506,765	129	(1,056)	0	1,624	4,731
3	District Wide Energy Management System Tier 1 & 2	Y	103,496	58	59,255	0	6,279	7,211
3A	District Wide Energy Management System Tier 3	Y	0	0	0	0	0	0
6	Solar PPA	Y	0	0	0	0	0	0
11	Water Conservation	Y	0	0	1,650	1504520	165	173
12	Plug Load Controls	Y	45,350	0	0	0	155	433
13	Pipe and Valve Insulation	Y	0	0	14,355	0	1,435	1,507
14	Steam Trap Replacement	Y	0	0	17,137	0	1,714	1,799
16	Roofing Upgrades	Y	850	0	684	0	71	80
19	Building Envelope Improvements	Y	36,704	0	18,890	0	2,014	2,334
TOTALS			693,164	187	110,915	1504520	13,457	18,268

ECM Breakdown by Greenhouse Gas Reduction

Dumont Board of Education		INCLUDED IN PROJECT	Reduction of CO_2	Reduction of NO_x	Reduction of SO_2	Reduction of Hg
ECM #	ENERGY CONSERVATION MEASURE	"Y" OR "N"	LBS	LBS	LBS	LBS
1	LED Lighting Retrofit	Y	545,090	472	1,120	2,356
3	District Wide Energy Management System Tier 1 & 2	Y	807,125	643	229	481.3
3A	District Wide Energy Management System Tier 3	Y	0	0	0	0.0
6	Solar PPA	Y	0	0	0	0
11	Water Conservation	Y	19,305	15	0	0.0
12	Plug Load Controls	Y	49,885	43	100	211
13	Pipe and Valve Insulation	Y	167,953	132	0	0
14	Steam Trap Replacement	Y	200,497	158	0	0
16	Roofing Upgrades	Y	8,937	7	2	4
19	Building Envelope Improvements	Y	261,389	209	81	171
TOTALS			2,060,181	1,679	1,532	3,223

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

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

- ***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.

Dumont Board of Education
25 Depew Street
Dumont, NJ 07628

ECM Budgeting Narrative

Detailed plans, schematics and specifications for Dumont Board of Education were not available to deliver a cost estimate for each ECM. The budgetary costs carried 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.

Dumont Board of Education		INCLUDED IN PROJECT	INSTALLED COST
ECM #	ENERGY CONSERVATION MEASURE	"Y" OR "N"	$
1	LED Lighting Retrofit	Y	$624,828
3	District Wide Energy Management System Tier 1 & 2	Y	$783,641
3A	District Wide Energy Management System Tier 3	Y	$261,272
6	Solar PPA	Y	$0
11	Water Conservation	Y	$134,929
12	Plug Load Controls	Y	$38,244
13	Pipe and Valve Insulation	Y	$135,550
14	Steam Trap Replacement	Y	$136,000
16	Roofing Upgrades	Y	$1,183,645
19	Building Envelope Improvements	Y	$214,944
TOTALS			$3,513,052

Prescriptive Rebates

As part of the Energy Savings Plan for Dumont Board of Education, prescriptive rebate through PSE&G 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.

Energy Conservation Measure	Facility	Estimated Incentive
Led Lighting Upgrades	Administration Building	$ 1,454.17
Led Lighting Upgrades	Dumont High School	$ 27,146.55
Led Lighting Upgrades	Grant School	$ 10,125.98
Led Lighting Upgrades	Honiss School	$ 14,326.16
Led Lighting Upgrades	Lincoln School	$ 7,818.52
Led Lighting Upgrades	Selzer School	$ 3,913.23
Plug Loads	Administration Building	$ 166.69
Plug Loads	Dumont High School	$ 1,023.95
Plug Loads	Grant School	$ 607.23
Plug Loads	Honiss School	$ 821.54
Plug Loads	Lincoln School	$ 464.35
Plug Loads	Selzer School	$ 809.63
	Total Incentive	$ 68,678.00

Incentive Calculations

All estimated incentive values for Dumont Board of Education ESIP project were calculated using PSE&G prescriptive rebates. The total incentive amount was calculated to be $68,678

No implied and/or written guarantee is being made with respective to the receipt of incentives. All incentives estimates carry inherent risks that may jeopardize the receipt of them. Therefore, Dumont Board of Education acknowledges and accepts that any project proposed should not rely on the receipt of incentives as a reason to implement it.

ECM 1 – LED Lighting Retrofit

Dumont Board of Education

✔	ECM evaluated but not included
✔	ECM included in the project

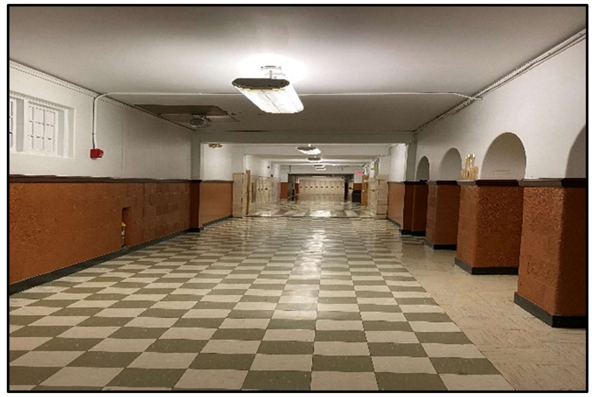
ECM #	ECM DESCRIPTION	Administration Building	Dumont High School	Grant School	Honiss School	Lincoln School	Selzer School
1	LED Lighting Retrofit	✔	✔	✔	✔	✔	✔

Lighting retrofits 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.

Existing Conditions

Existing interior lighting at Administration and Dumont HS


Existing interior lighting at Grant and Selzer

Scope of Work

Retrofit or replace existing interior and exterior fixtures with LED bulbs/fixtures as proposed in the line-by-lines in Appendix G. The new LED tubes do not require the existing fluorescent ballasts to operate (Type B retrofit). The existing ballasts across the district will be removed during this implementation. Additional 3% attic stock of Led tubes are included are there is a 10-year warranty on all LED tubes.

ECM Calculations

A coincidence factor is applied to estimate peak demand savings. The impact on the HVAC systems is captured as well. See Appendix G for supporting documents, LED Lighting Replacement savings calculation.

CALCULATED SAVINGS				
LED Lighting Retrofit Savings				
BUILDING	**SQFT**	**Peak Demand Savings (kW)**	**Total Energy Savings (kWh)**	**Total Fuel Savings (therms)**
Administration Building	7,000	3	12,004	-25
Dumont High School	165,469	46	182,328	-377
Grant School	52,527	18	71,400	-149
Honiss School	61,917	27	105,868	-221
Lincoln School	34,130	12	48,332	-101
Selzer School	58,455	22	86,833	-182

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

ECM 2 – Lighting Controls

Dumont Board of Education

✓	ECM evaluated but not included
✓	ECM included in the project

ECM #	ECM DESCRIPTION	Administration Building	Dumont High School	Grant School	Honiss School	Lincoln School	Selzer School
2	Lighting Controls	✓	✓	✓	✓	✓	✓

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


Existing interior lighting at Selzer and Lincoln

Scope of Work

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

ECM Calculations

This ECM is not included in the project because of poor financial payback. See Appendix G for detailed savings calculations and ECM costs.

ECM 3 & 3A – District Wide Energy Management System-

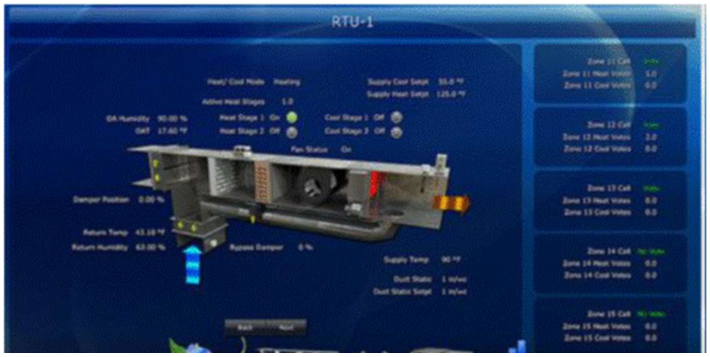
Dumont Board of Education

✔ (white)	ECM evaluated but not included
✔ (green)	ECM included in the project

ECM #	ECM DESCRIPTION	Administration Building	Dumont High School	Grant School	Honiss School	Lincoln School	Selzer School
3	District Wide Energy Management System Tier 1 & 2	✔ (green)	✔ (green)	✔ (green)	✔ (green)	✔ (green)	✔ (green)
3A	District Wide Energy Management System Tier 3	✔ (white)	✔ (green)	✔ (green)	✔ (green)	✔ (green)	✔ (green)

Background

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 Dumont Board of Education with continuous monitoring & reporting.

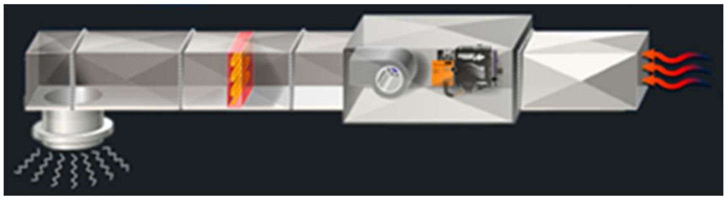


Web Based Building Automation Interface

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 these 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, demand-controlled ventilation, 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.

The upgraded District Wide EMS will integrate existing proprietary systems with new Open Protocol DDC Controls. 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
8. CO2 Ventilation Control

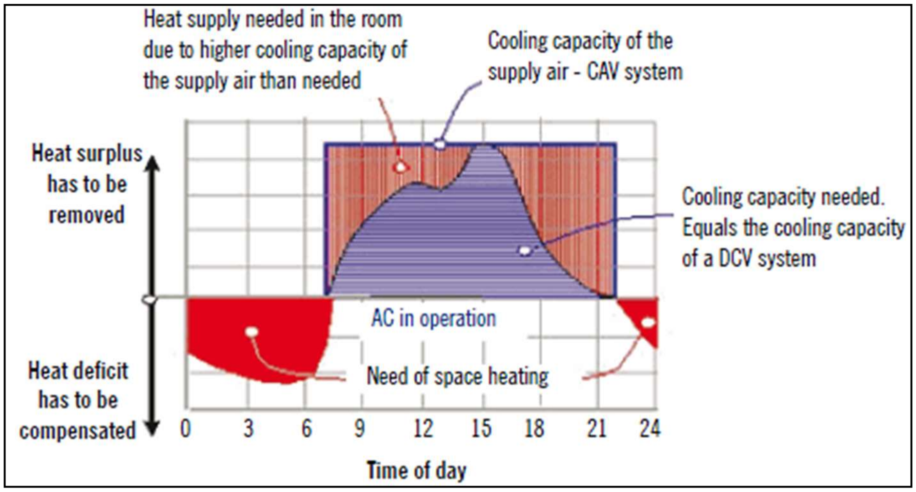


Demand Control Ventilation

In most commercial occupancies, ventilation is provided to deal with two types of indoor pollution: (1) odors from people, and (2) off-gassing from building components and furniture. When a space is vacant, it has no people pollution, so the people-related ventilation rate is not needed. Many types of high-occupancy spaces, such as classrooms, multipurpose rooms, theaters, conference rooms, or lobbies have ventilation designed for a high peak occupancy that rarely occurs. Ventilation can be reduced during the many hours of operation when spaces are vacant or at lower than peak occupancy. When ventilation is reduced, building owners or operators save energy because it is not necessary to heat or cool as much outside air. In colder climates, heating for ventilation air is greater and DCV saves the most energy.

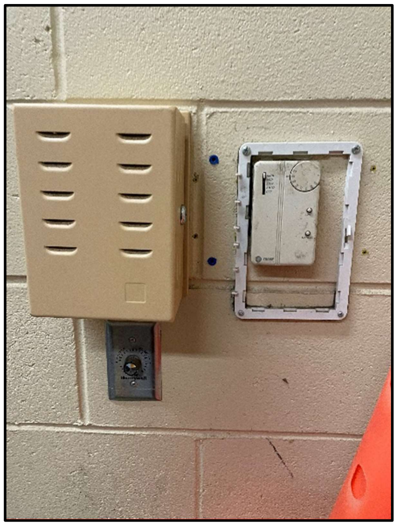
Demand Control Ventilation Operation

The objective of a CO2 control strategy is to modulate ventilation to maintain target cfm/person ventilation rates based on actual occupancy. The strategy should allow for reduced overall ventilation during periods of less than full occupancy which will save energy. Typical control approaches have used a proportional or proportional-integral control algorithm to modulate ventilation between a base ventilation rate established for non-occupant-related sources and the design ventilation rate for the space. Typically, modulation of outside air above base ventilation begins when indoor CO2 is 100 ppm above outside levels and continues until the target CO2 levels are reached and the design ventilation rate is provided.

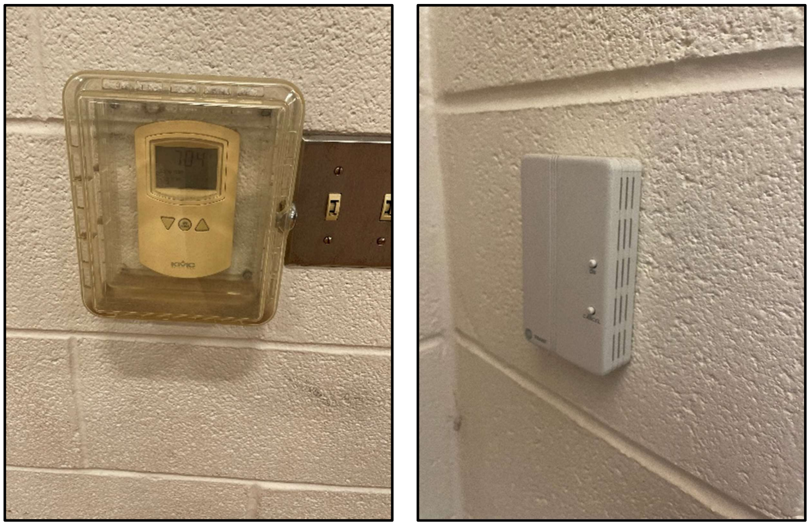


Duct sensors are best used where a single space or multiple spaces with common occupancy patterns are being ventilated. An example of this approach would be to place a sensor in the return duct of an air handler that serves multiple classrooms, using an upper limit set point of 500 or 600 ppm CO_2 above ambient (instead of 700 ppm). This approach works best when the AHU system is serving spaces that are occupied with very similar schedules and rates.

Existing Conditions

Existing thermostats Dumont HS and Honiss



Existing thermostats at Grant and Selzer

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 advance capabilities for the control of the new HVAC equipment, will tie into the existing EMS's architecture. Additionally, where the existing HVAC equipment is to remain, integration to the existing legacy Direct Digital Controllers onto the new EMS Open platform will occur. The Open platform proposed is based on the Honeywell Niagara 4 frameworks. 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 unleashes 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. Each building will be provided with electric and natural gas submetering for continuous monitoring and reporting of building energy consumption via Energy Dashboards.

A more specific scope of work includes:

- Building Automation Systems shall be accessible via the Internet.
- User 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.
- Demand Control Ventilation (DCV) will be utilized in applicable spaces:

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 maintain the occupied setpoint of 70F during occupied hours and 65F setpoint 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. Demand Control Ventilation energy savings for the specific units reflected in the scope of work are calculated using BPU Protocols based off and ASHRAE STANDARD 62.1 -2016 calculated outdoor air rates. The calculations are shown below.

CALCULATED SAVINGS									
EMS Savings									
BUILDING	**SQFT**	**Unit Type**	**Weekly Occupied Hours [H]**	**Heat Pump Cooling (tons) [CAPhp]**	**Heat Pump Cooling Efficiency (EER) [EERhp]**	**RTU Cooling (tons) [CAPrtu]**	**RTU Cooling Efficiency (EER) [EERrtu]**	**Existing RTU Cooling Efficiency (EER) [EERrtu]**	**Proposed RTU Cooling Efficiency (EER) [EERrtu]**
Administration Building	7,000	Boiler	63						
Administration Building		Rooftop Units (DX-Gas Fired)	63			10.0	9.8		
Administration Building		Rooftop Units (DX)	63			10.0	11.7		
Administration Building		Split Systems	63						
Administration Building		Heat Pump	63						
Dumont High School	165,469	Boiler	63						
Dumont High School		Rooftop Units (DX-Gas Fired)	63			156.5	9.8	9.8	10.4
Dumont High School		Rooftop Units (DX)	63			16.0	10.1	10.1	11.8
Dumont High School		Split Systems	63			28.2	11.0	11.0	11.3
Dumont High School		Heat Pump	63	3.00	11.6				
Grant School	52,527	Boiler	75						
Grant School		Rooftop Units (DX-Gas Fired)	75			57.0	10.0	10.0	10.9
Grant School		Rooftop Units (DX)	75			0.0	0.0	0.0	0.0
Grant School		Split Systems	75			13.0	11.1	11.1	12.1
Grant School		Heat Pump	75	3.00	12.0				
Honiss School	61,917	Boiler	63						
Honiss School		Rooftop Units (DX-Gas Fired)	63			34.5	10.8	10.8	11.3
Honiss School		Rooftop Units (DX)	63			9.7	9.4	9.4	11.3
Honiss School		Split Systems	63			3.5	10.8	10.8	11.5
Honiss School		Heat Pump	63	0.75	11.2				
Lincoln School	34,130	Boiler	75						
Lincoln School		Rooftop Units (DX-Gas Fired)	75			61.3	10.0	10.0	11.0
Lincoln School		Rooftop Units (DX)	75			0.0	0.0	0.0	0.0
Lincoln School		Split Systems	75			8.0	11.5	11.5	12.3
Lincoln School		Heat Pump	75						
Selzer School	58,455	Boiler	63						
Selzer School		Rooftop Units (DX-Gas Fired)	63			63.9	9.0	9.0	10.9
Selzer School		Rooftop Units (DX)	63			0.0	0.0	0.0	0.0
Selzer School		Split Systems	63			23.0	11.7	11.7	12.3
Selzer School		Heat Pump	63						

CALCULATED SAVINGS

EMS Savings

BUILDING	SQFT	Unit Type	RTU Heating (Btu/hr) [CAPrtu]	RTU Heating Efficiency (%) [AFUEh]	Existing RTU Heating Efficiency (%) [AFUEh]	Proposed RTU Heating Efficiency (%) [AFUEh]	Boiler Heating (Btu/hr) [CAPboiler]	Boiler Heating Efficiency (%) [AFUEh]	Heat Pump Heating (tons) [CAPhp]	Heat Pump Heating Efficiency (EER) [EERhp]
Administration Building	7,000	Boiler					245,000	80.8%		
Administration Building		Rooftop Units (DX-Gas Fired)	200,000	78.31%	78.3%	78.3%				
Administration Building		Rooftop Units (DX)								
Administration Building		Split Systems								
Administration Building		Heat Pump								
Dumont High School	165,469	Boiler					16,554,000	74.3%		
Dumont High School		Rooftop Units (DX-Gas Fired)	3,159,000	75.10%	75.1%	78.5%				
Dumont High School		Rooftop Units (DX)								
Dumont High School		Split Systems	48,000	80.00%	80.0%	80.0%				
Dumont High School		Heat Pump							2.833333333	11.26
Grant School	52,527	Boiler					3,663,000	80.9%		
Grant School		Rooftop Units (DX-Gas Fired)	1,160,000	77.05%	77.1%	79.4%				
Grant School		Rooftop Units (DX)								
Grant School		Split Systems	108,000	78.36%	78.4%	78.4%				
Grant School		Heat Pump							3	11.26
Honiss School	61,917	Boiler					9,034,000	71.4%		
Honiss School		Rooftop Units (DX-Gas Fired)	530,000	78.57%	78.6%	78.5%				
Honiss School		Rooftop Units (DX)								
Honiss School		Split Systems	24,000	77.05%	77.1%	77.1%				
Honiss School		Heat Pump							6.75	11.26
Lincoln School	34,130	Boiler					3,663,000	80.5%		
Lincoln School		Rooftop Units (DX-Gas Fired)	1,285,000	77.05%	77.1%	80.8%				
Lincoln School		Rooftop Units (DX)								
Lincoln School		Split Systems	96,000	79.50%	79.5%	79.5%				
Lincoln School		Heat Pump								
Selzer School	58,455	Boiler					4,608,000	76.7%		
Selzer School		Rooftop Units (DX-Gas Fired)	1,260,000	77.82%	77.8%	79.4%				
Selzer School		Rooftop Units (DX)								
Selzer School		Split Systems	192,000	80.00%	80.0%	80.0%				
Selzer School		Heat Pump								

Dumont Board of Education
25 Depew Street
Dumont, NJ 07628

CALCULATED SAVINGS

EMS Savings

BUILDING	Unit Type	DCV kWh Savings	DCV kW Savings	DCV Therms Savings	ELFHc	ELFHh	Heat Pump Cooling Energy Savings (kWh)	RTU Cooling Energy Savings (kWh)	Chiller Cooling Energy Savings (kWh)	Electric Heat Heating Energy Savings (kWh)
Administration Building	Boiler				955	400	0	0	0	0
Administration Building	Rooftop Units (DX-Gas Fired)	0.0			955	400	0	2,085	0	0
Administration Building	Rooftop Units (DX)				955	400	0	1,746	0	0
Administration Building	Split Systems				955	400	0	0	0	0
Administration Building	Heat Pump				955	400	0	0	0	0
Dumont High School	Boiler				466	901	0	0	0	0
Dumont High School	Rooftop Units (DX-Gas Fired)	46,216.4	46.0	11,361.1	466	901	0	15,923	0	0
Dumont High School	Rooftop Units (DX)				466	901	0	1,581	0	0
Dumont High School	Split Systems				466	901	0	2,549	0	0
Dumont High School	Heat Pump				466	901	257	0	0	0
Grant School	Boiler				394	325	0	0	0	0
Grant School	Rooftop Units (DX-Gas Fired)	1,210.6	1.5	325.4	394	625	0	4,219	0	0
Grant School	Rooftop Units (DX)				394	625	0	0	0	0
Grant School	Split Systems				394	625	0	874	0	0
Grant School	Heat Pump				394	625	185	0	0	0
Honiss School	Boiler				394	840	0	0	0	0
Honiss School	Rooftop Units (DX-Gas Fired)	6,834.4	8.2	3,434.9	394	840	0	2,695	0	0
Honiss School	Rooftop Units (DX)				394	840	0	876	0	0
Honiss School	Split Systems				394	840	0	273	0	0
Honiss School	Heat Pump				394	840	57	0	0	0
Lincoln School	Boiler				394	400	0	0	0	0
Lincoln School	Rooftop Units (DX-Gas Fired)	1,894.7	2.3	509.2	394	625	0	4,540	0	0
Lincoln School	Rooftop Units (DX)				394	625	0	0	0	0
Lincoln School	Split Systems				394	625	0	518	0	0
Lincoln School	Heat Pump				394	625	0	0	0	0
Selzer School	Boiler				394	840	0	0	0	0
Selzer School	Rooftop Units (DX-Gas Fired)	366.9	0.4	1,865.0	394	840	0	5,999	0	0
Selzer School	Rooftop Units (DX)				394	840	0	0	0	0
Selzer School	Split Systems				394	840	0	1,657	0	0
Selzer School	Heat Pump				394	840	0	0	0	0

CALCULATED SAVINGS

EMS Savings

BUILDING	Unit Type	DCV kWh Savings	DCV kW Savings	DCV Therms Savings	ELFHc	ELFHh	Heat Pump Cooling Energy Savings (kWh)	RTU Cooling Energy Savings (kWh)	Chiller Cooling Energy Savings (kWh)	Electric Heat Heating Energy Savings (kWh)
Administration Building	Boiler				955	400	0	0	0	0
Administration Building	Rooftop Units (DX-Gas Fired)	0.0			955	400	0	2,085	0	0
Administration Building	Rooftop Units (DX)				955	400	0	1,746	0	0
Administration Building	Split Systems				955	400	0	0	0	0
Administration Building	Heat Pump				955	400	0	0	0	0
Dumont High School	Boiler				466	901	0	0	0	0
Dumont High School	Rooftop Units (DX-Gas Fired)	46,216.4	46.0	11,361.1	466	901	0	15,923	0	0
Dumont High School	Rooftop Units (DX)				466	901	0	1,581	0	0
Dumont High School	Split Systems				466	901	0	2,549	0	0
Dumont High School	Heat Pump				466	901	257	0	0	0
Grant School	Boiler				394	325	0	0	0	0
Grant School	Rooftop Units (DX-Gas Fired)	1,210.6	1.5	325.4	394	625	0	4,219	0	0
Grant School	Rooftop Units (DX)				394	625	0	0	0	0
Grant School	Split Systems				394	625	0	874	0	0
Grant School	Heat Pump				394	625	185	0	0	0
Honiss School	Boiler				394	840	0	0	0	0
Honiss School	Rooftop Units (DX-Gas Fired)	6,834.4	8.2	3,434.9	394	840	0	2,695	0	0
Honiss School	Rooftop Units (DX)				394	840	0	876	0	0
Honiss School	Split Systems				394	840	0	273	0	0
Honiss School	Heat Pump				394	840	57	0	0	0
Lincoln School	Boiler				394	400	0	0	0	0
Lincoln School	Rooftop Units (DX-Gas Fired)	1,894.7	2.3	509.2	394	625	0	4,540	0	0
Lincoln School	Rooftop Units (DX)				394	625	0	0	0	0
Lincoln School	Split Systems				394	625	0	518	0	0
Lincoln School	Heat Pump				394	625	0	0	0	0
Selzer School	Boiler				394	840	0	0	0	0
Selzer School	Rooftop Units (DX-Gas Fired)	366.9	0.4	1,865.0	394	840	0	5,999	0	0
Selzer School	Rooftop Units (DX)				394	840	0	0	0	0
Selzer School	Split Systems				394	840	0	1,657	0	0
Selzer School	Heat Pump				394	840	0	0	0	0

CALCULATED SAVINGS

EMS Savings

BUILDING	Unit Type	Heat Pump Heating Energy Savings(kWh)	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)
Administration Building	Boiler	0	0	108	0	108	3,831	199
Administration Building	Rooftop Units (DX-Gas Fired)	0	91	0	2,085	91		
Administration Building	Rooftop Units (DX)	0	0	0	1,746	0		
Administration Building	Split Systems	0	0	0	0	0		
Administration Building	Heat Pump	0	0	0	0	0		
Dumont High School	Boiler	0	0	17,934	0	17,934	66,769	32,727
Dumont High School	Rooftop Units (DX-Gas Fired)	0	3,384	0	62,139	14,745		
Dumont High School	Rooftop Units (DX)	0	0	0	1,581	0		
Dumont High School	Split Systems	0	48	0	2,549	48		
Dumont High School	Heat Pump	243	0	0	500	0		
Grant School	Boiler	0	0	1,156	0	1,156	6,646	2288.024905
Grant School	Rooftop Units (DX-Gas Fired)	0	739	0	5,430	1,065		
Grant School	Rooftop Units (DX)	0	0	0	0	0		
Grant School	Split Systems	0	68	0	874	68		
Grant School	Heat Pump	157	0	0	342	0		
Honiss School	Boiler	0	0	9,495	0	9,495	11,275	13459.565
Honiss School	Rooftop Units (DX-Gas Fired)	0	506	0	9,529	3,941		
Honiss School	Rooftop Units (DX)	0	0	0	876	0		
Honiss School	Split Systems	0	23	0	273	23		
Honiss School	Heat Pump	540	0	0	596	0		
Lincoln School	Boiler	0	0	1,430	0	1,430	6,952	2817.007665
Lincoln School	Rooftop Units (DX-Gas Fired)	0	819	0	6,434	1,328		
Lincoln School	Rooftop Units (DX)	0	0	0	0	0		
Lincoln School	Split Systems	0	59	0	518	59		
Lincoln School	Heat Pump	0	0	0	0	0		
Selzer School	Boiler	0	0	4,504	0	4,504	8,022	7763.464058
Selzer School	Rooftop Units (DX-Gas Fired)	0	1,214	0	6,365	3,079		
Selzer School	Rooftop Units (DX)	0	0	0	0	0		
Selzer School	Split Systems	0	180	0	1,657	180		
Selzer School	Heat Pump	0	0	0	0	0		

Occupancy Controlled Thermostat Savings Calculation	
Th (F)	70
Tc (F)	72
Sh (F)	65
Sc (F)	77
H (hrs per week)	Varies
EFLHc (hrs per year)	Varies
EFLHh (hrs per year)	Varies
Ph (%)	3%
Pc (%)	6%

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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).

<u>Summary of Inputs</u>

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

CALCULATED SAVINGS

Demand Control Ventilation Savings

BUILDING	Ventilation SQFT	Componet	HVAC Unit #	People Outdoor Air Rate (cfm/person)	Area Outdoor Air Rate (cfm/sqft)	Occupant Density (#/1000 sqft)
Dumont High School	12,000	Auditorium	RTU-1-2	5	0.06	150
Dumont High School	5,200	Band/Choir	RTU-3	10	0.12	35
Dumont High School	2,000	Classroom 03/05	RTU-4	10	0.12	35
Dumont High School	2,000	2nd Floor Office	RTU-5	5	0.06	5
Dumont High School	4,000	Classrooms 130-132	RTU-6	10	0.12	35
Dumont High School	1,200	Main Office	RTU-7	5	0.06	5
Dumont High School	2,080	Guidance	RTU-8	5	0.06	5
Dumont High School	6,000	Media Center	RTU-9	5	0.06	5
Dumont High School	6,000	Gym	RTU-10-11	20	0.18	7
Dumont High School	6,000	Aux Gym	RTU-12	20	0.18	7
Dumont High School	10,000	Cafeteria	RTU-13	8	0.18	100
Dumont High School	10,200	Classrooms	RTU-14	10	0.12	35
Grant School	8,000	Cafetera	RTU-1A-RTU1B	5.0	0.06	5
Grant School	2,600	Media Center	RTU-2	5	0.06	5
Grant School	2,600	Classrooms	RTU-3	5	0.06	5
Honiss School	5,200	Media Center	RTU-1	10	0.12	35
Honiss School	2,000	Guidance Office	RTU-2	5.0	0.06	5
Honiss School	4,000	Cafeteria	RTU-3-4	8	0.18	100
Honiss School	7,200	Gymnasium	HV-1	20.0	0.18	7
Lincoln School	12,000	Gymnasium	RTU-1A-1B	5.0	0.06	5
Lincoln School	3,300	Media Center	RTU-2	5	0.06	5
Lincoln School	2,000	Music	RTU-3	5	0.06	5
Lincoln School	3,300	Cafeteria	RTU-4	5	0.06	5
Selzer School	8,000	Gymnasium	HV-1	20.0	0.18	7
Selzer School	4,000	Media Center	RTU-1	5	0.06	5

CALCULATED SAVINGS

Demand Control Ventilation Savings

BUILDING	Ventilation SQFT	Combined Outdoor Air Rate (cfm/person)	Total Occupants	Calculated OA (cfm)	CESF	CDSF	HSF
Dumont High School	12,000	5.4	1,800	9,720	1.500	0.0015	0.029
Dumont High School	5,200	13.4	182	2,444	1.079	0.0013	0.029
Dumont High School	2,000	13.4	70	940	1.079	0.0013	0.029
Dumont High School	2,000	17.0	10	170	1.079	0.0013	0.029
Dumont High School	4,000	13.4	140	1,880	1.079	0.0013	0.029
Dumont High School	1,200	17.0	6	102	1.079	0.0013	0.029
Dumont High School	2,080	17.0	11	180	1.079	0.0013	0.029
Dumont High School	6,000	17.0	30	510	1.079	0.0013	0.029
Dumont High School	6,000	45.7	42	1,920	2.529	0.0013	0.069
Dumont High School	6,000	45.7	42	1,920	2.529	0.0013	0.069
Dumont High School	10,000	9.3	1,000	9,300	1.079	0.0013	0.029
Dumont High School	10,200	13.4	357	4,794	1.079	0.0013	0.029
Grant School	8,000	17.0	40	680	1.079	0.0013	0.029
Grant School	2,600	17.0	13	221	1.079	0.0013	0.029
Grant School	2,600	17.0	13	221	1.079	0.0013	0.029
Honiss School	5,200	13.4	182	2,444	1.079	0.0013	0.029
Honiss School	2,000	17.0	10	170	1.079	0.0013	0.029
Honiss School	4,000	9.3	400	3,720	1.079	0.0013	0.029
Honiss School	7,200	45.7	51	2,316			0.069
Lincoln School	12,000	17.0	60	1,020	1.079	0.0013	0.029
Lincoln School	3,300	17.0	17	283	1.079	0.0013	0.029
Lincoln School	2,000	17.0	10	170	1.079	0.0013	0.029
Lincoln School	3,300	17.0	17	283	1.079	0.0013	0.029
Selzer School	8,000	45.7	56	2,560			0.069
Selzer School	4,000	17.0	20	340	1.079	0.0013	0.029

CALCULATED SAVINGS

Demand Control Ventilation Savings

BUILDING	Ventilation SQFT	DCV Electric Savings (kWh)	DCV Demand Savings (kW)	DCV Gas Savings (Th)	Total Electric Savings (kWh)	Total Demand Savings (kW)	Total Gas Savings (Th)
Dumont High School	12,000	14,580	15	2,819	46,216	46	11,361
Dumont High School	5,200	2,637	3	709			
Dumont High School	2,000	1,014	1	273			
Dumont High School	2,000	183	0	49			
Dumont High School	4,000	2,029	2	545			
Dumont High School	1,200	110	0	30			
Dumont High School	2,080	194	0	52			
Dumont High School	6,000	550	1	148			
Dumont High School	6,000	4,856	2	1,325			
Dumont High School	6,000	4,856	2	1,325			
Dumont High School	10,000	10,035	12	2,697			
Dumont High School	10,200	5,173	6	1,390			
Grant School	8,000	734	1	197	1,211	1	325
Grant School	2,600	238	0	64			
Grant School	2,600	238	0	64			
Honiss School	5,200	2,637	3	709	6,834	8	3,435
Honiss School	2,000	183	0	49			
Honiss School	4,000	4,014	5	1,079			
Honiss School	7,200	0	0	1,598			
Lincoln School	12,000	1,101	1	296	1,895	2	509
Lincoln School	3,300	305	0	82			
Lincoln School	2,000	183	0	49			
Lincoln School	3,300	305	0	82			
Selzer School	8,000	0	0	1,766	367	0	1,865
Selzer School	4,000	367	0	99			

NJ BPU FY 2020 Protocols – Demand Control Ventilation

Algorithms

Energy Savings (kWh/yr) = CESF * CFM

Peak Demand Savings (kW) = CDSF * CFM

Fuel Savings (MMBtu/yr) = HSF * CFM

Definition of Variables

CESF = Cooling Energy Savings Factor (kWh/CFM)

CDSF = Cooling Demand Savings Factor (kW/CFM)

HSF = Heating Savings Factor (MMBtu/CFM)

CFM = Baseline Design Ventilation Rate of Controlled Space (CFM)

Summary of Inputs

Demand Controlled Ventilation Using CO_2 SensorsComponent	Type	Value	Source
CESF	Fixed	0.0484 MMBtu/CFM See Table 2	1

Demand Controlled Ventilation Using CO_2 SensorsComponent	Type	Value	Source
CDSF	Fixed		1
HSF	Fixed		1
CFM	Variable		Application

Savings Factors for Demand-Controlled Ventilation Using CO_2 Sensors

Component	CESF	CDSF	HSF
Assembly	2.720	0.0014	0.074
Auditorium – Community Center	1.500	0.0015	0.043
Gymnasium	2.558	0.0013	0.069
Office Building	2.544	0.0013	0.068
Elementary School	1.079	0.0013	0.029
High School	2.529	0.0015	0.072
Shopping Center	1.934	0.0012	0.050
Other	2.544	0.0013	0.068

All Calculated Outdoor Air Rates refence ANSI ASHRAE STANDARD 62.1 -2016

ECM 4 – Unit Ventilator Replacement & Capital Improvement 5 – Addition of Cooling

Dumont Board of Education

✔	ECM evaluated but not included
✔	ECM included in the project

ECM #	ECM DESCRIPTION	Administration Building	Dumont High School	Grant School	Honiss School	Lincoln School	Selzer School
4	Unit Ventilator Replacement		✔	✔	✔	✔	✔
5	Addition of Cooling		✔	✔	✔	✔	✔

New unit ventilators will improve classroom indoor air quality. Superior indoor air quality can help ensure a healthier and higher performance learning environment for students and staff, and the choice of ventilation equipment plays a big role in the quality of the indoor air. Proper ventilation with outdoor air is a key component for good indoor air quality in schools and classrooms since indoor air may be two to five times more polluted than outdoor air, and there are large populations of children who may be more susceptible to indoor pollutants than the general population.

Unit Ventilator

The high occupant densities of schools and classrooms often make it challenging for building designers to incorporate ventilation systems that provide adequate outdoor ventilation air (in compliance with the industry's ventilation standard, ASHRAE 62-2013), while providing buildings with good indoor air quality and minimized costs.

Addition of Cooling will accompany each new unit ventilator with a remote dedicated air-cooled condensing unit (ACCU). The system being proposed in this ECM will utilize a standard classroom unit ventilator style indoor unit that will fit in the same area as the existing classroom unit ventilators. Heating will be accomplished utilizing the new ACCU heat pumps. Cooling will be accomplished utilizing direct expansion, or D/X, coils. The unit ventilator will also allow for economizer mode of operation, or free cooling, when the outdoor ambient conditions permit the use of 100% outside air.

Existing Conditions

Existing unit ventilators at Selzer and Honiss

Existing Unit Ventilators at Dumont HS and Grant

Dumont Board of Education has expressed interest to add cooling to their classrooms across the district. DCO Energy has recommended the installation of heat pump air-cooled condensing units (ACCU) which will be equipped to the new proposed unit ventilators. These unit ventilators will be equipped with a D/X coil and will be able to provide cooling to classroom spaces via the Air-Cooled Condensing Units.

Scope of Work

- The scope of work for Unit Ventilator replacement does not include budget dollars to replace the existing shelving in any of the classrooms.
- Furnishing and installation of new outdoor air-cooled condensing units.
- Size, quantity, and approximate location of each outdoor condensing unit shall be based on the attached unit ventilator schedule provided in Appendix G.
- Provide all required controls and control wiring between the ACCU condensing units and associated classroom unit ventilators for a complete and functional system.
- New condensing units shall be mounted on the roof. Provide all roof supports (equipment rails) and roof repairs required to maintain existing roof warranty.
- Furnish and install new refrigerant piping from outdoor condensing unit to new indoor unit ventilators. Refrigerant piping shall be run on the outside of the building, either on the roof or on the exterior wall(s) in a protective pipe enclosure. Refrigerant piping shall be run inside the building as much as possible in pipe covers (horizontal and vertical.
- Electrical
    - Disconnect existing electrical power to classroom UVs being removed and re-use/reconnect to new classroom UVs.
    - Provide new electrical power for outdoor condensing units. Contractor shall assume a new main breaker will be required at the primary electrical service.
    - Provide new electrical distribution, including new electrical subpanels, breakers, conduit, and feeders to serve new outdoor condensing units.
-

CALCULATED SAVINGS		
Unit Ventilator Replacement Scope of Work		
BUILDING	**SQFT**	**NUMBER OF UNITS**
Dumont High School	165,469	19
Grant School	52,527	24
Honiss School	61,917	37
Lincoln School	34,130	13
Selzer School	58,455	24

Addition of Cooling Scope		
BUILDING	**SQFT**	**AIR-COOLED CONDERSER QUANTITY**
Dumont High School	165,469	38
Grant School	52,527	33
Honiss School	61,917	39
Lincoln School	34,130	18
Selzer School	58,455	24

ECM Calculations

This ECM is not included in the project because of poor financial payback. See Appendix G for detailed savings calculations and ECM costs.

ECM 6 – Solar Power Purchase Agreement

Dumont Board of Education		Administration Building	Dumont High School	Grant School	Honiss School	Lincoln School	Selzer School
✔ (white)	ECM evaluated but not included						
✔ (green)	ECM included in the project						
ECM #	**ECM DESCRIPTION**						
6	Solar PPA	✔ (white)	✔ (green)	✔ (green)	✔ (green)	✔ (green)	✔ (green)

Photovoltaic (PV) solar array

The renewable energy industry is one of the fastest growing and evolving components to modern building system design. The ability to capture solar energy will provide long term economic and environmental benefits. Technology improvements are rapidly evolving as well, and the market is flooded with new products with new features that have only been available within the last few years, with promising new technologies and updates on the verge of becoming available to the market.

Clients have the opportunity to purchase power through a Power Purchase Agreement, predetermining fixed low rates for the duration of the agreement, without having to manage any part of the process. This allows the solar provider to manage compliance reporting, filings, and maintenance of the equipment for the entire length of the contract.

A solar PPA makes going green easy. Work takes place around the client's schedule, and a safe and functional environment is maintained throughout installation of the system.

Assessment

A preliminary assessment of your facilities will allow for the design of a system that meets your energy needs and environmental goals

Agreement

Power Purchase Agreements allow for the sale of the energy produced on a per kWh basis, while a lease agreement allows the solar provider to access the system they own so that they may monitor and maintain the system for you.

Installation

A turnkey system includes the design, construction, commissioning, and interconnection with local utilities.

Monitoring

The solar provider monitors the PV installation to ensure performance and for ease of billing. The client has the capability to track output and environmental benefits online.

Management

The solar provider handles all compliance and reporting requirements for the client. They will file documentation with federal and state agencies and participate in state and utility REC markets.

Scope of Work

- Savings estimates are calculated from proposals received during the Dumont Board of Education Solar PPA RFP process
- Installation of the Solar PV System shall be in accordance with NFPA 70. NEC 2011. ARTICLE 690.Solar Photovoltaic (PV) Systems
- PPA Firm will receive any incentives available

Solar Photovoltaic Arrays

Dumont Board of Education roof mounted solar opportunities are show below:

Administration Building

Dumont High School

Honiss School

Grant School

Lincoln School

Selzer School

ECM Calculations

The energy savings shown below are a result of the reduced electrical cost from the PPA for the kWh generated by the solar panels. Actual rates and solar generation estimates were taken from the proposals received during the Dumont Board of Education Solar PPA RFP process. A comparison was done to ensure the generated kWh did not exceed the post-project estimated energy consumption. In cases where the generated kWh exceeded the post-project electrical consumption, the generation numbers were reduced to ensure the site would not generate more electric than it consumes. The PPA term is 15 years.

INSTALLED CAPACITY (kWdc)	PROPOSED CAPACITY (kWdc	TOTAL ECM YEAR 1 SAVINGS	INITIAL PPA RATE ($/kWh)	ANNUAL ESCALATION RATE	ANNUAL PANEL DERATING
1,201	1,219	$128,226	$0.0390	2.00%	0.50%

Solar PPA - Rates & Savings

BUILDING	MOUNTING CATEGORY	INSTALL? (Y/N)	EFLH	INITIAL kWh GENERATION	INSTALLED kWh GENERATION	$$/kWh RATES		SAVINGS	TOTAL SAVINGS
						UTILITY	SOLAR PPA		
Administration Building	HESP - Roof	N	1,186	29,403	0	$0.154	$0.0390	$0	**$0**
Dumont High School	HESP - Roof	Y	1,189	607,665	607,665	$0.106	$0.0390	$40,468	**$40,468**
Grant School	HESP - Roof	Y	1,180	209,745	195,047	$0.147	$0.0390	$21,095	**$21,095**
Honiss School	HESP - Roof	Y	1,188	265,162	258,040	$0.125	$0.0390	$22,178	**$22,178**
Lincoln School	HESP - Roof	Y	1,176	140,733	140,733	$0.108	$0.0390	$9,724	**$9,724**
Selzer School	HESP - Roof	Y	1,176	220,147	220,147	$0.127	$0.0390	$19,450	**$19,450**

CALENDAR YEAR	PPA YEAR	PPA kWh PRODUCTION	UTILITY SAVINGS	PPA COST	NET SOLAR SAVINGS
2025	1	1,421,631	$183,669	($55,444)	$128,226
2026	2	1,414,523	$186,772	($56,270)	$130,502
2027	3	1,407,451	$189,926	($57,108)	$132,818
2028	4	1,400,413	$193,134	($57,959)	$135,175
2029	5	1,393,411	$196,396	($58,823)	$137,573
2030	6	1,386,444	$199,713	($59,699)	$140,014
2031	7	1,379,512	$203,086	($60,589)	$142,498
2032	8	1,372,614	$206,516	($61,491)	$145,025
2033	9	1,365,751	$210,004	($62,408)	$147,597
2034	10	1,358,923	$213,551	($63,337)	$150,214
2035	11	1,352,128	$217,158	($64,281)	$152,877
2036	12	1,345,367	$220,826	($65,239)	$155,587
2037	13	1,338,640	$224,556	($66,211)	$158,345
2038	14	1,331,947	$228,349	($67,198)	$161,151
2039	15	1,325,288	$232,205	($68,199)	$164,007
Total	**Total**	**20,594,044**	**$3,105,863**	**($924,255)**	**$2,181,608**

Administration Building						
YEAR	$$/kWh RATES		SOLAR kWh	UTILITY SAVINGS	PPA COST	SAVINGS
	UTILITY	SOLAR PPA				
1	$0.168	$0.0390	0	$0	$0	$0
2	$0.172	$0.0398	0	$0	$0	$0
3	$0.176	$0.0406	0	$0	$0	$0
4	$0.180	$0.0414	0	$0	$0	$0
5	$0.184	$0.0422	0	$0	$0	$0
6	$0.188	$0.0431	0	$0	$0	$0
7	$0.192	$0.0439	0	$0	$0	$0
8	$0.196	$0.0448	0	$0	$0	$0
9	$0.200	$0.0457	0	$0	$0	$0
10	$0.205	$0.0466	0	$0	$0	$0
11	$0.209	$0.0475	0	$0	$0	$0
12	$0.214	$0.0485	0	$0	$0	$0
13	$0.218	$0.0495	0	$0	$0	$0
14	$0.223	$0.0505	0	$0	$0	$0
15	$0.228	$0.0515	0	$0	$0	$0
Total			**0**	**$0**	**$0**	**$0**

Dumont High School						
YEAR	$$/kWh RATES		SOLAR kWh	UTILITY SAVINGS	PPA COST	SAVINGS
	UTILITY	SOLAR PPA				
1	$0.115	$0.0390	607,665	$70,002	($23,699)	$46,303
2	$0.118	$0.0398	604,627	$71,185	($24,052)	$47,132
3	$0.120	$0.0406	601,604	$72,387	($24,410)	$47,976
4	$0.123	$0.0414	598,596	$73,609	($24,774)	$48,835
5	$0.126	$0.0422	595,603	$74,853	($25,143)	$49,709
6	$0.128	$0.0431	592,625	$76,117	($25,518)	$50,599
7	$0.131	$0.0439	589,661	$77,403	($25,898)	$51,504
8	$0.134	$0.0448	586,713	$78,710	($26,284)	$52,426
9	$0.137	$0.0457	583,780	$80,039	($26,676)	$53,364
10	$0.140	$0.0466	580,861	$81,391	($27,073)	$54,318
11	$0.143	$0.0475	577,956	$82,766	($27,476)	$55,289
12	$0.146	$0.0485	575,067	$84,164	($27,886)	$56,278
13	$0.150	$0.0495	572,191	$85,585	($28,301)	$57,284
14	$0.153	$0.0505	569,330	$87,031	($28,723)	$58,308
15	$0.156	$0.0515	566,484	$88,501	($29,151)	$59,350
Total			**8,802,761**	**$1,183,743**	**($395,066)**	**$788,677**

Grant School						
YEAR	$$/kWh RATES		SOLAR kWh	UTILITY SAVINGS	PPA COST	SAVINGS
	UTILITY	SOLAR PPA				
1	$0.161	$0.0390	195,047	$31,312	($7,607)	$23,705
2	$0.164	$0.0398	194,071	$31,841	($7,720)	$24,120
3	$0.168	$0.0406	193,101	$32,378	($7,835)	$24,543
4	$0.171	$0.0414	192,135	$32,925	($7,952)	$24,973
5	$0.175	$0.0422	191,175	$33,481	($8,070)	$25,411
6	$0.179	$0.0431	190,219	$34,047	($8,191)	$25,856
7	$0.183	$0.0439	189,268	$34,622	($8,313)	$26,309
8	$0.187	$0.0448	188,321	$35,207	($8,437)	$26,770
9	$0.191	$0.0457	187,380	$35,801	($8,562)	$27,239
10	$0.195	$0.0466	186,443	$36,406	($8,690)	$27,716
11	$0.200	$0.0475	185,511	$37,021	($8,819)	$28,202
12	$0.204	$0.0485	184,583	$37,646	($8,951)	$28,695
13	$0.208	$0.0495	183,660	$38,282	($9,084)	$29,198
14	$0.213	$0.0505	182,742	$38,929	($9,219)	$29,709
15	$0.218	$0.0515	181,828	$39,586	($9,357)	$30,229
Total			**2,825,484**	**$529,484**	**($126,807)**	**$402,677**

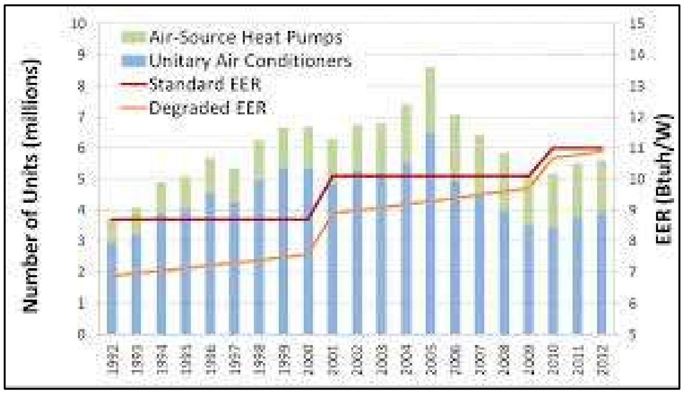
Honiss School						
YEAR	$$/kWh RATES		SOLAR kWh	UTILITY SAVINGS	PPA COST	SAVINGS
	UTILITY	SOLAR PPA				
1	$0.136	$0.0390	258,040	$35,174	($10,064)	$25,110
2	$0.139	$0.0398	256,750	$35,768	($10,213)	$25,554
3	$0.142	$0.0406	255,466	$36,372	($10,366)	$26,006
4	$0.146	$0.0414	254,188	$36,986	($10,520)	$26,466
5	$0.149	$0.0422	252,918	$37,611	($10,677)	$26,934
6	$0.152	$0.0431	251,653	$38,246	($10,836)	$27,410
7	$0.155	$0.0439	250,395	$38,892	($10,997)	$27,895
8	$0.159	$0.0448	249,143	$39,549	($11,161)	$28,388
9	$0.162	$0.0457	247,897	$40,217	($11,328)	$28,890
10	$0.166	$0.0466	246,658	$40,897	($11,496)	$29,400
11	$0.169	$0.0475	245,424	$41,587	($11,668)	$29,920
12	$0.173	$0.0485	244,197	$42,290	($11,842)	$30,448
13	$0.177	$0.0495	242,976	$43,004	($12,018)	$30,986
14	$0.181	$0.0505	241,761	$43,730	($12,197)	$31,533
15	$0.185	$0.0515	240,552	$44,469	($12,379)	$32,090
Total			**3,738,017**	**$594,793**	**($167,761)**	**$427,032**

Lincoln School						
YEAR	$$/kWh RATES		SOLAR kWh	UTILITY SAVINGS	PPA COST	SAVINGS
	UTILITY	SOLAR PPA				
1	$0.118	$0.0390	140,733	$16,596	($5,489)	$11,108
2	$0.121	$0.0398	140,029	$16,877	($5,570)	$11,306
3	$0.123	$0.0406	139,329	$17,162	($5,653)	$11,508
4	$0.126	$0.0414	138,633	$17,451	($5,738)	$11,714
5	$0.129	$0.0422	137,939	$17,746	($5,823)	$11,923
6	$0.131	$0.0431	137,250	$18,046	($5,910)	$12,136
7	$0.134	$0.0439	136,563	$18,351	($5,998)	$12,353
8	$0.137	$0.0448	135,881	$18,661	($6,087)	$12,573
9	$0.140	$0.0457	135,201	$18,976	($6,178)	$12,798
10	$0.143	$0.0466	134,525	$19,296	($6,270)	$13,026
11	$0.147	$0.0475	133,853	$19,622	($6,363)	$13,259
12	$0.150	$0.0485	133,183	$19,954	($6,458)	$13,495
13	$0.153	$0.0495	132,517	$20,291	($6,555)	$13,736
14	$0.156	$0.0505	131,855	$20,633	($6,652)	$13,981
15	$0.160	$0.0515	131,196	$20,982	($6,751)	$14,231
Total			**2,038,687**	**$280,643**	**($91,496)**	**$189,147**

Selzer School						
YEAR	$$/kWh RATES		SOLAR kWh	UTILITY SAVINGS	PPA COST	SAVINGS
	UTILITY	SOLAR PPA				
1	$0.139	$0.0390	220,147	$30,585	($8,586)	$22,000
2	$0.142	$0.0398	219,046	$31,102	($8,714)	$22,388
3	$0.145	$0.0406	217,951	$31,627	($8,843)	$22,784
4	$0.148	$0.0414	216,861	$32,161	($8,975)	$23,186
5	$0.152	$0.0422	215,777	$32,705	($9,109)	$23,596
6	$0.155	$0.0431	214,698	$33,257	($9,245)	$24,012
7	$0.158	$0.0439	213,625	$33,819	($9,382)	$24,436
8	$0.162	$0.0448	212,556	$34,390	($9,522)	$24,868
9	$0.165	$0.0457	211,494	$34,971	($9,664)	$25,307
10	$0.169	$0.0466	210,436	$35,561	($9,808)	$25,753
11	$0.173	$0.0475	209,384	$36,162	($9,954)	$26,208
12	$0.177	$0.0485	208,337	$36,773	($10,103)	$26,670
13	$0.180	$0.0495	207,295	$37,394	($10,253)	$27,141
14	$0.184	$0.0505	206,259	$38,025	($10,406)	$27,620
15	$0.188	$0.0515	205,228	$38,668	($10,561)	$28,107
Total			**3,189,095**	**$517,200**	**($143,126)**	**$374,075**

ECM 7 – Rooftop Unit Replacement

Dumont Board of Education ✔ ECM evaluated but not included ✔ ECM included in the project		Administration Building	Dumont High School	Grant School	Honiss School	Lincoln School	Selzer School
ECM #	ECM DESCRIPTION						
7	Rooftop Unit Replacement		✔	✔	✔	✔	✔



Many commercial buildings are operating with older and inefficient HVAC systems. The average life expectancy of commercial HVAC RTU equipment is 10 to 15 years—which means that many commercial buildings are ready for new natural gas rooftop units. Technology improvements and demand have led to greater energy efficiency and more choices in systems. Installing new, higher efficiency units will provide energy savings as well as deliver enhanced technology and controls of the RTUs when compared to the existing units.

Existing Conditions

Existing roof top units at Dumont HS

Existing roof top units at Grant and Honiss

Existing roof top units at Lincoln and Selzer

Scope of Work (

The following RTUs will be replaced with high efficiency constant volume units:

RTU Replacement Scope of Work			
BUILDING	**CATEGORY**	**TONS**	**QUANTITY**
Dumont High School	LGA180SH1Y	15	1
	LGA180SH1Y	15	1
	DH090N15C2DAD4	7.5	1
	DH102N15C2DAD4	8.5	1
	DH090N15C2DAD4	7.5	1
	DH102N15C2DAD4	8.5	1
	DH102N15C2DAD4	8.5	1
	D1EB060A25B	5	1
	DAPB-T060AB	5	1
	THC072A3R0A	6	1
Grant School	wr240s32b2bzz2001a	20	1
	wr240s32b2bzz2002a	20	1
	DF102S15Q2BZZ40001A	8.5	1
	DF102S15Q2BZZ40002A	8.5	1
Honiss School	DDHB-T060AA	5	1
	RM-004-8-0-AA01-222	4	1
	RM-013-8-0-AA02-234	13	1
Lincoln School	DH060S10z30001a	4.75	1
	df102s15q2bzz4001a	8.25	1
	wr240s32b2bzz2001a	20	1
	wr240s32b2bzz2002a	20	1
	df102s15q2bzz4001a	8.25	1
Selzer School	YCD151C3HCAA	12.5	1
	RM-008-8-0-AA02-234	8.4	1
	YCD151C3HCAA	12.5	1
	RM-010-8-0-AA02-234	10.5	1
	DM240N32B2AAA1C	20	1
		290.65	**27**

Dumont High School

- Straight time
- Demo and carting of existing units
- Furnish and install (4) rooftop units
    - Furnish and install (2) adapter curbs and (2) new curbs
    - Connect to existing duct drops
- Electrical disconnects/reconnects
    - New disconnects figured
- Gas piping disconnects/reconnects
    - From existing valves
- Structural steel for new curbs
- Air balance
- Crane and rigging
- Startup

Grant School

- Straight time
- Demo and carting of existing units
- Furnish and install (10) rooftop units
    - Furnish and install (7) adapter curbs and (3) new curbs
    - Connect to existing duct drops
- Electrical disconnects/reconnects
    - New disconnects figured
- Gas piping disconnects/reconnects
    - From existing valves
- Structural steel for new curbs
- Air balance
- Crane and rigging
- Startup

Honiss School

- Straight time
- Demo and carting of existing units
- Furnish and install (2) rooftop units
    - Furnish and install (2) adapter curbs
    - Connect to existing duct drops
- Electrical disconnects/reconnects
    - New disconnects figured
- Gas piping disconnects/reconnects
    - From existing valves

- Structural steel for new curbs
- Air balance
- Crane and rigging
- Startup

Lincoln School

- Straight time
- Demo and carting of existing units
- Furnish and install (5) rooftop units
    - Furnish and install (2) adapter curbs and (3) new curbs
    - Connect to existing duct drops
- Electrical disconnects/reconnects
    - New disconnects figured
- Gas piping disconnects/reconnects
    - From existing valves
- Structural steel for new curbs
- Air balance
- Crane and rigging
- Startup

Selzer School

- Straight time
- Demo and carting of existing units
- Furnish and install (4) rooftop units
    - Furnish and install (4) adapter curbs
    - Connect to existing duct drops
- Electrical disconnects/reconnects
    - New disconnects figured
- Gas piping disconnects/reconnects
    - From existing valves
- Structural steel for new curbs
- Air balance
- Crane and rigging
- Startup

ECM Calculations

This ECM is not included in the project because of poor financial payback. See Appendix G for detailed savings calculations and ECM costs.

RTU Replacement - Heating Savings						
BUILDING NAME	**SYSTEM**	**Qty**	**Estimated Existing Efficiency**	**Efficiency Units**	**Baseline RTU Rated Input MBH**	**Baseline Plant Rated Input MBH (CAPYbi)**
Dumont High School	LGA180SH1Y	1	69.4%	%AFUE	470	470
	LGA180SH1Y	1	69.4%	%AFUE	470	470
	DH090N15C2DAD4	1	77.1%	%AFUE	180	180
	DH102N15C2DAD4	1	77.1%	%AFUE	180	180
	DH090N15C2DAD4	1	77.1%	%AFUE	180	180
	DH102N15C2DAD4	1	77.1%	%AFUE	180	180
	DH102N15C2DAD4	1	77.1%	%AFUE	180	180
	D1EB060A25B	1		N/A		0
	DAPB-T060AB	1		N/A		0
	THC072A3R0A	1		N/A		0
Grant School	wr240s32b2bzz2001a	1	77.05%	%AFUE	400	400
	wr240s32b2bzz2002a	1	77.05%	%AFUE	400	400
	DF102S15Q2BZZ40001A	1	77.05%	%AFUE	180	180
	DF102S15Q2BZZ40002A	1	77%	%AFUE	180	180
Honiss School	DDHB-T060AA	1				0
	RM-004-8-0-AA01-222	1	78.12%	%AFUE	90	90
	RM-013-8-0-AA02-234	1	78%	%AFUE	90	90
Lincoln School	DH060S10z30001a	1	77%	%AFUE	125	125
	df102s15q2bzz4001a	1	77%	%AFUE	180	180
	wr240s32b2bzz2001a	1	77%	%AFUE	400	400
	wr240s32b2bzz2002a	1	77%	%AFUE	400	400
	df102s15q2bzz4001a	1	77%	%AFUE	180	180
Selzer School	YCD151C3HCAA	1	78%	%AFUE	250	250
	RM-008-8-0-AA02-234	1	78.12%	%AFUE	180	180
	YCD151C3HCAA	1	78%	%AFUE	250	250
	RM-010-8-0-AA02-234	1	78%	%AFUE	180	180
	DM240N32B2AAA1C	1	77%	%AFUE	400	400

RTU Replacement - Heating Savings						
BUILDING NAME	SYSTEM	Qualifying RTU Capacity MBH	Qualifying Plant Capacity (CAPYqi)	Qualifying RTU Efficiency	Efficiency Units	EFLH
Dumont High School	LGA180SH1Y	470	470	80.0%	%AFUE	901
	LGA180SH1Y	470	470	80.0%	%AFUE	901
	DH090N15C2DAD4	180	180	80.0%	%AFUE	901
	DH102N15C2DAD4	180	180	80.0%	%AFUE	901
	DH090N15C2DAD4	180	180	80.0%	%AFUE	901
	DH102N15C2DAD4	180	180	80.0%	%AFUE	901
	DH102N15C2DAD4	180	180	80.0%	%AFUE	901
	D1EB060A25B		0			901
	DAPB-T060AB		0			901
	THC072A3R0A		0			901
Grant School	wr240s32b2bzz2001a	400	400	80.00%	%AFUE	840
	wr240s32b2bzz2002a	400	400	80.00%	%AFUE	840
	DF102S15Q2BZZ40001A	180	180	80.00%	%AFUE	840
	DF102S15Q2BZZ40002A	180	180	80.00%	%AFUE	840
Honiss School	DDHB-T060AA	0	0			
	RM-004-8-0-AA01-222	90	90	80.00%	%AFUE	901
	RM-013-8-0-AA02-234	90	90	80.00%	%AFUE	901
Lincoln School	DH060S10z30001a	125	125	80%	%AFUE	840
	df102s15q2bzz4001a	180	180	80%	%AFUE	840
	wr240s32b2bzz2001a	400	400	80%	%AFUE	840
	wr240s32b2bzz2002a	400	400	80%	%AFUE	840
	df102s15q2bzz4001a	180	180	80%	%AFUE	840
Selzer School	YCD151C3HCAA	250	250	80.00%	%AFUE	901
	RM-008-8-0-AA02-234	180	180	80.00%	%AFUE	901
	YCD151C3HCAA	250	250	80.00%	%AFUE	901
	RM-010-8-0-AA02-234	180	180	80.00%	%AFUE	901
	DM240N32B2AAA1C	400	400	80.00%	%AFUE	901

RTU Replacement - Heating Savings							
BUILDING NAME	SYSTEM	Conversion of BTU to kWh	Conversion of BTU to therms	Annual Electric Savings (kWh)	Baseline Gas Use (Therms)	Proposed Gas Use (Therms)	Annual Gas Savings (Therms)
Dumont High School	LGA180SH1Y	3,412	100,000	-	6,105	5,293	811
	LGA180SH1Y	3,412	100,000	-	6,105	5,293	811
	DH090N15C2DAD4	3,412	100,000	-	2,105	2,027	78
	DH102N15C2DAD4	3,412	100,000	-	2,105	2,027	78
	DH090N15C2DAD4	3,412	100,000	-	2,105	2,027	78
	DH102N15C2DAD4	3,412	100,000	-	2,105	2,027	78
	DH102N15C2DAD4	3,412	100,000	-	2,105	2,027	78
	D1EB060A25B	3,412	100,000	-	-	-	-
	DAPB-T060AB	3,412	100,000	-	-	-	-
	THC072A3R0A	3,412	100,000	-	-	-	-
Grant School	wr240s32b2bzz2001a	3,412	100,000	-	4,361	4,200	161
	wr240s32b2bzz2002a	3,412	100,000	-	4,361	4,200	161
	DF102S15Q2BZZ40001A	3,412	100,000	-	1,962	1,890	72
	DF102S15Q2BZZ40002A	3,412	100,000	-	1,962	1,890	72
Honiss School	DDHB-T060AA	3,412	100,000	-	-	-	-
	RM-004-8-0-AA01-222	3,412	100,000	-	1,038	1,014	24
	RM-013-8-0-AA02-234	3,412	100,000	-	1,038	1,014	24
Lincoln School	DH060S10z30001a	3,412	100,000	-	1,363	1,313	50
	df102s15q2bzz4001a	3,412	100,000	-	1,962	1,890	72
	wr240s32b2bzz2001a	3,412	100,000	-	4,361	4,200	161
	wr240s32b2bzz2002a	3,412	100,000	-	4,361	4,200	161
	df102s15q2bzz4001a	3,412	100,000	-	1,962	1,890	72
Selzer School	YCD151C3HCAA	3,412	100,000	-	2,880	2,816	65
	RM-008-8-0-AA02-234	3,412	100,000	-	2,076	2,027	49
	YCD151C3HCAA	3,412	100,000	-	2,880	2,816	65
	RM-010-8-0-AA02-234	3,412	100,000	-	2,076	2,027	49
	DM240N32B2AAA1C	3,412	100,000	-	4,677	4,505	172

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 = Furnace Baseline Efficiency

Eff_q = Furnace Proposed Efficiency

1000 = Conversion from kBtu to MMBtu

Summary of Inputs

Prescriptive Furnaces

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

$EFLH_h$ 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 Furnace Efficiencies (Eff_b)

Furnace Type	Size Category (kBtu input)	Standard 90.1-2016
Gas Fired	< 225 ≥ 225	78% AFUE or 80% Et 80% Et
Oil Fired	< 225 ≥ 225	78% AFUE 81% Et

RTU Replacement - Total Savings

BUILDING NAME	SYSTEM	Annual Electric Savings (kWh)	Total Electric Savings (kWh)	Annual Demand Savings (kW)	Total Demand Savings (kW)	Annual Gas Savings (Therms)	Total Gas Savings (Therms)
Dumont High School	LGA180SH1Y	1,555	5,700	2	6	811	2,011
	LGA180SH1Y	1,555		2		811	
	DH090N15C2DAD4	227		0		78	
	DH102N15C2DAD4	257		0		78	
	DH090N15C2DAD4	227		0		78	
	DH102N15C2DAD4	257		0		78	
	DH102N15C2DAD4	257		0		78	
	D1EB060A25B	1,163		1		-	
	DAPB-T060AB	178		0		-	
	THC072A3R0A	23		0		-	
Grant School	wr240s32b2bzz2001a	175	1,240	0	2	161	466
	wr240s32b2bzz2002a	175		0		161	
	DF102S15Q2BZZ40001A	445		1		72	
	DF102S15Q2BZZ40002A	445		1		72	
Honiss School	DDHB-T060AA	1,030	1,586	1	2	-	49
	RM-004-8-0-AA01-222	289		0		24	
	RM-013-8-0-AA02-234	267		0		24	
Lincoln School	DH060S10z30001a	451	1,665	1	2	50	516
	df102s15q2bzz4001a	432		1		72	
	wr240s32b2bzz2001a	175		0		161	
	wr240s32b2bzz2002a	175		0		161	
	df102s15q2bzz4001a	432		1		72	
Selzer School	YCD151C3HCAA	1,129	6,179	1	7	65	399
	RM-008-8-0-AA02-234	172		0		49	
	YCD151C3HCAA	1,129		1		65	
	RM-010-8-0-AA02-234	318		0		49	
	DM240N32B2AAA1C	3,431		4		172	

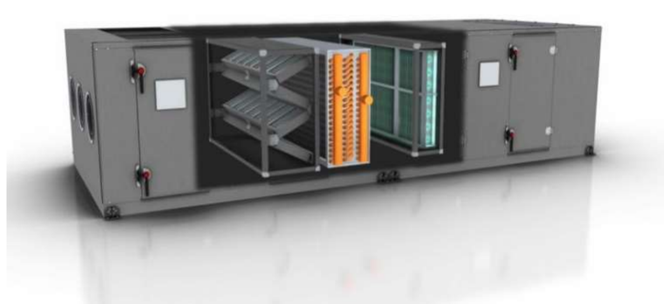
ECM 8 – Air Handling Unit Replacement & Capital Improvement 8A – Honiss Gymnasium Addition of Cooling

Dumont Board of Education

✓	ECM evaluated but not included
✓	ECM included in the project

ECM #	ECM DESCRIPTION	Administration Building	Dumont High School	Grant School	Honiss School	Lincoln School	Selzer School
8	Air Handling Unit Replacement		✓		✓		
8A	Honiss Gymnasium - Addition of Cooling				✓		

Over time the casings of air handlers will rust which could lead to excess air leakage into the mechanical room they are located in. The mechanical rooms that house air handlers were not designed to be conditioned but it was evident that the leakage of the air handlers was conditioning the spaces. Old air handlers are susceptible to oxidation and particulate build-up on the coils. Since heat transfer occurs on the fins of the coils it is important to keep them clean and rust-free, especially when serving a very humid space such as a pool. However, when equipment ages the build-up of the deposits is inevitable when the unit approaches the ASHRAE useful life of 20 years



High Efficiency Air Handling Unit

Existing Conditions

Existing AHU at Dumont HS

Existing AHU at Honiss School

Scope of Work

AHU Replacement Scope of Work			
BUILDING	**SYSTEM**	**Areas Served**	**QTY**
Dumont High School	AHU	Kitchen	1
	AHU	Kitchen Storage	1
	AHU	Gym A, Storage 114 and 116	2
Honiss School	AHU	Gym (Tower)	1
	AHU	Kitchen	1

Alternate 8A

Honiss Gymnasium - Addition of Cooling Scope			
BUILDING	**AREA SERVED**	**Tons**	**QUANTITY**
Honiss School	Gynmasium	12.5	2

Two ducted 12.5 ton packaged units to provide cooling to Honiss Gymnasium

Dumont High School

- Removal and carting of (4) existing AHUs
- Furnish and install (4) AHUs
    - Connect to existing ductwork
- Furnish and install refrigerant and condensate piping
    - Connect to existing pipe within 5 feet of units
- Electrical disconnects/reconnects o New disconnects figured
- Air balance
- Startup

Honiss School

- Removal and carting of (2) existing AHUs
- Furnish and install (2) AHUs
    - Connect to existing ductwork
- Furnish and install refrigerant and condensate piping
    - Connect to existing pipe within 5 feet of units

- Electrical disconnects/reconnects o New disconnects figured
- Air balance
- Startup

ECM Calculations

This ECM is not included in the project because of poor financial payback. See Appendix G for detailed savings calculations and ECM costs.

ECM 9 –Split System Replacement

Dumont Board of Education

✔	ECM evaluated but not included
✔	ECM included in the project

ECM #	ECM DESCRIPTION	Administration Building	Dumont High School	Grant School	Honiss School	Lincoln School	Selzer School
9	Split System Air Conditioning Replacement		✔	✔	✔	✔	✔

An air conditioning unit is one of the most energy-intensive units in any facility. Technology has made leaps and bounds in the past several years in making these machines more efficient. air conditioning unit efficiency is rated by how much electrical energy is used to produce an amount of cooling. This is expressed in kilowatts per ton of cooling (kW/ton). An older machine may be as high as 1.2 kW/ton, whereas a new air conditioning unit r may be as low as 0.9 kW/ton or even less. A new machine uses less electrical power to produce the same amount of cooling. In addition, installing new high efficient rooftop air conditioners will include:

- Condensing units that drain to the interior of the building
- Improved insulation
- Duct dampers which prevent off-cycle losses due to convection loops that lose heat
- More efficient modulating compressor and improved humidity control if the indoor blower or air handler is also variable speed

Existing Conditions

Existing split system AC units at Honiss School and Grant School

Existing Split system AC unit at Dumont HS

Scope of Work

The following Split Systems will be replaced with high efficiency units:

Split System AC Replacement Scope of Work				
BUILDING	**CATEGORY**	**AREA SERVED**	**Tons**	**QUANTITY**
Dumont High School	Condensing Unit	Office - Open Plan 210 CST	2.333333333	1
Grant School	Condensing Unit	Corridor 3	5	1
Honiss School	Condensing Unit		2	1
Lincoln School	Condensing Unit	Office- Enclosed 113	4	1
	Condensing Unit	Classroom 111	4	1
Selzer School	Condensing Unit	Office 104	3	1
	Condensing Unit	Office 106	4	1

Dumont High School

- Straight time
- Demo and carting of existing units
- Reclaim Refrigerant
- Furnish and install split system with roof rails

Grant School

- Straight time
- Demo and carting of existing units
- Reclaim Refrigerant
- Furnish and install split system with roof rails
- Furnish and install refrigerant and condensate piping
- Electrical disconnects/reconnects
  - New disconnects figured
- Crane and rigging
- Startup

Honiss School

- Straight time
- Demo and carting of existing units
- Reclaim Refrigerant
- Furnish and install (2) split systems with roof rails
- Furnish and install refrigerant and condensate piping

- Electrical disconnects/reconnects
    - New disconnects figured
- Crane and rigging
- Startup

Lincoln School

- Straight time
- Demo and carting of existing units
- Reclaim Refrigerant
- Furnish and install (2) split systems with roof rails
- Furnish and install refrigerant and condensate piping
- Electrical disconnects/reconnects
    - New disconnects figured
- Crane and rigging
- Startup

Selzer School

- Straight time
- Demo and carting of existing units
- Reclaim Refrigerant
- Furnish and install (2) split systems with roof rails
- Furnish and install refrigerant and condensate piping
- Electrical disconnects/reconnects
    - New disconnects figured
- Crane and rigging
- Startup

ECM Calculations

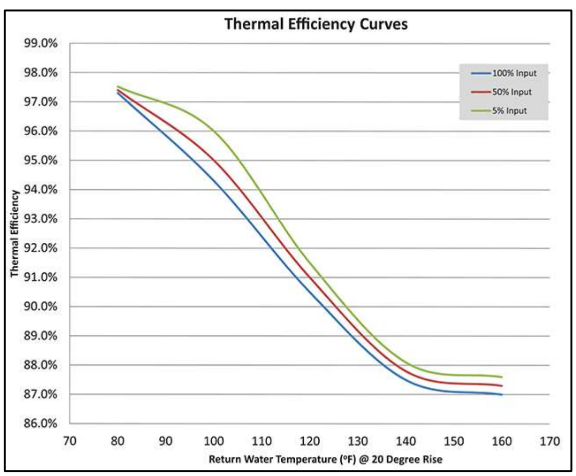
This ECM is not included in the project because of poor financial payback. See Appendix G for detailed savings calculations and ECM costs.

ECM 10 – Hybrid Boiler Plant Conversion

Dumont Board of Education ✔ ECM evaluated but not included ✔ ECM included in the project		Administration Building	Dumont High School	Grant School	Honiss School	Lincoln School	Selzer School
ECM #	ECM DESCRIPTION						
10	Hybrid Boiler Plant Conversion		✔		✔		

Background

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.



Existing Conditions

Dumont High School – The boiler room at Dumont HS has (2) 5,093 MBh BHP force draft steam boilers. The boilers are model 4500A –S/W-19 manufactured by The H.B. Smith Company. The steam produced by the boilers serves cast iron radiators and a steam-to-hot water heat exchanger located in another mechanical room near the cafeteria.

Existing force draft steam boilers at Dumont HS

Selzer School – The boiler room at Honiss Elementary School has (2) 2,766 MBh BHP force draft steam boilers. They were installed in 1993 and 1999. The boilers are model 28A-14 manufactured by The H.B. Smith Company. The steam produced by the boilers serves steam heating terminal units and a steam-to-hot water heat exchanger located just outside the boiler room in the basement.

Existing force draft steam boilers at Honiss School

Scope of Work

Both Dumont HS and at Honiss Elementary School, the existing steam boilers and the steam to hot water heat exchangers will be decoupled from the hot water system. The steam piping from the steam header to the hot water heat exchanger will removed along with the hot water heat exchanger. Two (2) new condensing hot water boilers will be sized with 100% redundancy. The two (2) new condensing hot water boilers will be connected to existing hot water piping.

- Demolish, remove and responsibly dispose of the following
  - Existing heat exchanger piping and valves
  - Existing heat exchanger pumps
  - Existing steam piping from heat exchanger to header
- Provide and install the following:
  - (2) new 1,000 MBH Condensing Hot Water Boilers at Dumont HS
  - (2) new 1,000 MBH Condensing Hot Water Boilers at Honiss ES
  - New concrete pads
  - (2) new inline hot water pumps with integral VFDs at Dumont HS
  - (2) new inline hot water pumps with integral VFDs Honiss ES
  - Connect new hot water piping to the existing hot water piping
  - New DDC controls to operate the new condensing hot water boilers
  - Install new power wiring (incl. new conduit, wiring and circuit breakers) for new water condensing hot water boilers and re-circ pump from existing power panel(s). If adequate spare capacity is not available, provide 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.
- Perform system start-up and testing

ECM Calculations

This ECM is not included in the project because of poor financial payback. See Appendix G for detailed savings calculations and ECM costs.

ECM 11 – Water Conservation

Dumont Board of Education

✔ (white)	ECM evaluated but not included
✔ (green)	ECM included in the project

ECM #	ECM DESCRIPTION	Administration Building	Dumont High School	Grant School	Honiss School	Lincoln School	Selzer School
11	Water Conservation	✔ (white)	✔ (green)	✔ (green)	✔ (green)	✔ (green)	✔ (green)

It takes a considerable amount of energy to deliver and treat the water you use every day. For example, letting your faucet run for five minutes uses about as much energy as letting a 60-watt light bulb run for 22 hours. Pump and water heating energy is required to deliver hot water to the end user.

Fixture with aerator

Scope of Work

Existing faucets within the facilities will be retrofit with high efficiency aerators. New low flow toilet diaphragm valves and new toilet fixtures where retrofits are not applicable will reduce flows from 2.4 to 3.5 gallons per flush down to 1.28 to 1.6 gallons per flush. New low flow urinal retrofits will reduce flows from 1 to 0.5 gallons per flush.

Water Conservation Scope		
BUILDING	**CATEGORY**	**QUANTITY**
Administration Building	Faucet Aerator	4
Dumont High School	Faucet Aerator	42
	Install Urinal Diaphram Kit	16
	Install Toilet Diaphram Kit	9
	Replace Toilet China and Valve	37
	Custom	1
Grant School	Faucet Aerator	18
Honiss School	Faucet Aerator	36
	Install Urinal Diaphram Kit	11
	Install Toilet Diaphram Kit	6
	Replace Toilet China and Valve	29
Lincoln School	Faucet Aerator	19
Selzer School	Faucet Aerator	46

- (66) – Remove and dispose of existing flushometer type toilet and replace with new 1.28 GPF toilet fixture and diaphragm flush valve; if present, existing side mount sensors will be reused.
- (15) – Remove and dispose of existing toilet flush valve diaphragm kit and replace with new 1.6 GPF flush valve diaphragm kit.
- (27) – Remove and dispose of existing urinal flush valve diaphragm kit and replace with new 0.5 GPF flush valve diaphragm kit.
- (165) – Retrofit existing sink faucet with new aerator (remove and dispose of existing aerator, if applicable):
    a. (118) 0.5 GPM aerators
    b. (47) 1.5 GPM aerators
- (1) – Repair solenoid valve on once-through water cooling line serving walk-in refrigeration unit

ECM Calculations

See Appendix G for supporting documents for fuel savings associated with water conservation from faucet aerators.

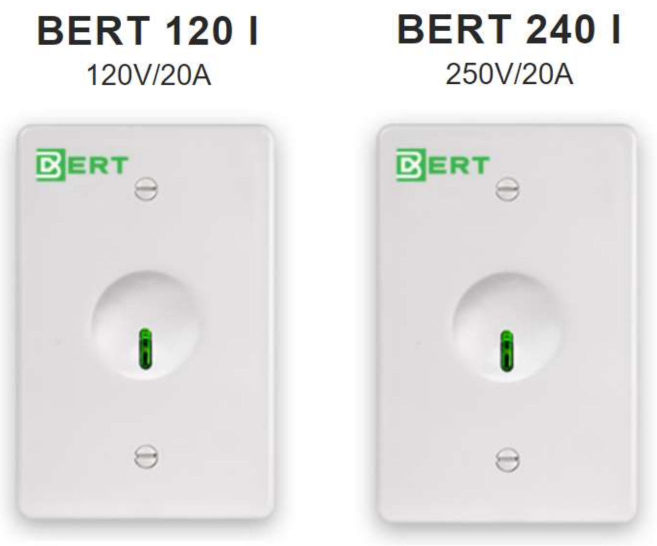
ECM 12 – Plug Load Controls

Dumont Board of Education

✓ (white)	ECM evaluated but not included
✓ (green)	ECM included in the project

ECM #	ECM DESCRIPTION	Administration Building	Dumont High School	Grant School	Honiss School	Lincoln School	Selzer School
12	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 buildings 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.

Plug Load Controller Scope of Work

BUILDING	CATEGORY	NOTES	QUANTITY
Administration Building	**Bert 110X**	Network Verification Units	1/6
	Bert 110X		14
	Bert 110X	3 Years Extended software maintenance- metering	14
	Bert 240I Inline	**Bert 240I Inline**	0
	Bert 240I Inline	3 Years Extended software maintenance- metering - must be installed by licensed electrician	0
	Bert Harness	Bert Harness	0
	Bert Harness Installation	Bert Harness Installation	0
	Screws 6-32 X 3/4"	**Screws 6-32 X 3/4" TO SCREW Bert into outlet**	14
	Device Sticker	Sticker to attach device power cord	14
	Instructions	End User Instructions	14
	Set up	Preload SSID and Passphrase - Plug ins	14
	Set up	Preload SSID and Passphrase - inlines	0
	Program	Name, Group and Schedule Berts	14
	Test	Verify network communication and final test	14
	Training	Remote software training/ customer signoff	14
	Installation	Install Berts and record MAC address- assumes no prevailing wage - plug in units only	14
	Travel	Travel Expensers	1/6
	Shipping	FedEx Ground	14
Dumont High School	**Bert 110X**	Network Verification Units	1/6
	Bert 110X		74
	Bert 110X	3 Years Extended software maintenance- metering	74
	Bert 240I Inline	**Bert 240I Inline**	12
	Bert 240I Inline	3 Years Extended software maintenance- metering - must be installed by licensed electrician	12
	Bert Harness	Bert Harness	6
	Bert Harness Installation	Bert Harness Installation	6
	Screws 6-32 X 3/4"	**Screws 6-32 X 3/4" TO SCREW Bert into outlet**	74
	Device Sticker	Sticker to attach device power cord	74
	Instructions	End User Instructions	86
	Set up	Preload SSID and Passphrase - Plug ins	74
	Set up	Preload SSID and Passphrase - inlines	12
	Program	Name, Group and Schedule Berts	86
	Test	Verify network communication and final test	86
	Training	Remote software training/ customer signoff	86
	Installation	Install Berts and record MAC address- assumes no prevailing wage - plug in units only	74
	Travel	Travel Expensers	1/6
	Shipping	FedEx Ground	86

Plug Load Controller Scope of Work

BUILDING	CATEGORY	NOTES	QUANTITY
Grant School	Bert 110X	Network Verification Units	1/6
	Bert 110X		51
	Bert 110X	3 Years Extended software maintenance- metering	51
	Bert 240I Inline	**Bert 240I Inline**	0
	Bert 240I Inline	3 Years Extended software maintenance- metering - must be installed by licensed electrician	0
	Bert Harness	Bert Harness	12
	Bert Harness Installation	Bert Harness Installation	12
	Screws 6-32 X 3/4"	**Screws 6-32 X 3/4" TO SCREW Bert into outlet**	51
	Device Sticker	Sticker to attach device power cord	51
	Instructions	End User Instructions	51
	Set up	Preload SSID and Passphrase - Plug ins	51
	Set up	Preload SSID and Passphrase - inlines	0
	Program	Name, Group and Schedule Berts	51
	Test	Verify network communication and final test	51
	Training	Remote software training/ customer signoff	51
	Installation	Install Berts and record MAC address- assumes no prevailing wage - plug in units only	51
	Travel	Travel Expensers	1/6
	Shipping	FedEx Ground	51
Honiss School	Bert 110X	Network Verification Units	1/6
	Bert 110X		66
	Bert 110X	3 Years Extended software maintenance- metering	66
	Bert 240I Inline	**Bert 240I Inline**	3
	Bert 240I Inline	3 Years Extended software maintenance- metering - must be installed by licensed electrician	3
	Bert Harness	Bert Harness	24
	Bert Harness Installation	Bert Harness Installation	24
	Screws 6-32 X 3/4"	**Screws 6-32 X 3/4" TO SCREW Bert into outlet**	66
	Device Sticker	Sticker to attach device power cord	66
	Instructions	End User Instructions	69
	Set up	Preload SSID and Passphrase - Plug ins	66
	Set up	Preload SSID and Passphrase - inlines	3
	Program	Name, Group and Schedule Berts	69
	Test	Verify network communication and final test	69
	Training	Remote software training/ customer signoff	69
	Installation	Install Berts and record MAC address- assumes no prevailing wage - plug in units only	66
	Travel	Travel Expensers	1/6
	Shipping	FedEx Ground	69
Lincoln School	Bert 110X	Network Verification Units	1/6
	Bert 110X		38
	Bert 110X	3 Years Extended software maintenance- metering	38
	Bert 240I Inline	**Bert 240I Inline**	1
	Bert 240I Inline	3 Years Extended software maintenance- metering - must be installed by licensed electrician	1
	Bert Harness	Bert Harness	12
	Bert Harness Installation	Bert Harness Installation	12
	Screws 6-32 X 3/4"	**Screws 6-32 X 3/4" TO SCREW Bert into outlet**	38
	Device Sticker	Sticker to attach device power cord	38
	Instructions	End User Instructions	39
	Set up	Preload SSID and Passphrase - Plug ins	38
	Set up	Preload SSID and Passphrase - inlines	1
	Program	Name, Group and Schedule Berts	39
	Test	Verify network communication and final test	39
	Training	Remote software training/ customer signoff	39
	Installation	Install Berts and record MAC address- assumes no prevailing wage - plug in units only	38
	Travel	Travel Expensers	1/6
	Shipping	FedEx Ground	39
Selzer School	Bert 110X	Network Verification Units	1/6
	Bert 110X		67
	Bert 110X	3 Years Extended software maintenance- metering	67
	Bert 240I Inline	**Bert 240I Inline**	1
	Bert 240I Inline	3 Years Extended software maintenance- metering - must be installed by licensed electrician	1
	Bert Harness	Bert Harness	22
	Bert Harness Installation	Bert Harness Installation	22
	Screws 6-32 X 3/4"	**Screws 6-32 X 3/4" TO SCREW Bert into outlet**	67
	Device Sticker	Sticker to attach device power cord	67
	Instructions	End User Instructions	68
	Set up	Preload SSID and Passphrase - Plug ins	67
	Set up	Preload SSID and Passphrase - inlines	1
	Program	Name, Group and Schedule Berts	68
	Test	Verify network communication and final test	68
	Training	Remote software training/ customer signoff	68
	Installation	Install Berts and record MAC address- assumes no prevailing wage - plug in units only	67
	Travel	Travel Expensers	1/6
	Shipping	FedEx Ground	68

ECM Calculations

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

CALCULATED SAVINGS

Plug Load Controller Savings

BUILDING NAME	Device Type	Plug Load Type	Quantity	Standby Power Draw	Baseline Hours Scheduled ON	Controller Hours	Controller Hours	Annual Energy	Total Annual Energy
Administration Building	Smartboard TV	Bert 110X	1	8	8,760	2,405	6,355	51	3,247
Administration Building	Copier - 110 15A	Bert 110X	2	40	8,760	2,405	6,355	508	
Administration Building	Printer	Bert 110X	6	15	8,760	2,405	6,355	572	
Administration Building	Air Scrubber	Bert 110X	4	68	8,760	2,405	6,355	1,729	
Administration Building	H/C Water Disp.	Bert 110X	1	61	8,760	2,405	6,355	388	
Dumont High School	Projector	Bert 110X	32	8	8,760	2,405	6,355	1,627	8,096
Dumont High School	Smartboard TV	Bert 110X	5	8	8,760	2,405	6,355	254	
Dumont High School	Copier - 110 15A	Bert 110X	2	40	8,760	2,405	6,355	508	
Dumont High School	Charging Cart	Bert 110X	6	37	8,760	2,405	6,355	1,411	
Dumont High School	Printer	Bert 110X	24	15	8,760	2,405	6,355	2,288	
Dumont High School	Air Scrubber	Bert 110X	3	68	8,760	2,405	6,355	1,296	
Dumont High School	AC - 110V (15A)	Bert 110X	2	8	8,760	2,405	6,355	102	
Dumont High School	AC - 220V (< 20A)	Bert 240I Inline	12	8	8,760	2,405	6,355	610	
Grant School	Projector	Bert 110X	14	8	8,760	2,035	6,725	753	9,032
Grant School	Smartboard TV	Bert 110X	6	8	8,760	2,035	6,725	323	
Grant School	Copier - 110 15A	Bert 110X	1	40	8,760	2,035	6,725	269	
Grant School	Charging Cart	Bert 110X	12	37	8,760	2,035	6,725	2,986	
Grant School	Printer	Bert 110X	10	15	8,760	2,035	6,725	1,009	
Grant School	Soda Vending	Bert 110X	1	320	8,760	2,035	6,725	2,152	
Grant School	Air Scrubber	Bert 110X	2	68	8,760	2,035	6,725	915	
Grant School	H/C Water Disp.	Bert 110X	1	61	8,760	2,035	6,725	410	
Grant School	AC - 110V (15A)	Bert 110X	4	8	8,760	2,035	6,725	215	

CALCULATED SAVINGS

Plug Load Controller Savings

BUILDING NAME	Device Type	Plug Load Type	Quantity	Standby Power Draw	Baseline Hours Scheduled ON	Controller Hours	Controller Hours	Annual Energy	Total Annual Energy
Honiss School	Projector	Bert 110X	22	8	8,760	2,220	6,540	1,151	9,267
Honiss School	Smartboard TV	Bert 110X	5	8	8,760	2,220	6,540	262	
Honiss School	Copier - 110 15A	Bert 110X	1	40	8,760	2,220	6,540	262	
Honiss School	Charging Cart	Bert 110X	24	37	8,760	2,220	6,540	5,808	
Honiss School	Printer	Bert 110X	11	15	8,760	2,220	6,540	1,079	
Honiss School	Air Scrubber	Bert 110X	1	68	8,760	2,220	6,540	445	
Honiss School	AC - 110V (15A)	Bert 110X	2	8	8,760	2,220	6,540	105	
Honiss School	AC - 220V (< 20A)	Bert 240I Inline	3	8	8,760	2,220	6,540	157	
Lincoln School	Projector	Bert 110X	5	8	8,760	2,035	6,725	269	6,362
Lincoln School	Smartboard TV	Bert 110X	7	8	8,760	2,035	6,725	377	
Lincoln School	Copier - 110 15A	Bert 110X	2	40	8,760	2,035	6,725	538	
Lincoln School	Charging Cart	Bert 110X	12	37	8,760	2,035	6,725	2,986	
Lincoln School	Printer	Bert 110X	6	15	8,760	2,035	6,725	605	
Lincoln School	Air Scrubber	Bert 110X	3	68	8,760	2,035	6,725	1,372	
Lincoln School	AC - 110V (15A)	Bert 110X	3	8	8,760	2,035	6,725	161	
Lincoln School	AC - 220V (< 20A)	Bert 240I Inline	1	8	8,760	2,035	6,725	54	
Selzer School	Projector	Bert 110X	19	8	8,760	2,220	6,540	994	9,346
Selzer School	Smartboard TV	Bert 110X	7	8	8,760	2,220	6,540	366	
Selzer School	Copier - 110 15A	Bert 110X	2	40	8,760	2,220	6,540	523	
Selzer School	Charging Cart	Bert 110X	22	37	8,760	2,220	6,540	5,324	
Selzer School	Printer	Bert 110X	10	15	8,760	2,220	6,540	981	
Selzer School	Air Scrubber	Bert 110X	1	68	8,760	2,220	6,540	445	
Selzer School	H/C Water Disp.	Bert 110X	1	61	8,760	2,220	6,540	399	
Selzer School	AC - 110V (15A)	Bert 110X	5	8	8,760	2,220	6,540	262	
Selzer School	AC - 220V (< 20A)	Bert 240I Inline	1	8	8,760	2,220	6,540	52	

4.6.3.11 Plug and Process Load Reduction Measures

- EEMs saving energy by eliminating or reducing idle or stand-by power consumption of connected plug loads through the use of the following eligible plug load controls. The percentages presented in the following tables represent the maximum energy reduction percentage that can be claimed for the plug load control.

  - *Load Sensing Controls:* Monitors a specific devices power state and de-energizes connected auxiliary units when the monitored devise enters a low power state.

Load Sensing Control	
Space Type	**Percent Energy Reduction from Baseline**
Workstation	4%
Print Rooms	32%

  - *Occupancy Sensing Controls:* Automatically de-energize devices when no user is present for a set period of time.

Occupancy Control	
Space Type	**Percent Energy Reduction from Baseline**
All	21%

  - *Scheduled Timer Control:* Allows users to set a schedule to energize and de-energize devices based on the devices usage pattern and space schedule.

Schedule Timer Control	
Space Type	**Percent Energy Reduction from Baseline**
Workstation	26%
Print Rooms	50%
Break Rooms	46%

ECM 13 – Pipe and Valve Insulation

Dumont Board of Education

✔ (white)	ECM evaluated but not included
✔ (green)	ECM included in the project

ECM #	ECM DESCRIPTION	Administration Building	Dumont High School	Grant School	Honiss School	Lincoln School	Selzer School
13	Pipe and Valve Insulation	✔	✔	✔	✔	✔	✔

Background

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


Uninsulated condensate tank and heating hot water distribution piping at Honiss and Selzer Schools.


Uninsulated steam distribution and heating hot water distribution piping at Grant School and Administration Building

Scope of Work

Pipe and Valve Insulation Scope of Work

BUILDING	Component	Fluid Type
Administration Building	45 Degree Elbow	MTHW
Administration Building	90 Degree Elbow	MTHW
Administration Building	Flo-Check	MTHW
Administration Building	Gate Valve	MTHW
Administration Building	In-Line Pump	MTHW
Administration Building	Straight Pipe	MTHW
Administration Building	T Intersection	MTHW
Administration Building	45 Degree Elbow	MTHW
Administration Building	90 Degree Elbow	MTHW
Administration Building	Ball valve	MTHW
Administration Building	Straight Pipe	MTHW
Administration Building	45 Degree Elbow	MTHW
Administration Building	90 Degree Elbow	MTHW
Administration Building	Air Scoop	MTHW
Administration Building	Straight Pipe	MTHW
Administration Building	T Intersection	MTHW
Dumont High School	90 Degree Elbow	LPS
Dumont High School	Flange	LPS
Dumont High School	Gate Valve	LPS
Dumont High School	Straight Pipe	LPS
Dumont High School	T Intersection	LPS
Dumont High School	90 Degree Elbow	LPS
Dumont High School	Flange	LPS
Dumont High School	Gate Valve	LPS
Dumont High School	Flange	LPS
Dumont High School	Gate Valve	LPS
Dumont High School	Flange	LPS
Dumont High School	Gate Valve	LPS
Dumont High School	Straight Pipe	LPS
Dumont High School	End Cap	LPS
Dumont High School	90 Degree Elbow	Cond
Dumont High School	Steam Trap	Cond
Dumont High School	Straight Pipe	Cond
Dumont High School	Strainer	Cond
Dumont High School	90 Degree Elbow	Cond
Dumont High School	Ball valve	Cond
Dumont High School	Flange	Cond
Dumont High School	Straight Pipe	Cond
Dumont High School	90 Degree Elbow	Cond
Dumont High School	Straight Pipe	Cond

Pipe and Valve Insulation Scope of Work

BUILDING	Component	Fluid Type
Lincoln School	45 Degree Elbow	MTHW
Lincoln School	90 Degree Elbow	MTHW
Lincoln School	Ball valve	MTHW
Lincoln School	Flange	MTHW
Lincoln School	Flex Fitting	MTHW
Lincoln School	In-Line Pump	MTHW
Lincoln School	Straight Pipe	MTHW
Lincoln School	Strainer	MTHW
Lincoln School	Triple Duty Valve	MTHW
Lincoln School	90 Degree Elbow	LPS
Lincoln School	Straight Pipe	LPS
Lincoln School	90 Degree Elbow	LPS
Lincoln School	Straight Pipe	LPS
Lincoln School	45 Degree Elbow	LPS
Lincoln School	90 Degree Elbow	LPS
Lincoln School	Flange	LPS
Lincoln School	Gate Valve	LPS
Lincoln School	Straight Pipe	LPS
Lincoln School	T Intersection	LPS
Lincoln School	Flange	LPS
Lincoln School	90 Degree Elbow	LPS
Lincoln School	Bonnet	LPS
Lincoln School	End Cap	LPS
Lincoln School	Flange	LPS
Lincoln School	45 Degree Elbow	Cond
Lincoln School	90 Degree Elbow	Cond
Lincoln School	In-Line Pump	Cond
Lincoln School	Straight Pipe	Cond
Lincoln School	90 Degree Elbow	Cond
Lincoln School	Gate Valve	Cond
Lincoln School	In-Line Pump	Cond
Lincoln School	Steam Trap	Cond
Lincoln School	Straight Pipe	Cond
Lincoln School	Strainer	Cond
Lincoln School	45 Degree Elbow	Cond
Lincoln School	90 Degree Elbow	Cond
Lincoln School	Ball valve	Cond
Lincoln School	Check Valve	Cond
Lincoln School	Straight Pipe	Cond
Lincoln School	T Intersection	Cond
Lincoln School	90 Degree Elbow	Cond
Lincoln School	Gate Valve	Cond
Lincoln School	Straight Pipe	Cond
Lincoln School	45 Degree Elbow	Cond
Lincoln School	90 Degree Elbow	Cond
Lincoln School	Gate Valve	Cond
Lincoln School	Straight Pipe	Cond
Lincoln School	Strainer	Cond
Lincoln School	T Intersection	Cond

Pipe and Valve Insulation Scope of Work

BUILDING	Component	Fluid Type
Grant School	45 Degree Elbow	MTHW
Grant School	90 Degree Elbow	MTHW
Grant School	Ball valve	MTHW
Grant School	Flange	MTHW
Grant School	Flex Fitting	MTHW
Grant School	In-Line Pump	MTHW
Grant School	Straight Pipe	MTHW
Grant School	Strainer	MTHW
Grant School	Triple Duty Valve	MTHW
Grant School	90 Degree Elbow	LPS
Grant School	Straight Pipe	LPS
Grant School	90 Degree Elbow	LPS
Grant School	Straight Pipe	LPS
Grant School	45 Degree Elbow	LPS
Grant School	90 Degree Elbow	LPS
Grant School	Flange	LPS
Grant School	Gate Valve	LPS
Grant School	Straight Pipe	LPS
Grant School	T Intersection	LPS
Grant School	Flange	LPS
Grant School	90 Degree Elbow	LPS
Grant School	Bonnet	LPS
Grant School	End Cap	LPS
Grant School	Flange	LPS
Grant School	45 Degree Elbow	Cond
Grant School	90 Degree Elbow	Cond
Grant School	In-Line Pump	Cond
Grant School	Straight Pipe	Cond
Grant School	90 Degree Elbow	Cond
Grant School	Gate Valve	Cond
Grant School	In-Line Pump	Cond
Grant School	Steam Trap	Cond
Grant School	Straight Pipe	Cond
Grant School	Strainer	Cond
Grant School	45 Degree Elbow	Cond
Grant School	90 Degree Elbow	Cond
Grant School	Ball valve	Cond
Grant School	Check Valve	Cond
Grant School	Straight Pipe	Cond
Grant School	T Intersection	Cond
Grant School	90 Degree Elbow	Cond
Grant School	Gate Valve	Cond
Grant School	Straight Pipe	Cond
Grant School	45 Degree Elbow	Cond
Grant School	90 Degree Elbow	Cond
Grant School	Gate Valve	Cond
Grant School	Straight Pipe	Cond
Grant School	Strainer	Cond
Grant School	T Intersection	Cond

Pipe and Valve Insulation Scope of Work

BUILDING	Component	Fluid Type
Honiss School	90 Degree Elbow	MTHW
Honiss School	Flange	MTHW
Honiss School	Flex Fitting	MTHW
Honiss School	Straight Pipe	MTHW
Honiss School	90 Degree Elbow	MTHW
Honiss School	Bonnet	MTHW
Honiss School	Control Valve	MTHW
Honiss School	End Cap	MTHW
Honiss School	Flange	MTHW
Honiss School	Flex Fitting	MTHW
Honiss School	Gate Valve	MTHW
Honiss School	Straight Pipe	MTHW
Honiss School	Bonnet	LPS
Honiss School	Bonnet	LPS
Honiss School	90 Degree Elbow	LPS
Honiss School	Flange	LPS
Honiss School	Straight Pipe	LPS
Honiss School	T Intersection	LPS
Honiss School	Bonnet	LPS
Honiss School	End Cap	LPS
Honiss School	Flange	LPS
Honiss School	Bonnet	LPS
Honiss School	End Cap	LPS
Honiss School	Flange	LPS
Honiss School	Gate Valve	LPS
Honiss School	Flange	LPS
Honiss School	45 Degree Elbow	Cond
Honiss School	90 Degree Elbow	Cond
Honiss School	Steam Trap	Cond
Honiss School	Straight Pipe	Cond
Honiss School	45 Degree Elbow	Cond
Honiss School	Straight Pipe	Cond
Honiss School	45 Degree Elbow	Cond
Honiss School	90 Degree Elbow	Cond
Honiss School	Straight Pipe	Cond
Honiss School	90 Degree Elbow	Cond
Honiss School	Ball valve	Cond
Honiss School	Check Valve	Cond
Honiss School	In-Line Pump	Cond
Honiss School	Straight Pipe	Cond
Honiss School	90 Degree Elbow	Cond
Honiss School	Steam Trap	Cond
Honiss School	Straight Pipe	Cond
Honiss School	Strainer	Cond
Honiss School	T Intersection	Cond

Pipe and Valve Insulation Scope of Work		
BUILDING	Component	Fluid Type
Selzer School	Butterfly Valve	MTHW
Selzer School	In-Line Pump	MTHW
Selzer School	Straight Pipe	MTHW
Selzer School	T Intersection	MTHW
Selzer School	Triple Duty Valve	MTHW
Selzer School	90 Degree Elbow	MTHW
Selzer School	Flex Fitting	MTHW
Selzer School	Gate Valve	MTHW
Selzer School	Straight Pipe	MTHW
Selzer School	T Intersection	MTHW
Selzer School	45 Degree Elbow	MTHW
Selzer School	90 Degree Elbow	MTHW
Selzer School	Check Valve	MTHW
Selzer School	Control Valve	MTHW
Selzer School	Flange	MTHW
Selzer School	Flex Fitting	MTHW
Selzer School	Flo-Check	MTHW
Selzer School	Gate Valve	MTHW
Selzer School	Pipe Reducer	MTHW
Selzer School	Straight Pipe	MTHW
Selzer School	Strainer	MTHW
Selzer School	T Intersection	MTHW
Selzer School	Straight Pipe	MTHW
Selzer School	T Intersection	MTHW

Insulation will be installed on exposed pipes and valves. Failed insulation will be replaced. Poorly insulated pipes in the heating and cooling distribution system is 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
  - Fiberglass
  - Mineral wool
  - Foamglass
  - Styrofoam
  - Urethane
  - Closed cell rubber

ECM Calculations

Hot water pipe insulation is calculated using NJ BPU Protocols.

CALCULATED SAVINGS

Pipe and Valve Insulation Savings

BUILDING	Component	Fluid Type	Pipe Dia (") or Tank Surface Area(SF)*	Total Eq Length(LF) or Total Area(SF)*	AMBIENT TEMP	Fluid Temperature	Savings Factor	OPERATION HOURS/YEAR	Heating / Cooling Efficiency	Proposed Insulation Thickness	Savings Factor	Fuel Savings Therms	Total Therms by Fluid Type	Total Therms
Administration Building	45 Degree Elbow	MTHW	1	5	85	185	85	3,300	0.83	1.5	0.769	12.998	837.50	837.50
Administration Building	90 Degree Elbow	MTHW	1	19.8	85	185	85	3,300	0.83	1.5	0.769	51.473		
Administration Building	Flo-Check	MTHW	1	16.4	85	185	85	3,300	0.83	1.5	0.769	42.634		
Administration Building	Gate Valve	MTHW	1	60	85	185	85	3,300	0.83	1.5	0.769	155.978		
Administration Building	In-Line Pump	MTHW	1	20	85	185	85	3,300	0.83	1.5	0.769	51.993		
Administration Building	Straight Pipe	MTHW	1	40	85	185	85	3,300	0.83	1.5	0.769	103.985		
Administration Building	T Intersection	MTHW	1	9.6	85	185	85	3,300	0.83	1.5	0.769	24.956		
Administration Building	45 Degree Elbow	MTHW	1.25	1	85	185	107	3,300	0.83	1.5	0.769	3.272		
Administration Building	90 Degree Elbow	MTHW	1.25	12.6	85	185	107	3,300	0.83	1.5	0.769	41.233		
Administration Building	Ball valve	MTHW	1.25	8.2	85	185	107	3,300	0.83	1.5	0.769	26.834		
Administration Building	Straight Pipe	MTHW	1.25	20	85	185	107	3,300	0.83	1.5	0.769	65.449		
Administration Building	45 Degree Elbow	MTHW	2	1	85	185	153	3,300	0.83	2.0	0.769	4.679		
Administration Building	90 Degree Elbow	MTHW	2	14.4	85	185	153	3,300	0.83	2.0	0.769	67.382		
Administration Building	Air Scoop	MTHW	2	4.4	85	185	148	3,300	0.83	1.5	0.769	19.916		
Administration Building	Straight Pipe	MTHW	2	28	85	185	153	3,300	0.83	2.0	0.769	131.021		
Administration Building	T Intersection	MTHW	2	7.2	85	185	153	3,300	0.83	2.0	0.769	33.691		
Dumont High School	90 Degree Elbow	LPS	3	7.2	85	205	236	4,282	0.80	2.5	0.923	83.954	2,362	3,146.47
Dumont High School	Flange	LPS	3	18	85	205	230	4,282	0.80	1.5	0.923	204.548		
Dumont High School	Gate Valve	LPS	3	25	85	205	230	4,282	0.80	1.5	0.923	284.094		
Dumont High School	Straight Pipe	LPS	3	18	85	205	236	4,282	0.80	2.5	0.923	209.884		
Dumont High School	T Intersection	LPS	3	7.2	85	205	236	4,282	0.80	2.5	0.923	83.954		
Dumont High School	90 Degree Elbow	LPS	4	1.8	85	205	281	4,282	0.80	3.0	0.923	24.990		
Dumont High School	Flange	LPS	4	18	85	205	274	4,282	0.80	1.5	0.923	243.679		
Dumont High School	Gate Valve	LPS	4	25	85	205	274	4,282	0.80	1.5	0.923	338.443		
Dumont High School	Flange	LPS	6	3.6	85	205	281	4,282	0.80	1.5	0.923	49.981		
Dumont High School	Gate Valve	LPS	6	5	85	205	281	4,282	0.80	1.5	0.923	69.418		
Dumont High School	Flange	LPS	8	21.6	85	205	281	4,282	0.80	1.5	0.923	299.885		
Dumont High School	Gate Valve	LPS	8	10	85	205	281	4,282	0.80	1.5	0.923	138.836		
Dumont High School	Straight Pipe	LPS	8	22	85	205	281	4,282	0.80	3.0	0.923	305.438		
Dumont High School	End Cap	LPS	12	1.8	85	205	281	4,282	0.80	3.0	0.923	24.990		
Dumont High School	90 Degree Elbow	Cond	1	28.8	85	165	85	4,282	0.80	1.5	0.615	80.633	784	
Dumont High School	Steam Trap	Cond	1	22	85	165	85	4,282	0.80	1.5	0.615	61.595		
Dumont High School	Straight Pipe	Cond	1	56	85	165	85	4,282	0.80	1.5	0.615	156.787		
Dumont High School	Strainer	Cond	1	25	85	165	85	4,282	0.80	1.5	0.615	69.994		
Dumont High School	90 Degree Elbow	Cond	3	5.4	85	165	185	4,282	0.80	2.0	0.615	32.906		
Dumont High School	Ball valve	Cond	3	4.1	85	165	182	4,282	0.80	1.5	0.615	24.579		
Dumont High School	Flange	Cond	3	1.8	85	165	182	4,282	0.80	1.5	0.615	10.791		
Dumont High School	Straight Pipe	Cond	3	12	85	165	185	4,282	0.80	2.0	0.615	73.123		
Dumont High School	90 Degree Elbow	Cond	4	3.6	85	165	281	4,282	0.80	2.0	0.615	33.321		
Dumont High School	Straight Pipe	Cond	4	26	85	165	281	4,282	0.80	2.0	0.615	240.648		

CALCULATED SAVINGS

Pipe and Valve Insulation Savings

BUILDING	Component	Fluid Type	Pipe Dia (") or Tank Surface Area(SF)*	Total Eq Length(LF) or Total Area(SF)*	AMBIENT TEMP	Fluid Temperature	Savings Factor	OPERATION HOURS/YEAR	Heating / Cooling Efficiency	Proposed Insulation Thickness	Savings Factor	Fuel Savings Therms	Total Therms by Fluid Type	Total Therms
Grant School	45 Degree Elbow	MTHW	2	1	85	185	153	2,850	0.83	2.0	0.769	4.041		
Grant School	90 Degree Elbow	MTHW	2	19.8	85	185	153	2,850	0.83	2.0	0.769	80.017		
Grant School	Ball valve	MTHW	2	8.2	85	185	148	2,850	0.83	1.5	0.769	32.055		
Grant School	Flange	MTHW	2	7.2	85	185	148	2,850	0.83	1.5	0.769	28.146		
Grant School	Flex Fitting	MTHW	2	6	85	185	148	2,850	0.83	1.5	0.769	23.455	293.08	
Grant School	In-Line Pump	MTHW	2	10	85	185	148	2,850	0.83	1.5	0.769	39.092		
Grant School	Straight Pipe	MTHW	2	8	85	185	153	2,850	0.83	2.0	0.769	32.330		
Grant School	Strainer	MTHW	2	5	85	185	148	2,850	0.83	1.5	0.769	19.546		
Grant School	Triple Duty Valve	MTHW	2	8.8	85	185	148	2,850	0.83	1.5	0.769	34.401		
Grant School	90 Degree Elbow	LPS	2	1.8	85	205	153	2,850	0.80	2.5	0.923	9.056		
Grant School	Straight Pipe	LPS	2	8	85	205	153	2,850	0.80	2.5	0.923	40.251		
Grant School	90 Degree Elbow	LPS	3	3.6	85	205	236	2,850	0.80	2.5	0.923	27.939		
Grant School	Straight Pipe	LPS	3	13	85	205	236	2,850	0.80	2.5	0.923	100.890		
Grant School	45 Degree Elbow	LPS	4	1	85	205	281	2,850	0.80	3.0	0.923	9.241		
Grant School	90 Degree Elbow	LPS	4	10.8	85	205	281	2,850	0.80	3.0	0.923	99.798		
Grant School	Flange	LPS	4	9	85	205	274	2,850	0.80	1.5	0.923	81.093		
Grant School	Gate Valve	LPS	4	10	85	205	274	2,850	0.80	1.5	0.923	90.104	1,185	
Grant School	Straight Pipe	LPS	4	45	85	205	281	2,850	0.80	3.0	0.923	415.826		
Grant School	T Intersection	LPS	4	12	85	205	281	2,850	0.80	3.0	0.923	110.887		
Grant School	Flange	LPS	6	10.8	85	205	281	2,850	0.80	1.5	0.923	99.798		
Grant School	90 Degree Elbow	LPS	8	1.8	85	205	281	2,850	0.80	3.0	0.923	16.633		
Grant School	Bonnet	LPS	8	3.6	85	205	281	2,850	0.80	1.5	0.923	33.266		
Grant School	End Cap	LPS	8	3.6	85	205	281	2,850	0.80	3.0	0.923	33.266		
Grant School	Flange	LPS	8	1.8	85	205	281	2,850	0.80	1.5	0.923	16.633		
Grant School	45 Degree Elbow	Cond	1	2	85	165	68	2,850	0.80	1.5	0.615	2.982		2,271.38
Grant School	90 Degree Elbow	Cond	1	7.2	85	165	68	2,850	0.80	1.5	0.615	10.734		
Grant School	In-Line Pump	Cond	1	5	85	165	68	2,850	0.80	1.5	0.615	7.454		
Grant School	Straight Pipe	Cond	1	8	85	165	68	2,850	0.80	1.5	0.615	11.926		
Grant School	90 Degree Elbow	Cond	1	23.4	85	165	85	2,850	0.80	1.5	0.615	43.605		
Grant School	Gate Valve	Cond	1	20	85	165	85	2,850	0.80	1.5	0.615	37.269		
Grant School	In-Line Pump	Cond	1	10	85	165	85	2,850	0.80	1.5	0.615	18.635		
Grant School	Steam Trap	Cond	1	8.8	85	165	85	2,850	0.80	1.5	0.615	16.398		
Grant School	Straight Pipe	Cond	1	15	85	165	85	2,850	0.80	1.5	0.615	27.952		
Grant School	Strainer	Cond	1	10	85	165	85	2,850	0.80	1.5	0.615	18.635		
Grant School	45 Degree Elbow	Cond	2	1	85	165	125	2,850	0.80	2.0	0.615	2.740		
Grant School	90 Degree Elbow	Cond	2	18	85	165	125	2,850	0.80	2.0	0.615	49.327		
Grant School	Ball valve	Cond	2	12.3	85	165	120	2,850	0.80	1.5	0.615	32.358	794	
Grant School	Check Valve	Cond	2	4.1	85	165	120	2,850	0.80	1.5	0.615	10.786		
Grant School	Straight Pipe	Cond	2	37	85	165	125	2,850	0.80	2.0	0.615	101.394		
Grant School	T Intersection	Cond	2	3.6	85	165	125	2,850	0.80	2.0	0.615	9.865		
Grant School	90 Degree Elbow	Cond	2	14.4	85	165	153	2,850	0.80	2.0	0.615	48.301		
Grant School	Gate Valve	Cond	2	5	85	165	148	2,850	0.80	1.5	0.615	16.223		
Grant School	Straight Pipe	Cond	2	51	85	165	153	2,850	0.80	2.0	0.615	171.066		
Grant School	45 Degree Elbow	Cond	3	1	85	165	236	2,850	0.80	2.0	0.615	5.174		
Grant School	90 Degree Elbow	Cond	3	9	85	165	236	2,850	0.80	2.0	0.615	46.565		
Grant School	Gate Valve	Cond	3	5	85	165	230	2,850	0.80	1.5	0.615	25.212		
Grant School	Straight Pipe	Cond	3	8	85	165	236	2,850	0.80	2.0	0.615	41.391		
Grant School	Strainer	Cond	3	5	85	165	230	2,850	0.80	1.5	0.615	25.212		
Grant School	T Intersection	Cond	3	2.4	85	165	236	2,850	0.80	2.0	0.615	12.417		

CALCULATED SAVINGS

Pipe and Valve Insulation Savings

BUILDING	Component	Fluid Type	Pipe Dia (") or Tank Surface Area(SF)*	Total Eq Length(LF) or Total Area(SF)*	AMBIENT TEMP	Fluid Temperature	Savings Factor	OPERATION HOURS/YEAR	Heating / Cooling Efficiency	Proposed Insulation Thickness	Savings Factor	Fuel Savings Therms	Total Therms by Fluid Type	Total Therms
Honiss School	90 Degree Elbow	MTHW	3	14.4	85	185	236	4,282	0.83	2.0	0.769	134.865	1,080.9	2,329.6
Honiss School	Flange	MTHW	3	14.4	85	185	230	4,282	0.83	1.5	0.769	131.436		
Honiss School	Flex Fitting	MTHW	3	6	85	185	230	4,282	0.83	1.5	0.769	54.765		
Honiss School	Straight Pipe	MTHW	3	12	85	185	236	4,282	0.83	2.0	0.769	112.388		
Honiss School	90 Degree Elbow	MTHW	4	3.6	85	185	281	4,282	0.83	2.0	0.769	40.145		
Honiss School	Bonnet	MTHW	4	14.4	85	185	274	4,282	0.83	1.5	0.769	156.581		
Honiss School	Control Valve	MTHW	4	4.1	85	185	274	4,282	0.83	1.5	0.769	44.582		
Honiss School	End Cap	MTHW	4	1.8	85	185	281	4,282	0.83	2.0	0.769	20.073		
Honiss School	Flange	MTHW	4	23.4	85	185	274	4,282	0.83	1.5	0.769	254.444		
Honiss School	Flex Fitting	MTHW	4	3	85	185	274	4,282	0.83	1.5	0.769	32.621		
Honiss School	Gate Valve	MTHW	4	5	85	185	274	4,282	0.83	1.5	0.769	54.368		
Honiss School	Straight Pipe	MTHW	4	4	85	185	281	4,282	0.83	2.0	0.769	44.606		
Honiss School	Bonnet	LPS	2	1.8	85	205	148	4,282	0.80	1.5	0.923	13.162	488	
Honiss School	Bonnet	LPS	3	1.8	85	205	230	4,282	0.80	1.5	0.923	20.455		
Honiss School	90 Degree Elbow	LPS	4	1.8	85	205	281	4,282	0.80	3.0	0.923	24.990		
Honiss School	Flange	LPS	4	1.8	85	205	274	4,282	0.80	1.5	0.923	24.368		
Honiss School	Straight Pipe	LPS	4	2	85	205	281	4,282	0.80	3.0	0.923	27.767		
Honiss School	T Intersection	LPS	4	2.4	85	205	281	4,282	0.80	3.0	0.923	33.321		
Honiss School	Bonnet	LPS	6	7.2	85	205	281	4,282	0.80	1.5	0.923	99.962		
Honiss School	End Cap	LPS	6	1.8	85	205	281	4,282	0.80	3.0	0.923	24.990		
Honiss School	Flange	LPS	6	1.8	85	205	281	4,282	0.80	1.5	0.923	24.990		
Honiss School	Bonnet	LPS	8	3.6	85	205	281	4,282	0.80	1.5	0.923	49.981		
Honiss School	End Cap	LPS	8	1.8	85	205	281	4,282	0.80	3.0	0.923	24.990		
Honiss School	Flange	LPS	8	1.8	85	205	281	4,282	0.80	1.5	0.923	24.990		
Honiss School	Gate Valve	LPS	8	5	85	205	281	4,282	0.80	1.5	0.923	69.418		
Honiss School	Flange	LPS	20	1.8	85	205	281	4,282	0.80	1.5	0.923	24.990		
Honiss School	45 Degree Elbow	Cond	1	2	85	165	68	4,282	0.80	1.5	0.615	4.480	760	
Honiss School	90 Degree Elbow	Cond	1	7.2	85	165	68	4,282	0.80	1.5	0.615	16.127		
Honiss School	Steam Trap	Cond	1	4.4	85	165	68	4,282	0.80	1.5	0.615	9.855		
Honiss School	Straight Pipe	Cond	1	20	85	165	68	4,282	0.80	1.5	0.615	44.796		
Honiss School	45 Degree Elbow	Cond	1	2	85	165	85	4,282	0.80	1.5	0.615	5.600		
Honiss School	Straight Pipe	Cond	1	2	85	165	85	4,282	0.80	1.5	0.615	5.600		
Honiss School	45 Degree Elbow	Cond	1	1	85	165	107	4,282	0.80	1.5	0.615	3.524		
Honiss School	90 Degree Elbow	Cond	1	5.4	85	165	107	4,282	0.80	1.5	0.615	19.032		
Honiss School	Straight Pipe	Cond	1	11	85	165	107	4,282	0.80	1.5	0.615	38.769		
Honiss School	90 Degree Elbow	Cond	2	12.6	85	165	125	4,282	0.80	2.0	0.615	51.878		
Honiss School	Ball valve	Cond	2	8.2	85	165	120	4,282	0.80	1.5	0.615	32.411		
Honiss School	Check Valve	Cond	2	8.2	85	165	120	4,282	0.80	1.5	0.615	32.411		
Honiss School	In-Line Pump	Cond	2	10	85	165	120	4,282	0.80	1.5	0.615	39.526		
Honiss School	Straight Pipe	Cond	2	21	85	165	125	4,282	0.80	2.0	0.615	86.463		
Honiss School	90 Degree Elbow	Cond	2	21.6	85	165	153	4,282	0.80	2.0	0.615	108.855		
Honiss School	Steam Trap	Cond	2	8.8	85	165	148	4,282	0.80	1.5	0.615	42.899		
Honiss School	Straight Pipe	Cond	2	24	85	165	153	4,282	0.80	2.0	0.615	120.950		
Honiss School	Strainer	Cond	2	10	85	165	148	4,282	0.80	1.5	0.615	48.749		
Honiss School	T Intersection	Cond	2	9.6	85	165	153	4,282	0.80	2.0	0.615	48.380		

CALCULATED SAVINGS

Pipe and Valve Insulation Savings

BUILDING	Component	Fluid Type	Pipe Dia (") or Tank Surface Area(SF)*	Total Eq Length(LF) or Total Area(SF)*	AMBIENT TEMP	Fluid Temperature	Savings Factor	OPERATION HOURS/YEAR	Heating / Cooling Efficiency	Proposed Insulation Thickness	Savings Factor	Fuel Savings Therms	Total Therms by Fluid Type	Total Therms
Lincoln School	45 Degree Elbow	MTHW	2	1	85	185	153	2,850	0.83	2.0	0.769	4.041	293	2,351
Lincoln School	90 Degree Elbow	MTHW	2	19.8	85	185	153	2,850	0.83	2.0	0.769	80.017		
Lincoln School	Ball valve	MTHW	2	8.2	85	185	148	2,850	0.83	1.5	0.769	32.055		
Lincoln School	Flange	MTHW	2	7.2	85	185	148	2,850	0.83	1.5	0.769	28.146		
Lincoln School	Flex Fitting	MTHW	2	6	85	185	148	2,850	0.83	1.5	0.769	23.455		
Lincoln School	In-Line Pump	MTHW	2	10	85	185	148	2,850	0.83	1.5	0.769	39.092		
Lincoln School	Straight Pipe	MTHW	2	8	85	185	153	2,850	0.83	2.0	0.769	32.330		
Lincoln School	Strainer	MTHW	2	5	85	185	148	2,850	0.83	1.5	0.769	19.546		
Lincoln School	Triple Duty Valve	MTHW	2	8.8	85	185	148	2,850	0.83	1.5	0.769	34.401		
Lincoln School	90 Degree Elbow	LPS	2	1.8	85	205	153	2,850	0.80	2.5	0.923	9.056	1,264	
Lincoln School	Straight Pipe	LPS	2	8	85	205	153	2,850	0.80	2.5	0.923	40.251		
Lincoln School	90 Degree Elbow	LPS	3	10.8	85	205	236	2,850	0.80	2.5	0.923	83.816		
Lincoln School	Straight Pipe	LPS	3	26	85	205	236	2,850	0.80	2.5	0.923	201.780		
Lincoln School	45 Degree Elbow	LPS	4	1	85	205	281	2,850	0.80	3.0	0.923	9.241		
Lincoln School	90 Degree Elbow	LPS	4	10.8	85	205	281	2,850	0.80	3.0	0.923	99.798		
Lincoln School	Flange	LPS	4	5.4	85	205	274	2,850	0.80	1.5	0.923	48.656		
Lincoln School	Gate Valve	LPS	4	5	85	205	274	2,850	0.80	1.5	0.923	45.052		
Lincoln School	Straight Pipe	LPS	4	45	85	205	281	2,850	0.80	3.0	0.923	415.826		
Lincoln School	T Intersection	LPS	4	12	85	205	281	2,850	0.80	3.0	0.923	110.887		
Lincoln School	Flange	LPS	6	10.8	85	205	281	2,850	0.80	1.5	0.923	99.798		
Lincoln School	90 Degree Elbow	LPS	8	1.8	85	205	281	2,850	0.80	3.0	0.923	16.633		
Lincoln School	Bonnet	LPS	8	3.6	85	205	281	2,850	0.80	1.5	0.923	33.266		
Lincoln School	End Cap	LPS	8	3.6	85	205	281	2,850	0.80	3.0	0.923	33.266		
Lincoln School	Flange	LPS	8	1.8	85	205	281	2,850	0.80	1.5	0.923	16.633		
Lincoln School	45 Degree Elbow	Cond	1	2	85	165	68	2,850	0.80	1.5	0.615	2.982	794	
Lincoln School	90 Degree Elbow	Cond	1	7.2	85	165	68	2,850	0.80	1.5	0.615	10.734		
Lincoln School	In-Line Pump	Cond	1	5	85	165	68	2,850	0.80	1.5	0.615	7.454		
Lincoln School	Straight Pipe	Cond	1	8	85	165	68	2,850	0.80	1.5	0.615	11.926		
Lincoln School	90 Degree Elbow	Cond	1	23.4	85	165	85	2,850	0.80	1.5	0.615	43.605		
Lincoln School	Gate Valve	Cond	1	20	85	165	85	2,850	0.80	1.5	0.615	37.269		
Lincoln School	In-Line Pump	Cond	1	10	85	165	85	2,850	0.80	1.5	0.615	18.635		
Lincoln School	Steam Trap	Cond	1	8.8	85	165	85	2,850	0.80	1.5	0.615	16.398		
Lincoln School	Straight Pipe	Cond	1	15	85	165	85	2,850	0.80	1.5	0.615	27.952		
Lincoln School	Strainer	Cond	1	10	85	165	85	2,850	0.80	1.5	0.615	18.635		
Lincoln School	45 Degree Elbow	Cond	2	1	85	165	125	2,850	0.80	2.0	0.615	2.740		
Lincoln School	90 Degree Elbow	Cond	2	18	85	165	125	2,850	0.80	2.0	0.615	49.327		
Lincoln School	Ball valve	Cond	2	12.3	85	165	120	2,850	0.80	1.5	0.615	32.358		
Lincoln School	Check Valve	Cond	2	4.1	85	165	120	2,850	0.80	1.5	0.615	10.786		
Lincoln School	Straight Pipe	Cond	2	37	85	165	125	2,850	0.80	2.0	0.615	101.394		
Lincoln School	T Intersection	Cond	2	3.6	85	165	125	2,850	0.80	2.0	0.615	9.865		
Lincoln School	90 Degree Elbow	Cond	2	14.4	85	165	153	2,850	0.80	2.0	0.615	48.301		
Lincoln School	Gate Valve	Cond	2	5	85	165	148	2,850	0.80	1.5	0.615	16.223		
Lincoln School	Straight Pipe	Cond	2	51	85	165	153	2,850	0.80	2.0	0.615	171.066		
Lincoln School	45 Degree Elbow	Cond	3	1	85	165	236	2,850	0.80	2.0	0.615	5.174		
Lincoln School	90 Degree Elbow	Cond	3	9	85	165	236	2,850	0.80	2.0	0.615	46.565		
Lincoln School	Gate Valve	Cond	3	5	85	165	230	2,850	0.80	1.5	0.615	25.212		
Lincoln School	Straight Pipe	Cond	3	8	85	165	236	2,850	0.80	2.0	0.615	41.391		
Lincoln School	Strainer	Cond	3	5	85	165	230	2,850	0.80	1.5	0.615	25.212		
Lincoln School	T Intersection	Cond	3	2.4	85	165	236	2,850	0.80	2.0	0.615	12.417		

CALCULATED SAVINGS

Pipe and Valve Insulation Savings

BUILDING	Component	Fluid Type	Pipe Dia (") or Tank Surface Area(SF)*	Total Eq Length(LF) or Total Area(SF)*	AMBIENT TEMP	Fluid Temperature	Savings Factor	OPERATION HOURS/YEAR	Heating / Cooling Efficiency	Proposed Insulation Thickness	Savings Factor	Fuel Savings Therms	Total Therms by Fluid Type	Total Therms
Selzer School	Butterfly Valve	MTHW	2	4.1	85	185	120	4,282	0.83	1.5	0.769	19.525	3419.37	3419.37
Selzer School	In-Line Pump	MTHW	2	5	85	185	120	4,282	0.83	1.5	0.769	23.811		
Selzer School	Straight Pipe	MTHW	2	3	85	185	125	4,282	0.83	2.0	0.769	14.882		
Selzer School	T Intersection	MTHW	2	1.2	85	185	125	4,282	0.83	2.0	0.769	5.953		
Selzer School	Triple Duty Valve	MTHW	2	4.4	85	185	120	4,282	0.83	1.5	0.769	20.954		
Selzer School	90 Degree Elbow	MTHW	2	30.6	85	185	153	4,282	0.83	2.0	0.769	185.797		
Selzer School	Flex Fitting	MTHW	2	6	85	185	148	4,282	0.83	1.5	0.769	35.240		
Selzer School	Gate Valve	MTHW	2	20	85	185	148	4,282	0.83	1.5	0.769	117.467		
Selzer School	Straight Pipe	MTHW	2	120	85	185	153	4,282	0.83	2.0	0.769	728.615		
Selzer School	T Intersection	MTHW	2	1.2	85	185	153	4,282	0.83	2.0	0.769	7.286		
Selzer School	45 Degree Elbow	MTHW	4	4	85	185	281	4,282	0.83	2.0	0.769	44.606		
Selzer School	90 Degree Elbow	MTHW	4	12.6	85	185	281	4,282	0.83	2.0	0.769	140.508		
Selzer School	Check Valve	MTHW	4	4.1	85	185	274	4,282	0.83	1.5	0.769	44.582		
Selzer School	Control Valve	MTHW	4	4.1	85	185	274	4,282	0.83	1.5	0.769	44.582		
Selzer School	Flange	MTHW	4	36	85	185	274	4,282	0.83	1.5	0.769	391.452		
Selzer School	Flex Fitting	MTHW	4	3	85	185	274	4,282	0.83	1.5	0.769	32.621		
Selzer School	Flo-Check	MTHW	4	4.1	85	185	274	4,282	0.83	1.5	0.769	44.582		
Selzer School	Gate Valve	MTHW	4	25	85	185	274	4,282	0.83	1.5	0.769	271.842		
Selzer School	Pipe Reducer	MTHW	4	1	85	185	274	4,282	0.83	1.5	0.769	10.874		
Selzer School	Straight Pipe	MTHW	4	82	85	185	281	4,282	0.83	2.0	0.769	914.419		
Selzer School	Strainer	MTHW	4	5	85	185	274	4,282	0.83	1.5	0.769	54.368		
Selzer School	T Intersection	MTHW	4	7.2	85	185	281	4,282	0.83	2.0	0.769	80.290		
Selzer School	Straight Pipe	MTHW	8	13	85	185	281	4,282	0.83	2.0	0.769	144.969		
Selzer School	T Intersection	MTHW	8	3.6	85	185	281	4,282	0.83	2.0	0.769	40.145		

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

-

ECM 14 – Steam Trap Replacement

Dumont Board of Education

✓	ECM evaluated but not included
✓ (green)	ECM included in the project

ECM #	ECM DESCRIPTION	Administration Building	Dumont High School	Grant School	Honiss School	Lincoln School	Selzer School
14	Steam Trap Replacement		✓	✓	✓	✓	

Background & Existing Conditions

Mechanical traps are prone to failure as they age, resulting in large steam losses and requiring substantial maintenance. Steam traps separate the steam system from the condensate system. Traditional steam traps can fail in the open or closed position. When a steam trap fails in the open or leaking-by position, some or all of the energy that was added at the boiler is lost into the condensate return system. The energy contained in steam is only utilized when it condenses in a heat exchanger (radiator, convector, hot water heater, AHU coil, etc.) and releases its latent heat to the process. It is at this point the steam trap should allow this condensate into the condensate return system to return to the boiler. As mentioned above, a leaking trap still allows steam to flow through the heat exchange device it serves and will typically not affect its heating capacity. For this reason, leaking traps are rarely discovered without performing specific tests on the trap. Conversely, a steam trap that fails in the closed position does not allow the condensate to enter the condensate return system. As a result, condensate backs up into the heat exchange device it serves, thereby first reducing, then eliminating, its heating capacity. Plugged traps are often identified through “cold calls” and repaired. Replacing or repairing failed traps will improve the efficiency of the steam distribution system and save energy.

Scope of Work

Steam Trap Scope		
BUILDING	CATEGORY	QUANTITY
Dumont High School	Retrofit Existing Thermostatic Trap with new Cage Unit and Cover	112
	Replace Existing Trap with new Float & Thermostatic Trap	19
Grant School	Retrofit Existing Thermostatic Trap with new Cage Unit and Cover	87
	Replace Existing Trap with new Float & Thermostatic Trap	11
Honiss School	Retrofit Existing Thermostatic Trap with new Cage Unit and Cover	42
	Replace Existing Trap with new Float & Thermostatic Trap	10
Lincoln School	Retrofit Existing Thermostatic Trap with new Cage Unit and Cover	40
	Replace Existing Trap with new Float & Thermostatic Trap	10

- (50) – Remove and dispose of existing trap and replace with new trap. Traps currently used as vacuum breakers will be replaced with vacuum breakers. Mechanical traps for which replacement is not feasible—due to location, size, or configuration—will be retrofit with a new insert and gasket; the existing cover will be reused (in some instances a new cover will be provided).
- (281) – Retrofit existing thermostatic trap with a new insert, gasket, and cap. Traps 1" and above will reuse the existing cap. In the event the existing trap will not accept a retrofit kit and new cap, it will be replaced like for like with a new thermostatic trap.

ECM Calculations

See Appendix G for supporting documents for fuel savings associated with steam trap replacements and retrofits.

CALCULATED SAVINGS	
Steam Trap Replacement Savings	
Building	Therm Savings
Dumont High School	11,050
Grant School	2,607
Honiss School	3,480
Lincoln School	1,989

ECM 15 – Combined Heat & Power

Dumont Board of Education

✔	ECM evaluated but not included
✔ (green)	ECM included in the project

ECM #	ECM DESCRIPTION	Administration Building	Dumont High School	Grant School	Honiss School	Lincoln School	Selzer School
15	Combined Heat and 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.

The simultaneous production of useful thermal and electrical energy in CHP systems lead 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.

35kW Yanmar CHP

Scope of Work

- Engineered and stamped drawings including shop drawings, submittals and as-builts.
- Furnish and install new 6" housekeeping pad for the CHP and thermal module
- Furnish and install new 35KW CHP and thermal unit on the new house keeping pads inside the existing boiler room at Administration Building
- Furnish and install new heat rejection radiator on the outside of the boiler room wall

- Furnish and install new gas piping and hot water heating piping to the new CHP
- Furnish and install flue piping from the CHP to outside the boiler room
- Furnish and install all power and control wiring for the CHP
- Shut down power to the building to install current sensors and power taps on the main switch
-

The following will be installed at Honiss School:

- One (1) CP35D1-TNUW Non-Black Start Capable, Radiator-less:
  - 35kW, 208 V, 60 Hz, 3-Phase, 3W
  - Industrial Natural Gas Engine, EPA Certified
  - Acoustical Enclosure
  - Engine Jacket, Oil, and Exhaust Heat Recovery
  - Yanmar Microprocessor Controls
  - Open Protocol Interface (Modbus-based or BACnet)
  - Emissions Control Package
  - Standard Electrical Protective Switchgear Panel
  - Critical Grade Silencer
  - Complete Factory Assembly
  - Factory Full-Load Test Run
  - Yanmar RMA (Remote Monitoring Adaptor)
  - Yanmar Power Cord
  - 208V to 480V Transformer for 35kW Yanmar to tie into 480V pane
  -
- Thermal Load Module to interface with building's space heating system:
  - BTU Meter
  - Circulation Pump
  - Control Valve
  - Gauges/Temp Sensors
  - Isolation Valves
  - Pre-wired for Aegis Propriety Remote Monitoring & Control
- Dump Radiator Load Module, built by Aegis, installed inside CHP Module:
  - CHP Circulation Pump
  - Flex hose connections
  - Glycol based loop pressure regulation system and storage vessel for glycol loop
  - Aegis to specify 20 Gallons of Glycol
  - Glycol supplied and installed by contractor.

- Temperature and pressure gauges
- Service isolation valves
- 75-psig water pressure relief valves
- Air separators

- Proprietary Aegis Remote Monitoring & Control (Building Automation System) Package:
  - Microprocessor based DDC Control System
  - Low Voltage Controls and Internal Panel Wiring
  - Motor starters & circuit protection for on-board pumps, motors, and fans
  - Low voltage and high voltage internal panel wiring
  - Allows for data communication for live “Real Time” monitoring
  - Controls operation of entire CHP system
  - Allows for remote restart (rather than manual) of system
  - Allows for remote resolution of system alarms
  - Allows for real-time monitoring and adjustments
  - Provides an on-board computer for data collection and instant accessibility

- Metering Package for Data Verification:
  - Gas meter with pulse output
  - Power transducer for CHP power monitoring
  - Btu Meter
  - Data acquisition panel

- Beckwith
  - Utility grade protection relay
  - 32R Protection
  - Includes three (3) CT’s

ECM Calculations

This ECM is not included in the project because of poor financial payback.

The CHP will act as the first stage of heating for the hot water heating loop. The CHP is estimated to run at full load for over 3070 hours per year. Run hours were estimated using eQuest simulations where a 35 kW CHP was proposed at a similar building. eQuest conservatively estimates run hours because it accounts for heating and electric loads on an hourly basis, which limits the run hours. There are certain hours during colder months where the CHP will not meet the entire heating load. eQuest accounts for this and requires the boilers to fire to meet the remaining load. For a more conservative energy savings calculation, the CHP is allowed to run during the heating season only (September thru May). 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	35	kW
Thermal output	204,040	BTU/hr
Gas input (HHV)	407,144	Btu/hr
Overall efficiency	79.4%	

Runtime Analysis	
Run hours	3,070
% Boiler load displaced by CHP	21%

		Fuel Usage Without CHP				
Month	Days	Total Gas - Post ECMs (Baseline reduced by 30%)	Proposed Boiler Efficiency	Non-Displaceable Gas Therms, Boilers OFF June-Oct	Displaceable Gas Therms	Displaceable Heat Therms
Jan	7	10,947	84.9%	2,954	7,993	6,786
Feb	28	9,754	84.9%	2,632	7,122	6,046
Mar	31	2,956	84.9%	798	2,158	1,832
Apr	30	3,769	84.9%	1,017	2,752	2,336
May	31	3,769	84.9%	3,769	0	0
Jun	30	371	84.9%	371	0	0
Jul	31	34	84.9%	34	0	0
Aug	31	33	84.9%	33	0	0
Sep	30	34	84.9%	34	0	0
Oct	31	45	84.9%	45	0	0
Nov	30	4,299	84.9%	1,160	3,139	2,665
Dec	31	4,299	84.9%	1,160	3,139	2,665
Total:	341	40,307		14,006	26,301	22,330

		35 kW Cogen Plant Thermal Operation							
Month	Days	Combined Cogen Run Hours	% Heat Load Displaced by CHP	Total Cogen Hours	Utilized Cogen Heat Therms	Max Cogen Heat Therms	Avoided Boiler Gas Therms	Full Load Run Hours	System Operating Efficiency
Jan	7	618	15%	618	993	1,261	1,169	618	69%
Feb	28	564	15%	564	889	1,150	1,048	564	68%
Mar	31	559	45%	559	832	1,141	980	559	66%
Apr	30	345	19%	345	441	703	520	345	61%
May	31	0	0%	0	0	0	0	0	-
Jun	30	0	0%	0	0	0	0	0	-
Jul	31	0	0%	0	0	0	0	0	-
Aug	31	0	0%	0	0	0	0	0	-
Sep	30	0	0%	0	0	0	0	0	-
Oct	31	0	0%	0	0	0	0	0	-
Nov	30	368	21%	368	551	750	649	368	66%
Dec	31	617	36%	617	946	1,259	1,114	617	67%
Total:	341	3,070	20.8%	3,070	4,653	6,264	5,480	3,070	67%

		Fuel Usage With CHP			Electric Savings With CHP			
Month	Days	Supplemental Boiler Gas Therms	Cogen Gas Therms	Total Gas	Run Hours	Avg Cogen Plant kW Output	kW Demand Savings	Cogen Electric Generation kWh
Jan	7	6,824	2,517	12,294	618	35	35	21,634
Feb	28	6,074	2,294	11,001	564	35	35	19,724
Mar	31	1,178	2,276	4,251	559	35	35	19,565
Apr	30	2,232	1,403	4,652	345	35	35	12,058
May	31	0	0	3,769	0	0	0	0
Jun	30	0	0	371	0	0	0	0
Jul	31	0	0	34	0	0	0	0
Aug	31	0	0	33	0	0	0	0
Sep	30	0	0	34	0	0	0	0
Oct	31	0	0	45	0	0	0	0
Nov	30	2,489	1,497	5,146	368	35	35	12,868
Dec	31	2,024	2,513	5,697	617	35	35	21,599
Total:	341	20,821	12,499	47,326	3,070		35	107,447

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

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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

CALCULATED SAVINGS

Combined Heat & Power Emission Reduction

BUILDING	SQFT	kW	Equivalent Full Load Electric Hours	NET GENERATION MWh	FUEL INPUT MMBTU	ELECTRIC SAVINGS FROM HEAT RECOVERY MWh	FOSSIL FUEL SAVINGS FROM HEAT RECOVERY MMBTU
Administration Building	7,000	35	3,070	107.4	1,249.9	0	548.0

Combined Heat & Power Emission Reduction

BUILDING	CO2 EF ELECTRIC	CO2 EF CHP	CO2 EF GAS	CO2 EMISSION REDUCTION LBS	NOx EF ELECTRIC	NOx EF CHP	NOx EF GAS	NOx EMISSION REDUCTION LBS	SO2 EF ELECTRIC	SO2 EF CHP	SO2 EMISSION REDUCTION LBS
Administration Building	1,292.0	1,361.0	117.0	56,704.4	0.83	1.07	0.092	24.6	0.67	0.00	72.0

Combined Heat & Power Emission Reduction										
BUILDING	Hg EF ELECTRIC	Hg EMISSION REDUCTION LBS	CHP Gas Input (therms)	Post ECM Boiler/DWH Gas Use (therms)	Post CHP Boiler/DWH Gas Use (therms)	Boiler/DWH Gas Savings (therms)	Net Building Gas Savings (therms)	Boiler/DWH Efficiency	CHP Heat Recovered (MMBTU)	CHP Overall Efficiency
Administration Building	0.67	0.0	12,499	26,301	20,821	5,480	-7,019	85%	466	37%

Note: 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.

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 (%)

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

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

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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

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

New Jersey's Clean Energy Program
Protocols to Measure Resource Savings

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ECM 16 – Roofing Upgrades

Dumont Board of Education

✓ (white)	ECM evaluated but not included
✓ (green)	ECM included in the project

ECM #	ECM DESCRIPTION	Administration Building	Dumont High School	Grant School	Honiss School	Lincoln School	Selzer School
16	Roofing Upgrades	✓ (white)	✓	✓	✓	✓	✓

Year after year, reflective elastomeric coatings continue to be used as a viable option for many roofing substrates, and single-ply membranes are no different. This system addresses all seams and penetrations that could potentially be a leak point while protective elastomeric coating maintains and restores the membrane. Single ply membrane restorations include the following benefits:

Single Ply Membrane Roof Restoration

Performance

Watertight	Addresses all sources of roof leaks by sealing all seams and fasteners.
Durable	Resistant to damage from roof traffic and storm damage.
UV Resistant	Designed for the harshest UV conditions.
Light Weight	Very low impact on your overall roof weight-load.
High Reflectivity	Nearly 85% of all UV light is reflected and the High Emissivity gives the coating and Emissivity the ability to release any heat that is absorbed which keeps the roof surface +/- 10 degrees from ambient temperature.
Disruption Free	Installation is completed without bothering building occupants.
Extends Building Life	Cool roof surface will reduce expansion and contraction stresses on the building.

Value

Energy Savings	Reduced solar heat gain will cut summer energy costs by up to 30%.
No Tear Off	Typically no costly tear off required.
Low Cost	Keeps more money in your pocket compared to replacement systems.
Low Life Cycle Cost	With no tear-off and by simply maintaining the protective surface coating on your roof every 10-15 years, your roof can last indefinitely.
Rebates	Many local and federal rebates are available.
Tax Benefits	Can often be fully expensed in the year of installation.

Environment

No Tear Off	Typically no need to remove roof and fill our land-fills with roof waste.
Water-based	Non-hazardous, non-flammable and easy cleanup.
Low VOC	Meets the most stringent VOC requirements in the U.S.
Low Odor	Can be installed in situations where rooftop air handlers cannot be turned off.
Sustainable	Simply maintaining the protective surface coating on your roof every 10-15 years, your roof will last indefinitely.

Sample Installation Process (EPDM/BUR style roof restoration)

- Identify the coating system to be used. Adhesion test most likely necessary.
- Identify wet insulation to be replaced using infrared scans.
- Address all deficient seams and penetrations. Repair with “like” materials. Probe and inspect all seams.
- Power wash the roof to wash away all contaminants including dirt and loose particulates.
- Apply wash primer. Allow to sit for 10 minutes and begin washing off with high pressure power wash. (Only prime what you plan to coat that day)
- Apply thick bead of sealant to seam and feather out with a chip brush to a width of 3”.
- Apply desired basecoat.
- Apply desired topcoat.

Sample Installation Process (Metal roof coating)

- Identify the coating system to be used. Adhesion test most likely necessary.
- Address all deficient seams and penetrations. Repair with “like” materials. Probe and inspect all seams.
- Power wash the roof to wash away all contaminants including dirt and loose particulates.
- Apply metal wash primer. Allow to sit for 10 minutes and begin washing off with high pressure power wash. (Only prime what you plan to coat that day)
- Apply thick bead of sealant to seam and feather out with a chip brush to a width of 3”.
- Apply desired basecoat.
- Apply desired topcoat.

Spray Polyurethane Foam Roof Restoration


Spray polyurethane foam Roof Restoration

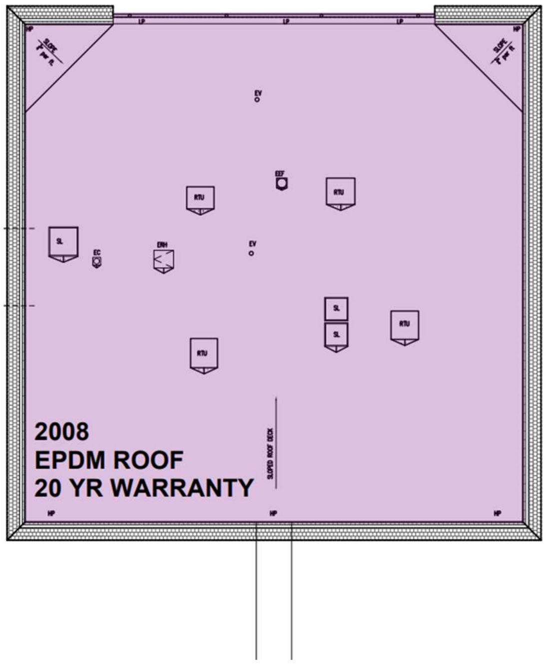
Spray polyurethane foam (commonly referred to as SPF) is a spray-applied rigid, insulating cellular plastic that is applied as a liquid, immediately expanding to 30 times its original volume. The resulting high density roofing foam is resistant to foot traffic and water. Spray polyurethane foam is the fastest growing insulating product in the world. As a roofing material it provides many benefits over traditional roofing materials. Exceptional durability, unmatched R-value, air barrier properties and a multitude of additional benefits make it a truly versatile roofing system. Spray Foam Roofing System is suitable for both new roofing and reroof applications.

Scope of Work

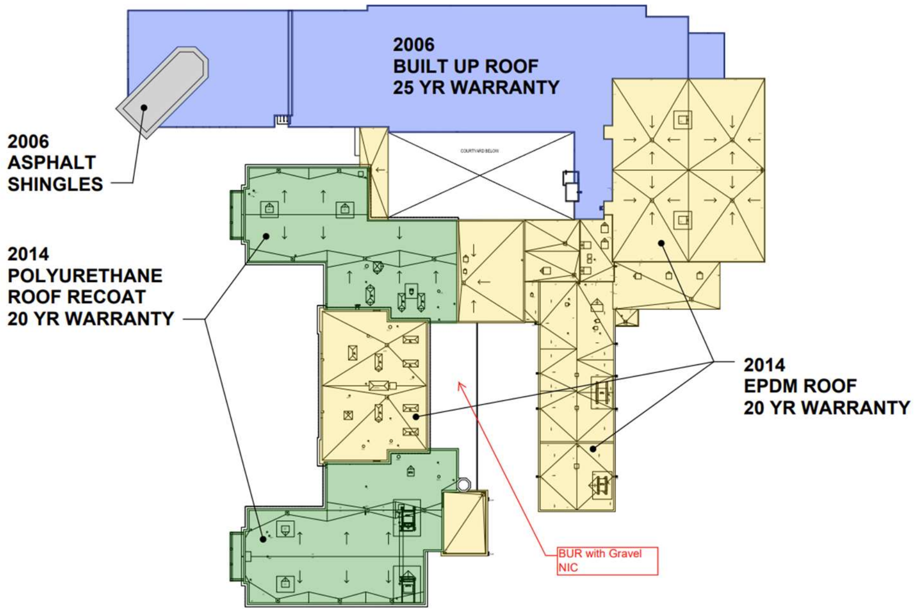
Roof sections and areas were identified by a roofing subcontractor to coincide with the installation of solar PV and are shown in red on the aerial photos below. The current scope of work has solar and roof upgrades for the following schools:

Roof Refurbishment Scope of Work			
BUILDING	LOCATION	PROPOSED SCOPE	QUANTITY
Administration Building	Entire roof - EPDM	Coating	7,618
Dumont High School	Section 1 - EPDM	Coating	25,838
	Section 2 - BUR	New SPF roof	23,684
	Section 3 - SPF	Coating	17,360
Grant School	EPDM roof	Coating	22,600
Honiss School	EPDM roof	Coating	23,312
Lincoln School	EPDM roof	Coating	8,307
Selzer School	EPDM roof	Coating	17,815

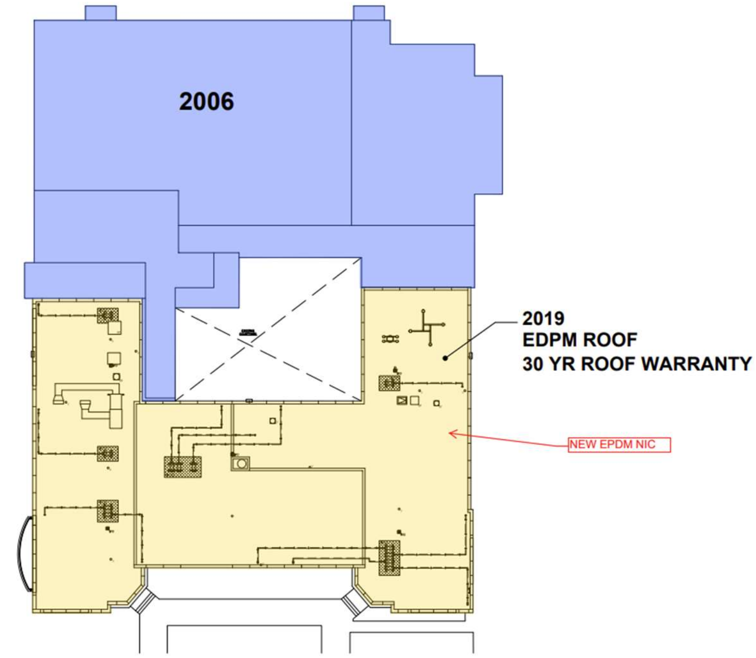
Administration Building



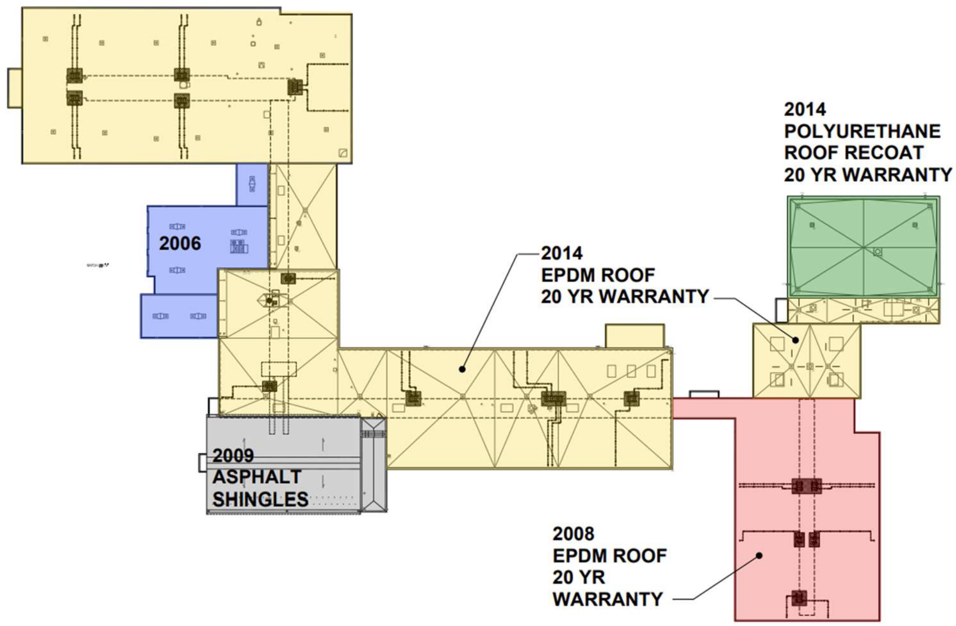
Dumont High School



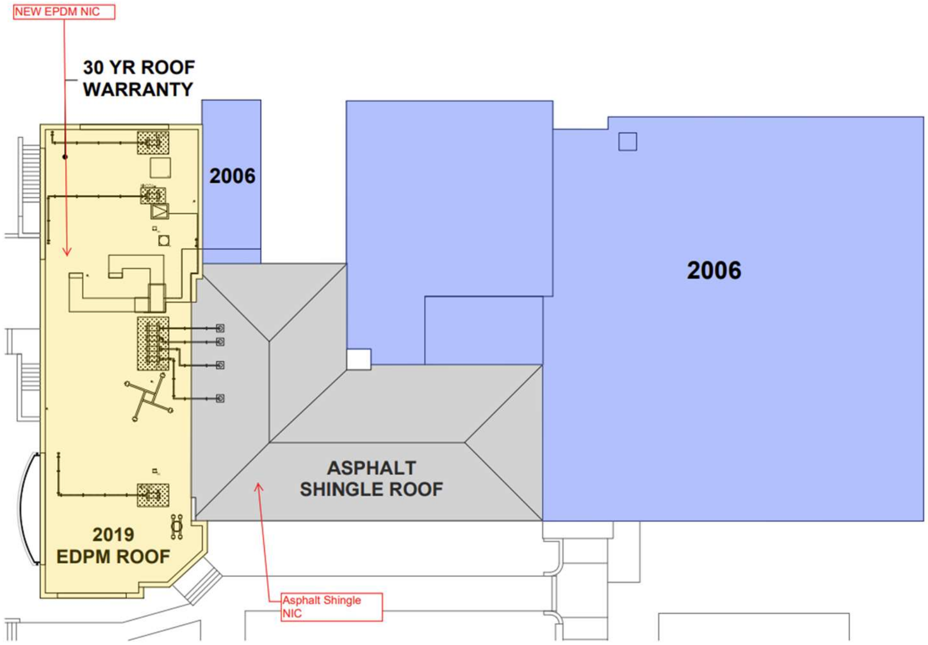
Grant School



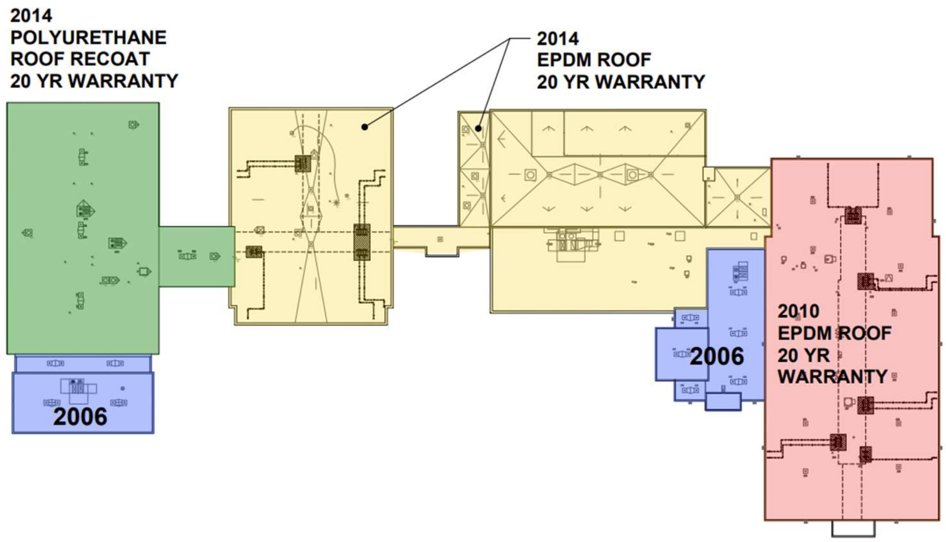
Honiss School



Lincoln School



Selzer School



ECM Calculations

Energy Savings from roof upgrades were calculated using BPU protocols. The calculations are shown below.

CALCULATED SAVINGS

Roof Refurbishment - Heating Savings

BUILDING	ROOF SQFT	HEATING EFFICIENC	HOURS (HR/DAY)	HEATING DEGREE	EXISTING R-VALUE	EXISTING U-VALUE	PROPOSED R-VALUE	PROPOSED U-VALUE	EXISTING HEAT LOS	POST-RETRO FIT	ROOF SAVINGS
Administration Building	7,618	80.8%	24.00	5166	20.0	0.0500	20.15	0.050	584	580	4
Dumont High School	25,838	74.3%	24.00	5166	20.0	0.0500	20.15	0.050	2157	2141	16
Dumont High School	23,684	74.3%	24.00	5166	20.0	0.0500	29.0	0.034	1977	1364	614
Dumont High School	17,360	74.3%	24.00	5166	20.0	0.0500	20.15	0.050	1449	1438	11
Grant School	22,600	80.9%	24.00	5166	20.0	0.0500	20.15	0.050	1731	1718	13
Honiss School	23,312	71.4%	24.00	5166	20.0	0.0500	20.15	0.050	2025	2010	15
Lincoln School	8,307	80.5%	24.00	5166	20.0	0.0500	20.15	0.050	639	635	5
Selzer School	17,815	76.7%	24.00	5166	20.0	0.0500	20.15	0.050	1439	1429	11

Roof 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

CALCULATED SAVINGS											
Roof Refurbishment- Cooling Savings											
BUILDING	ROOF SQFT	EFFICIENCY EER	HOURS (HR/DAY)	COOLING DEGREE	EXISTING R-VALUE	EXISTING U-VALUE	PROPOSED R-VALUE	PROPOSED U-VALUE	PRE-RETRO FIT COOLING	POST-RETRO FIT COOLING	ROOF SAVINGS
Administration Building	7,618	10.77	24.00	865	20.00	0.0500	20.15	0.0496	734	729	5
Dumont High School	25,838	10.01	24.00	865	20.00	0.0500	20.15	0.050	2680	2660	20
Dumont High School	23,684	10.01	24.00	865	20.00	0.0500	29.00	0.034	2456	1694	762
Dumont High School	17,360	10.01	24.00	865	20.00	0.0500	20.15	0.050	1800	1787	13
Grant School	22,600	10.23	24.00	865	20.00	0.0500	20.15	0.050	2294	2277	17
Honiss School	23,312	10.51	24.00	865	20.00	0.0500	20.15	0.050	2302	2284	17
Lincoln School	8,307	10.19	24.00	865	20.00	0.0500	20.15	0.050	846	840	6
Selzer School	17,815	9.72	24.00	865	20.00	0.0500	20.15	0.050	1903	1889	14

Roof 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)

Dumont Board of Education
25 Depew Street
Dumont, NJ 07628

ECM 17 – Field Lighting Fixture Replacement

Dumont Board of Education

✔	ECM evaluated but not included
✔	ECM included in the project

ECM #	ECM DESCRIPTION	Administration Building	Dumont High School	Grant School	Honiss School	Lincoln School	Selzer School
17	Field Lighting Fixture Replacement		✔				

Outdoor field lighting are types of site light fixtures that are commonly used to illuminate large areas for sporting events or other large outdoor events and activities, such as concerts. Sports light fixtures are typically mounted on poles 40 to 100 feet tall, with between 1-12 fixtures mounted on each pole. This type of outdoor lighting is often used by schools, colleges and universities, municipalities, amateur sports clubs, and professional sports franchises.

Common (HID) lamp wattages used for conventional sports lighting fixtures range from 400 watts to 2,000 watts. The higher the wattage the higher the light output. The function of the area being illuminated, combined with the quantity, spacing, and mounting height of the field light fixtures plays a role in the existing wattages utilized. A few 1000w or 2000w metal halide sports light lamps (very common wattages for existing outdoor sports lighting) can cost up to $6,300 and $12,500, respectively, to operate per year, in electricity costs alone.

Maintenance costs are often a big concern for those managing lights. In addition to the potential lamp lifetime concerns, sports field fixtures can easily cause interference with the day-to-day activities of teams or employees when changing out a lamp or a ballast. It can cost up to $2,000 in labor and material to maintain a single exterior HID sports field fixture over the course of three years.

Existing Conditions

Existing field lights at Dumont HS

Dumont High School

- Existing Field Lighting evaluated for replacement located at Dumont High School Football Field
- Four (4) total fixtures located on Four (4) steel poles
- Existing lighting system is approximately 95.58W.

Scope of Work

Dumont High School is evaluated for LED Football Field Lighting fixture replacements at 50 Footcandles. The following work is being done at each school:

Dumont High School

- Factory wired poletop luminaire assemblies
- Factory wired and tested remote electrical component enclosures
- Pole length, factory assembled wire harnesses
- Mounting hardware for pole top luminaire assemblies and electrical components enclosures
- Disconnects
- Includes demo of existing lighting, supply, and installation of lighting system, and reconnecting to owners existing electrical system by a licensed contractor
- Assumes the existing structures, electrical wiring, and electrical service can be reused

- Proposed Lighting System is 56.64kW for 50fc

FIELD LIGHTING LED Fixture Replacement Scope of Work				
BUILDING	**SQFT**	**CATEGORY**	**NOTES**	**QUANTITY**
Dumont High School	165,469	LED Fixture (Field Lighting)	Musco Lighting System 30FC	4
			Control Cabinet	

ECM Calculations

This ECM is not included in the project because of poor financial payback. See Appendix G for detailed savings calculations and ECM costs.

ECM 18 – Exhaust Fan Replacement

Dumont Board of Education

✔	ECM evaluated but not included
✔	ECM included in the project

ECM #	ECM DESCRIPTION	Administration Building	Dumont High School	Grant School	Honiss School	Lincoln School	Selzer School
18	Exhaust Fan Replacement	✔	✔	✔	✔	✔	✔

Exhaust fans are required for air balancing within commercial buildings and improve overall HVAC air distribution and system performance. Exhaust fans electric motors will help reduce a buildings electrical usage and be more efficient tied into a buildings energy management system. Exhaust fan motors efficiencies have been increasing recently to blow the same amount airflow with less electricity. Premium efficiency motors can be as high as 95% efficient (as opposed to standard efficiency motors of 78% to 88%). Exhaust fans can also be tied into a buildings energy management system. This allows the users to set schedules and turn the fans on only when necessary.

Existing Conditions

Existing exhaust fans at Dumont HS

Scope of Work

Exhaust Fan Scope of Work			
BUILDING	**SYSTEM**	**Fan QTY**	**EXISTING FAN HP**
Administration Building	Exhaust Fans	1	0.2
Dumont High School	Exhaust Fans	7	0.2
	Exhaust Fans	23	0.3
	Exhaust Fans	12	0.5
	Exhaust Fans	9	0.8
	Exhaust Fans	1	1.0
	Exhaust Fans	2	2.0
Grant School	Exhaust Fans	2	0.1
	Exhaust Fans	2	0.2
	Exhaust Fans	4	0.3
Honiss School	Exhaust Fans	7	0.1
	Exhaust Fans	3	0.2
	Exhaust Fans	5	0.3
	Exhaust Fans	5	0.5
Lincoln School	Exhaust Fans	3	0.1
	Exhaust Fans	1	0.2
	Exhaust Fans	1	0.3
	Exhaust Fans	1	0.8
Selzer School	Exhaust Fans	4	0.1
	Exhaust Fans	6	0.2
	Exhaust Fans	7	0.3
	Exhaust Fans	6	0.5

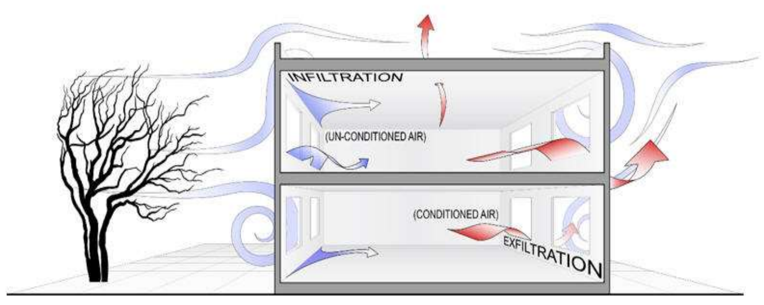
ECM Calculations

This ECM is not included in the project because of poor financial payback. See Appendix G for detailed savings calculations and ECM costs.

ECM 19 – Building Envelope Improvements

Dumont Board of Education ✓ ECM evaluated but not included ✓ ECM included in the project		Administration Building	Dumont High School	Grant School	Honiss School	Lincoln School	Selzer School
ECM #	ECM DESCRIPTION						
19	Building Envelope Improvements	✓	✓	✓	✓	✓	✓

An on-site survey of the existing air barrier continuity was conducted at all eight Dumont Board of Education 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.

Dumont Board of Education
25 Depew Street
Dumont, NJ 07628

Existing Conditions


Existing Conditions at Honiss School and Lincoln School


Existing Conditions at Dumont High School and Grant School

Scope of Work

Building Envelope Scope of Work				
BUILDING	**Type**	**CATEGORY**	**UNITS**	**QUANTITY**
Administration Building	Door Weather Stripping	Double Door - Sides, Sweep, Center (UT)	UT	1
		Single Door - Sides, Sweep (UT)	UT	1
	Roof-Wall Intersection Air Sealing	Block Seal	SF	330
Dumont High School	Buck Frame Air Sealing	Seal	LF	486
	Caulking	Interior Seal	LF	12150
	Door Weather Stripping	Double Door - Sides, Sweep, Center (UT)	UT	16
		Double Door - Sides, Top, Sweep, Center (UT)	UT	7
		Double Door - Sweep, Center (UT)	UT	3
		Single Door - Sides, Sweep (UT)	UT	3
		Single Door - Sides, Top, Sweep (UT)	UT	1
		Single Door - Sweep (UT)	UT	2
	Roof-Wall Intersection Air Sealing	Block, Seal (LF)	LF	40
		Block, Seal (SF)	SF	45
		Seal (LF)	LF	128
	Wall Air Sealing	Block, Seal (SF)	SF	196
Grant School	Buck Frame Air Sealing	Seal (LF)	LF	89
	Caulking	Interior Seal (LF)	LF	8258
	Door Weather Stripping	Double Door - Sides, Sweep, Center (UT)	UT	3
		Double Door - Sides, Top, Sweep, Center (UT)	UT	3
		Single Door - Sides, Sweep (UT)	UT	2
		Single Door - Sides, Top, Sweep (UT)	UT	2
	Roof-Wall Intersection Air Sealing	Block, Seal (LF)	LF	68.32
		Seal (LF)	LF	42.48
		Seal Firestop (LF)	LF	61
Honiss School	Buck Frame Air Sealing	Seal (LF)	LF	448
		Seal Exposed (LF)	LF	226
	Caulking	Interior Seal (LF)	LF	586.6666667
	Door Weather Stripping	Double Door - Sides, Top, Sweep, Center (UT)	UT	14
		Double Door - Sweep, Center (UT)	UT	1
		Single Door - Sides, Top, Sweep (UT)	UT	3
	Overhang Air Sealing	Block, Seal (LF)	LF	9.3
		Seal (LF)	LF	10.29
	Roof-Wall Intersection Air Sealing	Block, Seal (LF)	LF	900.77
		Seal (LF)	LF	127.15
	Wall Air Sealing	Block, Seal (SF)	SF	79
Lincoln School				
	Caulking	Interior Seal (LF)	LF	4949
	Door Weather Stripping	Double Door - Sides, Sweep, Center (UT)	UT	5
		Double Door - Sides, Top, Sweep, Center (UT)	UT	1
		Single Door - Sides, Sweep (UT)	UT	3
		Single Door - Sides, Top, Sweep (UT)	UT	1
Selzer School	Buck Frame Air Sealing	Seal	LF	147
	Door Weather Stripping	Double Door - Sides, Sweep, Center (UT)	UT	4
		Double Door - Sides, Top, Sweep, Center (UT)	UT	5
		Single Door - Sides, Sweep (UT)	UT	2
		Single Door - Sides, Top, Sweep (UT)	UT	5
	Roof-Wall Intersection Air Sealing	Block, Seal (LF)	LF	76
		Seal (LF)	LF	95
	Wall Air Sealing	Block, Seal (SF)	SF	348
	Overhang Air Sealing	Block, Seal (SF)	SF	25
	Garage Door Weather Stripping	Overhead Door Weather Strip - Sides, Top		1

Building Envelope improvements to the district will included and not limited to:

- 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 air tight 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:

CALCULATED SAVINGS					
Building Envelope - Heating Savings					
BUILDING	**TYPE**	**SUBTYPE**	**INFILTRATION REDUCTION (CFM)**	**HEATING FUEL**	**HEATING EFFICIENCY (%)**
Administration Building	Door Weather Stripping	Single Door - Sides, Sweep (UT)	20	Natural Gas	81%
Administration Building	Door Weather Stripping	Double Door - Sides, Sweep, Center (UT)	32	Natural Gas	81%
Administration Building	Roof-Wall Intersection Air Sealing	Block, Seal (SF)	258	Natural Gas	81%
Dumont High School	Caulking	Interior Seal (LF)	2,370	Natural Gas	74%
Dumont High School	Buck Frame Air Sealing	Seal (LF)	253	Natural Gas	74%
Dumont High School	Door Weather Stripping	Double Door - Sides, Sweep, Center (UT)	506	Natural Gas	74%
Dumont High School	Door Weather Stripping	Double Door - Sides, Top, Sweep, Center (UT)	270	Natural Gas	74%
Dumont High School	Door Weather Stripping	Double Door - Sweep, Center (UT)	46	Natural Gas	74%
Dumont High School	Door Weather Stripping	Single Door - Sides, Sweep (UT)	60	Natural Gas	74%
Dumont High School	Door Weather Stripping	Single Door - Sides, Top, Sweep (UT)	23	Natural Gas	74%
Dumont High School	Door Weather Stripping	Single Door - Sweep (UT)	7	Natural Gas	74%
Dumont High School	Roof-Wall Intersection Air Sealing	Block, Seal (LF)	47	Natural Gas	74%
Dumont High School	Roof-Wall Intersection Air Sealing	Seal (LF)	150	Natural Gas	74%
Dumont High School	Roof-Wall Intersection Air Sealing	Block, Seal (SF)	70	Natural Gas	74%
Dumont High School	Wall Air Sealing	Block, Seal (SF)	306	Natural Gas	74%
Grant School	Caulking	Interior Seal (LF)	1,611	Natural Gas	81%
Grant School	Buck Frame Air Sealing	Seal (LF)	46	Natural Gas	81%
Grant School	Door Weather Stripping	Double Door - Sides, Sweep, Center (UT)	95	Natural Gas	81%
Grant School	Door Weather Stripping	Double Door - Sides, Top, Sweep, Center (UT)	116	Natural Gas	81%
Grant School	Door Weather Stripping	Single Door - Sides, Sweep (UT)	40	Natural Gas	81%
Grant School	Door Weather Stripping	Single Door - Sides, Top, Sweep (UT)	47	Natural Gas	81%
Grant School	Roof-Wall Intersection Air Sealing	Block, Seal (LF)	80	Natural Gas	81%
Grant School	Roof-Wall Intersection Air Sealing	Seal (LF)	33	Natural Gas	81%
Grant School	Roof-Wall Intersection Air Sealing	Seal Firestop (LF)	48	Natural Gas	81%
Honiss School	Caulking	Interior Seal (LF)	114	Natural Gas	71%
Honiss School	Buck Frame Air Sealing	Seal (LF)	175	Natural Gas	71%
Honiss School	Buck Frame Air Sealing	Seal Exposed (LF)	88	Natural Gas	71%
Honiss School	Door Weather Stripping	Double Door - Sides, Top, Sweep, Center (UT)	541	Natural Gas	71%
Honiss School	Door Weather Stripping	Double Door - Sweep, Center (UT)	15	Natural Gas	71%
Honiss School	Door Weather Stripping	Single Door - Sides, Top, Sweep (UT)	70	Natural Gas	71%
Honiss School	Overhang Air Sealing	Block, Seal (LF)	11	Natural Gas	71%
Honiss School	Overhang Air Sealing	Seal (LF)	8	Natural Gas	71%
Honiss School	Roof-Wall Intersection Air Sealing	Block, Seal (LF)	1,054	Natural Gas	71%
Honiss School	Roof-Wall Intersection Air Sealing	Seal (LF)	99	Natural Gas	71%
Honiss School	Wall Air Sealing	Block, Seal (SF)	92	Natural Gas	71%

Dumont Board of Education
25 Depew Street
Dumont, NJ 07628

CALCULATED SAVINGS								
Building Envelope - Heating Savings								
BUILDING	TYPE	SENSIABLE HEAT CONSTANT	HOURS (HR/DAY)	HEAT EFFICIENCY FACTOR	HEATING Hours	INFILTRATION HEATING SAVINGS (THERM)	THERMAL INSULATION SAVINGS (THERM)	TOTAL HEATING SAVINGS (THERM)
Administration Building	Door Weather Stripping	1.08	24	3118	3700	24	0	24
Administration Building	Door Weather Stripping	1.08	24	3118	3700	38	0	38
Administration Building	Roof-Wall Intersection Air Sealing	1.08	24	3118	3700	306	0	306
Dumont High School	Caulking	1.08	24	2865	5166	4274	0	4,274
Dumont High School	Buck Frame Air Sealing	1.08	24	2865	5166	456	0	456
Dumont High School	Door Weather Stripping	1.08	24	2865	5166	912	0	912
Dumont High School	Door Weather Stripping	1.08	24	2865	5166	488	0	488
Dumont High School	Door Weather Stripping	1.08	24	2865	5166	82	0	82
Dumont High School	Door Weather Stripping	1.08	24	2865	5166	108	0	108
Dumont High School	Door Weather Stripping	1.08	24	2865	5166	42	0	42
Dumont High School	Door Weather Stripping	1.08	24	2865	5166	13	0	13
Dumont High School	Roof-Wall Intersection Air Sealing	1.08	24	2865	5166	84	0	84
Dumont High School	Roof-Wall Intersection Air Sealing	1.08	24	2865	5166	270	0	270
Dumont High School	Roof-Wall Intersection Air Sealing	1.08	24	2865	5166	127	0	127
Dumont High School	Wall Air Sealing	1.08	24	2865	5166	552	0	552
Grant School	Caulking	1.08	24	3123	2600	1341	0	1341
Grant School	Buck Frame Air Sealing	1.08	24	3123	2600	39	0	39
Grant School	Door Weather Stripping	1.08	24	3123	2600	79	0	79
Grant School	Door Weather Stripping	1.08	24	3123	2600	96	0	96
Grant School	Door Weather Stripping	1.08	24	3123	2600	33	0	33
Grant School	Door Weather Stripping	1.08	24	3123	2600	39	0	39
Grant School	Roof-Wall Intersection Air Sealing	1.08	24	3123	2600	67	0	67
Grant School	Roof-Wall Intersection Air Sealing	1.08	24	3123	2600	28	0	28
Grant School	Roof-Wall Intersection Air Sealing	1.08	24	3123	2600	40	0	40
Honiss School	Caulking	1.08	24	2753	5166	215	0	215
Honiss School	Buck Frame Air Sealing	1.08	24	2753	5166	328	0	328
Honiss School	Buck Frame Air Sealing	1.08	24	2753	5166	165	0	165
Honiss School	Door Weather Stripping	1.08	24	2753	5166	1015	0	1015
Honiss School	Door Weather Stripping	1.08	24	2753	5166	29	0	29
Honiss School	Door Weather Stripping	1.08	24	2753	5166	132	0	132
Honiss School	Overhang Air Sealing	1.08	24	2753	5166	20	0	20
Honiss School	Overhang Air Sealing	1.08	24	2753	5166	15	0	15
Honiss School	Roof-Wall Intersection Air Sealing	1.08	24	2753	5166	1978	0	1978
Honiss School	Roof-Wall Intersection Air Sealing	1.08	24	2753	5166	186	0	186
Honiss School	Wall Air Sealing	1.08	24	2753	5166	173	0	173

CALCULATED SAVINGS

Building Envelope - Heating Savings

BUILDING	TYPE	SUBTYPE	INFILTRATION REDUCTION (CFM)	HEATING FUEL	HEATING EFFICIENCY (%)
Lincoln School	Caulking	Interior Seal (LF)	965	Natural Gas	81%
Lincoln School	Door Weather Stripping	Double Door - Sides, Sweep, Center (UT)	158	Natural Gas	81%
Lincoln School	Door Weather Stripping	Double Door - Sides, Top, Sweep, Center (UT)	39	Natural Gas	81%
Lincoln School	Door Weather Stripping	Single Door - Sides, Sweep (UT)	60	Natural Gas	81%
Lincoln School	Door Weather Stripping	Single Door - Sides, Top, Sweep (UT)	23	Natural Gas	81%
Selzer School	Buck Frame Air Sealing	Seal (LF)	57	Natural Gas	77%
Selzer School	Door Weather Stripping	Double Door - Sides, Sweep, Center (UT)	126	Natural Gas	77%
Selzer School	Door Weather Stripping	Double Door - Sides, Top, Sweep, Center (UT)	193	Natural Gas	77%
Selzer School	Door Weather Stripping	Single Door - Sides, Sweep (UT)	40	Natural Gas	77%
Selzer School	Door Weather Stripping	Single Door - Sides, Top, Sweep (UT)	117	Natural Gas	77%
Selzer School	Overhang Air Sealing	Block, Seal (SF)	29	Natural Gas	77%
Selzer School	Garage Door Weather Stripping	Overhead Door Weather Strip - Sides, Top	29	Natural Gas	77%
Selzer School	Roof-Wall Intersection Air Sealing	Block, Seal (LF)	89	Natural Gas	77%
Selzer School	Roof-Wall Intersection Air Sealing	Seal (LF)	74	Natural Gas	77%
Selzer School	Wall Air Sealing	Block, Seal (SF)	408	Natural Gas	77%

CALCULATED SAVINGS

Building Envelope - Heating Savings

BUILDING	TYPE	SENSIABLE HEAT CONSTANT	HOURS (HR/DAY)	HEAT EFFICIENCY FACTOR	HEATING Hours	INFILTRATION HEATING SAVINGS (THERM)	THERMAL INSULATION SAVINGS (THERM)	TOTAL HEATING SAVINGS (THERM)
Lincoln School	Caulking	1.08	24	3107	2850	886	0	886
Lincoln School	Door Weather Stripping	1.08	24	3107	2850	145	0	145
Lincoln School	Door Weather Stripping	1.08	24	3107	2850	35	0	35
Lincoln School	Door Weather Stripping	1.08	24	3107	2850	55	0	55
Lincoln School	Door Weather Stripping	1.08	24	3107	2850	21	0	21
Selzer School	Buck Frame Air Sealing	1.08	24	2960	5166	100	0	100
Selzer School	Door Weather Stripping	1.08	24	2960	5166	221	0	221
Selzer School	Door Weather Stripping	1.08	24	2960	5166	337	0	337
Selzer School	Door Weather Stripping	1.08	24	2960	5166	69	0	69
Selzer School	Door Weather Stripping	1.08	24	2960	5166	204	0	204
Selzer School	Overhang Air Sealing	1.08	24	2960	5166	50	0	50
Selzer School	Garage Door Weather Stripping	1.08	24	2960	5166	51	0	51
Selzer School	Roof-Wall Intersection Air Sealing	1.08	24	2960	5166	155	0	155
Selzer School	Roof-Wall Intersection Air Sealing	1.08	24	2960	5166	129	0	129
Selzer School	Wall Air Sealing	1.08	24	2960	5166	712	0	712

Building Envelope Savings - Cooling Savings

BUILDING	TYPE	SUBTYPE	INFILTRATION REDUCTION (CFM)	TOTAL HEAT CONSTANT	INTERIOR DRY BULB TEMP (F)	EXTERIOR DRY BULB TEMP (F)	INTERIOR DRY RELATIVE HUMIDITY (%)
Administration Building	Door Weather Stripping	Single Door - Sides, Sweep (UT)	20	4.5	72.0	75.0	40.0
Administration Building	Door Weather Stripping	Double Door - Sides, Sweep, Center (UT)	32	4.5	72.0	75.0	40.0
Administration Building	Roof-Wall Intersection Air Sealing	Block, Seal (SF)	258	4.5	72.0	75.0	40.0
Dumont High School	Caulking	Interior Seal (LF)	2,370	4.5	72.0	75.0	40.0
Dumont High School	Buck Frame Air Sealing	Seal (LF)	253	4.5	72.0	75.0	40.0
Dumont High School	Door Weather Stripping	Double Door - Sides, Sweep, Center (UT)	506	4.5	72.0	75.0	40.0
Dumont High School	Door Weather Stripping	Double Door - Sides, Top, Sweep, Center (UT)	270	4.5	72.0	75.0	40.0
Dumont High School	Door Weather Stripping	Double Door - Sweep, Center (UT)	46	4.5	72.0	75.0	40.0
Dumont High School	Door Weather Stripping	Single Door - Sides, Sweep (UT)	60	4.5	72.0	75.0	40.0
Dumont High School	Door Weather Stripping	Single Door - Sides, Top, Sweep (UT)	23	4.5	72.0	75.0	40.0
Dumont High School	Door Weather Stripping	Single Door - Sweep (UT)	7	4.5	72.0	75.0	40.0
Dumont High School	Roof-Wall Intersection Air Sealing	Block, Seal (LF)	47	4.5	72.0	75.0	40.0
Dumont High School	Roof-Wall Intersection Air Sealing	Seal (LF)	150	4.5	72.0	75.0	40.0
Dumont High School	Roof-Wall Intersection Air Sealing	Block, Seal (SF)	70	4.5	72.0	75.0	40.0
Dumont High School	Wall Air Sealing	Block, Seal (SF)	306	4.5	72.0	75.0	40.0
Grant School	Caulking	Interior Seal (LF)	1,611	4.5	72.0	75.0	40.0
Grant School	Buck Frame Air Sealing	Seal (LF)	6	4.5	72.0	75.0	40.0
Grant School	Door Weather Stripping	Double Door - Sides, Sweep, Center (UT)	12	4.5	72.0	75.0	40.0
Grant School	Door Weather Stripping	Double Door - Sides, Top, Sweep, Center (UT)	14	4.5	72.0	75.0	40.0
Grant School	Door Weather Stripping	Single Door - Sides, Sweep (UT)	40	4.5	72.0	75.0	40.0
Grant School	Door Weather Stripping	Single Door - Sides, Top, Sweep (UT)	47	4.5	72.0	75.0	40.0
Grant School	Roof-Wall Intersection Air Sealing	Block, Seal (LF)	80	4.5	72.0	75.0	40.0
Grant School	Roof-Wall Intersection Air Sealing	Seal (LF)	33	4.5	72.0	75.0	40.0
Grant School	Roof-Wall Intersection Air Sealing	Seal Firestop (LF)	48	4.5	72.0	75.0	40.0
Honiss School	Caulking	Interior Seal (LF)	114	4.5	72.0	75.0	40.0
Honiss School	Buck Frame Air Sealing	Seal (LF)	175	4.5	72.0	75.0	40.0
Honiss School	Buck Frame Air Sealing	Seal Exposed (LF)	88	4.5	72.0	75.0	40.0
Honiss School	Door Weather Stripping	Double Door - Sides, Top, Sweep, Center (UT)	541	4.5	72.0	75.0	40.0
Honiss School	Door Weather Stripping	Double Door - Sweep, Center (UT)	15	4.5	72.0	75.0	40.0
Honiss School	Door Weather Stripping	Single Door - Sides, Top, Sweep (UT)	70	4.5	72.0	75.0	40.0
Honiss School	Overhang Air Sealing	Block, Seal (LF)	11	4.5	72.0	75.0	40.0
Honiss School	Overhang Air Sealing	Seal (LF)	8	4.5	72.0	75.0	40.0
Honiss School	Roof-Wall Intersection Air Sealing	Block, Seal (LF)	1,054	4.5	72.0	75.0	40.0
Honiss School	Roof-Wall Intersection Air Sealing	Seal (LF)	99	4.5	72.0	75.0	40.0
Honiss School	Wall Air Sealing	Block, Seal (SF)	92	4.5	72.0	75.0	40.0

Building Envelope Savings - Cooling Savings

BUILDING	TYPE	EXTERIOR RELATIVE HUMIDITY (%)	INTERIOR ENTHALPY (SUMMER)	EXTERIOR ENTHALPY (SUMMER)	ENTHALPY	TONS	EFFICIENCY (kW/TON)	COOLING HOURS (HRS)	INFILTRATION ELECTRIC SAVINGS (kW)	INFILTRATION ELECTRIC SAVINGS (kWh)
Administration Building	Door Weather Stripping	75.0	24.55	33.27	8.72	0.07	1.11	865	0	63
Administration Building	Door Weather Stripping	75.0	24.55	33.27	8.72	0.10	1.11	865	0	100
Administration Building	Roof-Wall Intersection Air Sealing	75.0	24.55	33.27	8.72	0.84	1.11	865	1	812
Dumont High School	Caulking	75.0	24.55	33.27	8.72	7.75	1.20	865	9	8,037
Dumont High School	Buck Frame Air Sealing	75.0	24.55	33.27	8.72	0.83	1.20	865	1	857
Dumont High School	Door Weather Stripping	75.0	24.55	33.27	8.72	1.65	1.20	865	2	1,715
Dumont High School	Door Weather Stripping	75.0	24.55	33.27	8.72	0.88	1.20	865	1	917
Dumont High School	Door Weather Stripping	75.0	24.55	33.27	8.72	0.15	1.20	865	0	155
Dumont High School	Door Weather Stripping	75.0	24.55	33.27	8.72	0.20	1.20	865	0	202
Dumont High School	Door Weather Stripping	75.0	24.55	33.27	8.72	0.08	1.20	865	0	79
Dumont High School	Door Weather Stripping	75.0	24.55	33.27	8.72	0.02	1.20	865	0	24
Dumont High School	Roof-Wall Intersection Air Sealing	75.0	24.55	33.27	8.72	0.15	1.20	865	0	159
Dumont High School	Roof-Wall Intersection Air Sealing	75.0	24.55	33.27	8.72	0.49	1.20	865	1	508
Dumont High School	Roof-Wall Intersection Air Sealing	75.0	24.55	33.27	8.72	0.23	1.20	865	0	238
Dumont High School	Wall Air Sealing	75.0	24.55	33.27	8.72	1.00	1.20	865	1	1,037
Grant School	Caulking	75.0	24.55	33.27	8.72	5.27	1.17	865	6	5,346
Grant School	Buck Frame Air Sealing	75.0	24.55	33.27	8.72	0.02	1.17	865	0	19
Grant School	Door Weather Stripping	75.0	24.55	33.27	8.72	0.04	1.17	865	0	39
Grant School	Door Weather Stripping	75.0	24.55	33.27	8.72	0.05	1.17	865	0	48
Grant School	Door Weather Stripping	75.0	24.55	33.27	8.72	0.13	1.17	865	0	132
Grant School	Door Weather Stripping	75.0	24.55	33.27	8.72	0.15	1.17	865	0	155
Grant School	Roof-Wall Intersection Air Sealing	75.0	24.55	33.27	8.72	0.26	1.17	865	0	265
Grant School	Roof-Wall Intersection Air Sealing	75.0	24.55	33.27	8.72	0.11	1.17	865	0	110
Grant School	Roof-Wall Intersection Air Sealing	75.0	24.55	33.27	8.72	0.16	1.17	865	0	158
Honiss School	Caulking	75.0	24.55	33.27	8.72	0.37	1.14	865	0	369
Honiss School	Buck Frame Air Sealing	75.0	24.55	33.27	8.72	0.57	1.14	865	1	564
Honiss School	Buck Frame Air Sealing	75.0	24.55	33.27	8.72	0.29	1.14	865	0	285
Honiss School	Door Weather Stripping	75.0	24.55	33.27	8.72	1.77	1.14	865	2	1,746
Honiss School	Door Weather Stripping	75.0	24.55	33.27	8.72	0.05	1.14	865	0	49
Honiss School	Door Weather Stripping	75.0	24.55	33.27	8.72	0.23	1.14	865	0	227
Honiss School	Overhang Air Sealing	75.0	24.55	33.27	8.72	0.04	1.14	865	0	35
Honiss School	Overhang Air Sealing	75.0	24.55	33.27	8.72	0.03	1.14	865	0	26
Honiss School	Roof-Wall Intersection Air Sealing	75.0	24.55	33.27	8.72	3.45	1.14	865	4	3,403
Honiss School	Roof-Wall Intersection Air Sealing	75.0	24.55	33.27	8.72	0.32	1.14	865	0	320
Honiss School	Wall Air Sealing	75.0	24.55	33.27	8.72	0.30	1.14	865	0	298

Building Envelope Savings - Cooling Savings

BUILDING	TYPE	SUBTYPE	INFILTRATION REDUCTION (CFM)	TOTAL HEAT CONSTANT	INTERIOR DRY BULB TEMP (F)	EXTERIOR DRY BULB TEMP (F)	INTERIOR DRY RELATIVE HUMIDITY (%)
Lincoln School	Caulking	Interior Seal (LF)	965	4.5	72.0	75.0	40.0
Lincoln School	Door Weather Stripping	Double Door - Sides, Sweep, Center (UT)	158	4.5	72.0	75.0	40.0
Lincoln School	Door Weather Stripping	Double Door - Sides, Top, Sweep, Center (UT)	39	4.5	72.0	75.0	40.0
Lincoln School	Door Weather Stripping	Single Door - Sides, Sweep (UT)	60	4.5	72.0	75.0	40.0
Lincoln School	Door Weather Stripping	Single Door - Sides, Top, Sweep (UT)	23	4.5	72.0	75.0	40.0
Selzer School	Buck Frame Air Sealing	Seal (LF)	57	4.5	72.0	75.0	40.0
Selzer School	Door Weather Stripping	Double Door - Sides, Sweep, Center (UT)	126	4.5	72.0	75.0	40.0
Selzer School	Door Weather Stripping	Double Door - Sides, Top, Sweep, Center (UT)	193	4.5	72.0	75.0	40.0
Selzer School	Door Weather Stripping	Single Door - Sides, Sweep (UT)	40	4.5	72.0	75.0	40.0
Selzer School	Door Weather Stripping	Single Door - Sides, Top, Sweep (UT)	117	4.5	72.0	75.0	40.0
Selzer School	Overhang Air Sealing	Block, Seal (SF)	29	4.5	72.0	75.0	40.0
Selzer School	Garage Door Weather Stripping	Overhead Door Weather Strip - Sides, Top	29	4.5	72.0	75.0	40.0
Selzer School	Roof-Wall Intersection Air Sealing	Block, Seal (LF)	89	4.5	72.0	75.0	40.0
Selzer School	Roof-Wall Intersection Air Sealing	Seal (LF)	74	4.5	72.0	75.0	40.0
Selzer School	Wall Air Sealing	Block, Seal (SF)	408	4.5	72.0	75.0	40.0

Building Envelope Savings - Cooling Savings

BUILDING	TYPE	EXTERIOR RELATIVE HUMIDITY (%)	INTERIOR ENTHALPY (SUMMER)	EXTERIOR ENTHALPY (SUMMER)	ENTHALPY	TONS	EFFICIENCY (kW/TON)	COOLING HOURS (HRS)	INFILTRATION ELECTRIC SAVINGS (kW)	INFILTRATION ELECTRIC SAVINGS (kWh)
Lincoln School	Caulking	75.0	24.55	33.27	8.72	3.16	1.18	865	4	3,215
Lincoln School	Door Weather Stripping	75.0	24.55	33.27	8.72	0.52	1.18	865	1	526
Lincoln School	Door Weather Stripping	75.0	24.55	33.27	8.72	0.13	1.18	865	0	129
Lincoln School	Door Weather Stripping	75.0	24.55	33.27	8.72	0.20	1.18	865	0	199
Lincoln School	Door Weather Stripping	75.0	24.55	33.27	8.72	0.08	1.18	865	0	78
Selzer School	Buck Frame Air Sealing	75.0	24.55	33.27	8.72	0.19	1.24	865	0	200
Selzer School	Door Weather Stripping	75.0	24.55	33.27	8.72	0.41	1.24	865	1	442
Selzer School	Door Weather Stripping	75.0	24.55	33.27	8.72	0.63	1.24	865	1	675
Selzer School	Door Weather Stripping	75.0	24.55	33.27	8.72	0.13	1.24	865	0	139
Selzer School	Door Weather Stripping	75.0	24.55	33.27	8.72	0.38	1.24	865	0	409
Selzer School	Overhang Air Sealing	75.0	24.55	33.27	8.72	0.09	1.24	865	0	100
Selzer School	Garage Door Weather Stripping	75.0	24.55	33.27	8.72	0.10	1.24	865	0	102
Selzer School	Roof-Wall Intersection Air Sealing	75.0	24.55	33.27	8.72	0.29	1.24	865	0	310
Selzer School	Roof-Wall Intersection Air Sealing	75.0	24.55	33.27	8.72	0.24	1.24	865	0	258
Selzer School	Wall Air Sealing	75.0	24.55	33.27	8.72	1.33	1.24	865	2	1,425

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 = Inflitration 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)

Dumont Board of Education
25 Depew Street
Dumont, NJ 07628

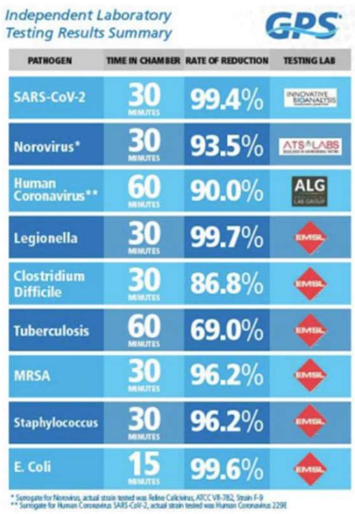
Capital Improvement Measure 20 – Needle Point Bipolar Ionization

Dumont Board of Education

✔	ECM evaluated but not included
✔	ECM included in the project

ECM #	ECM DESCRIPTION	Administration Building	Dumont High School	Grant School	Honiss School	Lincoln School	Selzer School
20	Needlepoint Bi-Polar Ionization	✔	✔	✔	✔	✔	✔

Needlepoint bipolar ionization helps facility operators enhance the air quality in their buildings using their building's existing air handling systems. This increases cleanliness & safety of the air the occupants breathe. Needle Point Bi-Polar Ionization technology works to safely clean the air inside facilities by using an electronic charge to create a plasma field filled with a high concentration of + and – ions. The ions help to agglomerate fine sub-micron particles, making them filterable. The ions kill pathogens by robbing them of life-sustaining hydrogen particles.



Independent Laboratory Testing Results Summary — GPS

PATHOGEN	TIME IN CHAMBER	RATE OF REDUCTION	TESTING LAB
SARS-CoV-2	30 MINUTES	99.4%	INNOVATIVE BIOANALYSIS
Norovirus*	30 MINUTES	93.5%	ATS LABS
Human Coronavirus**	60 MINUTES	90.0%	ALG
Legionella	30 MINUTES	99.7%	EMSL
Clostridium Difficile	30 MINUTES	86.8%	EMSL
Tuberculosis	60 MINUTES	69.0%	EMSL
MRSA	30 MINUTES	96.2%	EMSL
Staphylococcus	30 MINUTES	96.2%	EMSL
E. Coli	15 MINUTES	99.6%	EMSL

* Surrogate for Norovirus, actual strain tested was Feline Calicivirus, ATCC VR-782, Strain F-9
** Surrogate for Human Coronavirus SARS-CoV-2, actual strain tested was Human Coronavirus 229E

ECM Calculations

This ECM is not included in the project because of poor financial payback. See Appendix G for detailed savings calculations and ECM costs.

SECTION 4 – FINANCIAL ANALYSIS

Form II – Energy Conservation Measures Summary Form

FORM II - Dumont 15 Year @ 4.00%				
ESCO's PRELIMINARY ENERGY SAVINGS PLAN (ESP): ENERGY CONSERVATION MEASURES (ECMs) SUMMARY FORM Dumont Board of Education 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 Retrofit	$624,828	$68,703	9.1
3	District Wide Energy Management System Tier 1 & 2	$783,641	$78,336	10.0
6	Solar PPA	$0	$112,914	0.0
11	Water Conservation	$134,929	$11,329	11.9
12	Plug Load Controls	$38,244	$5,720	6.7
13	Pipe and Valve Insulation	$135,550	$16,038	8.5
14	Steam Trap Replacement	$136,000	$17,586	7.7
16	Roofing Upgrades	$1,183,645	$771	1535.9
19	Building Envelope Improvements	$214,944	$24,954	8.6
*Add additional lines as needed**	**Project Summary:**	**$3,251,781**	**$336,352**	**9.7**

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			
2	Lighting Controls	$143,265	$7,974	18.0
4	Unit Ventilator Replacement	$3,221,100	$1,136	2834.8
5	Addition of Cooling	$4,741,708	$0	-
7	Rooftop Unit Replacement	$1,948,363	$6,678	291.8
8	Air Handling Unit Replacement	$815,340	$2,876	283.5
8A	Honiss Gymnasium - Addition of Cooling	$306,204	$0	-
9	Split System Air Conditioning Replacement	$536,193	$263	2041.6
10	Hybrid Boiler Plant Conversion	$810,635	$3,769	215.1
11	Water Conservation	$3,445	$70	49.2
15	Combined Heat and Power	$871,471	$12,342	70.6
16	Roofing Upgrades	$60,562	$6	9483.3
17	Field Lighting Fixture Replacement	$357,500	$3,015	118.6
18	Exhaust Fan Replacement	$574,000	$2,602	220.6
20	Needlepoint Bi-Polar Ionization	$497,621	$0	-
*Add additional lines as needed**	**Optional ECMs Summary:**	**$14,887,407**	**$40,731**	**365.5**

Proposed Energy Related Capital Improvements		Supporting ECM	Estimated Cost $	Percentage of Total Project Cost (Not to Exceed 15%)
ECM Number	Energy Conservation Measure			
3A	District Wide Energy Management System Tier 3	District Wide Energy Management System Tier 1 & 2	$261,272	7.4%
*Add additional lines as needed**	**Optional ECMs Summary:**	**-**	**$261,272**	**7.4%**

(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 - Dumont 15 Year @ 4.00%		
ESCO's ENERGY SAVINGS PLAN (ESP): ESCOs PROPOSED FINAL PROJECT COST FORM Dumont Board of Education 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 [2]	$ 3,513,052	
ECM Contingency	$ 298,609	
Total Value of Hard Costs	$ 3,811,662	
Project Service Fees		
Investment Grade Energy Audit	$ 95,292	2.50%
Construction Management & Project Administration	$ 381,166	10.00%
System Commissioning	$ 28,587	0.75%
Equipment Initial Training Fees	$ 28,587	0.75%
ESCO Overhead	$ 152,466	4.00%
ESCO Profit	$ 152,466	4.00%
Project Service Fees Subtotal	$ 533,633	14.00%
ENV (Design Engineering)	$ 323,991	8.50%
TOTAL FINANCED PROJECT COSTS:	$ 4,974,218	30.50%

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	$0	0.00%

Form VI – Project Cash Flow Analysis

FORM VI - Dumont 15 Year @ 4.00%

ESCO's ENERGY SAVINGS PLAN (ESP):
ESCO's ANNUAL CASH FLOW ANALYSIS FORM
DUMONT BOARD OF EDUCATION - 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: **15** Years
2. Construction Period (2) (months): 24 Months
3. Cash Flow Analysis Format:

Miscellaneous Costs Financed:	
Cost of Issuance	$50,000
Total	$50,000

Project Cost(1): **$4,974,218**
Capital Contribution:
Miscellaneous Costs Financed: **$50,000**
Financed Amount: **$5,024,218**

Interest Rate: **4.00%**

Year	Annual Energy Savings	Solar Savings	Annual Operational Savings	Energy Rebates / Incentives(3)	Total Annual Savings	Annual Project Costs	Net Cash-Flow to Client	Cumulative Cash Flow
Installation	$ 220,434		$ -		$ 220,434		$ -	$ -
Year 1	$ 243,902	$ 128,226	$ 29,578	$ 68,678	$ 470,383	$ (683,114)	$ 7,703	$ 7,703
Year 2	$ 249,317	$ 130,502	$ 29,578	$ -	$ 409,397	$ (401,693)	$ 7,703	$ 15,407
Year 3	$ 254,858	$ 132,818	$ 20,201	$ -	$ 407,877	$ (400,173)	$ 7,703	$ 23,110
Year 4	$ 260,527	$ 135,175	$ 20,201	$ -	$ 415,902	$ (408,199)	$ 7,703	$ 30,813
Year 5	$ 266,327	$ 137,573	$ 20,201		$ 424,101	$ (416,398)	$ 7,703	$ 38,516
Year 6	$ 272,262	$ 140,014			$ 412,276	$ (404,573)	$ 7,703	$ 46,220
Year 7	$ 278,334	$ 142,498			$ 420,832	$ (413,128)	$ 7,703	$ 53,923
Year 8	$ 284,547	$ 145,025			$ 429,572	$ (421,868)	$ 7,703	$ 61,626
Year 9	$ 290,903	$ 147,597			$ 438,500	$ (430,797)	$ 7,703	$ 69,329
Year 10	$ 297,407	$ 150,214			$ 447,621	$ (439,917)	$ 7,703	$ 77,033
Year 11	$ 304,061	$ 152,877			$ 456,938	$ (449,235)	$ 7,703	$ 84,736
Year 12	$ 310,870	$ 155,587			$ 466,457	$ (458,753)	$ 7,703	$ 92,439
Year 13	$ 317,836	$ 158,345			$ 476,180	$ (468,477)	$ 7,703	$ 100,142
Year 14	$ 324,963	$ 161,151			$ 486,114	$ (478,411)	$ 7,703	$ 107,846
Year 15	$ 332,256	$ 164,007			$ 496,262	$ (488,559)	$ 7,703	$ 115,549
Totals	$ 4,508,803	$ 2,181,608	$ 119,757	$ 68,678	$ 6,878,845	$ (6,763,297)	$ 115,549	

NOTES:
(1) Includes: Hard costs and project service fees defined in ESCO's PROPOSED "FORM V"
(2) No payments are made by DBOE during the construction period.
(3) As of July 1, 2021, all of former NJ Clean Energy Program incentive programs transitioned over to the investor-owned gas and electric utility companies. Subsequently, the BPU is requiring that all ESIP projects consult with the DCA and follow all DCA guidance regarding the procurement of all subcontractors.

DUMONT PUBLIC SCHOOLS

Dumont Board of Education
25 Depew Street
Dumont, NJ 07628

Utility Inflation Details

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

Utility Inflation Worksheet					
Calendar Year	Savings Year	NET ANNUAL ELECTRIC COST SAVINGS (EXCLUDING SOLAR PPA SAVINGS)	ANNUAL NATURAL GAS COST SAVINGS	Net Solar Savings	ANNUAL Water & Sewer (Gal) COST SAVINGS
2025	1	$104,482.97	$129,865.39	$130,501.81	$9,553.51
2026	2	$106,781.59	$132,982.16	$132,817.96	$9,553.51
2027	3	$109,130.79	$136,173.73	$135,174.90	$9,553.51
2028	4	$111,531.67	$139,441.90	$137,573.34	$9,553.51
2029	5	$113,985.36	$142,788.51	$140,014.01	$9,553.51
2030	6	$116,493.04	$146,215.43	$142,497.65	$9,553.51
2031	7	$119,055.89	$149,724.60	$145,025.01	$9,553.51
2032	8	$121,675.12	$153,317.99	$147,596.85	$9,553.51
2033	9	$124,351.97	$156,997.62	$150,213.95	$9,553.51
2034	10	$127,087.71	$160,765.57	$152,877.10	$9,553.51
2035	11	$129,883.64	$164,623.94	$155,587.12	$9,553.51
2036	12	$132,741.08	$168,574.91	$158,344.81	$9,553.51
2037	13	$135,661.39	$172,620.71	$161,151.01	$9,553.51
2038	14	$138,645.94	$176,763.61	$164,006.58	$9,553.51
2039	15	$141,696.15	$181,005.94		$9,553.51
2040	16	$144,813.46	$185,350.08		$9,553.51
2041	17	$147,999.36	$189,798.48		$9,553.51
2042	18	$151,255.34	$194,353.64		$9,553.51
2043	19	$154,582.96	$199,018.13		$9,553.51
2044	20	$157,983.79	$203,794.57		$9,553.51

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	Dumont Board of Education
Disposition of Abandoned Equipment (Steam Piping, Condensate Piping, Oil Tanks, etc.)	Risk	Dumont Board of Education
New Natural Gas Distribution	Risk	Dumont Board of Education
Integrity of re-used Infrastructure	Risk	Dumont Board of Education
Life Safety System Coordination	Risk	Dumont Board of Education
Coordination with Dumont Board of Education Information Technology Department	Risk	Dumont Board of Education
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. Dumont Board of Education
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 & Dumont Board of Education
Scope changes relating to requests by Authorities Having Jurisdiction.	Risk	Dumont Board of Education (via contingency)
Department of Environmental Protection Permitting	Risk	Consulting Engineer
Modifications of Energy Saving Control Sequences and Setpoints impacting Energy Savings and Incentives	Risk	Dumont Board of Education
Post Construction Calibration of Sensors, Meters, & Safety Devices	Risk	Dumont Board of Education
Adequate time and access for bidding contractor site surveys	Risk	Dumont Board of Education
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 Dumont Board of Education, 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 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	Based on computer simulation model calibrated with whole-building or end-use

Computer Simulation	engineering expertise. Inputs to the model include facility 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	metered data or both. 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 for 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 units 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 year end. Dumont Board of Education 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 the Dumont Board of Education and DCO in a timely manner.

As part of the optional energy guarantee, DCO uses weather normalization procedures to correct for 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 Dumont Board of Education.

Maintenance Plan

Owner Tasks and Responsibilities:

As a general statement, Dumont Board of Education 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, Dumont Board of Education 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 Dumont Board of Education'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:

Dumont Board of Education will be given specific training on the changes and advancements in the environmental operations and energy savings strategies. Dumont Board of Education 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

Dumont Board of Education will be required to assure that proper mechanical maintenance continues to be implemented on its 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 Dumont Board of Education's attention for correction.

ENERGY SAVINGS PLAN

SECTION 6 – OPERATION & MAINTENANCE

It is critical to the success of achieving continued energy savings that Dumont Board of Education develop and implement an Operation and Maintenance Plan. In this section are some recommendations for Dumont Board of Education 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) CO_2
    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.

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 Dumont Board of Education and DCO. If Dumont Board of Education 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 Dumont Board of Education 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 Dumont Board of Education will achieve 100% of the total energy units 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 Dumont Board of Education.

SAVINGS VERIFICATION

There are events that cause energy savings to change. Dumont Board of Education 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 for 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 Dumont Board of Education.

Dumont Board of Education
25 Depew Street
Dumont, NJ 07628

DUMONT
PUBLIC SCHOOLS

ENERGY SAVINGS PLAN

APPENDICIES

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APPENDIX C	Operations & Maintenance Savings
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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 unknown. Missing or inaccurate Blueprints, deviations from the original blue prints 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 added 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 Dumont Board of Education were not available to deliver a cost estimate for each ECM. The budgetary costs carried 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 (8.5% of Hard Costs)

BID PACKAGE ALLOWANCE SCHEDULE			
ECM #	ENERGY CONSERVATION MEASURE	ESTIMATED INSTALLED HARD COSTS $	CONTINGENCY AMOUNT(8.5%)
1	LED Lighting Retrofit	$624,828	$53,110
2	District Wide Energy Management System Tier 1 & 2	$783,641	$66,610
3	District Wide Energy Management System Tier 3	$261,272	$22,208
9	Solar PPA	$0	$0
11	Water Conservation	$134,929	$11,469
12	Plug Load Controls	$38,244	$3,251
13	Pipe and Valve Insulation	$135,550	$11,522
14	Steam Trap Replacement	$136,000	$11,560
15	Roofing Upgrades	$1,183,645	$100,610
16	Building Envelope Improvements	$214,944	$18,270
	TOTALS	$3,513,052	$298,609

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 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 obtain 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:

- Re-bid the construction of the project on a 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 PACKAGE ALLOWANCE SCHEDULE		
ENERGY CONSERVATION MEASURE	COST + ALLOWANCE	SAVINGS
LED Lighting Retrofit	$677,938	$68,703
Solar PPA	$0	$112,914
Plug Load Controls	$41,495	$5,720
Pipe and Valve Insulation	$147,072	$16,038
Steam Trap Replacement	$147,560	$17,586
Building Envelope Improvements	$233,214	$24,954
District Wide Energy Management System Tier 1 & 2	$850,251	$78,336
District Wide Energy Management System Tier 3	$283,480	$0
Water Conservation	$146,398	$11,329
Roofing Upgrades	$1,284,254	$771
TOTALS	$3,811,662	$336,352

2. Bids in group 1 (Green) are within 15% of 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 will be 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

Dumont Board of Education		ANNUAL O&M COST SAVINGS
ECM #	ENERGY CONSERVATION MEASURE	$
1	LED Lighting Retrofit	$19,222
3	District Wide Energy Management System Tier 1 & 2	$5,459
16	Roofing Upgrades	$4,897
	TOTALS	$29,578

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: 4.0%
Term: .... 15 Years
Construction Term .... 24 Months
Construction Interest Only Payment of .... TBD by Dumont Board of Education 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

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Appendix E – Incentives in Debt Service

As part of the Energy Savings Plan for Dumont Board of Education, prescriptive rebate through PSE&G 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.

Energy Conservation Measure	Facility	Estimated Incentive
Led Lighting Upgrades	Administration Building	$ 1,454.17
Led Lighting Upgrades	Dumont High School	$ 27,146.55
Led Lighting Upgrades	Grant School	$ 10,125.98
Led Lighting Upgrades	Honiss School	$ 14,326.16
Led Lighting Upgrades	Lincoln School	$ 7,818.52
Led Lighting Upgrades	Selzer School	$ 3,913.23
Plug Loads	Administration Building	$ 166.69
Plug Loads	Dumont High School	$ 1,023.95
Plug Loads	Grant School	$ 607.23
Plug Loads	Honiss School	$ 821.54
Plug Loads	Lincoln School	$ 464.35
Plug Loads	Selzer School	$ 809.63
	Total Incentive	$ 68,678.00

All estimated incentive values for Dumont Board of Education ESIP project were calculated using PSE&G prescriptive rebates. The total incentive amount was calculated to be $68,678

No implied and/or written guarantee is being made with respective to the receipt of incentives. All incentives estimates carry inherent risks that may jeopardize the receipt of them. Therefore, Dumont Board of Education 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

Dumont Board of Education % SAVINGS BY BUILDING (T.O.R.)

Dumont Board of Education BUILDINGS/FACILITIES		UTILITY ELECTRIC CONSUMPTION SAVINGS	ELECTRIC DEMAND SAVINGS	NATURAL GAS SAVINGS	ONSITE NATURAL GAS SAVINGS	Water & Sewer (Gal) SAVINGS
BUILDING/FACILITY NAME	SQFT	kWh	kW	THERMS	THERMS	Water & Sewer (Gal)
Administration Building	7,000	39.3%	6.3%	39.8%	39.8%	0.0%
Dumont High School	165,469	27.7%	15.1%	40.4%	40.4%	36.6%
Grant School	52,527	31.3%	6.3%	39.3%	39.3%	3.7%
Honiss School	61,917	33.0%	13.3%	35.5%	35.5%	30.1%
Lincoln School	34,130	26.6%	8.3%	36.4%	36.4%	8.0%
Selzer School	58,455	28.0%	7.4%	34.7%	34.7%	9.7%
TOTALS	**379,498**	**29.3%**	**10.9%**	**38.1%**	**38.1%**	**23.8%**

Dumont Board of Education SAVINGS BY BUILDING BY UTILITY FROM SMART SELECT

Dumont Board of Education BUILDINGS/FACILITIES		ELECTRIC CONSUMPTION SAVINGS	ELECTRIC DEMAND SAVINGS	NATURAL GAS SAVINGS	ONSITE NATURAL GAS SAVINGS	Water & Sewer (Gal) SAVINGS
BUILDING/FACILITY NAME	SQFT	kWh	kW	THERMS	THERMS	Water & Sewer (Gal)
Administration Building	7,000	20,057	3	1,317	1,317	0
Dumont High School	165,469	271,916	92	55,284	55,284	982,520
Grant School	52,527	93,368	20	8,901	8,901	25,000
Honiss School	61,917	133,749	35	23,800	23,800	415,000
Lincoln School	34,130	65,799	15	8,273	8,273	20,000
Selzer School	58,455	108,275	23	13,340	13,340	62,000
TOTALS	**379,498**	**693,164**	**187**	**110,915**	**110,915**	**1,504,520**

ECM's evaluated and included in the project

Dumont Board of Education		INCLUDED IN PROJECT	INSTALLED COST	ANNUAL ELECTRIC COST SAVINGS	ANNUAL NATURAL GAS COST SAVINGS	ANNUAL Water & Sewer (Gal) COST SAVINGS	ANNUAL ENERGY COST SAVINGS
ECM #	ENERGY CONSERVATION MEASURE	"Y" OR "N"	$	$	$	$	$
1	LED Lighting Retrofit	Y	$624,828	$69,850	($1,147)	$0	$68,703
3	District Wide Energy Management System Tier 1 & 2	Y	$783,641	$15,687	$62,649	$0	$78,336
3A	District Wide Energy Management System Tier 3	Y	$261,272	$0	$0	$0	$0
6	Solar PPA	Y	$0	$112,914	$0	$0	$112,914
11	Water Conservation	Y	$134,929	$0	$1,776	$9,554	$11,329
12	Plug Load Controls	Y	$38,244	$5,720	$0	$0	$5,720
13	Pipe and Valve Insulation	Y	$135,550	$0	$16,038	$0	$16,038
14	Steam Trap Replacement	Y	$136,000	$0	$17,586	$0	$17,586
16	Roofing Upgrades	Y	$1,183,645	$91	$680	$0	$771
19	Building Envelope Improvements	Y	$214,944	$4,424	$20,530	$0	$24,954
TOTALS			$3,513,052	$208,687	$118,112	$9,554	$336,352

ECM's evaluated and included in the project

Dumont Board of Education			INCLUDED IN PROJECT	INSTALLED COST	ANNUAL ELECTRIC COST SAVINGS	ANNUAL NATURAL GAS COST SAVINGS	ANNUAL Water & Sewer (Gal) COST SAVINGS
ECM #	BUILDING/FACILITY	ENERGY CONSERVATION MEASURE	"Y" OR "N"	$	$	$	$
1	Administration Building	LED Lighting Retrofit	Y	$12,594	$2,066	($32)	$0
3	Administration Building	District Wide Energy Management System Tier 1 & 2	y	$37,608	$591	$254	$0
12	Administration Building	Plug Load Controls	Y	$1,690	$501	$0	$0
13	Administration Building	Pipe and Valve Insulation	y	$8,540	$0	$1,067	$0
19	Administration Building	Building Envelope Improvements	Y	$8,467	$150	$389	$0
1	Dumont High School	LED Lighting Retrofit	Y	$236,294	$22,292	($371)	$0
3	Dumont High School	District Wide Energy Management System Tier 1 & 2	Y	$279,395	$10,074	$32,219	$0
3A	Dumont High School	District Wide Energy Management System Tier 3	Y	$49,140	$0	$0	$0
6	Dumont High School	Solar PPA	Y	$0	$40,468	$0	$0
11	Dumont High School	Water Conservation	Y	$61,744	$0	$679	$6,239
12	Dumont High School	Plug Load Controls	Y	$10,947	$855	$0	$0
13	Dumont High School	Pipe and Valve Insulation	Y	$24,447	$0	$3,098	$0
14	Dumont High School	Steam Trap Replacement	Y	$63,900	$0	$10,878	$0
16	Dumont High School	Roofing Upgrades	Y	$631,594	$84	$631	$0
19	Dumont High School	Building Envelope Improvements	Y	$64,150	$1,471	$7,292	$0
1	Grant School	LED Lighting Retrofit	Y	$81,434	$11,291	($158)	$0
3	Grant School	District Wide Energy Management System Tier 1 & 2	Y	$91,823	$1,041	$2,414	$0
3A	Grant School	District Wide Energy Management System Tier 3	Y	$54,469	$0	$0	$0
6	Grant School	Solar PPA	Y	$0	$21,095	$0	$0
11	Grant School	Water Conservation	Y	$7,599	$0	$116	$159
12	Grant School	Plug Load Controls	Y	$5,616	$1,329	$0	$0
13	Grant School	Pipe and Valve Insulation	Y	$28,443	$0	$2,397	$0
14	Grant School	Steam Trap Replacement	Y	$42,100	$0	$2,750	$0
16	Grant School	Roofing Upgrades	Y	$163,951	$3	$14	$0
19	Grant School	Building Envelope Improvements	Y	$33,162	$923	$1,859	$0

ECM's evaluated and included in the project

Dumont Board of Education			INCLUDED IN PROJECT	ANNUAL ENERGY COST SAVINGS	ANNUAL O&M COST SAVINGS	TOTAL ANNUAL COST SAVINGS	SIMPLE PAYBACK WITHOUT INCENTIVES
ECM #	BUILDING/FACILITY	ENERGY CONSERVATION MEASURE	"Y" OR "N"	$	$	$	YEARS
1	Administration Building	LED Lighting Retrofit	Y	$2,034	$357	$2,391	5.3
3	Administration Building	District Wide Energy Management System Tier 1 & 2	y	$845	$0	$845	44.5
12	Administration Building	Plug Load Controls	Y	$501	$0	$501	3.4
13	Administration Building	Pipe and Valve Insulation	y	$1,067	$0	$1,067	8.0
19	Administration Building	Building Envelope Improvements	Y	$540	$0	$540	15.7
1	Dumont High School	LED Lighting Retrofit	Y	$21,920	$8,145	$30,065	7.9
3	Dumont High School	District Wide Energy Management System Tier 1 & 2	Y	$42,292	$3,983	$46,275	6.0
3A	Dumont High School	District Wide Energy Management System Tier 3	Y	$0	$0	$0	0.0
6	Dumont High School	Solar PPA	Y	$40,468	$0	$40,468	0.0
11	Dumont High School	Water Conservation	Y	$6,918	$0	$6,918	8.9
12	Dumont High School	Plug Load Controls	Y	$855	$0	$855	12.8
13	Dumont High School	Pipe and Valve Insulation	Y	$3,098	$0	$3,098	7.9
14	Dumont High School	Steam Trap Replacement	Y	$10,878	$0	$10,878	5.9
16	Dumont High School	Roofing Upgrades	Y	$715	$0	$715	883.9
19	Dumont High School	Building Envelope Improvements	Y	$8,763	$0	$8,763	7.3
1	Grant School	LED Lighting Retrofit	Y	$11,133	$2,323	$13,456	6.1
3	Grant School	District Wide Energy Management System Tier 1 & 2	Y	$3,455	$169	$3,624	25.3
3A	Grant School	District Wide Energy Management System Tier 3	Y	$0	$0	$0	0.0
6	Grant School	Solar PPA	Y	$21,095	$0	$21,095	0.0
11	Grant School	Water Conservation	Y	$275	$0	$275	27.7
12	Grant School	Plug Load Controls	Y	$1,329	$0	$1,329	4.2
13	Grant School	Pipe and Valve Insulation	Y	$2,397	$0	$2,397	11.9
14	Grant School	Steam Trap Replacement	Y	$2,750	$0	$2,750	15.3
16	Grant School	Roofing Upgrades	Y	$16	$0	$16	10,176.6
19	Grant School	Building Envelope Improvements	Y	$2,782	$0	$2,782	11.9

ECM's evaluated and included in the project

Dumont Board of Education			INCLUDED IN PROJECT	ELECTRIC CONSUMPTION SAVINGS	ELECTRIC DEMAND SAVINGS	NATURAL GAS SAVINGS	Water & Sewer (Gal) SAVINGS
ECM #	BUILDING/FACILITY	ENERGY CONSERVATION MEASURE	"Y" OR "N"	kWh	kW	THERMS	Water & Sewer (Gal)
1	Administration Building	LED Lighting Retrofit	Y	12,004	3.1	-25	0
3	Administration Building	District Wide Energy Management System Tier 1 & 2	y	3,831	0.0	199	0
12	Administration Building	Plug Load Controls	Y	3,247	0.0	0	0
13	Administration Building	Pipe and Valve Insulation	y	0	0.0	837	0
19	Administration Building	Building Envelope Improvements	Y	974	0	306	0
1	Dumont High School	LED Lighting Retrofit	Y	182,328	46.2	-377	0
3	Dumont High School	District Wide Energy Management System Tier 1 & 2	Y	66,769	46.0	32,727	0
3A	Dumont High School	District Wide Energy Management System Tier 3	Y	0	0.0	0	0
6	Dumont High School	Solar PPA	Y	607,665	0.0	0	0
11	Dumont High School	Water Conservation	Y	0	0.0	690	982,520
12	Dumont High School	Plug Load Controls	Y	8,096	0.0	0	0
13	Dumont High School	Pipe and Valve Insulation	Y	0	0.0	3,146	0
14	Dumont High School	Steam Trap Replacement	Y	0	0.0	11,050	0
16	Dumont High School	Roofing Upgrades	Y	796	0.0	640	0
19	Dumont High School	Building Envelope Improvements	Y	13,928	0.0	7,407	0
1	Grant School	LED Lighting Retrofit	Y	71,400	18.2	-149	0
3	Grant School	District Wide Energy Management System Tier 1 & 2	Y	6,646	1.5	2,288	0
3A	Grant School	District Wide Energy Management System Tier 3	Y	0	0.0	0	0
6	Grant School	Solar PPA	Y	195,047	0.0	0	0
11	Grant School	Water Conservation	Y	0	0.0	110	25,000
12	Grant School	Plug Load Controls	Y	9,032	0.0	0	0
13	Grant School	Pipe and Valve Insulation	Y	0	0.0	2,271	0
14	Grant School	Steam Trap Replacement	Y	0	0.0	2,607	0
16	Grant School	Roofing Upgrades	Y	17	0.0	13	0
19	Grant School	Building Envelope Improvements	Y	6,273	0.0	1,761	0

ECM's evaluated and included in the project

Dumont Board of Education			INCLUDED IN PROJECT	TOTAL SITE ENERGY SAVINGS	TOTAL SOURCE ENERGY SAVINGS
ECM #	BUILDING/FACILITY	ENERGY CONSERVATION MEASURE	"Y" OR "N"	MMBTU	MMBTU
1	Administration Building	LED Lighting Retrofit	Y	38	112
3	Administration Building	District Wide Energy Management System Tier 1 & 2	y	33	58
12	Administration Building	Plug Load Controls	Y	11	31
13	Administration Building	Pipe and Valve Insulation	y	84	88
19	Administration Building	Building Envelope Improvements	Y	34	41
1	Dumont High School	LED Lighting Retrofit	Y	584	1,702
3	Dumont High School	District Wide Energy Management System Tier 1 & 2	Y	3,501	4,074
3A	Dumont High School	District Wide Energy Management System Tier 3	Y	0	0
6	Dumont High School	Solar PPA	Y	2,073	5,805
11	Dumont High School	Water Conservation	Y	69	72
12	Dumont High School	Plug Load Controls	Y	28	77
13	Dumont High School	Pipe and Valve Insulation	Y	315	330
14	Dumont High School	Steam Trap Replacement	Y	1,105	1,160
16	Dumont High School	Roofing Upgrades	Y	67	75
19	Dumont High School	Building Envelope Improvements	Y	788	911
1	Grant School	LED Lighting Retrofit	Y	229	666
3	Grant School	District Wide Energy Management System Tier 1 & 2	Y	251	304
3A	Grant School	District Wide Energy Management System Tier 3	Y	0	0
6	Grant School	Solar PPA	Y	665	1,863
11	Grant School	Water Conservation	Y	11	12
12	Grant School	Plug Load Controls	Y	31	86
13	Grant School	Pipe and Valve Insulation	Y	227	238
14	Grant School	Steam Trap Replacement	Y	261	274
16	Grant School	Roofing Upgrades	Y	1	2
19	Grant School	Building Envelope Improvements	Y	198	245

ECM's evaluated and included in the project

Dumont Board of Education			INCLUDED IN PROJECT	Reduction of CO_2	Reduction of NO_x	Reduction of SO_2	Reduction of Hg
ECM #	BUILDING/FACILITY	ENERGY CONSERVATION MEASURE	"Y" OR "N"	LBS	LBS	LBS	LBS
1	Administration Building	LED Lighting Retrofit	Y	12,911	11	27	56
3	Administration Building	District Wide Energy Management System Tier 1 & 2	y	6,549	5	8	18
12	Administration Building	Plug Load Controls	Y	3,572	3	7	15
13	Administration Building	Pipe and Valve Insulation	y	9,799	8	0	0
19	Administration Building	Building Envelope Improvements	Y	4,647	4	2	5
1	Dumont High School	LED Lighting Retrofit	Y	196,146	170	403	848
3	Dumont High School	District Wide Energy Management System Tier 1 & 2	Y	456,354	365	148	310
3A	Dumont High School	District Wide Energy Management System Tier 3	Y	0	0	0	0
6	Dumont High School	Solar PPA	Y	668,432	577	1,343	2,826
11	Dumont High School	Water Conservation	Y	8,073	6	0	0
12	Dumont High School	Plug Load Controls	Y	8,906	8	18	38
13	Dumont High School	Pipe and Valve Insulation	Y	36,814	29	0	0
14	Dumont High School	Steam Trap Replacement	Y	129,285	102	0	0
16	Dumont High School	Roofing Upgrades	Y	8,369	7	2	4
19	Dumont High School	Building Envelope Improvements	Y	101,983	81	31	65
1	Grant School	LED Lighting Retrofit	Y	76,794	66	158	332
3	Grant School	District Wide Energy Management System Tier 1 & 2	Y	34,080	27	15	31
3A	Grant School	District Wide Energy Management System Tier 3	Y	0	0	0	0
6	Grant School	Solar PPA	Y	214,551	185	431	907
11	Grant School	Water Conservation	Y	1,287	1	0	0
12	Grant School	Plug Load Controls	Y	9,935	9	20	42
13	Grant School	Pipe and Valve Insulation	Y	26,575	21	0	0
14	Grant School	Steam Trap Replacement	Y	30,496	24	0	0
16	Grant School	Roofing Upgrades	Y	170	0	0	0
19	Grant School	Building Envelope Improvements	Y	27,508	22	14	29

DUMONT PUBLIC SCHOOLS

Dumont Board of Education
25 Depew Street
Dumont, NJ 07628

ECM's evaluated and included in the project

Dumont Board of Education			INCLUDED IN PROJECT	INSTALLED COST	ANNUAL ELECTRIC COST SAVINGS	ANNUAL NATURAL GAS COST SAVINGS	ANNUAL Water & Sewer (Gal) COST SAVINGS
ECM #	BUILDING/FACILITY	ENERGY CONSERVATION MEASURE	"Y" OR "N"	$	$	$	$
1	Honiss School	LED Lighting Retrofit	Y	$122,835	$15,245	($252)	$0
3	Honiss School	District Wide Energy Management System Tier 1 & 2	Y	$129,862	$2,026	$15,306	$0
3A	Honiss School	District Wide Energy Management System Tier 3	Y	$73,710	$0	$0	$0
6	Honiss School	Solar PPA	Y	$0	$22,178	$0	$0
11	Honiss School	Water Conservation	Y	$48,959	$0	$546	$2,635
12	Honiss School	Plug Load Controls	Y	$7,967	$1,158	$0	$0
13	Honiss School	Pipe and Valve Insulation	Y	$24,776	$0	$2,649	$0
14	Honiss School	Steam Trap Replacement	Y	$30,000	$0	$3,958	$0
16	Honiss School	Roofing Upgrades	Y	$172,896	$2	$17	$0
19	Honiss School	Building Envelope Improvements	Y	$41,796	$915	$4,841	$0
1	Lincoln School	LED Lighting Retrofit	Y	$68,608	$6,004	($122)	$0
3	Lincoln School	District Wide Energy Management System Tier 1 & 2	Y	$93,790	$896	$3,404	$0
3A	Lincoln School	District Wide Energy Management System Tier 3	Y	$26,623	$0	$0	$0
6	Lincoln School	Solar PPA	Y	$0	$9,724	$0	$0
11	Lincoln School	Water Conservation	Y	$7,578	$0	$85	$127
12	Lincoln School	Plug Load Controls	Y	$4,577	$688	$0	$0
13	Lincoln School	Pipe and Valve Insulation	Y	$29,716	$0	$2,841	$0
14	Lincoln School	Building Envelope Improvements	Y	$24,600	$0	$2,404	$0
16	Lincoln School	Roofing Upgrades	Y	$73,456	$1	$6	$0
19	Lincoln School	Building Envelope Improvements	Y	$18,839	$448	$1,380	$0
1	Selzer School	LED Lighting Retrofit	Y	$103,063	$12,953	($212)	$0
3	Selzer School	District Wide Energy Management System Tier 1 & 2	Y	$151,164	$1,060	$9,051	$0
3A	Selzer School	District Wide Energy Management System Tier 3	Y	$57,330	$0	$0	$0
6	Selzer School	Solar PPA	Y	$0	$19,450	$0	$0
11	Selzer School	Water Conservation	Y	$9,049	$0	$350	$394
12	Selzer School	Plug Load Controls	Y	$7,446	$1,190	$0	$0
13	Selzer School	Pipe and Valve Insulation	Y	$19,628	$0	$3,987	$0
16	Selzer School	Roofing Upgrades	Y	$141,748	$2	$12	$0
19	Selzer School	Building Envelope Improvements	Y	$23,930	$517	$2,365	$0
		TOTALS		$3,513,052	$208,687	$118,112	$9,554

ECM's evaluated and included in the project

Dumont Board of Education			INCLUDED IN PROJECT	ANNUAL ENERGY COST SAVINGS	ANNUAL O&M COST SAVINGS	TOTAL ANNUAL COST SAVINGS	SIMPLE PAYBACK WITHOUT INCENTIVES
ECM #	BUILDING/FACILITY	ENERGY CONSERVATION MEASURE	"Y" OR "N"	$	$	$	YEARS
1	Honiss School	LED Lighting Retrofit	Y	$14,993	$3,502	$18,495	6.6
3	Honiss School	District Wide Energy Management System Tier 1 & 2	Y	$17,332	$537	$17,870	7.3
3A	Honiss School	District Wide Energy Management System Tier 3	Y	$0	$0	$0	0.0
6	Honiss School	Solar PPA	Y	$22,178	$0	$22,178	0.0
11	Honiss School	Water Conservation	Y	$3,181	$0	$3,181	15.4
12	Honiss School	Plug Load Controls	Y	$1,158	$0	$1,158	6.9
13	Honiss School	Pipe and Valve Insulation	Y	$2,649	$0	$2,649	9.4
14	Honiss School	Steam Trap Replacement	Y	$3,958	$0	$3,958	7.6
16	Honiss School	Roofing Upgrades	Y	$19	$4,349	$4,369	39.6
19	Honiss School	Building Envelope Improvements	Y	$5,756	$0	$5,756	7.3
1	Lincoln School	LED Lighting Retrofit	Y	$5,881	$1,948	$7,829	8.8
3	Lincoln School	District Wide Energy Management System Tier 1 & 2	Y	$4,301	$339	$4,640	20.2
3A	Lincoln School	District Wide Energy Management System Tier 3	Y	$0	$0	$0	0.0
6	Lincoln School	Solar PPA	Y	$9,724	$0	$9,724	0.0
11	Lincoln School	Water Conservation	Y	$212	$0	$212	35.8
12	Lincoln School	Plug Load Controls	Y	$688	$0	$688	6.7
13	Lincoln School	Pipe and Valve Insulation	Y	$2,841	$0	$2,841	10.5
14	Lincoln School	Building Envelope Improvements	Y	$2,404	$0	$2,404	10.2
16	Lincoln School	Roofing Upgrades	Y	$6	$0	$6	11417.4
19	Lincoln School	Building Envelope Improvements	Y	$1,829	$0	$1,829	10.3
1	Selzer School	LED Lighting Retrofit	Y	$12,741	$2,948	$15,689	6.6
3	Selzer School	District Wide Energy Management System Tier 1 & 2	Y	$10,111	$431	$10,542	14.3
3A	Selzer School	District Wide Energy Management System Tier 3	Y	$0	$0	$0	0.0
6	Selzer School	Solar PPA	Y	$19,450	$0	$19,450	0.0
11	Selzer School	Water Conservation	Y	$743	$0	$743	12.2
12	Selzer School	Plug Load Controls	Y	$1,190	$0	$1,190	6.3
13	Selzer School	Pipe and Valve Insulation	Y	$3,987	$0	$3,987	4.9
16	Selzer School	Roofing Upgrades	Y	$14	$548	$562	252.3
19	Selzer School	Building Envelope Improvements	Y	$2,882	$0	$2,882	8.3
		TOTALS		$336,352	$29,578	$365,930	9.6

ECM's evaluated and included in the project

Dumont Board of Education			INCLUDED IN PROJECT	ELECTRIC CONSUMPTION SAVINGS	ELECTRIC DEMAND SAVINGS	NATURAL GAS SAVINGS	Water & Sewer (Gal) SAVINGS
ECM #	BUILDING/FACILITY	ENERGY CONSERVATION MEASURE	"Y" OR "N"	kWh	kW	THERMS	Water & Sewer (Gal)
1	Honiss School	LED Lighting Retrofit	Y	105,868	26.9	-221	0
3	Honiss School	District Wide Energy Management System Tier 1 & 2	Y	11,275	8.2	13,460	0
3A	Honiss School	District Wide Energy Management System Tier 3	Y	0	0.0	0	0
6	Honiss School	Solar PPA	Y	258,040	0.0	0	0
11	Honiss School	Water Conservation	Y	0	0.0	480	415,000
12	Honiss School	Plug Load Controls	Y	9,267	0.0	0	0
13	Honiss School	Pipe and Valve Insulation	Y	0	0.0	2,330	0
14	Honiss School	Steam Trap Replacement	Y	0	0.0	3,480	0
16	Honiss School	Roofing Upgrades	Y	17	0.0	15	0
19	Honiss School	Building Envelope Improvements	Y	7,323	0.0	4,257	0
1	Lincoln School	LED Lighting Retrofit	Y	48,332	12.3	-101	0
3	Lincoln School	District Wide Energy Management System Tier 1 & 2	Y	6,952	2.3	2,817	0
3A	Lincoln School	District Wide Energy Management System Tier 3	Y	0	0.0	0	0
6	Lincoln School	Solar PPA	Y	140,733	0.0	0	0
11	Lincoln School	Water Conservation	Y	0	0.0	70	20,000
12	Lincoln School	Plug Load Controls	Y	6,362	0.0	0	0
13	Lincoln School	Pipe and Valve Insulation	Y	0	0.0	2,351	0
14	Lincoln School	Building Envelope Improvements	Y	0	0.0	1,989	0
16	Lincoln School	Roofing Upgrades	Y	6	0.0	5	0
19	Lincoln School	Building Envelope Improvements	Y	4,146	0.0	1,142	0
1	Selzer School	LED Lighting Retrofit	Y	86,833	22.1	-182	0
3	Selzer School	District Wide Energy Management System Tier 1 & 2	Y	8,022	0.4	7,763	0
3A	Selzer School	District Wide Energy Management System Tier 3	Y	0	0.0	0	0
6	Selzer School	Solar PPA	Y	220,147	0.0	0	0
11	Selzer School	Water Conservation	Y	0	0.0	300	62,000
12	Selzer School	Plug Load Controls	Y	9,346	0.0	0	0
13	Selzer School	Pipe and Valve Insulation	Y	0	0.0	3,419	0
16	Selzer School	Roofing Upgrades	Y	14	0.0	11	0
19	Selzer School	Building Envelope Improvements	Y	4,060	0.0	2,028	0
		TOTALS		2,114,796	187.1	110,915	1,504,520

Dumont Board of Education
25 Depew Street
Dumont, NJ 07628

ECM's evaluated and included in the project

Dumont Board of Education			INCLUDED IN PROJECT	TOTAL SITE ENERGY SAVINGS	TOTAL SOURCE ENERGY SAVINGS
ECM #	BUILDING/FACILITY	ENERGY CONSERVATION MEASURE	"Y" OR "N"	MMBTU	MMBTU
1	Honiss School	LED Lighting Retrofit	Y	339	988
3	Honiss School	District Wide Energy Management System Tier 1 & 2	Y	1,384	1,521
3A	Honiss School	District Wide Energy Management System Tier 3	Y	0	0
6	Honiss School	Solar PPA	Y	880	2,465
11	Honiss School	Water Conservation	Y	48	50
12	Honiss School	Plug Load Controls	Y	32	89
13	Honiss School	Pipe and Valve Insulation	Y	233	245
14	Honiss School	Steam Trap Replacement	Y	348	365
16	Honiss School	Roofing Upgrades	Y	2	2
19	Honiss School	Building Envelope Improvements	Y	451	517
1	Lincoln School	LED Lighting Retrofit	Y	155	451
3	Lincoln School	District Wide Energy Management System Tier 1 & 2	Y	305	362
3A	Lincoln School	District Wide Energy Management System Tier 3	Y	0	0
6	Lincoln School	Solar PPA	Y	480	1,345
11	Lincoln School	Water Conservation	Y	7	7
12	Lincoln School	Plug Load Controls	Y	22	61
13	Lincoln School	Pipe and Valve Insulation	Y	235	247
14	Lincoln School	Building Envelope Improvements	Y	199	209
16	Lincoln School	Roofing Upgrades	Y	0	1
19	Lincoln School	Building Envelope Improvements	Y	128	160
1	Selzer School	LED Lighting Retrofit	Y	278	811
3	Selzer School	District Wide Energy Management System Tier 1 & 2	Y	804	892
3A	Selzer School	District Wide Energy Management System Tier 3	Y	0	0
6	Selzer School	Solar PPA	Y	751	2,103
11	Selzer School	Water Conservation	Y	30	32
12	Selzer School	Plug Load Controls	Y	32	89
13	Selzer School	Pipe and Valve Insulation	Y	342	359
16	Selzer School	Roofing Upgrades	Y	1	1
19	Selzer School	Building Envelope Improvements	Y	217	252
		TOTALS		18,307	31,850

Dumont Board of Education
25 Depew Street
Dumont, NJ 07628

ECM's evaluated and included in the project

Dumont Board of Education			INCLUDED IN PROJECT	Reduction of CO_2	Reduction of NO_x	Reduction of SO_2	Reduction of Hg
ECM #	BUILDING/FACILITY	ENERGY CONSERVATION MEASURE	"Y" OR "N"	LBS	LBS	LBS	LBS
1	Honiss School	LED Lighting Retrofit	Y	113,864	99	234	492
3	Honiss School	District Wide Energy Management System Tier 1 & 2	Y	169,879	135	25	52
3A	Honiss School	District Wide Energy Management System Tier 3	Y	0	0	0	0
6	Honiss School	Solar PPA	Y	283,844	245	570	1,200
11	Honiss School	Water Conservation	Y	5,616	4	0	0
12	Honiss School	Plug Load Controls	Y	10,194	9	20	43
13	Honiss School	Pipe and Valve Insulation	Y	27,256	21	0	0
14	Honiss School	Steam Trap Replacement	Y	40,716	32	0	0
16	Honiss School	Roofing Upgrades	Y	195	0	0	0
19	Honiss School	Building Envelope Improvements	Y	57,861	46	16	34
1	Lincoln School	LED Lighting Retrofit	Y	51,983	45	107	225
3	Lincoln School	District Wide Energy Management System Tier 1 & 2	Y	40,607	33	15	32
3A	Lincoln School	District Wide Energy Management System Tier 3	Y	0	0	0	0
6	Lincoln School	Solar PPA	Y	154,806	134	311	654
11	Lincoln School	Water Conservation	Y	819	1	0	0
12	Lincoln School	Plug Load Controls	Y	6,998	6	14	30
13	Lincoln School	Pipe and Valve Insulation	Y	27,503	22	0	0
14	Lincoln School	Building Envelope Improvements	Y	23,271	18	0	0
16	Lincoln School	Roofing Upgrades	Y	63	0	0	0
19	Lincoln School	Building Envelope Improvements	Y	17,925	14	9	19
1	Selzer School	LED Lighting Retrofit	Y	93,392	81	192	404
3	Selzer School	District Wide Energy Management System Tier 1 & 2	Y	99,657	79	18	37
3A	Selzer School	District Wide Energy Management System Tier 3	Y	0	0	0	0
6	Selzer School	Solar PPA	Y	242,162	209	487	1,024
11	Selzer School	Water Conservation	Y	3,510	3	0	0
12	Selzer School	Plug Load Controls	Y	10,280	9	21	43
13	Selzer School	Pipe and Valve Insulation	Y	40,007	31	0	0
16	Selzer School	Roofing Upgrades	Y	141	0	0	0
19	Selzer School	Building Envelope Improvements	Y	28,195	23	9	19
		TOTALS		3,623,975	3,029	4,674	9,834

ECM's evaluated but not included in the project

Dumont Board of Education			INSTALLED COST	ANNUAL ELECTRIC COST SAVINGS	ANNUAL NATURAL GAS COST SAVINGS	ANNUAL Water & Sewer (Gal) 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	Water & Sewer (Gal) 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	ENERGY CONSERVATION MEASURE	$	$	$	$	$	$	$	YEARS	kWh	kW	THERMS	Water & Sewer (Gal)	MMBTU	MMBTU	LBS	LBS	LBS	LBS
2	Administration Building	Lighting Controls	$3,373	$263	($4)	$0	$259	$0	$259	13.0	1,530	0.4	-3	0	5	14	1,646	1	3	7
3A	Administration Building	District Wide Energy Management System Tier 3	$0	$0	$0	$0	$0	$0	$0	0.0	0	0.0	0	0	0	0	0	0	0	0
6	Administration Building	Solar PPA	$0	$0	$0	$0	$0	$0	$0	0.0	0	0.0	0	0	0	0	0	0	0	0
11	Administration Building	Water Conservation	$3,445	$0	$38	$32	$70	$0	$70	49.2	0	0.0	30	5,000	3	3	351	0	0	0
16	Administration Building	Roofing Upgrades	$60,562	$1	$6	$0	$6	$0	$6	9,483.3	5	0.0	4	0	0	1	57	0	0	0
18	Administration Building	Exhaust Fan Replacement	$5,125	$20	$0	$0	$20	$0	$20	252.0	113	0.040726298	0	0	0	1	125	0	0	1
20	Administration Building	Needlepoint Bi-Polar Ionization	$7,265	$0	$0	$0	$0	$0	$0	0.0	0	0.0	0	0	0	0	0	0	0	0
2	Dumont High School	Lighting Controls	$46,615	$1,948	($33)	$0	$1,915	$0	$1,915	24.3	15,931	4.0	-33	0	51	149	17,136	15	35	74
4	Dumont High School	Unit Ventilator Replacement	$522,500	$172	$0	$0	$172	$0	$172	3,035.2	422	1.9	0	0	1	4	465	0	1	2
5	Dumont High School	Addition of Cooling	$1,968,008	$0	$0	$0	$0	$0	$0	0.0	0	0.0	0	0	0	0	0	0	0	0
7	Dumont High School	Rooftop Unit Replacement	$495,838	$1,004	$1,979	$0	$2,983	$28,958	$31,942	15.5	5,700	6.1	2,011	0	221	266	29,794	24	13	27
8	Dumont High School	Air Handling Unit Replacement	$543,560	$885	$0	$0	$885	$1,139	$2,023	268.7	7,674	1.1	0	0	26	73	8,441	7	17	36
9	Dumont High School	Split System Air Conditioning Replacement	$80,999	$79	$0	$0	$79	$2,775	$2,853	28.4	447	0.480069448	0	0	2	4	492	0	1	2
10	Dumont High School	Hybrid Boiler Plant Conversion	$408,205	$0	$1,522	$0	$1,522	$0	$1,522	268.2	0	0	1,546	0	155	162	18,092	14	0	0
15	Dumont High School	Combined Heat and Power	$435,736	$12,496	($6,909)	$0	$5,587	$0	$5,587	78.0	107,447	35	-7,019	0	-335	290	36,075	38	237	500
17	Dumont High School	Field Lighting Fixture Replacement	$357,500	$3,015	$0	$0	$3,015	$0	$3,015	118.6	16,355	19.5	0	0	56	156	17,990	16	36	76
18	Dumont High School	Exhaust Fan Replacement	$276,750	$1,322	$0	$0	$1,322	$0	$1,322	209.4	10,215	3.671555649	0	0	35	98	11,236	10	23	47
20	Dumont High School	Needlepoint Bi-Polar Ionization	$168,900	$0	$0	$0	$0	$0	$0	0.0	0	0	0	0	0	0	0	0	0	0
2	Grant School	Lighting Controls	$20,100	$1,470	($21)	$0	$1,449	$0	$1,449	13.9	9,294	2.4	-19	0	30	87	9,996	9	21	43
4	Grant School	Unit Ventilator Replacement	$660,000	$184	$0	$0	$184	$0	$184	3578.9	533	2.5	0	0	2	5	587	1	1	2
5	Grant School	Addition of Cooling	$617,500	$0	$0	$0	$0	$0	$0	0.0	0	0.0	0	0	0	0	0	0	0	0
7	Grant School	Rooftop Unit Replacement	$403,497	$251	$492	$0	$742	$1,087	$1,829	220.6	1,240	1.6	466	0	51	61	6,817	5	3	6
9	Grant School	Split System Air Conditioning Replacement	$69,443	$112	$0	$0	$112	$272	$384	180.7	557	0.7	0	0	2	5	612	1	1	3
18	Grant School	Exhaust Fan Replacement	$41,000	$166	$0	$0	$166	$0	$166	247.1	1,020	0.4	0	0	3	10	1,122	1	2	5
20	Grant School	Needlepoint Bi-Polar Ionization	$78,094	$0	$0	$0	$0	$0	$0	0.0	0	0.0	0	0	0	0	0	0	0	0
2	Honiss School	Lighting Controls	$33,363	$2,073	($34)	$0	$2,039	$0	$2,039	16.4	14,398	3.7	-30	0	46	134	15,486	13	32	67
4	Honiss School	Unit Ventilator Replacement	$1,021,100	$386	$0	$0	$386	$0	$386	2645.5	822	3.8	0	0	3	8	905	1	2	4
5	Honiss School	Addition of Cooling	$1,078,700	$0	$0	$0	$0	$0	$0	0.0	0	0.0	0	0	0	0	0	0	0	0
7	Honiss School	Rooftop Unit Replacement	$184,896	$295	$52	$0	$347	$1,554	$1,901	97.2	1,341	1.7	45	0	9	18	2,007	2	3	6
8	Honiss School	Air Handling Unit Replacement	$271,780	$1,991	$0	$0	$1,991	$82	$2,073	131.1	14,644	2.2	0	0	50	140	16,109	14	32	68
8A	Honiss School	Honiss Gymnasium - Addition of Cooling	$306,204	$0	$0	$0	$0	$0	$0	0.0	0	0.0	0	0	0	0	0	0	0	0
9	Honiss School	Split System Air Conditioning Replacement	$102,308	$19	$0	$0	$19	$477	$496	206.4	92	0.1	0	0	0	1	101	0	0	0
10	Honiss School	Hybrid Boiler Plant Conversion	$402,430	$0	$2,246	$0	$2,246	$0	$2,246	179.1	0	0.0	1,975	0	198	207	23,112	18	0	0
15	Honiss School	Combined Heat and Power	$435,736	$14,737	($7,982)	$0	$6,755	$0	$6,755	64.5	107,447	35.0	-7,019	0	-335	290	36,075	38	237	500
18	Honiss School	Exhaust Fan Replacement	$102,500	$393	$0	$0	$393	$0	$393	260.9	2,587	0.9	0	0	9	25	2,846	2	6	12
20	Honiss School	Needlepoint Bi-Polar Ionization	$105,336	$0	$0	$0	$0	$0	$0	0.0	0	0.0	0	0	0	0	0	0	0	0
2	Lincoln School	Lighting Controls	$10,312	$545	($11)	$0	$534	$0	$534	19.3	4,389	1.1	-9	0	14	41	4,720	4	10	20
4	Lincoln School	Unit Ventilator Replacement	$357,500	$115	$0	$0	$115	$0	$115	3,098.1	289	1.3	0	0	1	3	318	0	1	1
5	Lincoln School	Addition of Cooling	$387,500	$0	$0	$0	$0	$0	$0	0.0	0	0.0	0	0	0	0	0	0	0	0
7	Lincoln School	Rooftop Unit Replacement	$533,823	$314	$624	$0	$938	$2,370	$3,307	161.4	1,665	2.1	516	0	57	70	7,871	6	4	8
9	Lincoln School	Split System Air Conditioning Replacement	$139,849	$8	$0	$0	$8	$948	$956	146.3	46	0.0	0	0	0	0	51	0	0	0
18	Lincoln School	Exhaust Fan Replacement	$30,750	$101	$0	$0	$101	$0	$101	304.6	771	0.3	0	0	3	7	849	1	2	4
20	Lincoln School	Needlepoint Bi-Polar Ionization	$45,403	$0	$0	$0	$0	$0	$0	0.0	0	0.0	0	0	0	0	0	0	0	0
2	Selzer School	Lighting Controls	$29,503	$1,806	($30)	$0	$1,777	$0	$1,777	16.6	12,107	3.1	-25	0	39	113	13,022	11	27	56
4	Selzer School	Unit Ventilator Replacement	$660,000	$278	$0	$0	$278	$0	$278	2,371.1	533	2.5	0	0	2	5	587	1	1	2
5	Selzer School	Addition of Cooling	$690,000	$0	$0	$0	$0	$0	$0	0.0	0	0.0	0	0	0	0	0	0	0	0
7	Selzer School	Rooftop Unit Replacement	$330,309	$1,234	$434	$0	$1,668	$3,119	$4,787	69.0	5,224	6.6	372	0	55	89	10,097	8	12	24
9	Selzer School	Split System Air Conditioning Replacement	$143,594	$44	$0	$0	$44	$624	$668	214.9	188	0.2	0	0	1	2	207	0	0	1
18	Selzer School	Exhaust Fan Replacement	$117,875	$601	$0	$0	$601	$0	$601	196.3	3,796	1.4	0	0	13	36	4,175	4	8	18
20	Selzer School	Needlepoint Bi-Polar Ionization	$92,623	$0	$0	$0	$0	$0	$0	0.0	0	0.0	0	0	0	0	0	0	0	0
		TOTALS	$14,887,407	$48,329	($7,630)	$32	$40,731	$43,405	$84,136	176.9	1,770,454	145.7	-7,191	5,000	471	2,577	299,568	1,616	3,913	8,233

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

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

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