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Thank you.

**Energy Guarantee Report  
Prepared by: Energy Systems Group;**

**Received by: Beecher Road School;**

Mary Joy, CMVP, EMIT  
Measurement and Verification Analyst

Alfred Pullo, Jr.  
Director of Business & Operations  
Woodbridge School District

Date: September 14, 2020

Date:



Energy Services Guarantee

# Beecher Road School

Woodbridge, Connecticut

Year 3 - Annual Report | June 2019 — May 2020



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## Introduction

Energy Systems Group is pleased to provide the Town of Woodbridge and Beecher Road School with this report, which details the energy cost avoidance portion of our joint project. The Guaranteed Year 3 energy savings for this project are **\$ 218,497**. This amount contains savings from Options A, C and Modified Option C. This report covers the Option A, Option C, and Modified Option C savings for Guarantee Year 3. Although outside of the scope of the project, this report takes into account the impact of electricity generated by the photovoltaic system at Beecher Road School during Year 3.

During Guarantee Year 3, June 2019 – May 2020, Beecher Road School realized total Year 3 cost savings of **\$ 292,851**. Option C Electric cost savings during Year 3 were **\$ 155,046**. Cost Savings from Modified Option C fuel switching from #2 fuel oil to natural gas and the new heating system were **\$ 130,938**. During this time there were also Option A Water Savings of **\$ 6,868**.

**As a result, a grand total of \$ 1,691,509 in energy savings occurred over the past 70 months.**

Beecher Road School - Cumulative Savings					
Period	Guaranteed Savings	Actual Electric Savings \$	Actual Fuel Switch Savings \$	Actual Water Savings \$	Total Actual Savings
Construction Period - August 2014 - May 2017	\$ 35,630	\$ 365,147	\$ 459,554	\$ 14,852	\$ 839,553
Year 1 - June 2017- May 2018	\$ 210,012	\$ 131,030	\$ 148,766	\$ 6,601	\$ 286,397
Year 2 - June 2018- May 2019	\$ 214,213	\$ 125,996	\$ 139,979	\$ 6,733	\$ 272,708
Year 3 - June 2019- May 2020	\$ 218,497	\$ 155,046	\$ 130,938	\$ 6,868	\$ 292,851
<b>Total</b>	<b>\$ 678,352</b>				<b>\$ 1,691,509</b>

This report explains in detail the process by which cost avoidance was determined. It includes summaries of the base year and current utility bills, weather information and what adjustments were made to the base year utility bills. The sole purpose of adjustments are to make an “apples to apples” comparison by taking today’s conditions and applying them to the base year, in order to accurately compare today’s utility bills with those of the base year prior to the upgrade projects.

## **Project Background**

The Energy Conservation Measures (ECM’s) and building upgrades implemented for this project included:

- Lighting and Lighting Sensors Retrofit
- Mechanical Upgrades
  - New chilled water plant providing cooling throughout the school
  - New Pool dehumidification unit
  - Upgrades to air distribution system, including replacement of Roof Top Units, Air Handling Units, Variable Air Volume boxes, and Unit Ventilators
- Building Control Upgrades (Direct Digital Control Building Management System)
- Demand Control Ventilation
- Building Envelope Improvements (weather-stripping, sealing and insulation)
- Plug Load Controls
- Walk-In Freezer and Cooler Controls
- Transformer Replacement
- Water Conservation Measures (installation of low flow fixtures)
- Micro-Turbine that uses Natural Gas to generate electricity and utilizes the waste heat for pool water heating, domestic water heating, and building space heating in the winter time
- Replacement of Curtain Wall
- Roof Replacement
- Casework in ABC and K Wing
- Building Security Upgrade Measures (Includes Security Doors, Visitor Management System, Access Control System, Camera and Intercom System)
- Installation of New Canopy at the North and South Entrances of the School
- Wall Painting
- Equipment Commissioning

These measures enabled Beecher Road School to increase system efficiency and performance, reduce the energy consumption, and improve the indoor environment for occupant comfort and security. As outlined in the Exhibit B Measurement and Verification Plan for this project, Energy Savings verification for this project was completed using IPMVP Option C and Modified Option C Methodology. This methodology utilizes utility bill analysis in order to calculate Cost Avoidance as detailed in this report. Verification of savings that result from Water Conservation measures was completed using IPMVP Option A Retrofit Isolation: Key Parameter Measurement methodology. The Option A savings were verified through on time pre-and post-retrofit water flow rates in sample fixtures and engineering calculations.

## **Executive Summary**

This comprehensive report shows energy consumption savings for those buildings associated with our joint project. The analysis was accomplished using EnergyCAP® energy accounting software to enhance the quality of the report in conjunction with MS-Excel. EnergyCAP® incorporates weather, billing period length, square footage and utility rate changes to provide the most accurate analysis of energy cost avoidance possible.

Energy Systems Group began the installation of energy saving upgrades to equipment in May 2014, with final acceptance of this project given by Beecher Road School in May 2017. With this project, came a guarantee of energy savings worth **\$3,667,462** over 15 years. The following table shows the cost avoidance to date.

Beecher Road School  
**Year 3 – Annual Report**

Beecher Road School - Cumulative Savings		
Period	Guaranteed Savings	Actual Savings
<b>Construction Period* - August 2014 - May 2017</b>	<b>\$ 35,630</b>	<b>\$ 839,553</b>
<b>Year 1 - June 2017- May 2018**</b>	<b>\$ 210,012</b>	<b>\$ 286,397</b>
<b>Year 2 - June 2018- May 2019**</b>	<b>\$ 214,213</b>	<b>\$ 272,708</b>
<b>Year 3 - June 2019- May 2020**</b>	<b>\$ 218,497</b>	<b>\$ 292,851</b>
<b>Total</b>	<b>\$ 678,352</b>	<b>\$ 1,691,509</b>

\*Note: The Guaranteed Savings for the Construction Period was \$35,630 of Agreed Upon Energy Savings. The Construction Savings summary in the Year 1 report is for informational purposes only.

\*\*Year 1 -Year 3 Savings include the impact of electricity generated by the photovoltaic system at Beecher Road School.



Mark Winters, PE, CEM  
 Engineering Manager  
 Northeast Region



Mary Joy, CMVP, EMIT  
 Measurement & Verification Analyst

# Beecher Road School Year 3 – Annual Report

## Year 3 Savings

Total Energy Costs (Dollar) - Savings by Methodology of Verification - Year 3: (Jun 2019 - May 2020)				
Month	Option C - Electric Savings	Modified Option C #2 FO to NG Fuel Switching Savings & Energy Efficiency Savings Combined Totals	Annual Option A - Water Savings <small>*Details found in Appendix of this Report</small>	Total Dollars Saved Year 3
January-2020	13,326	37,602		50,928
February-2020	9,823	8,657		18,480
March-2020	12,509	32,828		45,336
April-2020	14,681	13,353		28,034
May-2020	23,343	808		24,151
June-2019	9,394	(1,010)		8,384
July-2019	5,577	(3,366)		2,211
August-2019	5,677	(3,620)		2,057
September-2019	17,710	(3,329)		14,381
October-2019	16,208	(2,526)		13,681
November-2019	15,927	20,535		36,462
December-2019	10,872	31,007		41,879
<b>Total Option C &amp; Modified Option C</b>	<b>\$ 155,046</b>	<b>\$ 130,938</b>		<b>\$ 285,983</b>
<b>Total Year 3 Option A Water Savings</b>				<b>\$ 6,868</b>
<b>Grand Total Energy &amp; Water Savings</b>				<b>\$ 292,851</b>

### ELECTRIC - OPTION C

Month	Heating DD		Cooling DD		\$			Contractual Savings
	Base	Current	Base	Current	Base	Adjusted	Current at Contract Rates	
Jan-20	913	875	0	0	\$ 26,209	\$ 26,421	\$ 13,095	\$ 13,326
Feb-20	766	802	0	0	\$ 24,721	\$ 26,523	\$ 16,700	\$ 9,823
Mar-20	575	644	0	0	\$ 23,947	\$ 24,084	\$ 11,575	\$ 12,509
Apr-20	380	525	3	0	\$ 24,383	\$ 25,368	\$ 10,687	\$ 14,681
May-20	133	216	38	37	\$ 30,355	\$ 32,441	\$ 9,098	\$ 23,343
Jun-19	22	26	140	134	\$ 26,427	\$ 25,730	\$ 16,336	\$ 9,394
Jul-19	0	0	364	365	\$ 23,451	\$ 24,337	\$ 18,760	\$ 5,577
Aug-19	0	0	264	267	\$ 23,133	\$ 24,421	\$ 18,744	\$ 5,677
Sep-19	33	31	137	91	\$ 30,792	\$ 34,283	\$ 16,573	\$ 17,710
Oct-19	273	229	4	19	\$ 32,220	\$ 31,942	\$ 15,735	\$ 16,208
Nov-19	472	682	0	0	\$ 27,260	\$ 27,375	\$ 11,449	\$ 15,927
Dec-19	733	892	0	0	\$ 21,923	\$ 23,727	\$ 12,854	\$ 10,872
	4300	4922	950	913	\$ 314,821	\$ 326,652	\$ 171,606	

**Total Electric Savings \$ 155,046**



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## MODIFIED OPTION C - FUEL SWITCHING DOLLAR SAVINGS

Month	Base HDD	Current HDD	Base HDD	Current HDD	Base Year Consumption THERMS	Current Year Consumption THERMS	Fuel Switching Dollar Savings
Jan-20	913	875	0	0	25,330	13,718	\$ 18,831
Feb-20	766	802	0	0	5,200	13,489	\$ 18,517
Mar-20	575	644	0	0	20,361	11,503	\$ 15,791
Apr-20	380	525	3	0	4,422	7,715	\$ 10,591
May-20	133	216	38	37	378	5,187	\$ 7,120
Jun-19	22	26	140	134	1,452	5,672	\$ 7,787
Jul-19	0	0	364	365	378	6,258	\$ 8,591
Aug-19	0	0	264	267	378	6,604	\$ 9,065
Sep-19	33	31	137	91	378	6,200	\$ 8,511
Oct-19	273	229	4	19	378	5,774	\$ 7,926
Nov-19	472	682	0	0	8,742	9,790	\$ 13,439
Dec-19	733	892	0	0	16,007	12,440	\$ 17,076
	4300	4922	950	913	83,404	104,352	\$ 143,245

Total Fuel Switching Savings \$ 143,245

## MODIFIED OPTION C - ENERGY EFFICIENCY UPGRADE SAVINGS

Month	Base HDD	Current HDD	Base CDD	Current CDD	Base Therms	Adjusted Therms	Current Therms	Total Efficiency Upgrade \$ Saved
Jan-20	913	875	0	0	25,330	22,931	13,718	\$ 18,771
Feb-20	766	802	0	0	5,200	8,650	13,489	\$ (9,860)
Mar-20	575	644	0	0	20,361	19,865	11,503	\$ 17,037
Apr-20	380	525	3	0	4,422	9,071	7,715	\$ 2,762
May-20	133	216	38	37	378	2,089	5,187	\$ (6,312)
Jun-19	22	26	140	134	1,452	1,355	5,672	\$ (8,797)
Jul-19	0	0	364	365	378	390	6,258	\$ (11,957)
Aug-19	0	0	264	267	378	378	6,604	\$ (12,685)
Sep-19	33	31	137	91	378	389	6,200	\$ (11,840)
Oct-19	273	229	4	19	378	644	5,774	\$ (10,453)
Nov-19	472	682	0	0	8,742	13,273	9,790	\$ 7,096
Dec-19	733	892	0	0	16,007	19,277	12,440	\$ 13,931
	4300	4922	950	913	83,404	98,312	104,352	

Total Energy Efficiency Upgrade Savings \$ (12,307)

## Utility Rates

Rates used to calculate savings are presented in the table below. Rates used to calculate Fuel Switching and Natural Gas savings are presented in the Fuel Switching Methodology Section.

Commodity	Baseline	Escalated Base	Current	Year 3 Rate Used to Calculate Savings
Option C Electric (\$/kWh)	\$0.1984	\$ 0.2064	\$0.1875	\$0.2064
Option A Water (\$/kGal)	\$ 6.41	\$ 6.67		\$ 6.67

## Option A - Water System Savings

Option A “Retrofit Isolation: Key Parameter Measurement” was used in the verification of water system improvements at Beecher Road School. The verification was performed through one-time pre- and post-retrofit water flow rates in sample fixtures and engineering calculations and was presented in the Year 1 Report. The annual cost savings will be carried forward escalating annually as outlined in Section 4.1 of Exhibit B of the contract.

Beecher Road School Option A Water Savings				
	Gallons	Rate (\$/kgal)	Achieved Savings \$	Guaranteed Savings \$
Year 3 Option A Water Savings	1,029,802	\$6.67	\$ 6,868	\$ 3,964

## Option C and Modified Option C

### Measuring Energy Savings Through Cost Avoidance

The measurement of energy consumption and the cost savings associated with installed energy management equipment is a comparison between the energy consumed during the current billing period and the respective baseline billing period.

The first step in cost avoidance calculations is the creation of a baseline. The baseline reflects the facility’s energy use and energy costs prior to the installation of the energy conservation measures. The baseline calendar period will typically be a consecutive twelve month period for which reliable data exists prior to contract execution. The baseline will consist of all energy bills applicable to the meters in the project. For Beecher Road School, July 2011 – June 2012, was used as the base year.

Once the program is in place, actual energy use is recorded from current utility bills. The costs that the facility incurs after implementation of the measures are compared to the baseline in order to determine if savings projections--and guarantees--have been met.

## **Baseline Adjustments**

Proper analysis and comparison can only be achieved if the environmental and facility parameters are equal to those of the base year. Examples of factors effecting the environment and facility parameters are weather, energy rates, facility schedules and changes in equipment. The baseline may need to be adjusted to equalize the parameters of the current year so that an accurate analysis can be performed and valid savings can be measured. In essence, the adjustment process shows what the costs and usage would have been in the base year under the current conditions for an ‘apples to apples’ comparison.

These adjustments typically cover:

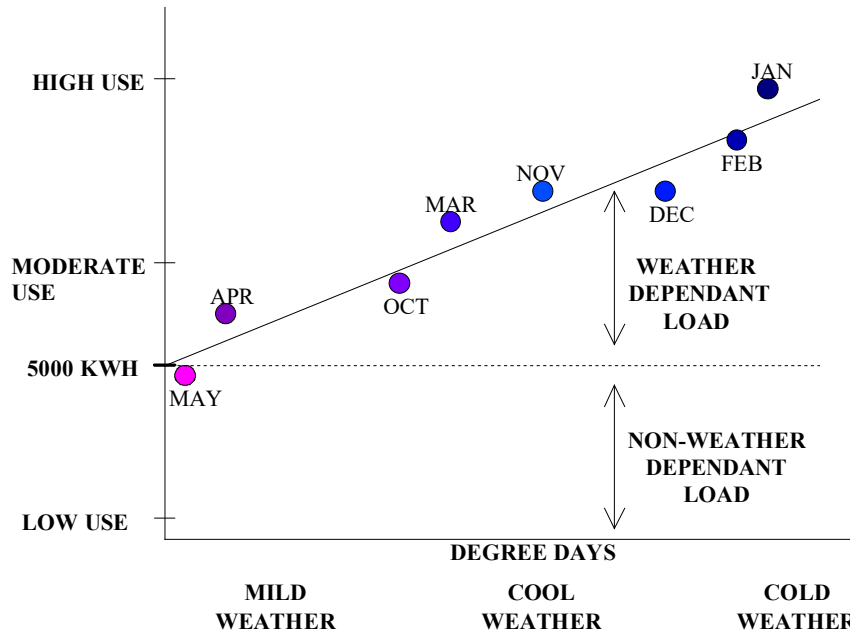
- standardize for the number of days in a billing period
- normalize the differences in outdoor temperature through degree days
- changes in facility occupancy and use
- additions or deletions of energy using equipment
- changes in energy prices and/or rate structures

## **Auditing Energy Savings**

ESG uses EnergyCAP®, a computerized energy accounting database to track cost and consumption during the guarantee period. Once a baseline is established, and entered into the program, EnergyCAP® uses this as the benchmark for contract performance.

EnergyCAP® will automatically adjust for differing number of days in the billing period before calculating performance. The software’s processors adjust for weather variations using degree days while still recognizing that not all energy consumption is weather-related.

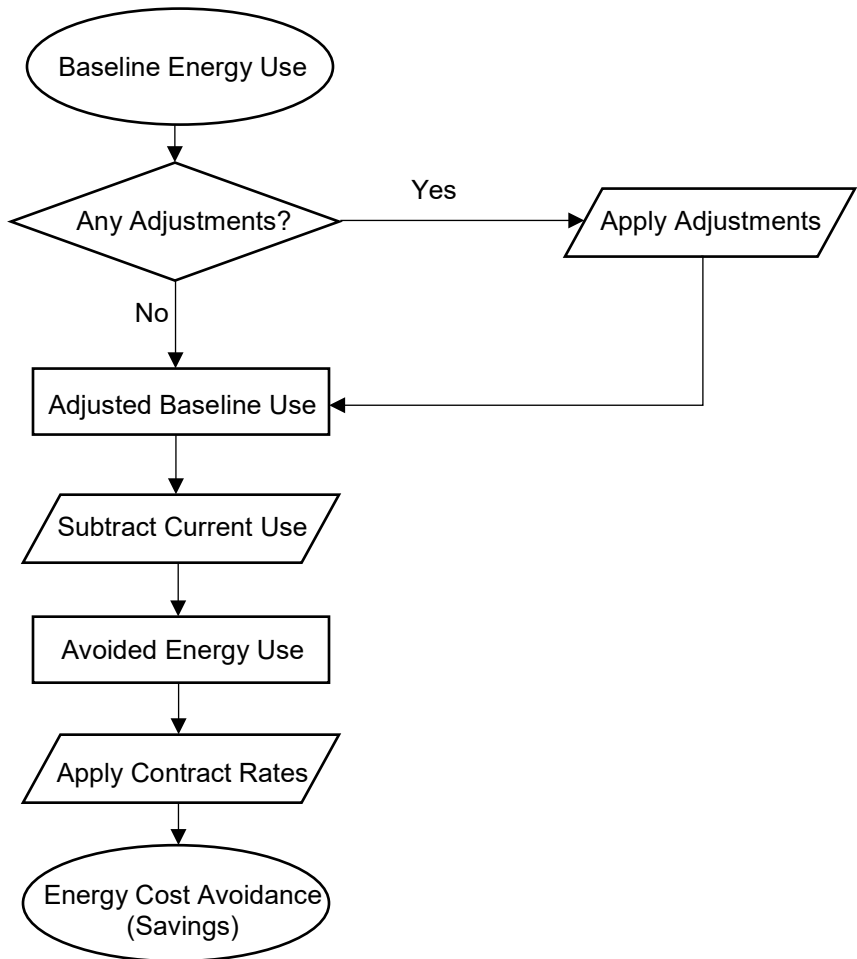
**EnergyCAP® WEATHER ADJUSTMENT MODEL SAMPLE**



After EnergyCAP® adjusts for weather and billing period, it allows additional adjustments to be made for items such as changes in equipment or occupancy. Changes in equipment can be removal of or an addition to existing equipment or operating hours.

Once all adjustments are taken into account, EnergyCAP® then produces the new baseline units of energy (adjusted baseline). The current energy consumption is then subtracted from the adjusted baseline to determine avoided energy units. The energy rates as agreed in the contract are then applied to avoided energy units to determine cost avoidance.

A summary of the calculation process for cost avoidance is as follows:



### **Methodology for Assigning Dollar Values to Savings:**

Assigning dollar values to savings will be accomplished by using an average cost per unit of energy. Charges for fuel adjustments, base services, transmission, tariffs, and distributions will be included to ensure an ‘apples to apples’ comparison. This method also allows for updating savings calculations with changing rate schedules. In the event of a utility rate decrease, the utility rate(s) used to assign dollar cost will not drop below that of the base year. In this project, savings have been guaranteed in dollars, not units of energy, therefore, a lower limit, or floor, must be set to that of the base year rate schedules.

The following pages graphically illustrate the actual energy usage of the base and guarantee years, and the resulting impacts of any adjustments to the base year (adjusted baseline).

It is noted that during the months of March, April and May 2020 it was observed that there was lower electric consumption than for the same months of 2019. The difference in kWh consumption was approximately 69,500 kWh valued at \$14,345. It is noted that the COVID-19 pandemic occurred during this time frame. No adjustments were applied in this report for this change in consumption.

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## Fuel Switching Methodology

Detailed Fuel Switching Modified Option C Methodology may be found in excerpts of Exhibit B, Section 4 of the contract; or at the end of this report.

**Fuel Switch Savings \$** = (Current Year Consumption or Fuel Oil Equivalent Baseline 83,404 Therms, whichever is greater) x (the Baseline Fuel Cost Savings difference value escalating 2% annually in \$/Therm)

	Current Year Therm Consumption	Fuel Oil Equivalent Baseline Therms	Fuel Switch Dollar Savings
Jan-20	13,718	25,330	\$ 18,831
Feb-20	13,489	5,200	\$ 18,517
Mar-20	11,503	20,361	\$ 15,791
Apr-20	7,715	4,422	\$ 10,591
May-20	5,187	378	\$ 7,120
Jun-19	5,672	1,452	\$ 7,787
Jul-19	6,258	378	\$ 8,591
Aug-19	6,604	378	\$ 9,065
Sep-19	6,200	378	\$ 8,511
Oct-19	5,774	378	\$ 7,926
Nov-19	9,790	8,742	\$ 13,439
Dec-19	12,440	16,007	\$ 17,076
<b>Total</b>	<b>104,352</b>	<b>83,404</b>	<b>\$ 143,245</b>

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	Baseline Fuel Unit Cost Difference \$1.3194	Escalated Baseline Fuel Unit Cost Difference (Beginning Cost \$1.3194)
Jan-19	\$ 1.3194	1.3727
Feb-19	\$ 1.3194	1.3727
Mar-19	\$ 1.3194	1.3727
Apr-19	\$ 1.3194	1.3727
May-19	\$ 1.3194	1.3727
Jun-18	\$ 1.3194	1.3727
Jul-18	\$ 1.3194	1.3727
Aug-18	\$ 1.3194	1.3727
Sep-18	\$ 1.3194	1.3727
Oct-18	\$ 1.3194	1.3727
Nov-18	\$ 1.3194	1.3727
Dec-18	\$ 1.3194	1.3727

Note: The Escalated Baseline Fuel Unit Cost Difference was used in the Fuel Switch Savings calculation.

**Energy Efficiency Upgrade Savings \$** = (Adjusted Baseline Therms – Current Year Therms) or (Fuel Oil Equivalent Baseline 83,404 Therms – Current Year Therms), whichever is greater x (Avoided Energy Cost escalating 2% annually in \$/Therm)

Note: The Escalated Avoided Energy Cost was used in the Efficiency Upgrade Savings calculation.

(tables shown on the following page)



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	Adjusted Baseline Therms (83,404 Therms adjusted for weather in EnergyCap regression analysis)	Current Year Therms (Facility Heat and Microturbine Therms)	Fuel Oil Equivalent Baseline Therms From Contract (Facility Heat Only)	Adjusted Baseline – Current Year Therms = Therms Saved	Baseline (Facility Heat Only) – Current Year Therms = Therms Saved	Greater of Therms Saved	Energy Efficiency Upgrade Savings Dollars = Greater of Therms Saved x Lower Unit Cost
Jan-20	22,931	13,718	25,330	9,213	11,612	9,213	\$ 18,771
Feb-20	8,650	13,489	5,200	(4,839)	(8,289)	(4,839)	\$ (9,860)
Mar-20	19,865	11,503	20,361	8,362	8,858	8,362	\$ 17,037
Apr-20	9,071	7,715	4,422	1,356	(3,293)	1,356	\$ 2,762
May-20	2,089	5,187	378	(3,098)	(4,809)	(3,098)	\$ (6,312)
Jun-19	1,355	5,672	1,452	(4,317)	(4,220)	(4,317)	\$ (8,797)
Jul-19	390	6,258	378	(5,868)	(5,880)	(5,868)	\$ (11,957)
Aug-19	378	6,604	378	(6,226)	(6,226)	(6,226)	\$ (12,685)
Sep-19	389	6,200	378	(5,811)	(5,822)	(5,811)	\$ (11,840)
Oct-19	644	5,774	378	(5,130)	(5,396)	(5,130)	\$ (10,453)
Nov-19	13,273	9,790	8,742	3,483	(1,048)	3,483	\$ 7,096
Dec-19	19,277	12,440	16,007	6,837	3,567	6,837	\$ 13,931
<b>Total</b>	<b>98,312</b>	<b>104,352</b>	<b>83,404</b>	<b>(6,040)</b>	<b>(20,948)</b>	<b>(6,040)</b>	<b>\$ (12,307)</b>

	Baseline Avoided Energy Cost \$1.9584	Baseline Avoided Energy Cost escalated 2% Annually
Jan-19	\$ 1.9584	\$ 2.0375
Feb-19	\$ 1.9584	\$ 2.0375
Mar-19	\$ 1.9584	\$ 2.0375
Apr-19	\$ 1.9584	\$ 2.0375
May-19	\$ 1.9584	\$ 2.0375
Jun-18	\$ 1.9584	\$ 2.0375
Jul-18	\$ 1.9584	\$ 2.0375
Aug-18	\$ 1.9584	\$ 2.0375
Sep-18	\$ 1.9584	\$ 2.0375
Oct-18	\$ 1.9584	\$ 2.0375
Nov-18	\$ 1.9584	\$ 2.0375
Dec-18	\$ 1.9584	\$ 2.0375

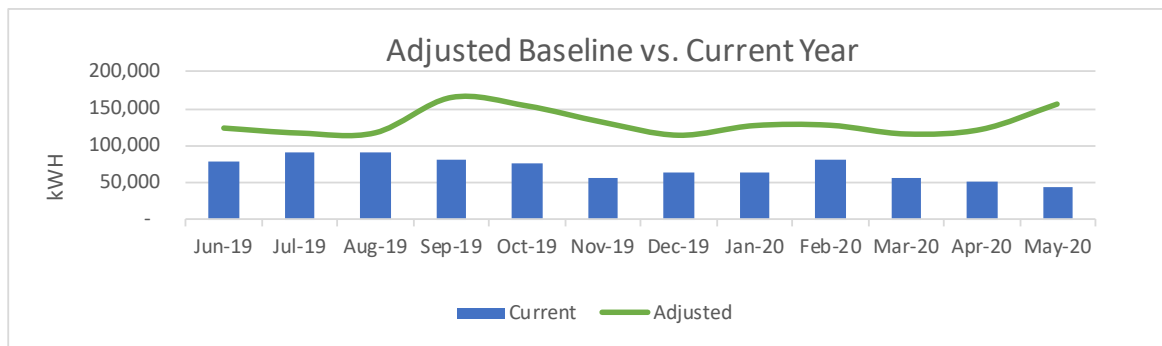
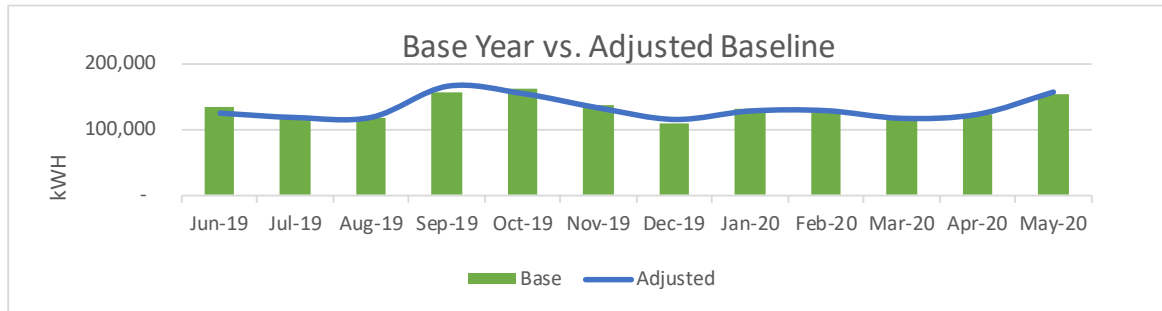
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## Electric kWh Savings

### ELECTRIC

Month	Heating DD		Cooling DD		kWH			
	Base	Current	Base	Current	Base	Adjusted	Current	Saved
Jan-20	913	875	0	0	132,100	127,997	63,439	64,558
Feb-20	766	802	0	0	124,600	128,493	80,904	47,589
Mar-20	575	644	0	0	120,700	116,677	56,078	60,599
Apr-20	380	525	3	0	122,900	122,900	51,776	71,124
May-20	133	216	38	37	153,000	157,162	44,076	113,086
Jun-19	22	26	140	134	133,200	124,653	79,143	45,510
Jul-19	0	0	364	365	118,200	117,904	90,884	27,020
Aug-19	0	0	264	267	116,600	118,308	90,808	27,500
Sep-19	33	31	137	91	155,200	166,088	80,290	85,798
Oct-19	273	229	4	19	162,400	154,748	76,229	78,519
Nov-19	472	682	0	0	137,400	132,623	55,464	77,159
Dec-19	733	892	0	0	110,500	114,946	62,274	52,672
Totals	4300	4922	950	913	1,586,800	1,582,499	831,365	

**Total Electric Grid Use Avoidance 751,134**



# Beecher Road School Year 3 – Annual Report

**Analysis of Year 3 Electric Consumption at Beecher Road School: Grid Use and Use of Solar Production**

		Total Consumption kWh shown on utility bill as Total on last page = grid consumption from North and South Meter Reads plus solar kWh exported to the grid from South Virtual Meter Reads	Total Metered Grid Consumption =North+South Meter Reads	Total Solar Production kWh (data provided by CT Green Bank)	Solar Production kWh Exported to the Grid (South Virtual Meter Reads)	Difference = Solar Production kWh used by Beecher Road School	Total kWh used by Beecher Road School during Year 3 = Metered Grid Consumption + Solar production kWh used by the school	\$ Value of Solar Production used by Beecher Road School during Year 3
12/20/2019-01/18/2020	Jan-20	50,400	49,680	14,479	720	13,759	63,439	\$ 2,580
1/17/2020-2/18/2020	Feb-20	61,680	60,000	22,584	1,680	20,904	80,904	\$ 3,919
2/19/2020-3/18/2020	Mar-20	47,520	39,360	24,878	8,160	16,718	56,078	\$ 3,134
3/20/2020-4/19/2020	Apr-20	46,080	31,200	35,456	14,880	20,576	51,776	\$ 3,858
4/20/2020-5/18/2020	May-20	47,520	28,080	33,036	17,040	15,996	44,076	\$ 2,999
5/20/2019-6/18/2019	Jun-19	72,240	62,640	26,103	9,600	16,503	79,143	\$ 3,094
6/19/2019-7/18/2019	Jul-19	75,120	68,880	28,244	6,240	22,004	90,884	\$ 4,125
7/19/2019-8/19/2019	Aug-19	81,840	74,160	24,328	7,680	16,648	90,808	\$ 3,121
08/20/2019-09/18/2019	Sep-19	78,720	72,000	15,010	6,720	8,290	80,290	\$ 1,554
9/19/2019-10/18/2019	Oct-19	74,880	69,600	11,909	5,280	6,629	76,229	\$ 1,243
10/21/2019- 11/18/2019	Nov-19	54,000	52,320	4,824	1,680	3,144	55,464	\$ 589
11/19/2019-12/18/2019	Dec-19	54,720	54,000	8,994	720	8,274	62,274	\$ 1,551
		744,720	661,920	249,845	80,400	169,445	831,365	\$ 31,768

831,365	Total kWh used by Beecher Road School during Year 3 = Metered Grid Consumption + Solar Production used at Beecher Road School
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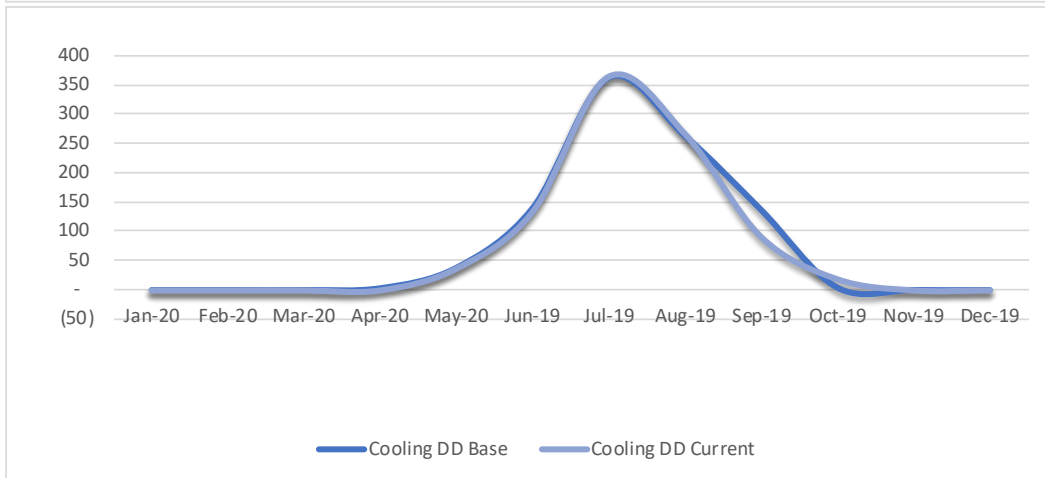
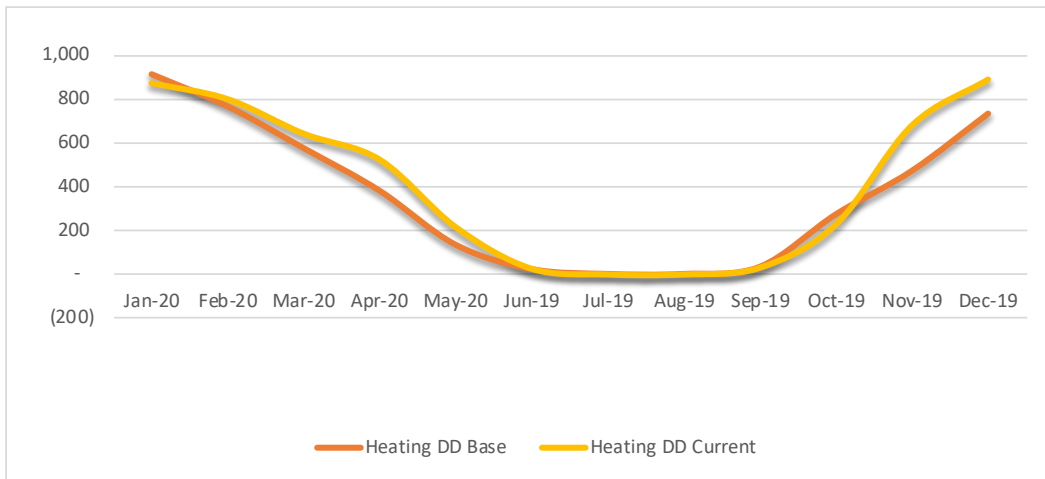
Total Year 3 Electric Consumption includes kWh purchased from the utility (grid use) and kWh generated by the solar power system that was used by Beecher Road School. Grid kWh consumption as listed on the utility bills is a sum of the North and South Meter reads. The South Virtual Meter represents the solar production kWh that is sold to the grid. Therefore, in order to determine Year 3 kWh generated by the solar power system that was used by Beecher Road School, the South Virtual Meter kWh exported to the grid were deducted from the total kWh produced by the solar power system. The grid use was then added to the solar production used by the school, resulting in 831,365 total kWh used by Beecher Road School during Year 3. The Year 3 Electric Grid rate is \$0.1875/kWh, which was the rate used to calculate the value of the solar production used by Beecher Road School during Year 3.

# Beecher Road School Year 3 – Annual Report

## Weather

Degree Days

Month	Heating DD			Cooling DD		
	Base	Current	Difference	Base	Current	Difference
Jan-20	913	875	38	0	0	0
Feb-20	766	802	-36	0	0	0
Mar-20	575	644	-69	0	0	0
Apr-20	380	525	-145	3	0	3
May-20	133	216	-83	38	37	1
Jun-19	22	26	-4	140	134	6
Jul-19	0	0	0	364	365	-1
Aug-19	0	0	0	264	267	-3
Sep-19	33	31	2	137	91	46
Oct-19	273	229	44	4	19	-15
Nov-19	472	682	-210	0	0	0
Dec-19	733	892	-159	0	0	0



## APPENDIX

Beecher Road School  
**Year 3 – Annual Report**

During a recent internal review, we discovered an error in the savings methodology we used to calculate the energy savings we reported to you. The error resulted in ESG reporting higher savings than the method prescribed in the contract would have reported. ESG has recalculated the savings based on the contract terms. The corrected calculations still show ESG delivered more than the guaranteed savings, but by a smaller margin than originally reported. A summary of the annual reconciliation is attached. The corrected yearly savings is reflected in this Year 3 Annual Report.

In the original report, the savings measured using the M&V Option C Methodology were not calculated in accordance with the methodology specified in the contract. The contract establishes an energy unit cost floor value to be used in calculations in the unusual situation in which energy costs fall over time. The calculated savings using the actual energy costs were in some years more than the calculated savings using the contractual floor price. The result was an overstatement of reported savings. Although, we are still meeting the guarantee and this has no contractual or financial implications, we wanted to make you aware of the error and provide you the restated annual savings.

We apologize for this error and for any inconvenience it may have caused.

Woodbridge School District, Beecher Road School– Recalculation of Savings

Reporting Period	Contract Guarantee	Savings Reported	Recalculated Savings
Construction	\$35,630	\$927,587	\$839,553
Year 1	\$210,012	\$300,140	\$286,397
Year 2	\$214,213	\$271,418	\$272,708
<b>Totals</b>	<b>\$459,855</b>	<b>\$1,499,145</b>	<b>\$1,398,658</b>

## Utility Bills

**Base Year Electric**



Meter Summary by Period BL - 01

yyyy-mm	Start Date	End Date	#Days	Use	Billed Demand	Actual Demand	Cost	Cost / Unit	Cost / Day	Use / Day
<b>Place: [BEECHER ROAD- WOODBRIDGE] Beecher Road - Woodbridge</b>							<b>Energy Type: Electric - kWh</b>			
<b>Meter: [EL ACCT 900000000066] El Acct # 900000000066</b>							<b>Cost Center: [BEECHERROADWOODBRIDGECT] Beecher F</b>			

Rate: Electric

Account: [MODIFIED EL - ACCT 900000000066]  
 Modified EL - Acct # 900000000066

Vendor: [UILLUMINATIONS] United Illuminations

2011 - 07	6/18/2011	7/18/2011	30	118,200 KWH			\$23,451.00	\$0.198	\$781.70	3,940.00
2011 - 08	7/18/2011	8/19/2011	32	116,600 KWH			\$23,133.00	\$0.198	\$722.91	3,643.75
2011 - 09	8/19/2011	9/17/2011	29	155,200 KWH			\$30,792.00	\$0.198	\$1,061.79	5,351.72
2011 - 10	9/17/2011	10/17/2011	30	162,400 KWH			\$32,220.00	\$0.198	\$1,074.00	5,413.33
2011 - 11	10/17/2011	11/18/2011	32	137,400 KWH			\$27,260.00	\$0.198	\$851.88	4,293.75
2011 - 12	11/18/2011	12/17/2011	29	110,500 KWH			\$21,923.00	\$0.198	\$755.97	3,810.34
2012 - 01	12/17/2011	1/18/2012	32	132,100 KWH			\$26,209.00	\$0.198	\$819.03	4,128.13
2012 - 02	1/18/2012	2/17/2012	30	124,600 KWH			\$24,721.00	\$0.198	\$824.03	4,153.33
2012 - 03	2/17/2012	3/18/2012	30	120,700 KWH			\$23,947.00	\$0.198	\$798.23	4,023.33
2012 - 04	3/18/2012	4/19/2012	32	122,900 KWH			\$24,383.00	\$0.198	\$761.97	3,840.63
2012 - 05	4/19/2012	5/17/2012	28	153,000 KWH			\$30,355.00	\$0.198	\$1,084.11	5,464.29
2012 - 06	5/17/2012	6/18/2012	32	133,200 KWH			\$26,427.00	\$0.198	\$825.84	4,162.50

Meter [EL ACCT  
 900000000066] El Acct #  
 900000000066 Totals:

**366                      1,586,800 KWH                      \$314,821.00**

## Current Year Electric



yyyy-mm	Start Date	End Date	#Days	Use	Unit	Billed Demand	Actual Demand	Cost	Cost/Unit	Cost/Day	Use/Day
Place: [BEECHER ROAD- WOODBRIDGE] Beecher Road - Woodbridge						Energy Type: [Electric] kWh					
Meter: [EL ACCT 900000000066] El Acct # 900000000066						Cost Center: [BEECHERROADWOODBRIDGECT] Beecher Road - WoodBridge, CT					
Rate: Electric											
Account: [MODIFIED EL - ACCT 900000000066] Modified EL - Acct # 900000000066						Vendor: [UILLUMINATIONS] United Illuminations					
2019-06	5/19/2019	6/18/2019	30	62,640	KWH			\$12,656.98	\$0.202	\$421.90	2,088.00
2019-07	6/18/2019	7/18/2019	30	68,880	KWH			\$12,834.50	\$0.186	\$427.82	2,296.00
2019-08	7/18/2019	8/19/2019	32	74,160	KWH			\$12,401.62	\$0.167	\$387.55	2,317.50
2019-09	8/19/2019	9/19/2019	31	72,000	KWH			\$13,725.33	\$0.191	\$442.75	2,322.58
2019-10	9/19/2019	10/18/2019	29	69,600	KWH			\$10,828.04	\$0.156	\$373.38	2,400.00
2019-11	10/18/2019	11/18/2019	31	52,320	KWH			\$11,658.91	\$0.223	\$376.09	1,687.74
2019-12	11/18/2019	12/18/2019	30	54,000	KWH			\$9,489.79	\$0.176	\$316.33	1,800.00
2020-01	12/18/2019	1/18/2020	31	49,680	KWH			\$9,057.29	\$0.182	\$292.17	1,602.58
2020-02	1/18/2020	2/18/2020	31	60,000	KWH			\$11,437.70	\$0.191	\$368.96	1,935.48
2020-03	2/18/2020	3/18/2020	29	39,360	KWH			\$8,919.19	\$0.227	\$307.56	1,357.24
2020-04	3/18/2020	4/19/2020	32	31,200	KWH			\$6,047.52	\$0.194	\$188.99	975.00
2020-05	4/19/2020	5/18/2020	29	28,080	KWH			\$5,043.71	\$0.180	\$173.92	968.28
<b>Meter: [EL ACCT 900000000066] El</b>			<b>365</b>	<b>661,920</b>	<b>KWH</b>			<b>\$124,100.58</b>	<b>\$0.187</b>	<b>\$340.00</b>	<b>1,813.48</b>
<b>Acct # 900000000066 Totals:</b>											

## Base Year Natural Gas

Meter Summary by Period BL - 01

yyyy-mm	Start Date	End Date	#Days	Use	Billed Demand	Actual Demand	Cost	Cost / Unit	Cost / Day	Use / Day
<b>Place: [MAIN CAMPUS] main campus</b>						<b>Energy Type: Natural Gas - THERM</b>				
<b>Meter: [MAIN CAMPUS-NAT02] main campus-Nat02</b>						<b>Cost Center: [BEECHERROADWOODBRIDGECT] Beecher F</b>				
<b>Rate: natural gas rate base year</b>										
<b>Account: [BASE YEAR NO TURBINE] Base Year No</b>						<b>Vendor: [SCG] SCG</b>				
<b>Turbine</b>										
2011 - 07	7/1/2011	8/1/2011	31	378 THERM			\$0.00	\$0.000	\$0.00	12.19
2011 - 08	8/1/2011	9/1/2011	31	378 THERM			\$0.00	\$0.000	\$0.00	12.19
2011 - 09	9/1/2011	10/1/2011	30	378 THERM			\$0.00	\$0.000	\$0.00	12.60
2011 - 10	10/1/2011	11/1/2011	31	378 THERM			\$0.00	\$0.000	\$0.00	12.19
2011 - 11	11/1/2011	12/1/2011	30	8,742 THERM			\$0.00	\$0.000	\$0.00	291.40
2011 - 12	12/1/2011	1/1/2012	31	16,007 THERM			\$0.00	\$0.000	\$0.00	516.35
2012 - 01	1/1/2012	2/1/2012	31	25,330 THERM			\$0.00	\$0.000	\$0.00	817.10
2012 - 02	2/1/2012	3/1/2012	29	5,200 THERM			\$0.00	\$0.000	\$0.00	179.31
2012 - 03	3/1/2012	3/31/2012	30	20,361 THERM			\$0.00	\$0.000	\$0.00	678.70
2012 - 04	3/31/2012	4/30/2012	30	4,422 THERM			\$0.00	\$0.000	\$0.00	147.40
2012 - 05	4/30/2012	5/30/2012	30	378 THERM			\$0.00	\$0.000	\$0.00	12.60
2012 - 06	5/30/2012	6/29/2012	30	1,452 THERM			\$0.00	\$0.000	\$0.00	48.40
<b>Meter [MAIN CAMPUS-NAT02]</b>			<b>364</b>	<b>83,404 THERM</b>		<b>\$0.00</b>				
<b>main campus-Nat02 Totals:</b>										

## Current Year Natural Gas



yyyy-mm	Start Date	End Date	#Days	Use	Unit	Billed Demand	Actual Demand	Cost	Cost/Unit	Cost/Day	Use/Day
Place: [BEECHER ROAD- WOODBRIDGE] Beecher Road - Woodbridge							Energy Type: [Natural Gas] THERM				
Meter: [GAS ACCT 050-0011217-4507] NG Acct # 050-0011217-4507							Cost Center: [BEECHERROADWOODBRIDGECT] Beecher Road - WoodBridge, CT				
Rate: Natural Gas											
Account: [MODIFIED NG ACCT 050-0011217-4507] Main NG Acct # 050-0011217-4507 SCG							Vendor: [SOUTHERNCONNECTI] Southern Connecticut				
2019-06	5/20/2019	6/19/2019	30	301	THERM			\$1,203.91	\$4.000	\$40.13	10.03
2019-07	6/19/2019	7/19/2019	30	591	THERM			\$1,121.05	\$1.897	\$37.37	19.70
2019-08	7/19/2019	8/20/2019	32	591	THERM			\$1,121.05	\$1.897	\$35.03	18.47
2019-09	8/20/2019	9/19/2019	30	591	THERM			\$1,121.05	\$1.897	\$37.37	19.70
2019-10	9/19/2019	10/19/2019	30	902	THERM			\$1,308.54	\$1.451	\$43.62	30.07
2019-11	10/19/2019	11/20/2019	32	4,770	THERM			\$1,851.98	\$0.388	\$57.87	149.06
2019-12	11/20/2019	12/19/2019	29	8,016	THERM			\$2,222.26	\$0.277	\$76.63	276.41
2020-01	12/19/2019	1/22/2020	34	9,468	THERM			\$2,378.98	\$0.251	\$69.97	278.47
2020-02	1/22/2020	2/20/2020	29	8,846	THERM			\$2,349.88	\$0.266	\$81.03	305.03
2020-03	2/20/2020	3/19/2020	28	8,213	THERM			\$1,970.80	\$0.240	\$70.39	293.32
2020-04	3/19/2020	4/20/2020	32	4,438	THERM			\$1,860.64	\$0.419	\$58.15	138.69
2020-05	4/20/2020	5/19/2020	29	3,007	THERM			\$1,704.22	\$0.567	\$58.77	103.69
<b>Meter: [GAS ACCT 050-0011217-4507]</b>			<b>365</b>	<b>49,734</b>	<b>THERM</b>			<b>\$20,214.36</b>	<b>\$0.406</b>	<b>\$55.38</b>	<b>136.26</b>
<b>NG Acct # 050-0011217-4507 Totals:</b>											



yyyy-mm	Start Date	End Date	#Days	Use	Unit	Billed Demand	Actual Demand	Cost	Cost/Unit	Cost/Day	Use/Day
Place: [MAIN CAMPUS] main campus							Energy Type: [Natural Gas] None				
Meter: [MAIN CAMPUS-NAT01] main campus-Nat01							Cost Center: [BEECHERROADWOODBRIDGECT] Beecher Road - WoodBridge, CT				
Rate: main supply											
Account: [MAIN GAS SUPPLY] Main Gas Supply Spark 5000000589950							Vendor: [SPARK] SPARK				
2019-06	5/20/2019	6/19/2019	30					\$200.15		\$6.67	
2019-07	6/19/2019	7/19/2019	30					\$0.00		\$0.00	
2019-08	7/19/2019	8/18/2019	30					\$0.00		\$0.00	
2019-09	8/18/2019	9/17/2019	30					\$0.00		\$0.00	
2019-10	9/17/2019	10/18/2019	31					\$601.11		\$19.39	
2019-11	10/18/2019	11/21/2019	34					\$3,180.95		\$93.56	
2019-12	11/21/2019	12/19/2019	28					\$5,344.41		\$190.87	
2020-01	12/19/2019	1/20/2020	32					\$6,310.34		\$197.20	
2020-02	1/20/2020	2/20/2020	31					\$5,895.99		\$190.19	
2020-03	2/20/2020	3/19/2020	28					\$3,655.54		\$130.56	
2020-04	3/19/2020	4/20/2020	32					\$2,958.70		\$92.46	
2020-05	4/20/2020	5/19/2020	29					\$2,005.49		\$69.15	
<b>Meter: [MAIN CAMPUS-NAT01] main campus-Nat01 Totals:</b>			<b>365</b>					<b>\$30,152.68</b>		<b>\$82.61</b>	





yyyy-mm	Start Date	End Date	#Days	Use	Unit	Billed Demand	Actual Demand	Cost	Cost/Unit	Cost/Day	Use/Day
Place: [TURBINE GAS METER] turbine gas meter							Energy Type: [Natural Gas] None				
Meter: [TURBINE GAS METER-02] turbine gas meter-02							Cost Center: [BEECHERROADWOODBRIDGECT] Beecher Road - WoodBridge, CT				
Rate: supply turbine gas											
Account: [TURBINE GAS SUPPLY] Turbine Gas Supply - Spark 5000000599834							Vendor: [SPARKENERGY] Spark Energy				
2019-06	5/19/2019	6/19/2019	31					\$3,573.87		\$115.29	
2019-07	6/19/2019	7/19/2019	30					\$3,768.67		\$125.62	
2019-08	7/19/2019	8/20/2019	32					\$3,998.26		\$124.95	
2019-09	8/20/2019	9/19/2019	30					\$3,729.19		\$124.31	
2019-10	9/19/2019	10/19/2019	30					\$2,816.13		\$93.87	
2019-11	10/19/2019	11/20/2019	32					\$3,346.29		\$104.57	
2019-12	11/20/2019	12/19/2019	29					\$2,948.66		\$101.68	
2020-01	12/19/2019	1/21/2020	33					\$2,833.53		\$85.86	
2020-02	1/21/2020	2/20/2020	30					\$3,095.26		\$103.18	
2020-03	2/20/2020	3/19/2020	28					\$2,192.93		\$78.32	
2020-04	3/19/2020	4/20/2020	32					\$2,184.22		\$68.26	
2020-05	4/20/2020	5/19/2020	29					\$1,454.58		\$50.16	
<b>Meter: [TURBINE GAS METER-02]</b>			<b>366</b>					<b>\$35,941.59</b>		<b>\$98.20</b>	
<b>turbine gas meter-02 Totals:</b>											



yyyy-mm	Start Date	End Date	#Days	Use	Unit	Billed Demand	Actual Demand	Cost	Cost/Unit	Cost/Day	Use/Day
Place: [TURBINE GAS METER] turbine gas meter							Energy Type: [Natural Gas] CCF				
Meter: [TURBINE GAS METER-NAT01] turbine gas meter-Nat01							Cost Center: [BEECHERROADWOODBRIDGECT] Beecher Road - WoodBridge, CT				
Rate: turbine gas											
Account: [TURBINEGAS] Turbine Gas 050-0011262-0252 SCG							Vendor: [SCG] SCG				
2019-06	5/20/2019	6/19/2019	30	5,372	THERM			\$610.56	\$0.114	\$20.35	179.07
2019-07	6/19/2019	7/19/2019	30	5,667	THERM			\$642.43	\$0.113	\$21.41	188.90
2019-08	7/19/2019	8/18/2019	30	6,013	THERM			\$679.63	\$0.113	\$22.65	200.43
2019-09	8/18/2019	9/17/2019	30	5,609	THERM			\$636.20	\$0.113	\$21.21	186.97
2019-10	9/17/2019	10/20/2019	33	4,872	THERM			\$487.02	\$0.100	\$14.76	147.64
2019-11	10/19/2019	11/20/2019	32	5,020	THERM			\$463.79	\$0.092	\$14.49	156.88
2019-12	11/20/2019	12/19/2019	29	4,424	THERM			\$412.36	\$0.093	\$14.22	152.55
2020-01	12/19/2019	1/22/2020	34	4,251	THERM			\$379.99	\$0.089	\$11.18	125.03
2020-02	1/22/2020	2/20/2020	29	4,644	THERM			\$403.88	\$0.087	\$13.93	160.14
2020-03	2/20/2020	3/19/2020	28	3,290	THERM			\$287.35	\$0.087	\$10.26	117.50
2020-04	3/19/2020	4/20/2020	32	3,277	THERM			\$573.49	\$0.175	\$17.92	102.41
2020-05	4/20/2020	5/19/2020	29	2,180	THERM			\$476.86	\$0.219	\$16.44	75.17
<b>Meter: [TURBINE GAS METER-NAT01]</b>			<b>366</b>	<b>54,619</b>	<b>THERM</b>			<b>\$6,053.56</b>	<b>\$0.111</b>	<b>\$16.54</b>	<b>149.23</b>
<b>turbine gas meter-Nat01 Totals:</b>											

## Guarantee and Modified Option C Methodology

**Table A – Guaranteed Savings**  
(Please refer to Notes 1 and 2)

Year	Agreed-Upon Annual Energy Savings	Option C	Modified Option C	Option A	Agreed-Upon Annual Operation Savings	Total Annual Savings
Construction	\$ 35,630					\$ 35,630
1		\$ 112,682	\$ 93,521	\$ 3,810		\$ 210,012
2		\$ 114,935	\$ 95,391	\$ 3,886		\$ 214,213
3		\$ 117,234	\$ 97,299	\$ 3,964		\$ 218,497
4		\$ 119,579	\$ 99,245	\$ 4,043		\$ 222,867
5		\$ 121,970	\$ 101,230	\$ 4,124		\$ 227,324
6		\$ 124,410	\$ 103,255	\$ 4,206		\$ 231,871
7		\$ 126,898	\$ 105,320	\$ 4,290		\$ 236,508
8		\$ 129,436	\$ 107,426	\$ 4,376		\$ 241,238
9		\$ 132,025	\$ 109,575	\$ 4,464		\$ 246,063
10		\$ 134,665	\$ 111,766	\$ 4,553		\$ 250,984
11		\$ 137,358	\$ 114,001	\$ 4,644		\$ 256,004
12		\$ 140,106	\$ 116,281	\$ 4,737		\$ 261,124
13		\$ 142,908	\$ 118,607	\$ 4,832		\$ 266,346
14		\$ 145,766	\$ 120,979	\$ 4,928		\$ 271,673
15		\$ 148,681	\$ 123,399	\$ 5,027		\$ 277,107
Total	\$ 35,630	\$ 1,948,652	\$ 1,617,295	\$ 65,884	\$ -	\$ 3,667,462

**Note 1:** The above table lists energy savings values during the M&V term. The actual finance term included in the project cash flow may be longer than the M&V term indicated in the above table and hence the total savings in the project cash flow may be different. The above table simply represents the guaranteed values through the M&V term.

**Note 2:** The Guaranteed Energy Savings is for total cost savings and not by ECM or fuel type.

#### 4.1 ESCALATION RATES

The minimum annual escalation rates listed below are agreed upon as part of the guaranteed energy savings listed in **Table A** and for M&V and O&M costs listed in the financial section of the proposal. ESG and OWNER agree to the escalation rates listed in **Table A-2** below.

**Table A-2 – Escalation Rates**

Energy Cost Escalation./year	<b>2.0%</b>
Labor Cost Escalation/year	<b>3.0%</b>
Maintenance Cost Escalation/year	<b>3.0%</b>

The actual escalation of calculated savings that will be applied in the M&V Report will be the *higher* of:

- (1) **Table A-2** above
- (2) CPI (Consumer Price Index) for the geographical region, or
- (3) Actual fuel rate

The escalation rates include the general inflation rates. The escalation of unit utility and maintenance rates begin following the end of the *Baseline Period* for the project.

**Table B – Baseline Information**

Building	Account Number	Energy Type	Gross Area, sq ft	Base Unit Cost	Baseline Use		
				\$/Unit	Units	Use	Cost
Beecher Road School	900000000066	Electric Baseline	150,000	\$0.1984	kWh	1,131,238	\$ 224,438
		Electric - Modified Adjustment <sup>(d)</sup>				455,562	\$ 90,384
	N/A	Fuel Oil		\$2.7300	gallon	59,830 <sup>(b, c)</sup>	\$163,336
	Natural Gas	Natural Gas <sup>(a)</sup>		\$0.6390	therm	83,403 <sup>(c)</sup>	NA
		Natural Gas - Modified Adjustment		\$0.6390	therm	48,585 <sup>(e)</sup>	NA
	210146991	Water		\$3.8400	kgal	3,328	\$12,779
		Sewer		\$2.5700	kgal		\$8,553

- a) As of January through November of 2013, the average natural gas rate is at \$0.639 per therm
- b) #2 Fuel Oil heating value of 139,400 Btu/gallon
- c) The baseline value includes space heating only and excludes increased fuel purchase for micro turbine
- d) The energy use values shown in **Table B** include the estimated increase in energy use (i.e., Modified Adjustment) from pool dehumidification, and cooling system. The Modified Baseline values for the school will be the sum of the Baseline (1,131,238 kWh) and the Modified Adjustment (455,562 kWh) values shown in the above table.
- e) Estimated net gas use of the proposed micro turbine. Modified Baseline value is the total of 83,403 + 48,585 = 131,988 therms/year
- f) The Modified Baseline values shown in **Table B** include the estimated increase in energy use from pool dehumidification, cooling and the natural gas for the CHP unit. The Modified Baseline values shown above will be the baseline values for the school in the performance period.

**Modified Baseline Monthly Use**

The following table provides monthly use of Modified Baseline values of electric, oil and natural gas for information only.

**Table B-1. Modified Baseline Monthly Utility Use**  
(for electric and fossil fuel only)

Baseline Year - 2011 - 2012

Month	ELECTRIC		FOSSIL FUEL			
	Electric Utility Bill Based kWh	Electric Modified Baseline kWh	Oil Utility-Bill Based Baseline gallons	Equivalent Baseline therms	Estimated Micro-Turbine Use therms	Total Modified Baseline Therms
Jul-11	52,775	118,200	271	378	4,126	4,504
Aug-11	80,807	116,600	271	378	4,126	4,504
Sep-11	93,889	155,200	271	378	3,993	4,371
Oct-11	93,779	162,400	271	378	4,126	4,504
Nov-11	97,012	137,400	6,271	8,742	3,993	12,735
Dec-11	109,338	110,500	11,483	16,007	4,126	20,134
Jan-12	95,718	132,100	18,171	25,330	4,126	29,457
Feb-12	94,284	124,600	3,731	5,200	3,727	8,927
Mar-12	107,068	120,700	14,606	20,361	4,126	24,487
Apr-12	101,634	122,900	3,172	4,422	3,993	8,415
May-12	99,514	153,000	271	378	4,126	4,504
Jun-12	105,420	133,200	1,042	1,452	3,993	5,445
<b>Total</b>	<b>1,131,238</b>	<b>1,586,800</b>	<b>59,830</b>	<b>83,403</b>	<b>48,585</b>	<b>131,988</b>

**Fuel Switching**

As part of the project, ESG has recommended switching the fuel from #2 fuel oil to natural gas. Changing the fuel type will yield savings by significantly reducing the cost per Btu based on current market conditions, as reflected in **Table C**.

**Table C – Energy per Dollar Equivalents Guarantee Year One**

Energy Type	Dollar per Btu Equivalents			100,000 X \$/Btu = \$/therm
	Utility Costs per Unit	Btu Content/Unit	\$/Btu	\$/therm
#2 Fuel Oil	\$ 2.7300/gallon	139,400 Btu/gallon	\$ 0.000019584/Btu	\$ 1.9584/therm
Natural Gas	\$0.6390/therm	1,000 Btu/ft <sup>3</sup>	\$ 0.00000639/Btu	\$ 0.6390/therm
Difference				\$ 1.3194/therm

**Savings Calculation**

There are two components of savings associated with converting from #2 fuel oil to natural gas. They are the cost (dollars) saved on Fuel Switching by paying less per Btu and the dollars saved from the efficiency of the upgrades. In order to accurately capture both savings components ESG will calculate the Fuel Switching savings utilizing a modified version of IPMVP Option C.

In calculating Fuel Switch savings ESG will collect and enter utility bill invoices from the base year and current year to capture and calculate Fuel Switch savings. These savings will simply be either:

*the current year consumption or 83403 therms, whichever is greater x the Baseline Fuel Cost Savings (difference) value (escalating) as listed in **Tables C and A-2** annually, beginning in the Year following Baseline Period.*

The second component of savings associated with the Fuel Switching project comes from the Efficiency Savings from the proposed upgrades. In order to calculate these savings ESG will once again utilize methodology similar to IPMVP Option C by utilizing a utility bill consumption analysis to derive the Therm Savings in each Guarantee Period. The calculation for Efficiency Savings will be:

*the [(Adjusted Baseline Therms – Current Year Therms) or the (Baseline Therms – Current Year Therms), whichever is greater] x the Baseline Avoided Energy Cost annually escalating beginning in the Year following the Baseline Period as listed in **Tables C and A-2** or Guarantee Year Average Unit Cost of #2 Fuel Oil converted to \$/therms, whichever is lower.*

The fuel switching cost reduction dollars and the efficiency dollars then will be added to other utilities that are utilizing the Option-C methodology to create a total Option-C calculated savings amount.

Below are the equations for the Measurement and Verification Methodology listed above.

### Defined Variables

Rate Escalation Defined in **Table A-2**

Baseline Fuel (#2 oil) Cost Savings (difference) as defined in **Table C** at \$1.3194/therm

Baseline Avoided Energy Cost as defined in **Table C** at \$1.9584/therm

Guarantee Year Average Unit Cost Difference = (Guarantee Year Average CPI of (#2 oil) expressed in \$/therm – Guarantee Year Average Cost of natural gas expressed in \$/therm)

Projected Calculated Consumption = 83,403 therms/year (baseline use without the micro turbine gas use, please refer to **Table B-1**)

### Fuel Switching

The approach discussed above is presented in the following equations.

$$(1),(2) \text{Fuel Switch Savings} = (\text{Current Year Consumption or } 83,403 \text{ Whichever is Greater}) \times ((\text{Baseline Fuel Cost Savings (difference; } \$1.3194) \times (1 + \text{Energy Escalation Rate})^{\text{Guarantee Year}}),$$

(1) Consumption value is in therms, and the cost difference is \$/therm

(2) The First Guarantee Year = 0, then the series will sum +1 for every proceeding guarantee year

### Energy Efficiency Upgrade Savings

$$\text{Therms Saved} = (\text{Adjusted Baseline} - \text{Current Year Consumption}) \text{ or } (\text{Baseline} - \text{Current Year Consumption}), \text{ whichever is greater}$$

(1) *Adjusted Baseline = Modified Baseline ± Routine Adjustments ± Non Routine Adjustment*

(1) Adjustments are described in **Section 4.2** of this contract.

*Energy Efficiency Cost Savings = Therms Saved x Guarantee Year Average CPI for #2 fuel oil or (Baseline Avoided Energy Costs (\$1.9584) x (1 + Rate Escalation)<sup>(Guarantee Year)</sup>), whichever is lower)*

## **Total Modified Option-C Savings**

*Total Annual Dollar Savings = Fuel Switch Savings + Energy Efficiency Upgrade Savings*

**4.2 Adjustments to the Guarantee.** The Guaranteed Savings will be adjusted to account for material changes, where material is defined as any change or changes that may increase or decrease the energy consumption of the Facilities by more than 1% annually, including, but not limited to the following:

- a. Changes in the hours of operation of any buildings constituting any part of the Facilities.
- b. Changes in the occupancy of the buildings constituting any part of the Facilities.
- c. Changes in the structure of buildings constituting any part of the Facilities, such as architectural features or building components.
- d. Modifications or renovations to the buildings constituting any part of the Facilities, which may or may not change the conditioned space.
- e. Changes to the ECMs.
- f. Changes in utility prices, rate structure, or average unit cost values as listed in this Exhibit
- g. Change in utility suppliers or utility type(s)
- h. Change in the method of utility billing or purchasing that affects utility costs with respect to the Facilities.
- i. Addition or deletion of energy consuming equipment at the site.
- j. Weather variance from base year to current year.
- k. CUSTOMER's failure to adhere to operating and maintenance responsibilities as defined by the equipment manufacturer.
- l. Adjustments necessary to account for lighting burnouts as documented before retrofit.
- m. New outside air ventilation needed to bring any buildings constituting any part of the Facilities up to state government code or recommendations after Final Acceptance.
- n. Required increases in light levels to bring any buildings constituting any part of the Facilities up to state government code.
- o. Any condition, which affects the energy demand or consumption of Facilities, caused by CUSTOMER or its agents.

ESG will be responsible for obtaining from OWNER notice of actual or proposed material changes to the site and its anticipated effect on energy usage and consumption.

OWNER agrees to:

- a. Notify ESG of changes to the initial building control's system program upon prior notice from ESG.
- b. Not place the building control system in a permanent 'on' status, nor will OWNER manually operate or override any part of the building control system except upon equipment failure or emergency conditions.
- c. Provide ESG access to the facility when required to inspect and adjust ECMs to ensure optimal operation and maximum energy savings.





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