

Powell County Schools Guaranteed Energy Savings Contract Year 7 Reconciliation Report

Submitted to:

Powell County Board of Education
691 Breckinridge Street
Stanton, KY 40380

Submitted by:



August 13, 2024

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Executive Summary

CMTA is pleased to present the Year 7 Guaranteed Savings Reconciliation Report for the Powell County Schools project. The tables below contain basic project and scope of work information.

Table 1: Project Information

Project Name	Powell County Savings
Project Locations	Stanton, KY
# of Buildings	13 Total
Final Completion	December 15, 2017
Contract Year	7
Current Savings Period	June 1, 2023, through May 31, 2024
Report Type	Year 7 Annual Report
Report Date	August 13 th , 2024

Table 2: Annual Savings Summary

Year	Guaranteed Annual Savings			Actual Savings Through Year 7			Excess Savings
	Energy	O&M	Total Savings	Energy	O&M	Total Savings	
1	\$ 202,336	\$ 15,457	\$ 217,793	\$ 223,628	\$ 15,457	\$ 239,085	\$ 21,292
2	\$ 210,429	\$ 15,766	\$ 226,196	\$ 212,246	\$ 15,766	\$ 228,012	\$ 1,817
3	\$ 218,846	\$ 16,082	\$ 234,928	\$ 283,360	\$ 16,082	\$ 299,442	\$ 64,514
4	\$ 227,600	\$ 16,403	\$ 244,004	\$ 282,970	\$ 16,403	\$ 299,373	\$ 55,370
5	\$ 236,704	\$ 16,731	\$ 253,436	\$ 261,299	\$ 16,731	\$ 278,030	\$ 24,594
6	\$ 246,173	\$ 17,066	\$ 263,239	\$ 276,753	\$ 17,066	\$ 293,819	\$ 30,581
7	\$ 256,019	\$ 17,407	\$ 273,427	\$ 308,541	\$ 17,407	\$ 325,948	\$ 52,521
8	\$ 266,260	\$ 17,756	\$ 284,016				
9	\$ 276,911	\$ 18,111	\$ 295,021				
10	\$ 287,987	\$ 18,473	\$ 306,460				
11	\$ 299,507	\$ 18,842	\$ 318,349				
12	\$ 311,487	\$ 19,219	\$ 330,706				
13	\$ 323,946	\$ 19,604	\$ 343,550				
14	\$ 336,904	\$ 19,996	\$ 356,900				
15	\$ 350,380	\$ 20,396	\$ 370,776				
16	\$ 364,395	\$ 20,804	\$ 385,199				
17	\$ 378,971	\$ 21,220	\$ 400,191				
18	\$ 394,130	\$ 21,644	\$ 415,774				
19	\$ 409,895	\$ 22,077	\$ 431,972				
20	\$ 426,291	\$ 22,518	\$ 448,810				
	\$ 6,025,173	\$ 375,572	\$ 6,400,745	\$ 1,848,796	\$ 114,914	\$ 1,963,710	\$ 250,688

District Savings Summary

Table 3 details the actual units of energy saved and the value of those units. The following sections of this report break down the savings information by facility including baseline usage, actual usage, and savings. For Year 7, the total project dollar savings are **19% ahead** of the guaranteed level!

Table 3: Actual Energy Cost Savings for Year 7

Powell County High School		
Unit	Units Saved	Total Savings
Consumption (kWh)	484,322	\$ 33,665
Demand (kW)	1,072	\$ 7,174
Natural Gas (CCF)	32,369	\$ 48,739
Water Consumption (kgal) *	380	\$ 5,742
Powell County Middle School		
Unit	Units Saved	Total Savings
Consumption (kWh)	403,576	\$ 28,053
Demand (kW)	800	\$ 5,353
Natural Gas (CCF)	35,130	\$ 51,563
Water Consumption (kgal) *	252	\$ 3,702
Clay City Elementary		
Unit	Units Saved	Total Savings
Consumption (kWh)	281,858	\$ 19,592
Demand (kW)	861	\$ 5,757
Natural Gas (CCF)	7,015	\$ 13,581
Water Consumption (kgal) *	320	\$ 7,568
Bowen Elementary		
Unit	Units Saved	Total Savings
Consumption (kWh)	234,506	\$ 16,301
Demand (kW)	356	\$ 2,380
Natural Gas (CCF)	7,745	\$ 12,837
Water Consumption (kgal) *	190	\$ 1,191
Stanton Elementary		
Unit	Units Saved	Total Savings
Consumption (kWh)	175,850	\$ 12,223
Demand (kW)	460	\$ 3,077
Natural Gas (CCF)	16,486	\$ 25,658
Water Consumption (kgal) *	152	\$ 2,934
Miscellaneous Facilities		
Unit	Units Saved	Total Savings
Consumption (kWh) **	10,122	\$ 1,452
TOTAL SAVINGS FROM ALL FACILITIES		\$ 308,541
GUARANTEED ENERGY SAVINGS - ALL FACILITIES		\$ 256,019
% AHEAD OF GUARANTEE		21%
Total kWh Saved	1,590,234	
Total kW Saved	3,549	
Total CCF Saved	98,745	
Total kgal Saved	1,294	

* Water savings figures are IPMVP Option A

** Miscellaneous Facilities electric savings figures are IPMVP Option A

Figures 1 and 2 show the district-wide electric consumption and gas profiles for the seventh year of the guarantee period (June 2023 – May 2024). The baseline period is the two-year average of January 2013 through December 2014 as presented in Exhibit K of the contract.

Figure 1: District-wide electricity consumption tracker showing a **39% reduction** in kWh

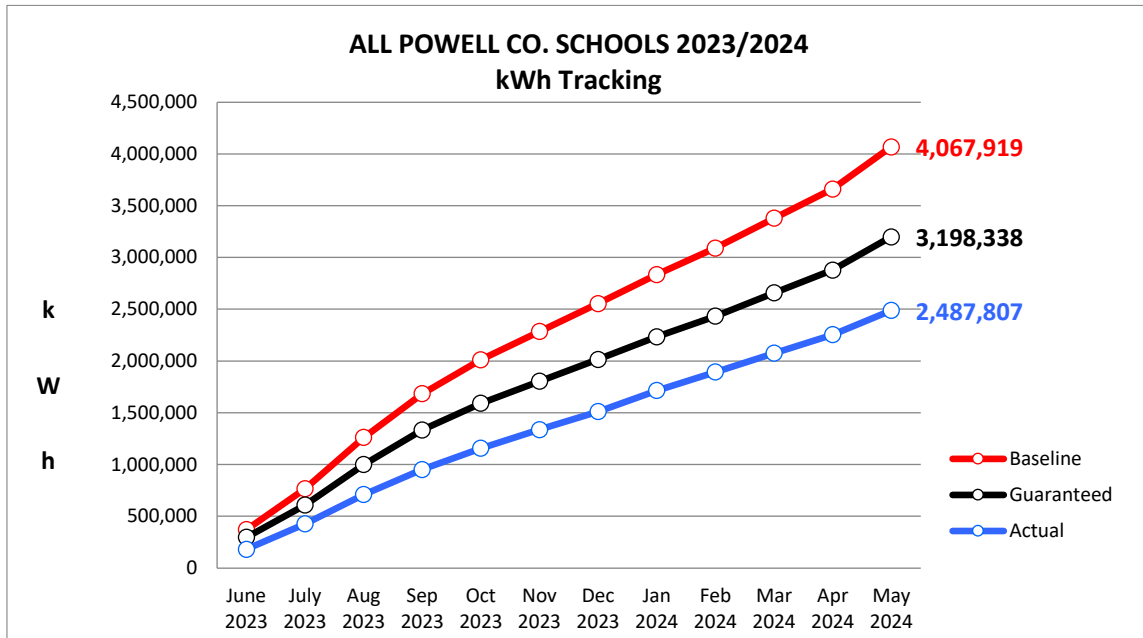


Figure 2: District-wide Natural Gas consumption tracker showing a **64% reduction** in CCF.

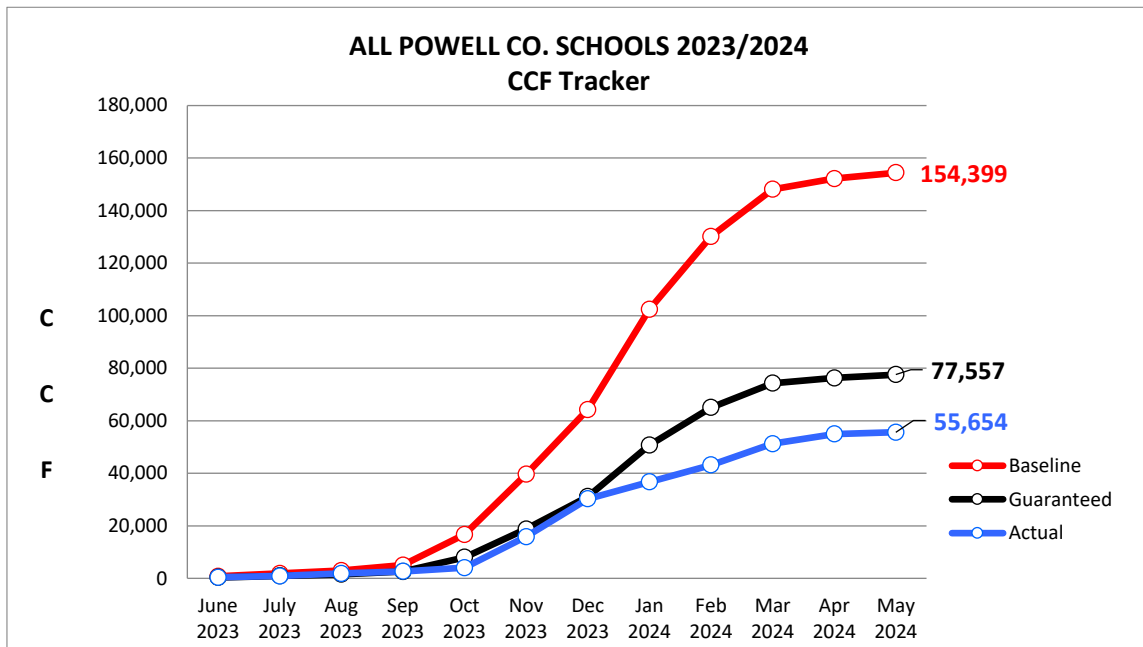
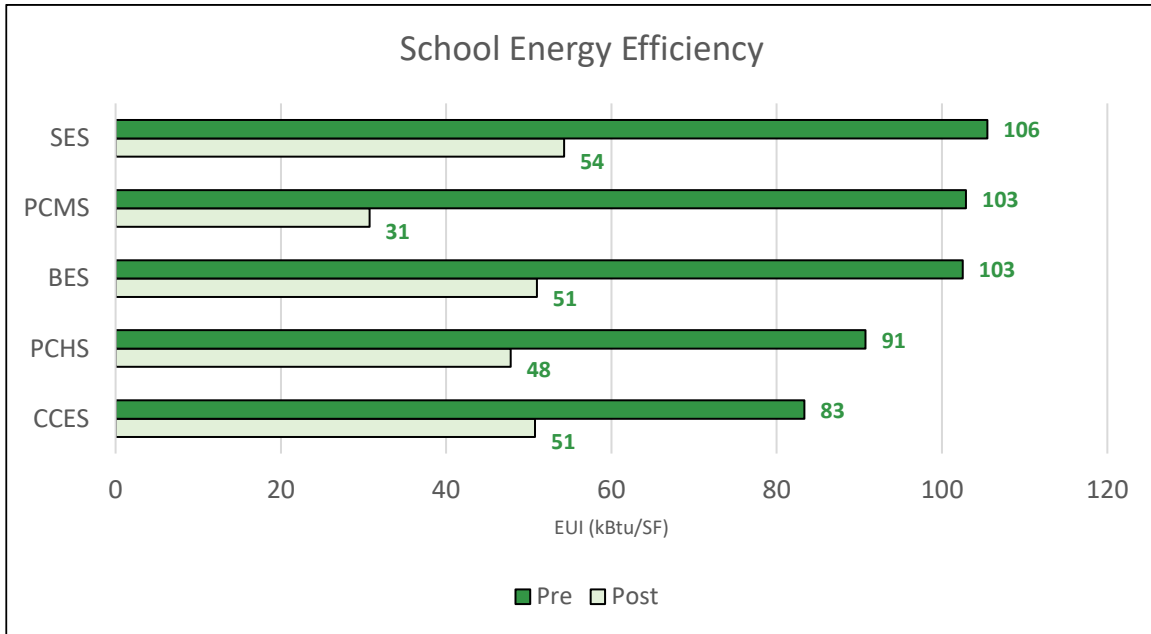


Figure 3: School-by-School Energy Efficiency Performance.



School Energy Efficiency

Figure 3 shows how energy efficient your schools were before the Guaranteed Energy Savings Project compared to after the project. The industry standard of comparing energy efficiency of a building is called the EUI, or Energy Use Index. This value is determined by using actual kWh and natural gas consumption from utility bills and converting them into their BTU, or British Thermal Unit, equivalent and then dividing that by the square footage of the building. The **lower the score, the more energy efficient the building is.**

Powell County Middle School is the best performer of the Powell County Schools. The geothermal HVAC system installed at the middle school is the most energy efficient system available in today’s market – and Figure 3 illustrates this. **PCMS experienced a 70% reduction in energy use with this system installed!** The middle school is operating with an EUI of 31, which is far below the national average. The national average EUI for education facilities is 62.7, based on the 2018 CBECS report published by the U.S Energy Information Association (EIA).

Powell County High School

Scope of Work:

1. HVAC Control System Upgrade

Equipment control devices were replaced and linked to a new direct digital controls system. The control device for each piece of equipment was programmed to have a graphics screen for interfacing on the controls system with various adjustable energy parameters.

2. Lighting Upgrades

LED lighting upgrades were made for both the interior and exterior of the facility. This included gym lighting, tube retrofits for all interior fixtures, exterior wall pack and canopy lights, and shoebox-style pole light fixtures.

3. Plumbing Fixture Replacements

The plumbing fixtures were upgraded to optimize flow for a balance of functionality and energy savings. These upgrades included water flow moderators for sinks and flush valve retrofits for toilets and urinals. Please refer to the Water Savings section of this report for more details.

Savings Summary:

Table 4: Powell County High school savings summary showing kWh, kW, and CCF savings

Month	Baseline			Year 7 Post-Project			Year 7 Post-Project Savings		
	Electrical		Gas	Electrical		Gas	Electrical		Gas
	kWh	kW	CCF	kWh	kW	CCF	kWh	kW	CCF
June 2023	124,951	376	164	88,647	257	136	36,304	119	28
July 2023	137,487	362	370	115,577	333	136	21,910	29	234
Aug 2023	179,001	538	283	125,079	469	229	53,922	69	54
Sep 2023	154,573	543	373	102,324	434	199	52,249	109	174
Oct 2023	121,509	490	2,623	87,471	366	507	34,038	124	2,116
Nov 2023	107,535	371	7,321	68,959	325	3,524	38,576	46	3,797
Dec 2023	110,757	363	7,139	66,988	253	5,511	43,769	110	1,628
Jan 2024	118,202	366	12,548	76,264	246	2,221	41,938	120	10,327
Feb 2024	109,045	368	10,203	72,589	273	2,197	36,456	95	8,006
Mar 2024	115,133	361	7,227	76,079	292	2,347	39,054	69	4,880
Apr 2024	113,757	434	1,819	76,800	328	1,178	36,957	106	641
May 2024	148,970	456	666	99,821	380	182	49,149	76	484
Totals	1,540,920	5,028	50,736	1,056,598	3,956	18,367	484,322	1,072	32,369

Figure 4: Powell County High School consumption tracker showing a **31% reduction** in kWh

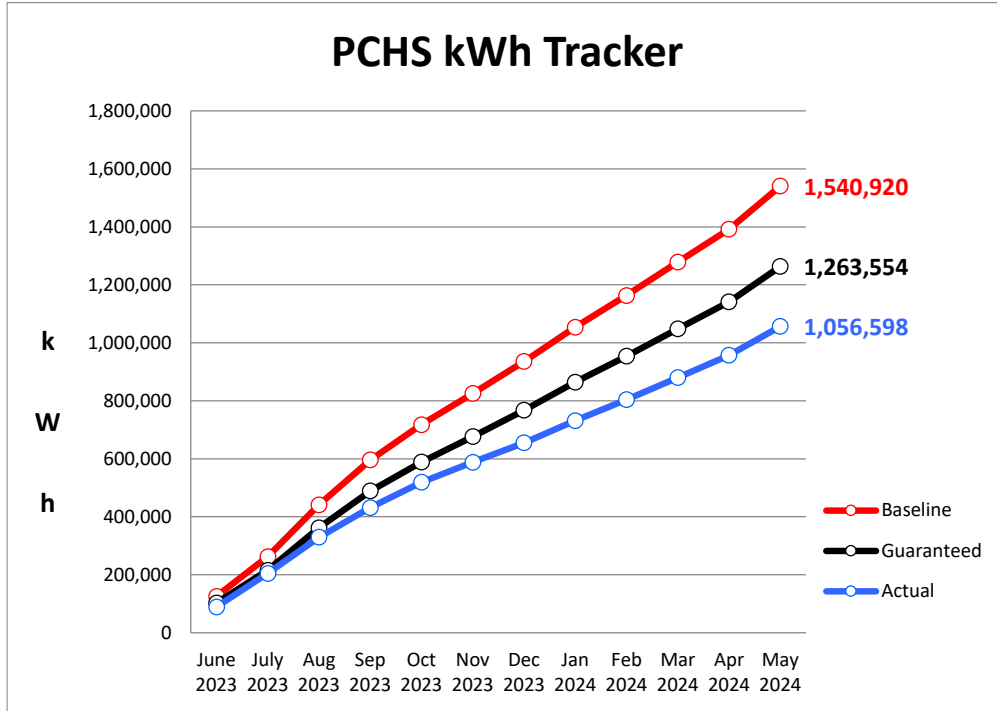
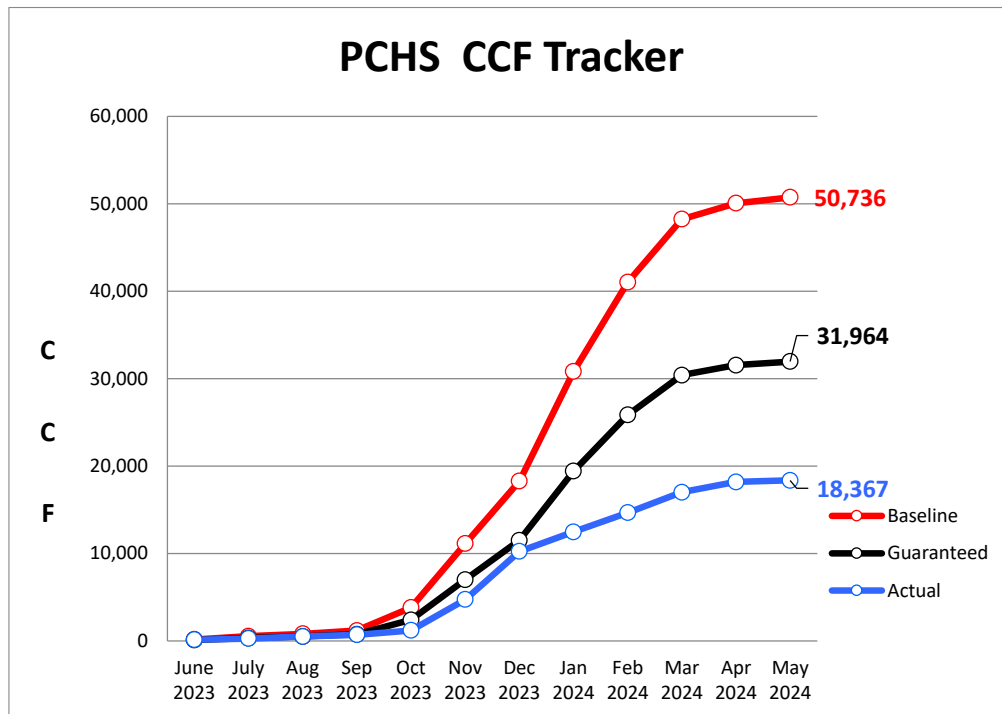


Figure 5: Powell County High School natural gas tracker showing a **64% reduction** in natural gas usage



Powell County Middle School

Scope of Work:

1. Geothermal Wellfield and HVAC System Upgrade

The existing HVAC system was replaced by a ground-source heat pump system with an accompanying geothermal wellfield. Additionally, this new HVAC system was equipped with the necessary infrastructure to be incorporated into Powell County’s district-wide building automation system.

2. Lighting Upgrades

LED lighting upgrades were made for both the interior and exterior of the facility. This included gym lighting, tube retrofits for all interior fixtures, exterior wall pack and canopy lights, and shoebox-style pole light fixtures.

3. Plumbing Fixture Replacements

The plumbing fixtures were upgraded to optimize flow for a balance of functionality and energy savings. These upgrades included water flow moderators for sinks and flush valve retrofits for toilets and urinals. Please refer to the Water Savings section of this report for more details.

Savings Summary:

Table 5: Powell County Middle School savings summary showing kWh, kW, and CCF savings

Month	Baseline			Year 7 Post-Project			Year 7 Post-Project Savings		
	Electrical		Gas	Electrical		Gas	Electrical		Gas
	kWh	kW	CCF	kWh	kW	CCF	kWh	kW	CCF
June 2023	111,047	248	173	29,544	98	66	81,503	150	107
July 2023	100,635	223	180	45,756	113	66	54,879	110	114
Aug 2023	126,469	331	205	54,364	213	95	72,105	118	110
Sep 2023	110,657	343	518	48,358	168	78	62,299	174	440
Oct 2023	75,652	274	4,258	47,703	176	109	27,949	97	4,149
Nov 2023	59,620	209	7,132	49,283	186	211	10,337	23	6,921
Dec 2023	57,056	189	6,088	49,655	188	232	7,401	2	5,856
Jan 2024	59,121	181	8,263	58,848	194	202	273	-14	8,061
Feb 2024	49,621	193	5,728	45,115	168	200	4,506	25	5,528
Mar 2024	59,172	187	3,256	43,750	168	270	15,422	19	2,986
Apr 2024	53,724	205	946	40,580	172	187	13,144	33	759
May 2024	98,211	255	184	44,450	191	85	53,761	64	99
Totals	960,982	2,836	36,931	557,406	2,035	1,801	403,576	800	35,130

Figure 6: Powell County Middle School consumption tracker showing **42% reduction** in kWh

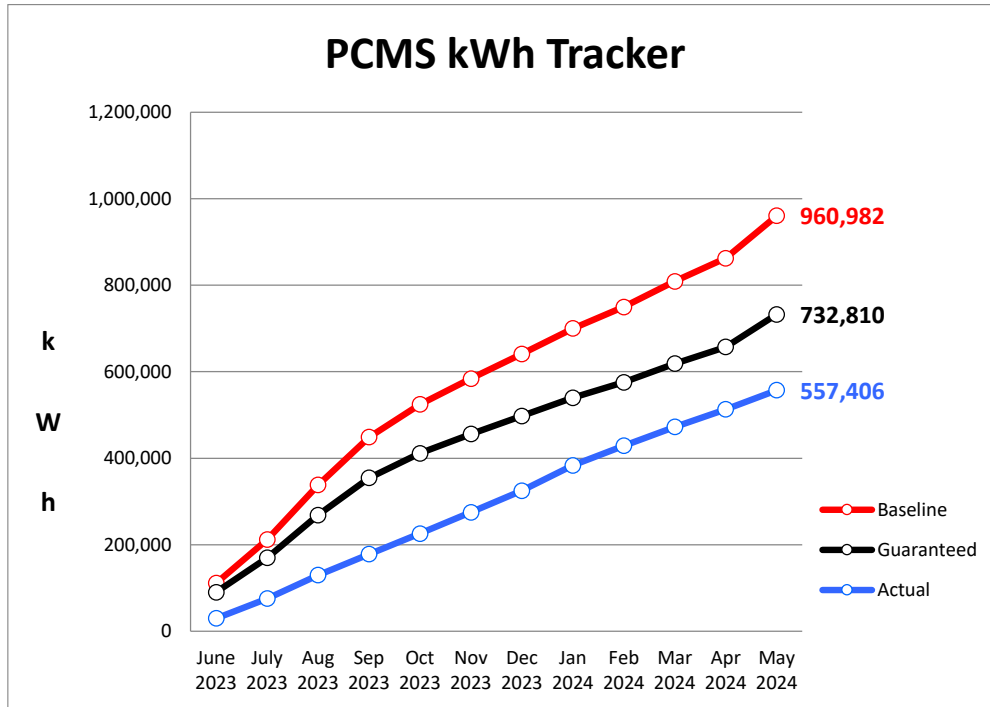
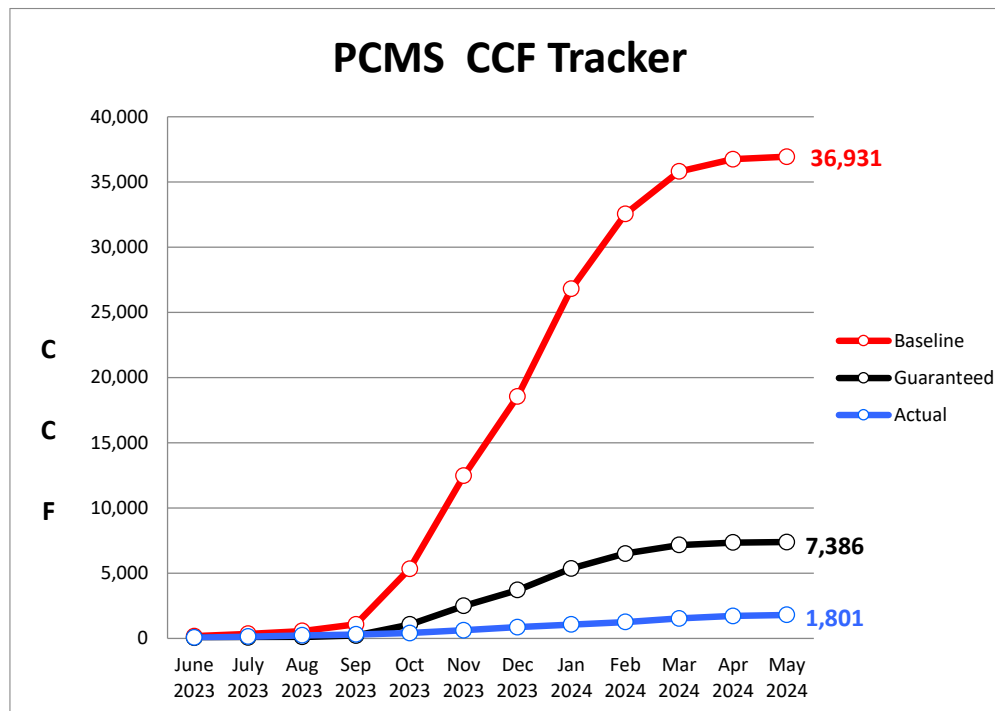


Figure 7: Powell County Middle School natural gas tracker showing **95% reduction** in natural gas usage



Clay City Elementary

Scope of Work:

1. HVAC Control System Upgrade

Equipment control devices were replaced and linked to a new direct digital controls system. The control device for each piece of equipment was programmed to have a graphics screen for interfacing on the controls system with various adjustable energy parameters.

2. Lighting Upgrades

LED lighting upgrades were made for both the interior and exterior of the facility. This included gym lighting, tube retrofits for all interior fixtures, exterior wall pack and canopy lights, and shoebox-style pole light fixtures.

3. Plumbing Fixture Replacements

The plumbing fixtures were upgraded to optimize flow for a balance of functionality and energy savings. These upgrades included water flow moderators for sinks and flush valve retrofits for toilets and urinals. Please refer to the Water Savings section of this report for more details.

Savings Summary:

Table 6: Clay City Elementary savings summary showing kWh, kW, and CCF

Month	Baseline			Year 7 Post-Project			Year 7 Post-Project Savings		
	Electrical		Gas	Electrical		Gas	Electrical		Gas
	kWh	kW	CCF	kWh	kW	CCF	kWh	kW	CCF
June 2023	54,716	186	148	22,602	82	86	32,114	103	62
July 2023	61,419	193	223	32,004	103	86	29,415	90	137
Aug 2023	84,143	283	189	43,406	196	296	40,737	87	-107
Sep 2023	72,565	276	649	37,604	185	184	34,961	91	465
Oct 2023	54,247	238	2,059	31,608	149	262	22,639	89	1,797
Nov 2023	44,949	197	2,029	26,623	119	2,803	18,326	78	-774
Dec 2023	41,936	166	4,173	23,627	121	3,068	18,309	45	1,105
Jan 2024	41,356	157	5,643	29,637	122	1,509	11,719	35	4,134
Feb 2024	39,054	171	3,863	27,223	117	1,521	11,831	53	2,342
Mar 2024	44,471	167	902	26,418	119	2,440	18,053	48	-1,538
Apr 2024	48,846	196	271	27,211	140	890	21,635	56	-619
May 2024	63,325	229	180	41,206	144	169	22,119	85	11
Totals	651,027	2,458	20,329	369,169	1,597	13,314	281,858	861	7,015

Figure 8: Clay City Elementary consumption tracker showing **47% reduction** in kWh

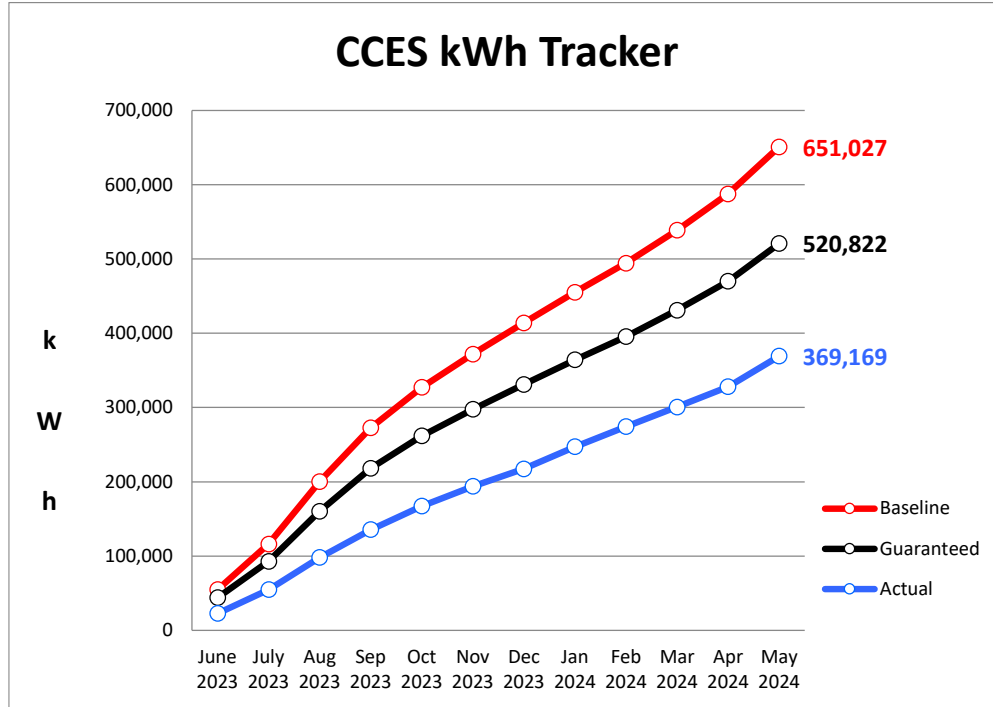
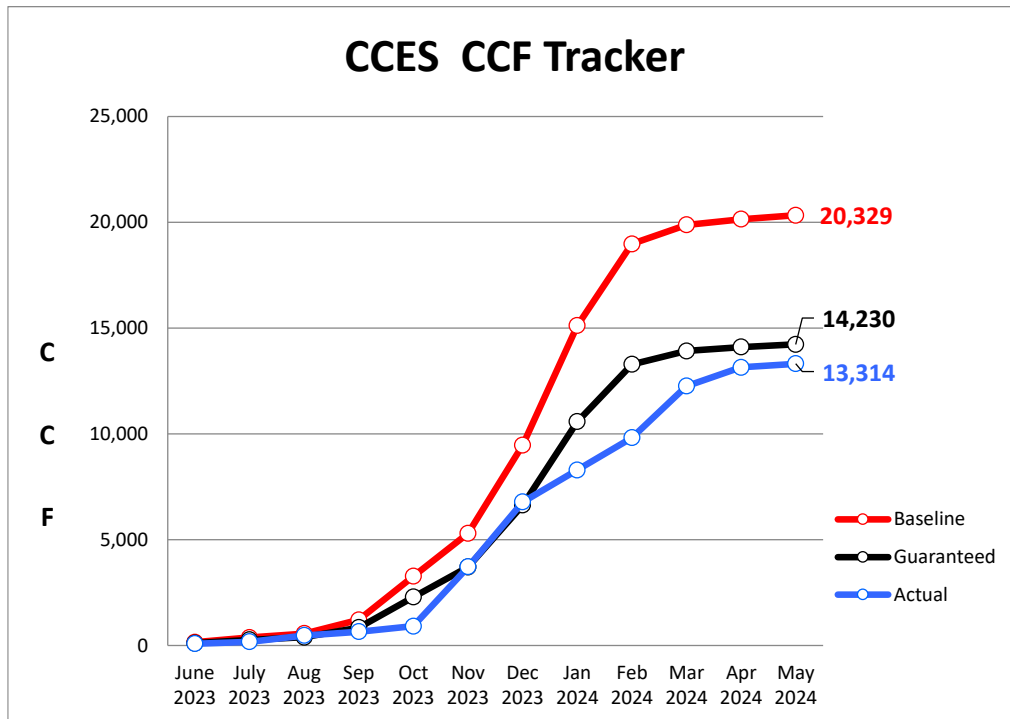


Figure 9: Clay City Elementary natural gas tracker showing **10% reduction** in natural gas usage



Bowen Elementary

Scope of Work:

1. HVAC Control System Upgrade

Equipment control devices were replaced and linked to a new direct digital controls system. The control device for each piece of equipment was programmed to have a graphics screen for interfacing on the controls system with various adjustable energy parameters.

2. Lighting Upgrades

LED lighting upgrades were made for both the interior and exterior of the facility. This included gym lighting, tube retrofits for all interior fixtures, exterior wall pack and canopy lights, and shoebox-style pole light fixtures.

3. Plumbing Fixture Replacements

The plumbing fixtures were upgraded to optimize flow for a balance of functionality and energy savings. These upgrades included water flow moderators for sinks and flush valve retrofits for toilets and urinals. Please refer to the Water Savings section of this report for more details.

Savings Summary:

Table 7: Bowen Elementary School savings summary showing kWh, kW, and CCF savings

Month	Baseline			Year 7 Post-Project			Year 7 Post-Project Savings		
	Electrical		Gas	Electrical		Gas	Electrical		Gas
	kWh	kW	CCF	kWh	kW	CCF	kWh	kW	CCF
June 2023	38,648	93	89	14,165	68	79	24,483	25	10
July 2023	54,323	113	131	18,577	100	79	35,746	13	52
Aug 2023	54,450	153	169	26,152	95	148	28,298	58	21
Sep 2023	45,700	145	240	24,176	105	141	21,524	39	99
Oct 2023	41,419	117	1,395	19,690	101	230	21,729	16	1,165
Nov 2023	30,985	88	1,831	17,443	56	1,896	13,542	32	-65
Dec 2023	28,592	83	2,468	15,798	53	1,910	12,794	30	558
Jan 2024	29,654	84	3,807	17,816	62	847	11,838	23	2,960
Feb 2024	25,883	86	2,066	17,148	59	887	8,735	28	1,179
Mar 2024	30,735	85	2,274	17,196	66	949	13,539	19	1,325
Apr 2024	35,672	129	162	16,078	87	459	19,594	42	-297
May 2024	47,619	119	873	24,935	87	135	22,684	32	738
Totals	463,680	1,295	15,505	229,174	939	7,760	234,506	356	7,745

Figure 10: Bowen Elementary School consumption tracker showing **49% reduction** in kWh

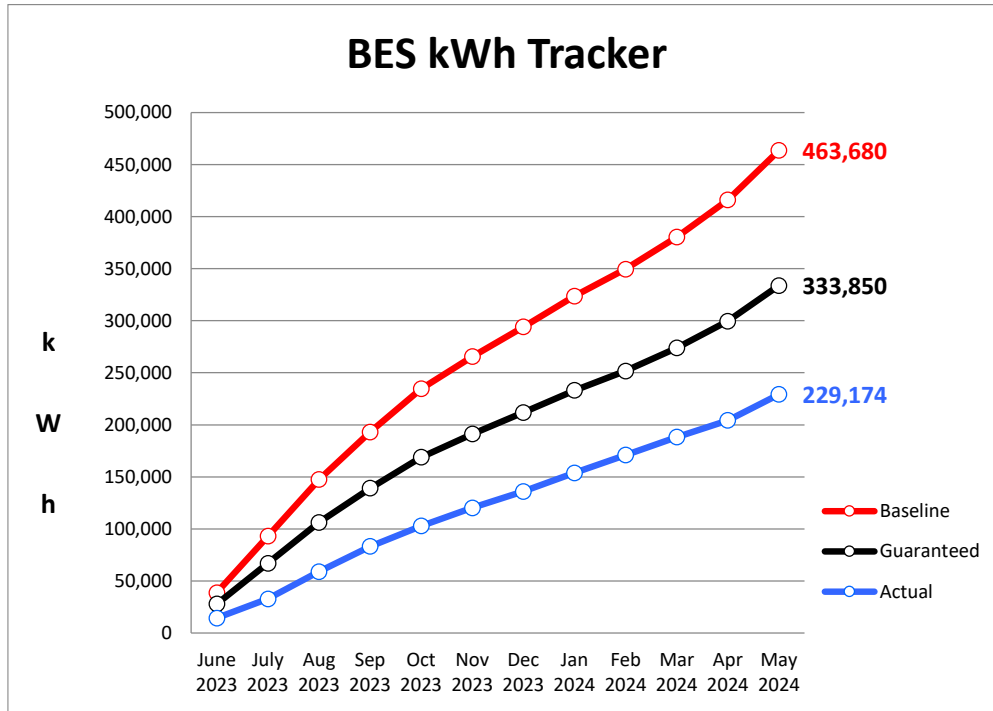
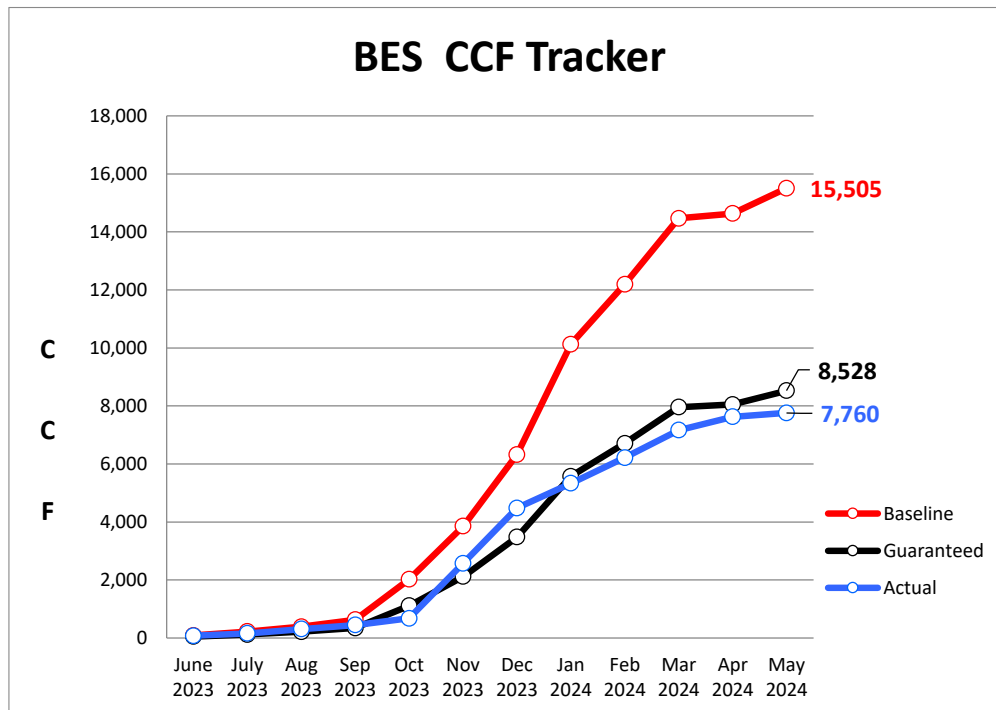


Figure 11: Bowen Elementary School natural gas tracker showing **32% reduction** in natural gas usage



Stanton Elementary

Scope of Work:

1. HVAC Control System Upgrade

Equipment control devices were replaced and linked to a new direct digital controls system. The control device for each piece of equipment was programmed to have a graphics screen for interfacing on the controls system with various adjustable energy parameters.

2. Lighting Upgrades

LED lighting upgrades were made for both the interior and exterior of the facility. This included gym lighting, tube retrofits for all interior fixtures, exterior wall pack and canopy lights, and shoebox-style pole light fixtures.

3. Plumbing Fixture Replacements

The plumbing fixtures were upgraded to optimize flow for a balance of functionality and energy savings. These upgrades included water flow moderators for sinks and flush valve retrofits for toilets and urinals. Please refer to the Water Savings section of this report for more details.

Savings Summary:

Table 8: Stanton Elementary School savings summary showing kWh, kW, and CCF savings

Month	Baseline			Year 7 Post-Project			Year 7 Post-Project Savings		
	Electrical		Gas	Electrical		Gas	Electrical		Gas
	kWh	kW	CCF	kWh	kW	CCF	kWh	kW	CCF
June 2023	41,792	86	216	25,680	55	91	16,112	31	125
July 2023	40,125	90	205	34,080	70	91	6,045	20	114
Aug 2023	52,060	129	247	34,780	91	227	17,280	38	20
Sep 2023	38,426	124	286	28,340	93	193	10,086	31	93
Oct 2023	35,986	100	1,340	19,260	55	248	16,726	45	1,092
Nov 2023	29,410	88	4,596	18,460	37	3,373	10,950	50	1,223
Dec 2023	31,385	72	4,781	17,800	33	3,703	13,585	39	1,078
Jan 2024	33,050	73	7,841	20,100	37	1,646	12,950	36	6,195
Feb 2024	31,964	74	5,915	17,640	36	1,645	14,324	37	4,270
Mar 2024	38,319	79	4,234	17,880	40	2,097	20,439	39	2,137
Apr 2024	30,855	97	893	17,480	48	950	13,375	48	-57
May 2024	47,938	112	344	23,960	67	148	23,978	46	196
Totals	451,310	1,123	30,898	275,460	663	14,412	175,850	460	16,486

Figure 12: Stanton Elementary School consumption tracker showing **41% reduction** in kWh

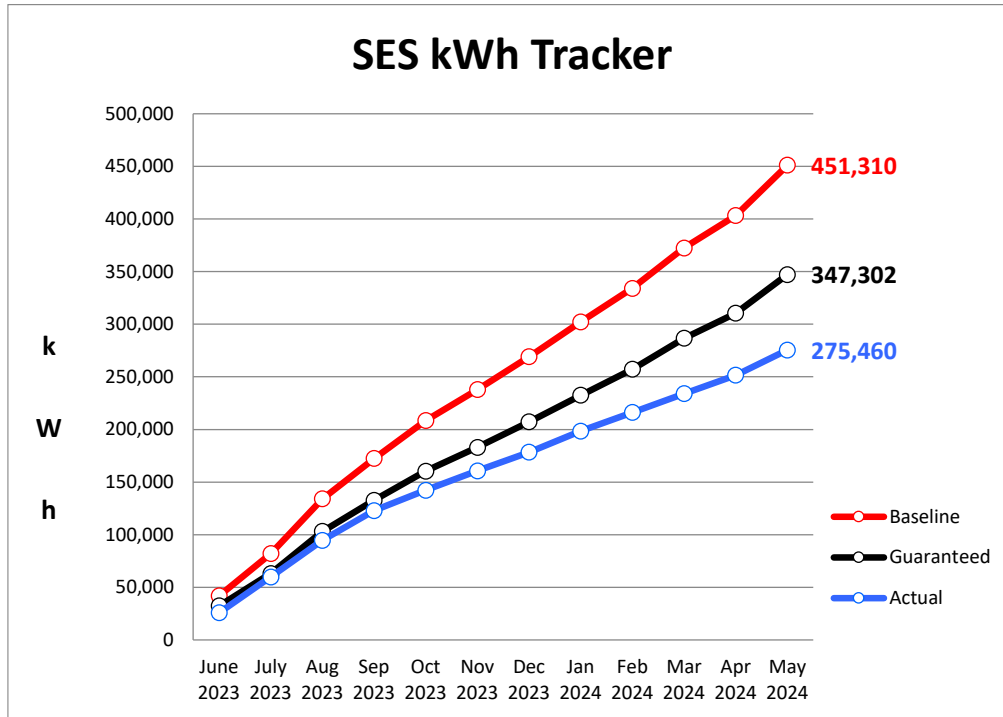
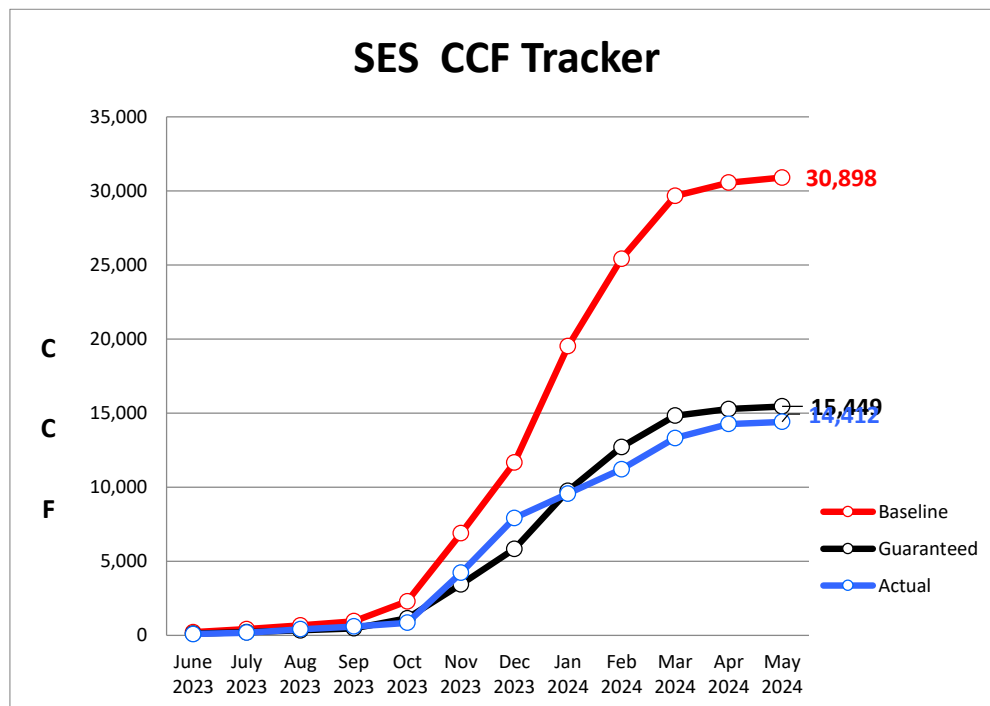


Figure 13: Stanton Elementary School natural gas tracker showing **39% reduction** in natural gas usage



Miscellaneous Facilities

Scope of Work:

1. Lighting Upgrades

LED lighting upgrades were made for both the interior and exterior of the following non-school facilities throughout the district: *the Academy, Adult Education, Annex, Board Office, Bus Garage, Greenhouse, High School Fieldhouse, and Maintenance buildings*. This included tube retrofits, LED fixtures and screw-in lamps, and exterior wall packs. Due to the small savings generated from this work, field measurements were performed on the lighting circuits directly before and after the upgrades to verify the savings generated (known as Option A) instead of using utility bill comparisons (known as Option C).

Savings Summary:

Table 9: Miscellaneous Facilities savings summary showing kWh savings

Miscellaneous Facilities Electric Savings				
Month	Baseline	Guarantee	Year 7 Post-Project Savings	
	kWh	kWh	kWh	\$
June 2023	14,112	13,336	776	\$111.41
July 2023	18,933	18,217	716	\$102.78
Aug 2023	16,829	16,073	756	\$108.52
Sep 2023	14,062	13,315	747	\$107.22
Oct 2023	10,798	9,819	979	\$140.41
Nov 2023	14,299	13,478	821	\$117.77
Dec 2023	15,374	14,471	903	\$129.58
Jan 2024	27,450	26,274	1,176	\$168.71
Feb 2024	20,910	19,895	1,015	\$145.69
Mar 2024	14,001	13,203	798	\$114.53
Apr 2024	12,111	11,405	706	\$101.35
May 2024	11,726	10,998	728	\$104.39
Totals	190,605	180,483	10,122	\$1,452

O&M Savings

The following table identifies the areas of O&M (Operation and Maintenance) cost that are reduced as a result of implementing this project.

Table 10: O&M Savings Summary Year 6

Description	O&M Savings
Geothermal Wellfield and HVAC System Upgrades	\$6,602
Lighting Upgrades	\$10,806
Totals	\$17,407

Water Savings

The contractual approach for measurement and verification of the water savings did not use the actual utility bill comparison like the electric and natural gas savings. Instead, the IPMVP Option A approach of using field measurements on the equipment was used to determine the savings amount. Pre and Post field measurements consisted of measuring gallons per flush (GPF) for the toilets and urinals that were replaced and gallons per minute (GPM) of the restroom hand sinks that received aerators. For this report, CMTA used the contractual M&V approach to determine the savings, however CMTA also prides itself on being fully transparent on how well our projects perform by using actual utility data to support our Guarantees. The following graphs indicate the water consumption trends for the facilities. The data shows an increase in water consumption at the high school. After correspondence with Powell County maintenance staff, a leak was previously identified and corrected in 2021 and another in 2024. CMTA will continue to monitor the water consumption for future reports. The following charts show the cumulative trend for Year 7 and the monthly bar chart compares the Baseline and first seven years of the Guarantee showing the magnitude of the increased consumption at the high school and the growing trend of water consumption.

Figure 14: Powell County High School water tracker showing an unexpected increase in usage.

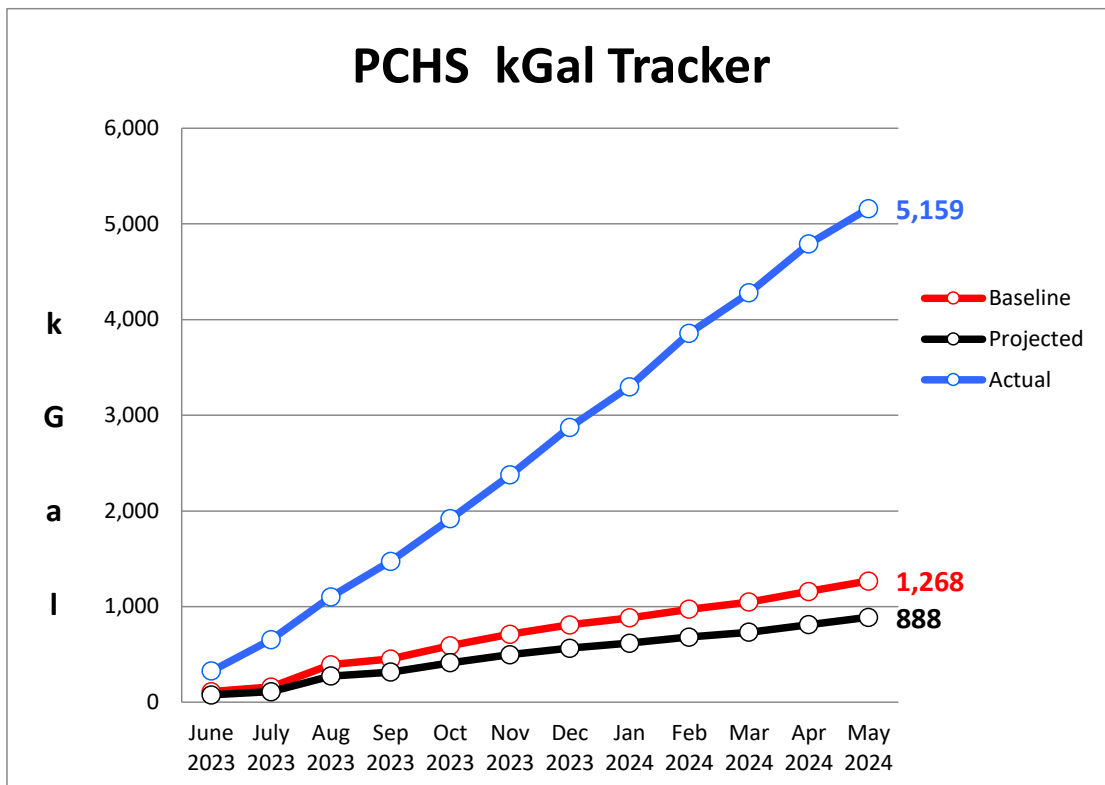
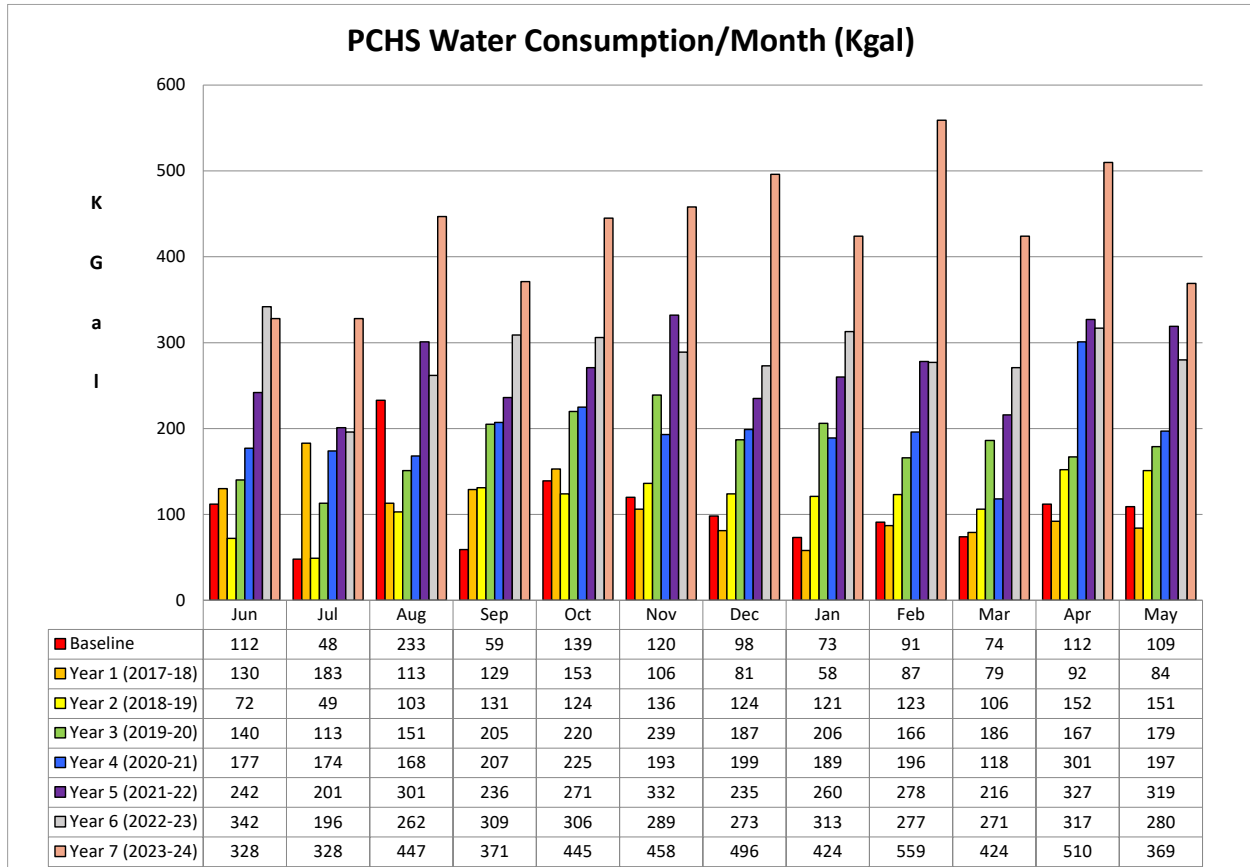


Figure 15: Powell County High School monthly water usage during all 7 years of the Guarantee.



The water consumption indicated on the bills for the remaining schools show more favorable results of the plumbing fixture replacements and indicated in the following charts, however the consumption at some of the schools are higher than expected. CMTA will continue to monitor the water consumption for future reports.

Figure 16: Powell County Middle School water tracker showing more consumption than expected.

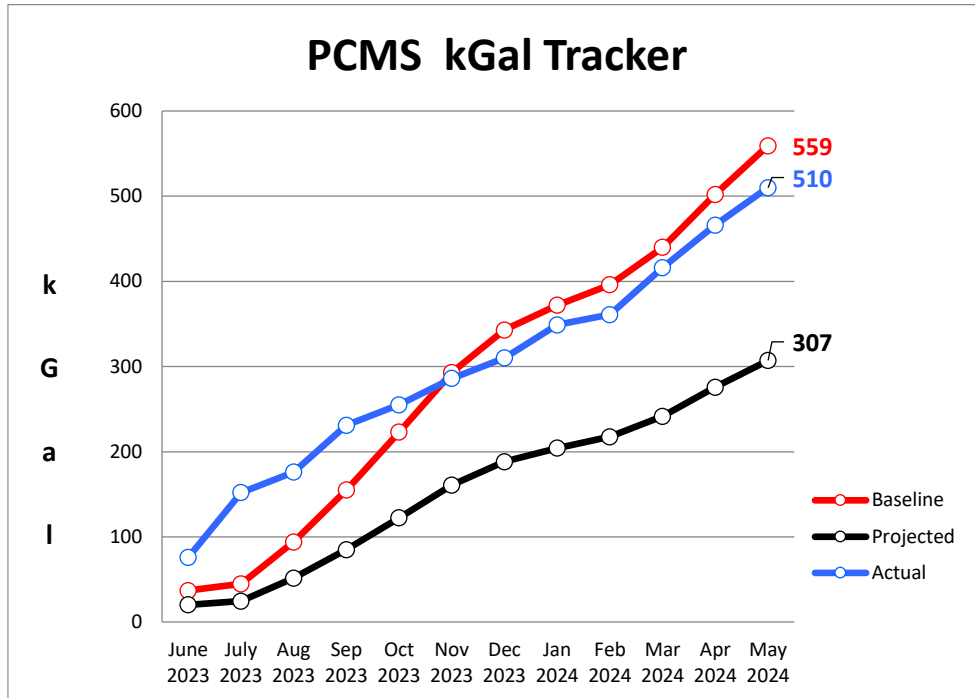


Figure 17: Clay City Elementary School water tracker showing savings better than expected.

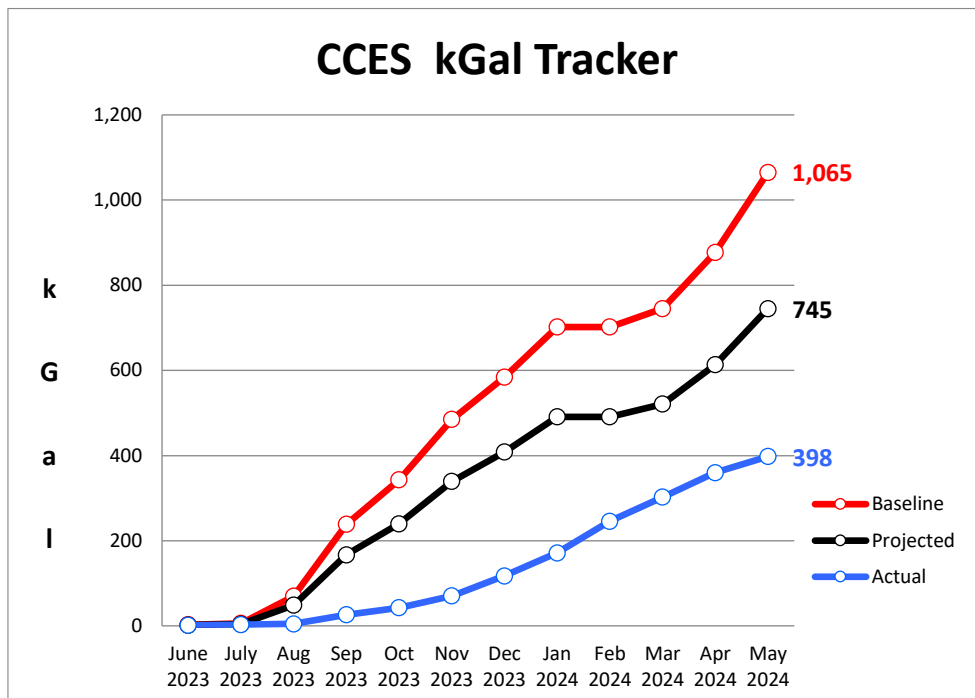


Figure 18: Bowen Elementary School water tracker showing more consumption than expected.

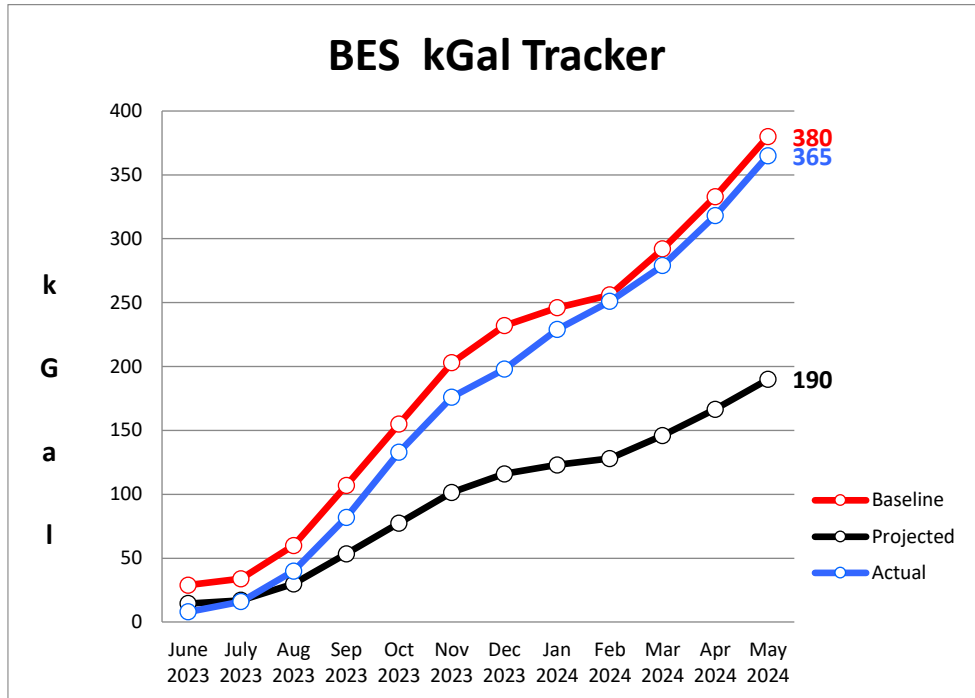
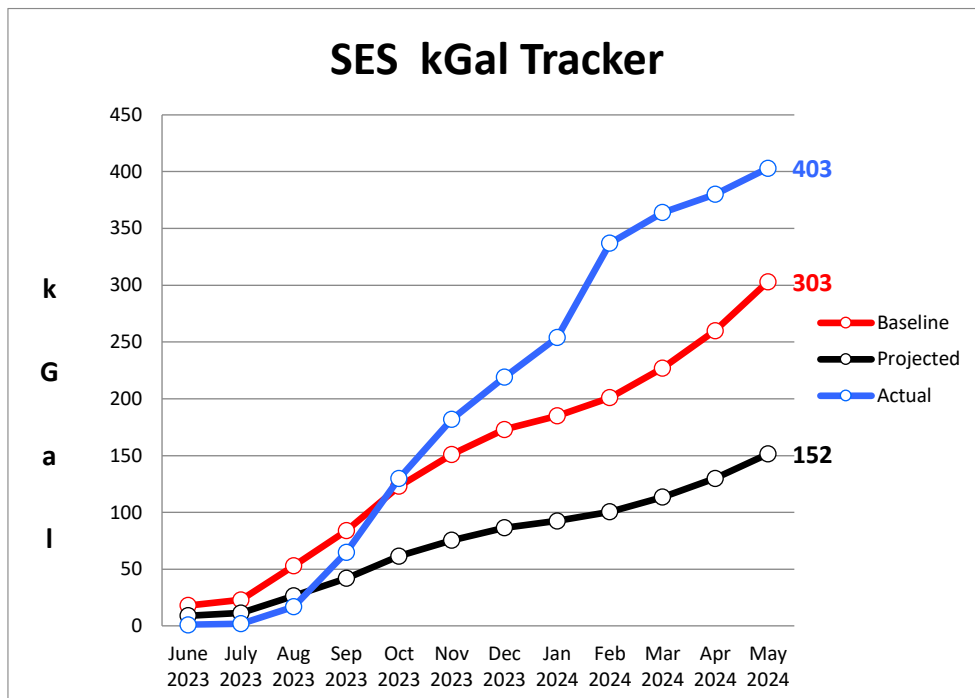


Figure 19: Stanton Elementary School water tracker showing unexpected increase in usage.



Energy Management Discussion

Building Schedules

For the duration of Year 7, CMTA was engaged in facilitating building scheduling for Powell County Schools. The intent of the scheduling service is to help optimize utility savings and prevent excesses in HVAC runtime from occurring. This involves maintaining regular building schedules as well as putting in special schedules for afterhours events in coordination with the Powell County Schools facilities staff.

Table 11: Typical Building Schedules and Space Temperature Setpoints

Space Type	Occupied Schedule	Occupied Cooling Setpoint	Occupied Heating Setpoint	Unoccupied Cooling Setpoint	Unoccupied Heating Setpoint
Classrooms	6:30 am – 4:30 pm, M-F	72°F +/- 2°F	68°F +/- 2°F	80°F	60°F
Administration	6:30 am – 4:30 pm, M-F	72°F +/- 2°F	68°F +/- 2°F	80°F	60°F
Cafeteria	5:30 am – 5:00 pm, M-F	72°F +/- 2°F	68°F +/- 2°F	80°F	60°F
Kitchen	5:00 am – 2:00 pm, M-F	72°F +/- 2°F	68°F +/- 2°F	80°F	60°F
Gymnasium	6:00 am – 9:00 pm, M-F 12:00 pm – 3:00 pm, Sun	72°F +/- 2°F	68°F +/- 2°F	80°F	60°F
Summer School	6:30 am – 5:30 pm, M-F	72°F +/- 2°F	68°F +/- 2°F	80°F	60°F

Powell County Schools has been an excellent partner in these scheduling efficiency efforts. CMTA Energy Solutions will continue to help ensure that operating hours, and consequent utility expenditures, do not reach excessive levels again. The district’s investment in the scheduling service pays for itself multiple times over in utility savings and will continue to do so. As a result, the district’s investment in this Guaranteed Energy Savings Contract will be further protected in the years to come.