

Powell County Schools Guaranteed Energy Savings Contract Year 5 Reconciliation Report

Submitted to:

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

Submitted by:



June 30, 2022

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Performance Contracting | MEP Engineering | Zero Energy Engineering | Technology | Commissioning

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Executive Summary

CMTA is pleased to present the Year 5 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	5
Current Savings Period	June 1, 2021, through May 31, 2022
Report Type	Year 5 Annual Report
Report Date	June 30, 2022

Table 2: Annual Savings Summary

Year	Guaranteed Annual Savings			Actual Savings Through Year 5			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				
7	\$ 256,019	\$ 17,407	\$ 273,427				
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	\$ 1,263,503	\$ 80,440	\$ 1,343,943	\$ 167,586

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 5, the total project dollar savings are **10% ahead** of the guaranteed level!

Table 3: Actual Energy Cost Savings for Year 5

Powell County High School		
Unit	Units Saved	Total Savings
Consumption (kWh)	525,325	\$ 36,515
Demand (kW)	988	\$ 6,608
Natural Gas (CCF)	20,693	\$ 28,807
Water Consumption (kgal) *	380	\$ 5,309
Powell County Middle School		
Unit	Units Saved	Total Savings
Consumption (kWh)	386,471	\$ 26,864
Demand (kW)	575	\$ 3,849
Natural Gas (CCF)	33,563	\$ 45,546
Water Consumption (kgal) *	252	\$ 3,423
Clay City Elementary		
Unit	Units Saved	Total Savings
Consumption (kWh)	308,035	\$ 21,412
Demand (kW)	1,059	\$ 7,087
Natural Gas (CCF)	2,006	\$ 3,591
Water Consumption (kgal) *	320	\$ 6,997
Bowen Elementary		
Unit	Units Saved	Total Savings
Consumption (kWh)	235,283	\$ 16,355
Demand (kW)	370	\$ 2,474
Natural Gas (CCF)	4,798	\$ 7,353
Water Consumption (kgal) *	190	\$ 1,101
Stanton Elementary		
Unit	Units Saved	Total Savings
Consumption (kWh)	202,690	\$ 14,089
Demand (kW)	556	\$ 3,717
Natural Gas (CCF)	11,222	\$ 16,148
Water Consumption (kgal) *	152	\$ 2,713
Miscellaneous Facilities		
Unit	Units Saved	Total Savings
Consumption (kWh) **	10,122	\$ 1,343
TOTAL SAVINGS FROM ALL FACILITIES		\$ 261,299
GUARANTEED ENERGY SAVINGS - ALL FACILITIES		\$ 236,704
% AHEAD OF GUARANTEE		10%
Total kWh Saved		1,667,926
Total kW Saved		3,548
Total CCF Saved		72,282
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 fifth year of the guarantee period (June 2021 – May 2022). 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 **41% reduction** in kWh

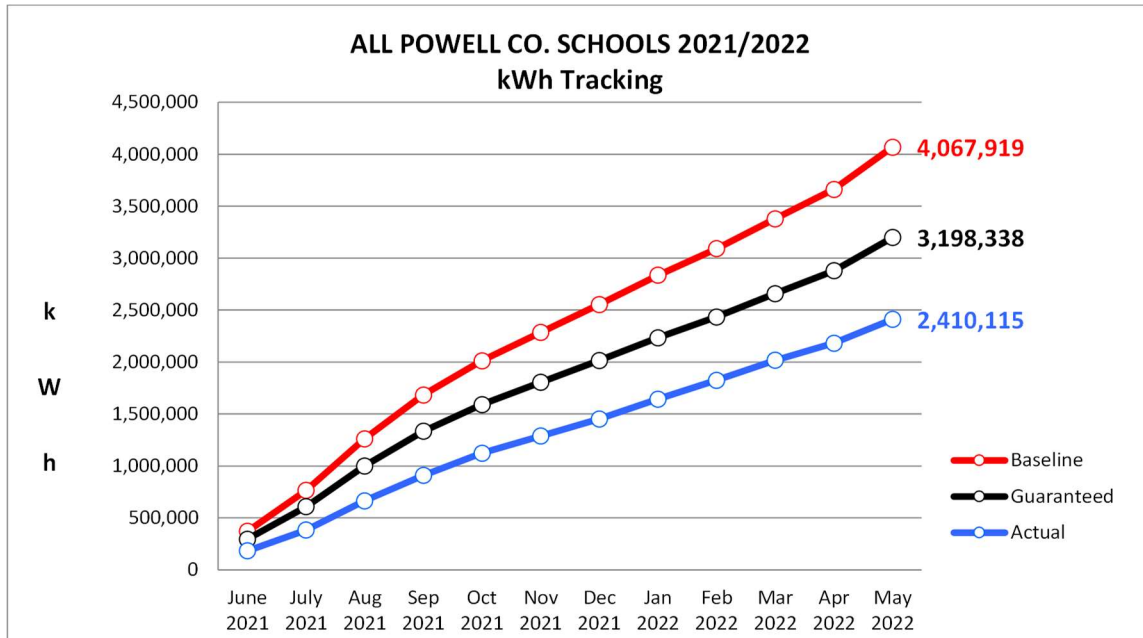
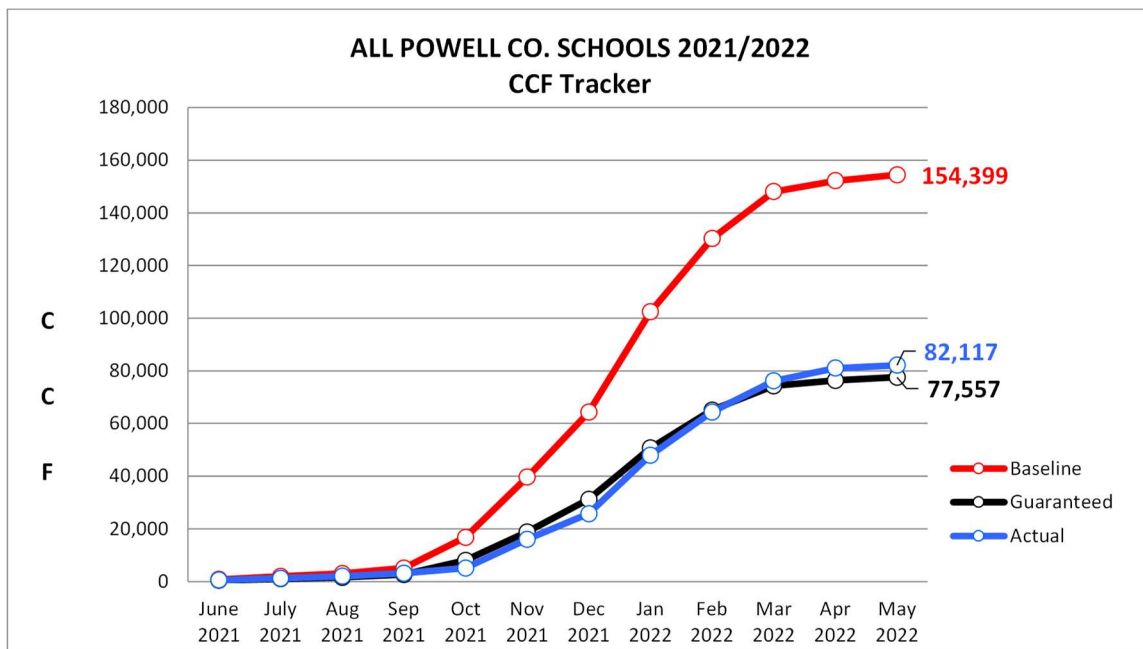


Figure 2: District-wide Natural Gas consumption tracker showing a **47% reduction** in CCF.



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 5 Post-Project			Year 5 Post-Project Savings		
	Electrical		Gas	Electrical		Gas	Electrical		Gas
	kWh	kW	CCF	kWh	kW	CCF	kWh	kW	CCF
June 2021	124,951	376	164	87,603	327	164	37,348	49	0
July 2021	137,487	362	370	88,791	322	171	48,696	40	199
Aug 2021	179,001	538	283	120,233	487	165	58,768	51	118
Sep 2021	154,573	543	373	102,685	417	214	51,888	126	159
Oct 2021	121,509	490	2,623	89,802	380	546	31,707	110	2,077
Nov 2021	107,535	371	7,321	68,113	270	3,510	39,422	101	3,811
Dec 2021	110,757	363	7,139	66,039	258	3,213	44,718	106	3,926
Jan 2022	118,202	366	12,548	74,505	275	8,829	43,697	91	3,719
Feb 2022	109,045	368	10,203	72,185	276	6,401	36,860	92	3,802
Mar 2022	115,133	361	7,227	76,126	260	4,530	39,007	101	2,697
Apr 2022	113,757	434	1,819	68,978	352	1,880	44,779	83	-61
May 2022	148,970	456	666	100,535	419	420	48,435	37	246
Totals	1,540,920	5,028	50,736	1,015,595	4,041	30,043	525,325	988	20,693

Figure 3: Powell County High School consumption tracker showing a **34% reduction** in kWh

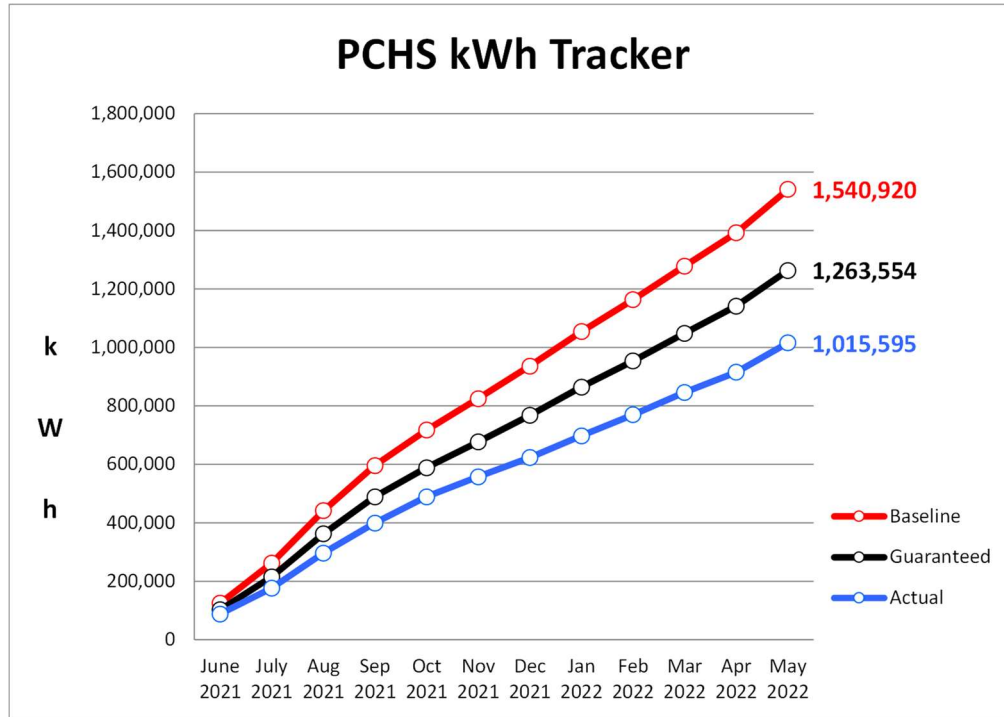
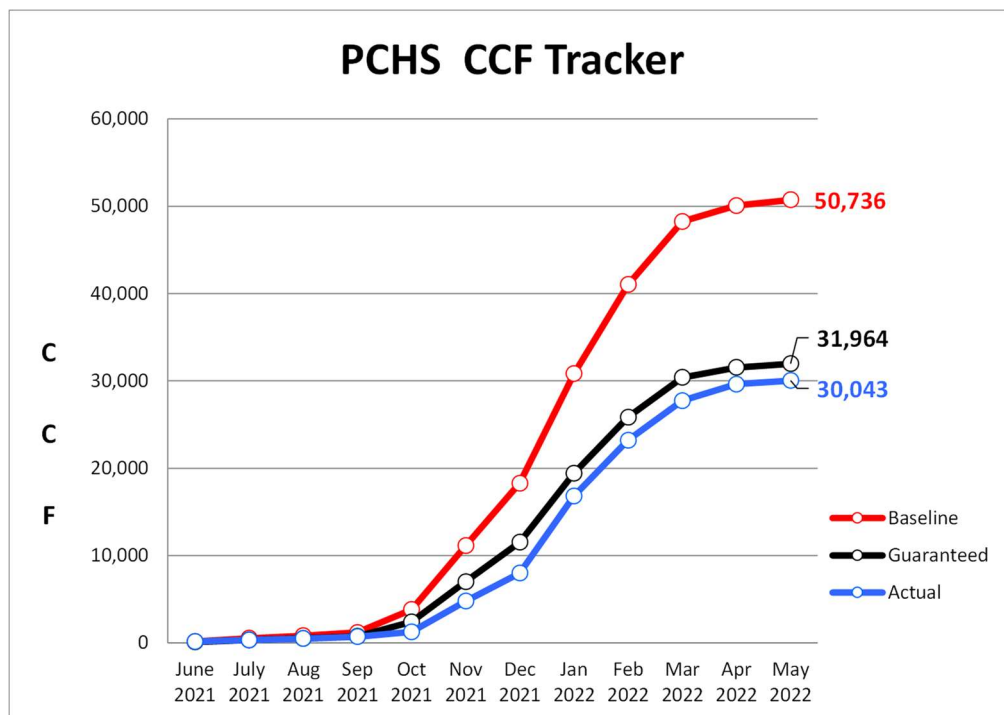


Figure 4: Powell County High School natural gas tracker showing a **41% reduction** in natural gas usage



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 5 Post-Project			Year 5 Post-Project Savings		
	Electrical		Gas	Electrical		Gas	Electrical		Gas
	kWh	kW	CCF	kWh	kW	CCF	kWh	kW	CCF
June 2021	111,047	248	173	34,624	119	20	76,423	129	153
July 2021	100,635	223	180	37,021	113	207	63,614	110	-27
Aug 2021	126,469	331	205	52,876	195	185	73,593	137	20
Sep 2021	110,657	343	518	58,888	228	337	51,769	114	181
Oct 2021	75,652	274	4,258	53,847	222	256	21,805	52	4,002
Nov 2021	59,620	209	7,132	41,280	179	346	18,340	30	6,786
Dec 2021	57,056	189	6,088	43,985	188	249	13,071	1	5,839
Jan 2022	59,121	181	8,263	56,880	220	776	2,241	-39	7,487
Feb 2022	49,621	193	5,728	50,499	217	420	-879	-24	5,308
Mar 2022	59,172	187	3,256	53,831	191	341	5,341	-5	2,915
Apr 2022	53,724	205	946	42,476	187	161	11,248	18	785
May 2022	98,211	255	184	48,304	202	70	49,907	53	114
Totals	960,982	2,836	36,931	574,511	2,260	3,368	386,471	575	33,563

Figure 5: Powell County Middle School consumption tracker showing **40% reduction** in kWh

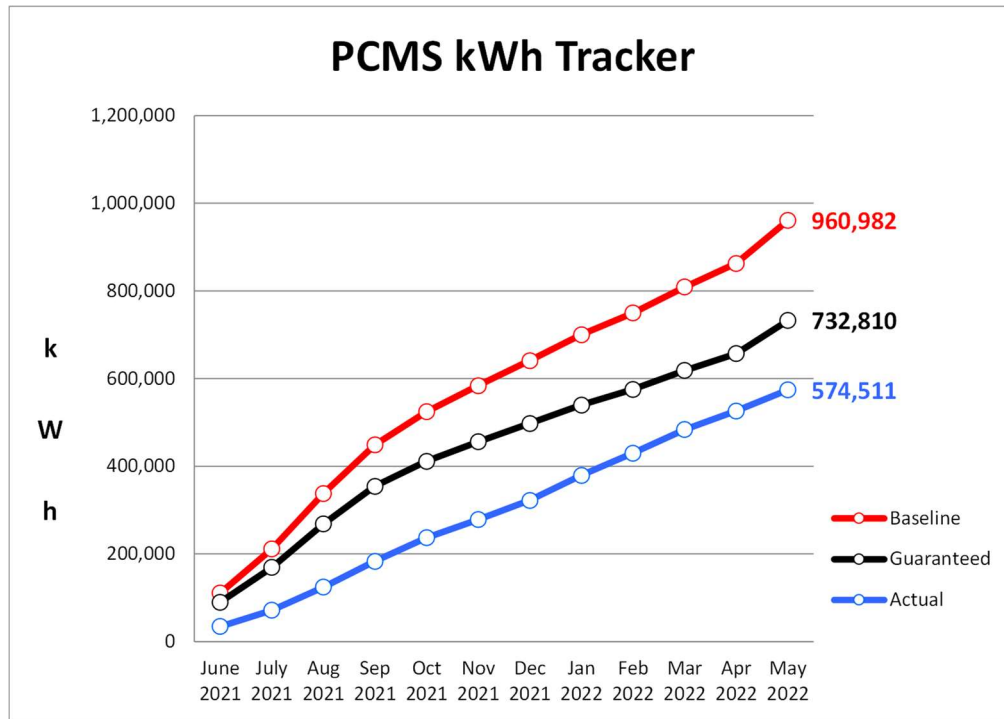
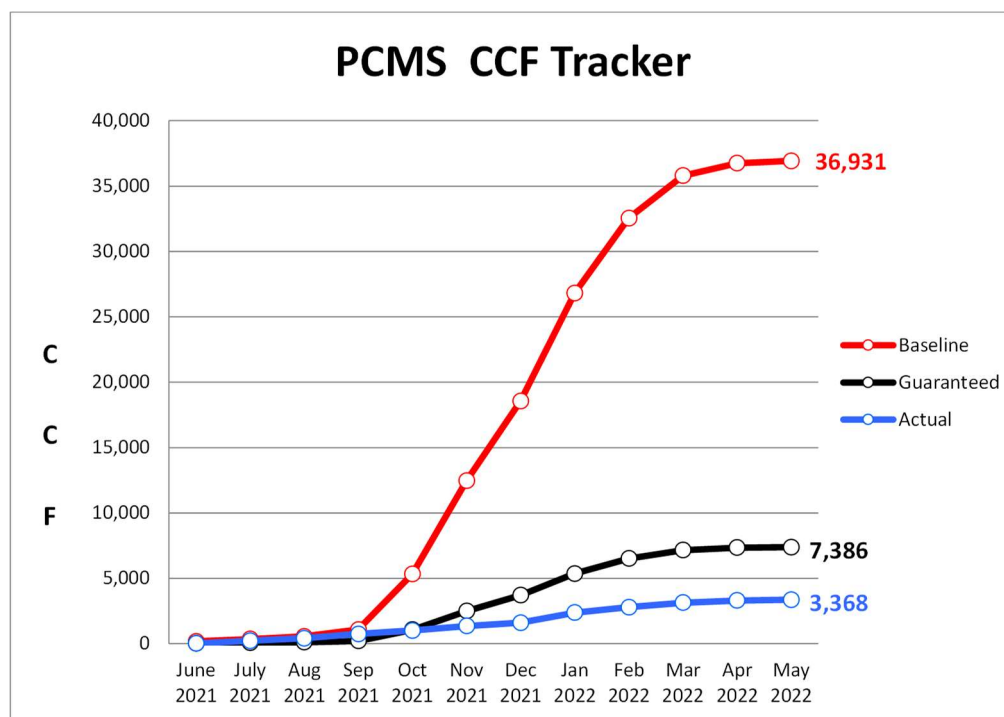


Figure 6: Powell County Middle School natural gas tracker showing **91% reduction** in natural gas usage



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 5 Post-Project			Year 5 Post-Project Savings		
	Electrical		Gas	Electrical		Gas	Electrical		Gas
	kWh	kW	CCF	kWh	kW	CCF	kWh	kW	CCF
June 2021	54,716	186	148	24,010	93	100	30,706	93	48
July 2021	61,419	193	223	28,213	122	113	33,206	71	110
Aug 2021	84,143	283	189	44,604	175	139	39,539	109	50
Sep 2021	72,565	276	649	34,214	141	197	38,351	135	452
Oct 2021	54,247	238	2,059	29,605	147	394	24,642	92	1,665
Nov 2021	44,949	197	2,029	23,828	94	2,539	21,121	103	-510
Dec 2021	41,936	166	4,173	23,222	93	2,453	18,714	73	1,720
Jan 2022	41,356	157	5,643	26,635	107	4,303	14,721	50	1,340
Feb 2022	39,054	171	3,863	25,024	100	3,676	14,030	70	187
Mar 2022	44,471	167	902	27,417	104	2,901	17,054	62	-1,999
Apr 2022	48,846	196	271	22,213	98	1,309	26,633	98	-1,038
May 2022	63,325	229	180	34,007	126	199	29,318	104	-19
Totals	651,027	2,458	20,329	342,992	1,398	18,323	308,035	1,059	2,006

Figure 7: Clay City Elementary consumption tracker showing **47% reduction** in kWh

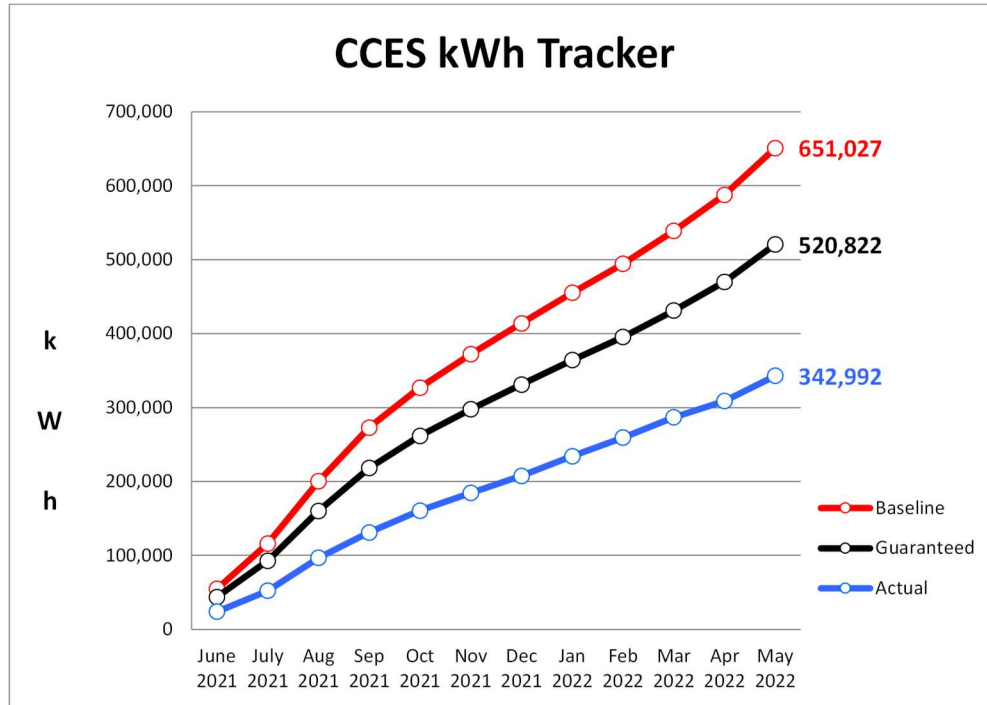
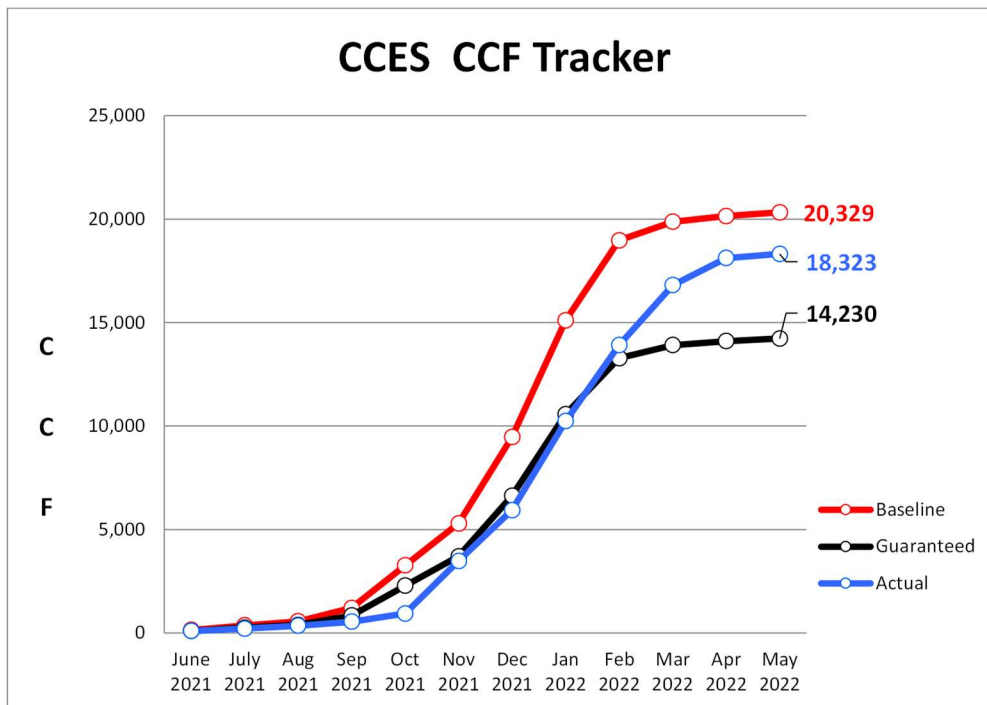


Figure 8: Clay City Elementary natural gas tracker showing **10% reduction** in natural gas usage



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 5 Post-Project			Year 5 Post-Project Savings		
	Electrical		Gas	Electrical		Gas	Electrical		Gas
	kWh	kW	CCF	kWh	kW	CCF	kWh	kW	CCF
June 2021	38,648	93	89	15,090	71	91	23,558	21	-2
July 2021	54,323	113	131	19,721	89	96	34,602	24	35
Aug 2021	54,450	153	169	30,528	124	131	23,922	29	38
Sep 2021	45,700	145	240	24,221	101	174	21,479	44	66
Oct 2021	41,419	117	1,395	20,290	97	196	21,129	20	1,199
Nov 2021	30,985	88	1,831	16,409	54	1,434	14,576	34	397
Dec 2021	28,592	83	2,468	14,811	55	1,281	13,781	28	1,187
Jan 2022	29,654	84	3,807	16,246	61	3,061	13,408	23	746
Feb 2022	25,883	86	2,066	16,251	60	2,213	9,632	27	-147
Mar 2022	30,735	85	2,274	17,866	60	1,398	12,869	26	876
Apr 2022	35,672	129	162	14,756	58	477	20,916	71	-315
May 2022	47,619	119	873	22,208	97	155	25,411	23	718
Totals	463,680	1,295	15,505	228,397	925	10,707	235,283	370	4,798

Figure 9: Bowen Elementary School consumption tracker showing **51% reduction** in kWh

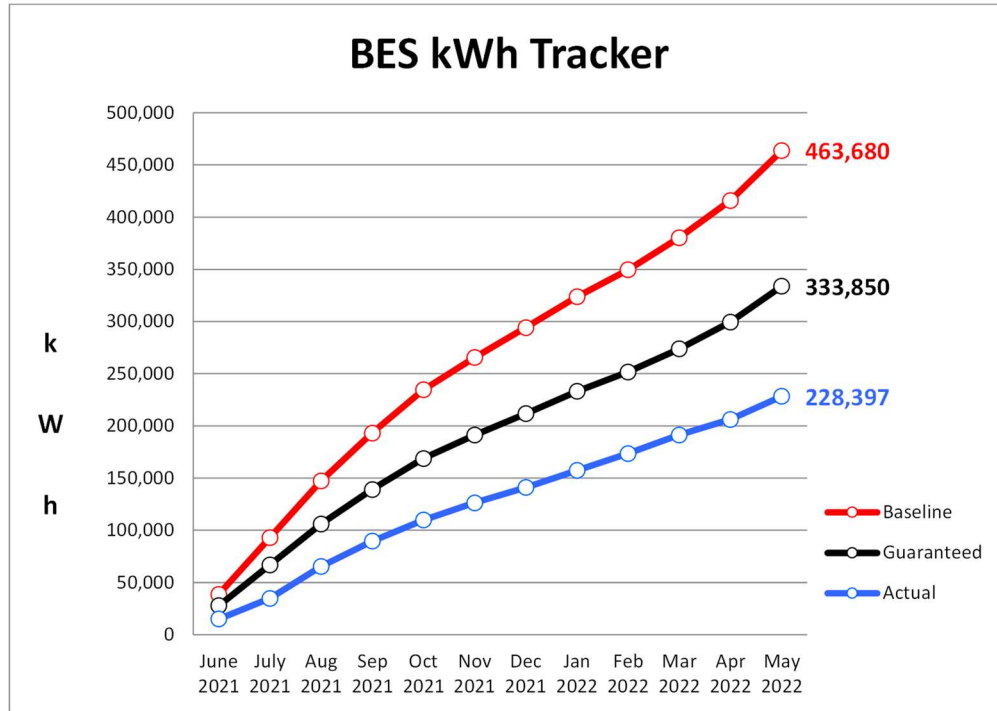
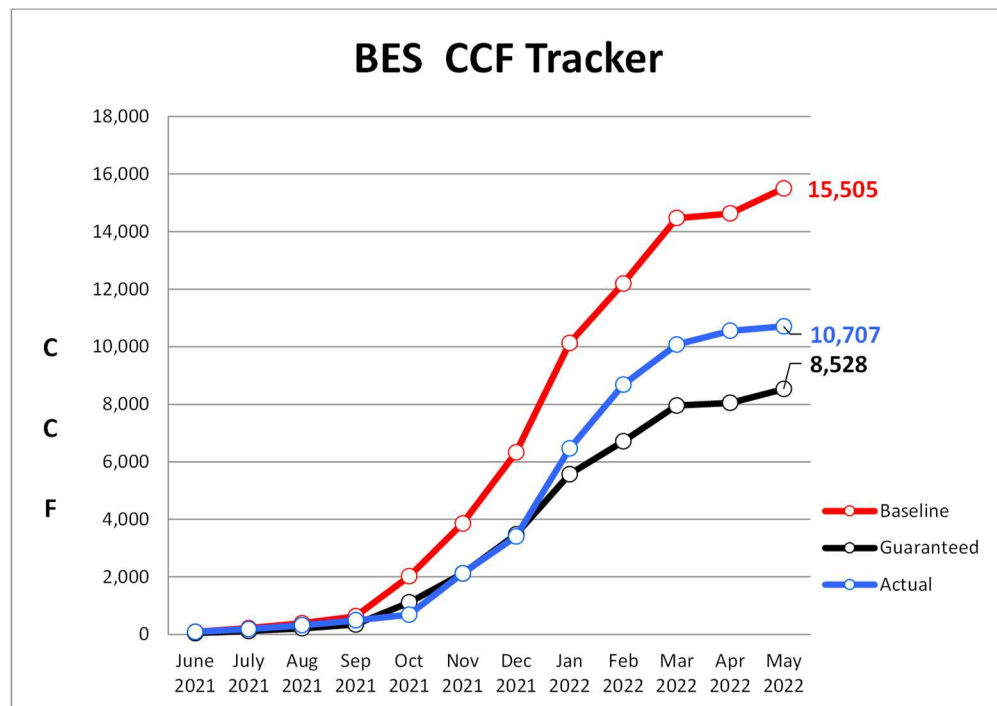


Figure 10: Bowen Elementary School natural gas tracker showing **31% reduction** in natural gas usage



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 5 Post-Project			Year 5 Post-Project Savings		
	Electrical		Gas	Electrical		Gas	Electrical		Gas
	kWh	kW	CCF	kWh	kW	CCF	kWh	kW	CCF
June 2021	41,792	86	216	22,000	61	134	19,792	25	82
July 2021	40,125	90	205	26,180	58	117	13,945	32	88
Aug 2021	52,060	129	247	33,680	72	155	18,380	57	92
Sep 2021	38,426	124	286	24,160	66	222	14,266	58	64
Oct 2021	35,986	100	1,340	19,840	58	539	16,146	42	801
Nov 2021	29,410	88	4,596	16,180	27	3,142	13,230	61	1,454
Dec 2021	31,385	72	4,781	15,360	28	2,505	16,025	44	2,276
Jan 2022	33,050	73	7,841	17,460	29	5,255	15,590	44	2,586
Feb 2022	31,964	74	5,915	16,540	26	3,646	15,424	48	2,269
Mar 2022	38,319	79	4,234	17,840	34	2,676	20,479	45	1,558
Apr 2022	30,855	97	893	15,380	44	1,055	15,475	53	-162
May 2022	47,938	112	344	24,000	65	230	23,938	48	114
Totals	451,310	1,123	30,898	248,620	567	19,676	202,690	556	11,222

Figure 11: Stanton Elementary School consumption tracker showing **45% reduction** in kWh

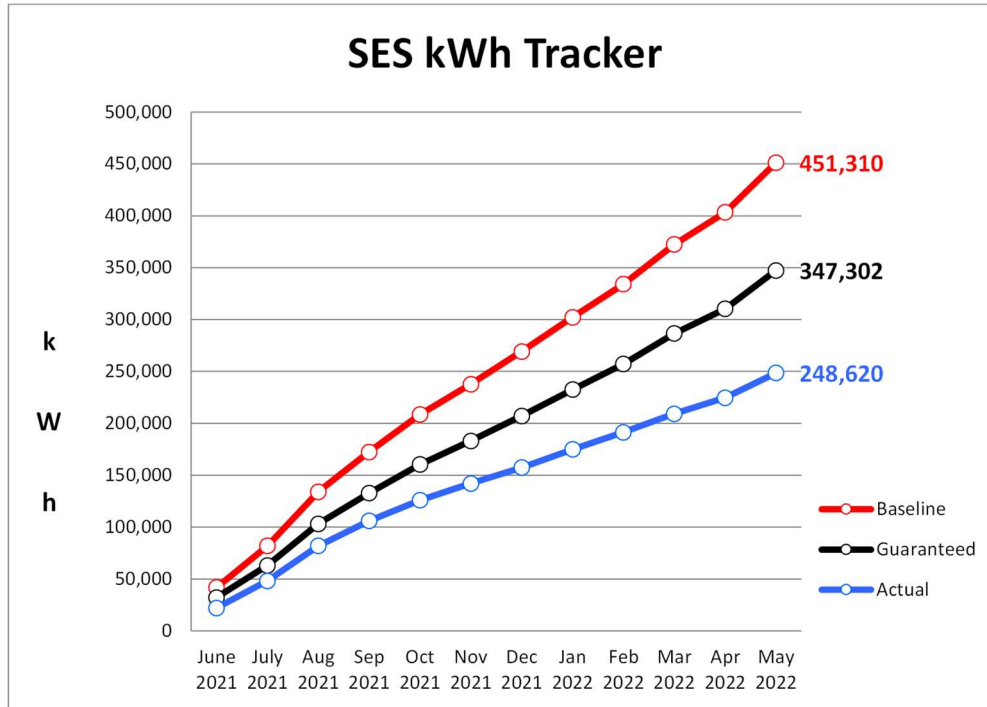
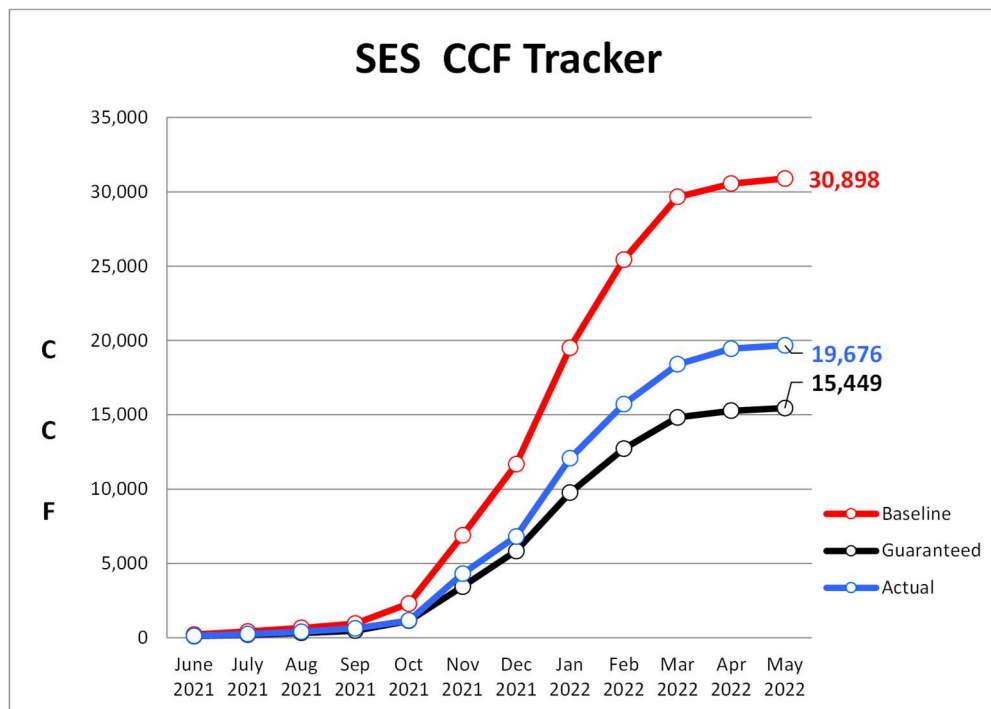


Figure 12: Stanton Elementary School natural gas tracker showing **36% reduction** in natural gas usage



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 5 Post-Project Savings	
	kWh	kWh	kWh	\$
June 2021	14,112	13,336	776	\$103.00
July 2021	18,933	18,217	716	\$95.02
Aug 2021	16,829	16,073	756	\$100.33
Sep 2021	14,062	13,315	747	\$99.13
Oct 2021	10,798	9,819	979	\$129.82
Nov 2021	14,299	13,478	821	\$108.88
Dec 2021	15,374	14,471	903	\$119.81
Jan 2022	27,450	26,274	1,176	\$155.98
Feb 2022	20,910	19,895	1,015	\$134.70
Mar 2022	14,001	13,203	798	\$105.89
Apr 2022	12,111	11,405	706	\$93.71
May 2022	11,726	10,998	728	\$96.52
Totals	190,605	180,483	10,122	\$1,343

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 5

Description	O&M Savings
Geothermal Wellfield and HVAC System Upgrades	\$6,345
Lighting Upgrades	\$10,386
Totals	\$16,731

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. CMTA used the contractual M&V approach to determine the savings included previously in this report, 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. CMTA will continue to monitor the water consumption for future reports. The following charts show the cumulative trend for Year 5 and the monthly bar chart compares the Baseline and first five years of the Guarantee showing the magnitude of the increased consumption at the high school and the growing trend of water consumption.

Figure 13: Powell County High School water tracker showing unexpected increase in usage.

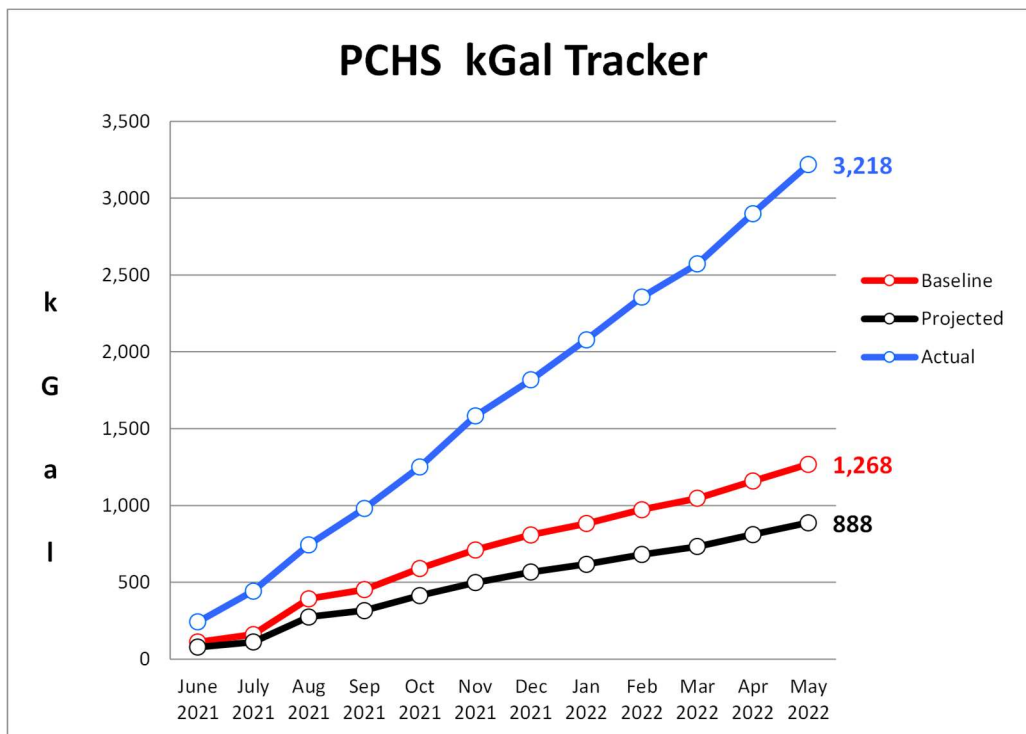
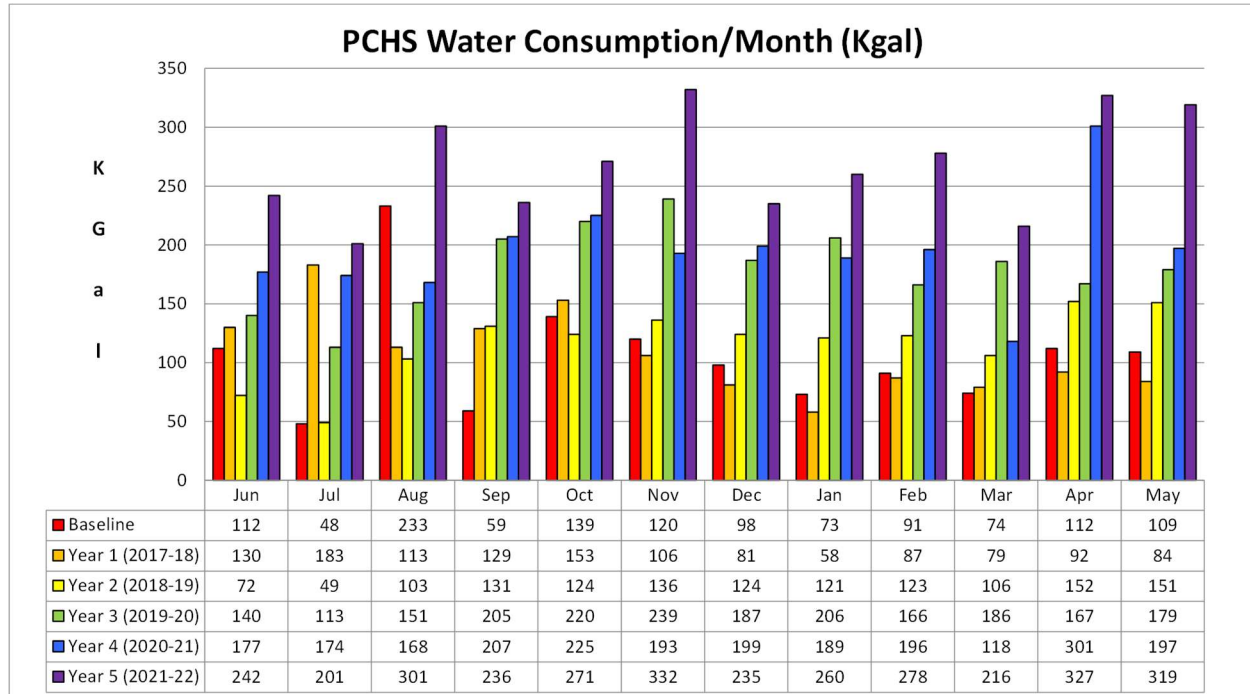


Figure 14: Powell County High School monthly water usage during all 5 years of the Guarantee.



The water consumption indicated on the bills for the remaining schools show the favorable results of the plumbing fixture replacements and indicated in the following charts. CMTA will continue to monitor the water consumption for future reports.

Figure 15: Powell County Middle School water tracker showing unexpected low usage

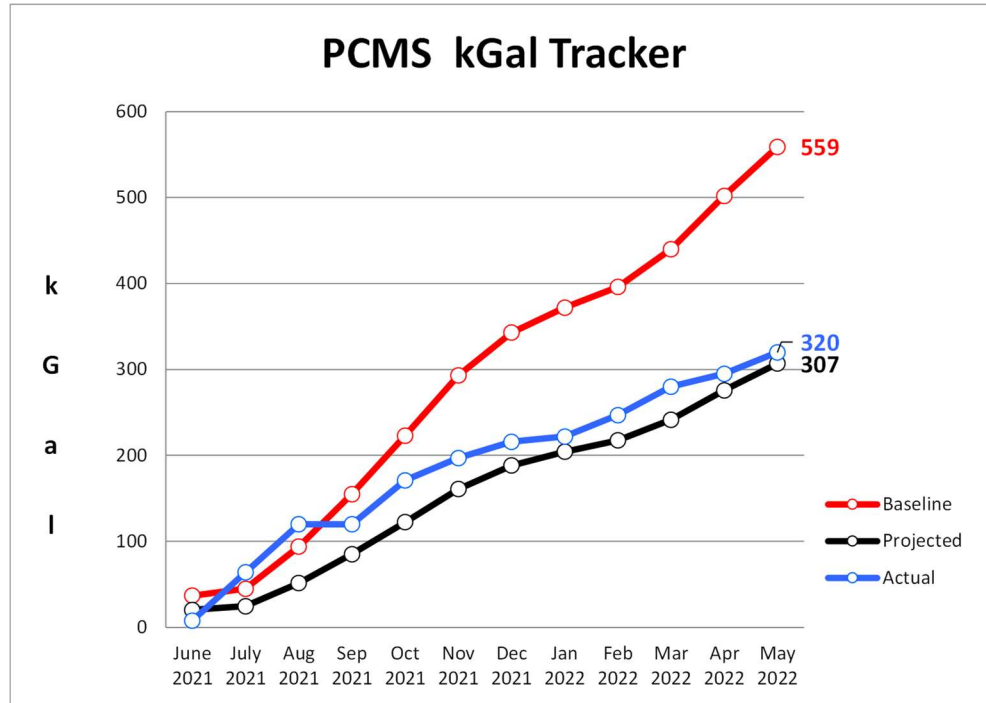


Figure 16: Clay City Elementary School water tracker showing savings better than expected.

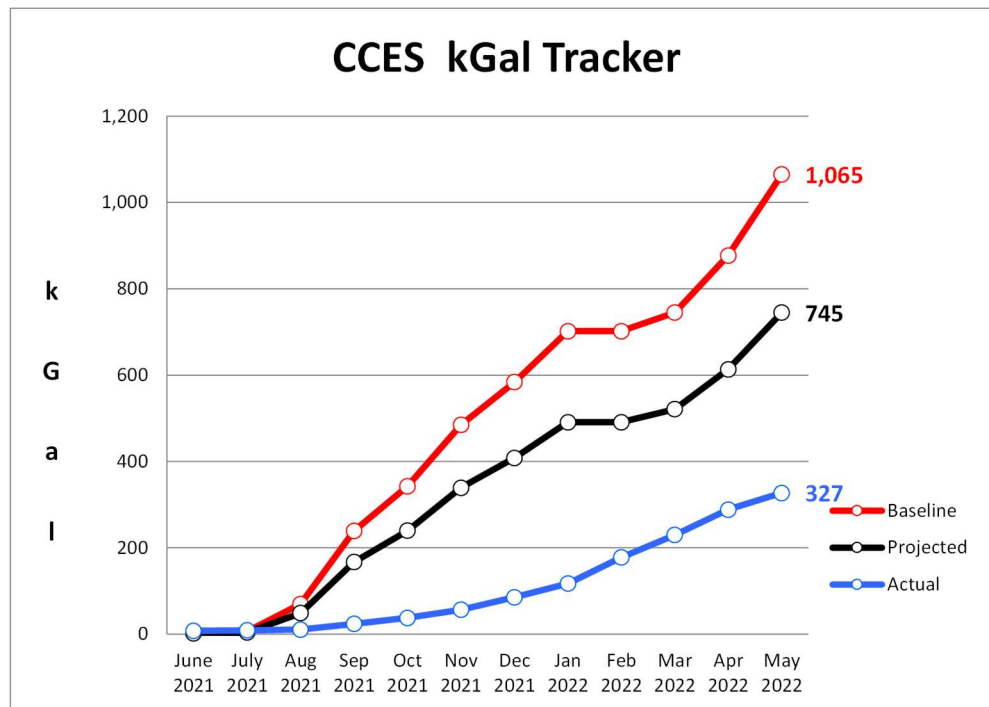


Figure 17: Bowen Elementary School water tracker showing savings a little less than expected.

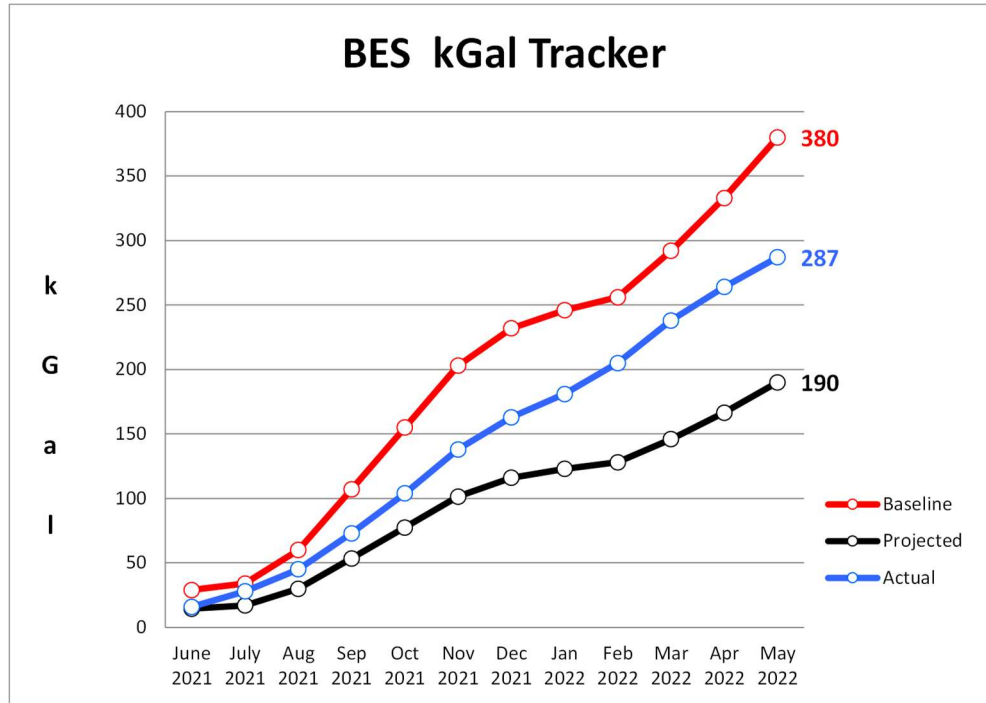
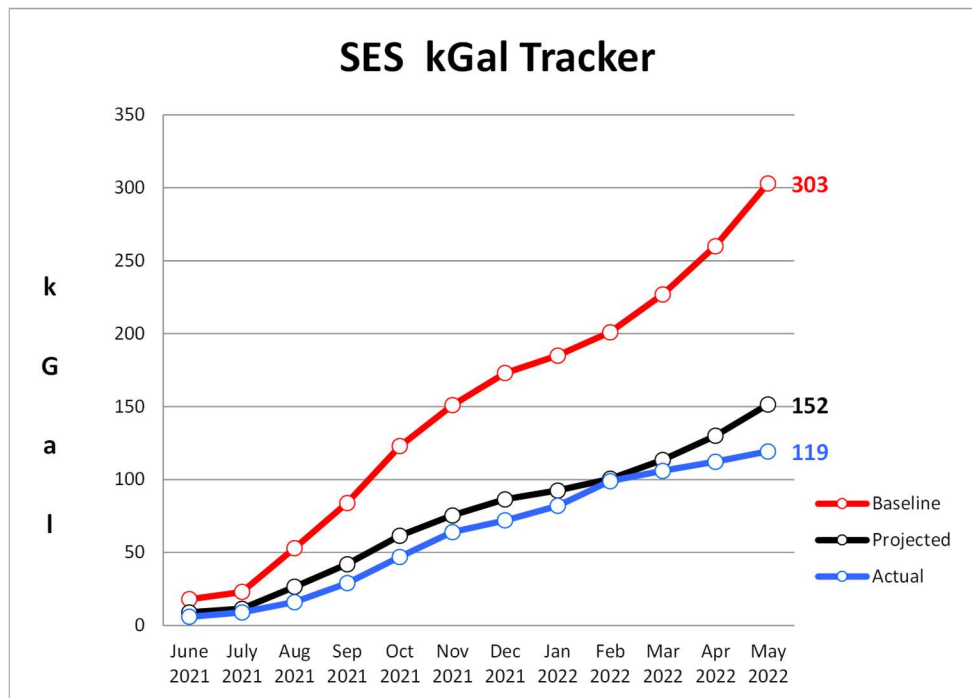


Figure 18: Stanton Elementary School water tracker showing savings better than expected.



Energy Management Discussion

Building Schedules

For the duration of Year 5, 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.