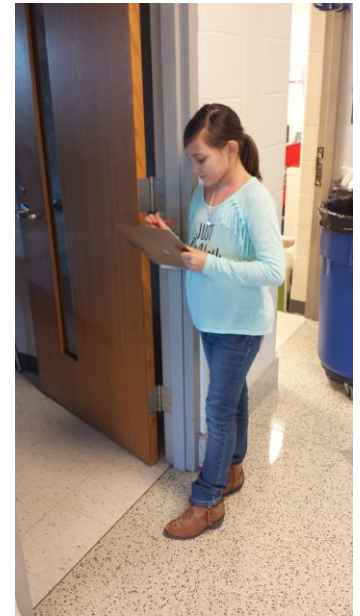
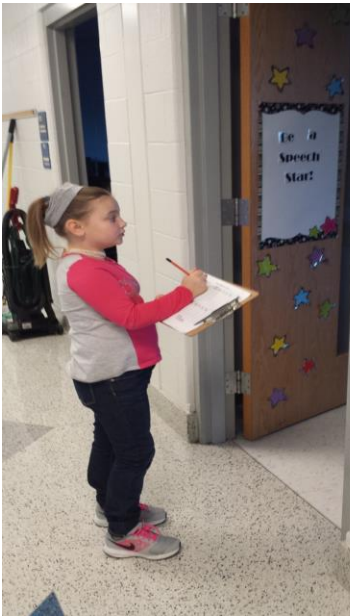




BULLITT COUNTY PUBLIC SCHOOLS ENERGY MANAGEMENT PROGRAM: 2016/2017 YEAR END REPORT



History

Bullitt County Public Schools began an energy conservation program in November 2006 through the Kentucky Energy Efficiency Program for Schools (KEEPS). Through the program, basic steps were taken to establish an energy program by: hiring an energy manager, creating an energy management plan, promoting energy conservation, and making low/no-cost changes to reduce energy consumption. By 2008, the district was ready to address capital building improvements – leading to the energy savings performance contract (ESPC) with

Harshaw Trane. Through the ESPC, 19 of our facilities received improvements such as new HVAC controls, lighting, and domestic water heater and boiler replacements.

2016/2017 School Year

This report summarizes the energy usage for the 2016/2017 fiscal year. Actions used for energy savings are included, as well as goals for the upcoming year.

- Total district electric consumption was **28% less** than the baseline usage. This resulted in a cost avoidance of approximately **\$583,679** (\$44,240 more savings than FY16)
- Total district natural gas consumption was **58% less** than the baseline usage. This resulted in a cost avoidance of approximately **\$120,880** (\$9,612 more savings than FY16)
- Propane for heating and cooking has been eliminated across the district (replaced with electricity or natural gas). This continues to result in a cost avoidance of approximately **\$78,135**

*BCPS baseline data is an average of the 2004/2005 and the 2005/2006 data.

Had we not reduced our electric, natural gas, and propane usage by these amounts, given the adjustment with today's utility rates, we would have spent approximately **\$782,694 more** on the utility bills for the 2016/2017 school year.

The cost of the district's energy management program in 2016/2017 was approximately \$90,000 for the energy manager budget and salary. The ESPC bond re-payment was approximately \$250,000. This leaves a net savings of \$442,694. The district's investment in the ESPC continues to result in significant energy savings. The district's investment has also resulted in a better environment for our students, with increased reliability of our lighting and HVAC systems, and the added comfort to all of our building occupants.

Total savings and costs since the BCPS energy management program began in 2006:

- Approximately \$5,522,926 in savings/avoided utility costs
- Average cost of energy management program annually: \$76,000
- Total bond repayment for the ESPC (to date): \$2,386,523

This leaves a net cost avoidance of approximately: \$2,452,403

Projects

Energy saving measures that were in place during the 2016/2017 school year includes:

- Energy manager tracking utility usage and costs monthly
- Utility rate review and evaluations
- Non-school hour energy conservation HVAC procedures including:
 - Shutdowns over long breaks
 - Temperature setbacks

- Outside air units only operating during occupied school hours
- Staff education and awareness such as:
 - Turning off lighting when leaving a room
 - Turning off computer monitors and ancillary equipment at the end of the day
- Student energy teams active in 19 schools during the 16/17 school year
- School walkthroughs to monitor energy use behaviors and equipment operation
- Daily monitoring of HVAC building automation systems to ensure proper equipment operation and scheduling
- Participating with the US Department of Energy in the Better Buildings Challenge, specifically highlighting renovations at Maryville Elementary and Mt. Washington Elementary
- Monitoring of indoor air quality (IAQ) – temperature, relative humidity, and CO₂
- Utility demand management program participation rebate of: **\$3,200**
- Partnership with Kentucky School Board Association (KSBA) and LG&E to receive grant funding towards the Energy Manager's salary: **\$11,957**
- KSBA/LG&E funding for an LED parking lot lighting project at ZMS, with a reimbursement of **\$17,000**

Planned Projects for 2017/2018

- Continuation of student energy team program.
- ENERGY STAR® re-certification for eligible buildings (already approved for 2017; 17 re-certifications – and 2 new certifications)
- Window film as part of a small energy savings project
- Continued monitoring of utility bills, utility rates, and building automation systems
- Continuation of building awareness throughout the district about energy efficiency and savings opportunities
- Continued participation in the KSBA School Energy Manager Project
 - KSBA SEMP and LG&E grant to fund \$11,957 of energy manager's salary for 2017/2018
 - LED parking lot lighting project at FES; funded through KSBA/LG&E grant, for up to \$15,000 of matching funds

District Energy Management Program Success

On the following page, Figure 1 illustrates how our district's energy use has decreased, while our growth in building space (square footage) has significantly increased since the 2004/2005 school year.

Table 1 provides a glimpse of the hard data that was used to create Figure 1. The first column is the 2006/2007 school year, which was the peak of the district's energy use. From 2004/2005 to 2006/2007, the district has started its growth period, and the utility use was increasing with it. The second column, for comparison, has the 2016/2017 school year utility use and cost data.

From just over 1.6 million square feet in 06/07, to the current square footage of just over 2 million square feet – the district is currently using 44,363,546 kBtu less than the 2006/2007 school year. Comparisons like these, to the early years of our utility tracking, help to illustrate where the over \$5.5 million in cost savings/cost avoidance comes from. With utility rates continuing to increase year to year, the district is being extremely fiscally responsible by participating and supporting an energy management program.

FIGURE 1--ENERGY USE COMPARED TO DISTRICT GROWTH

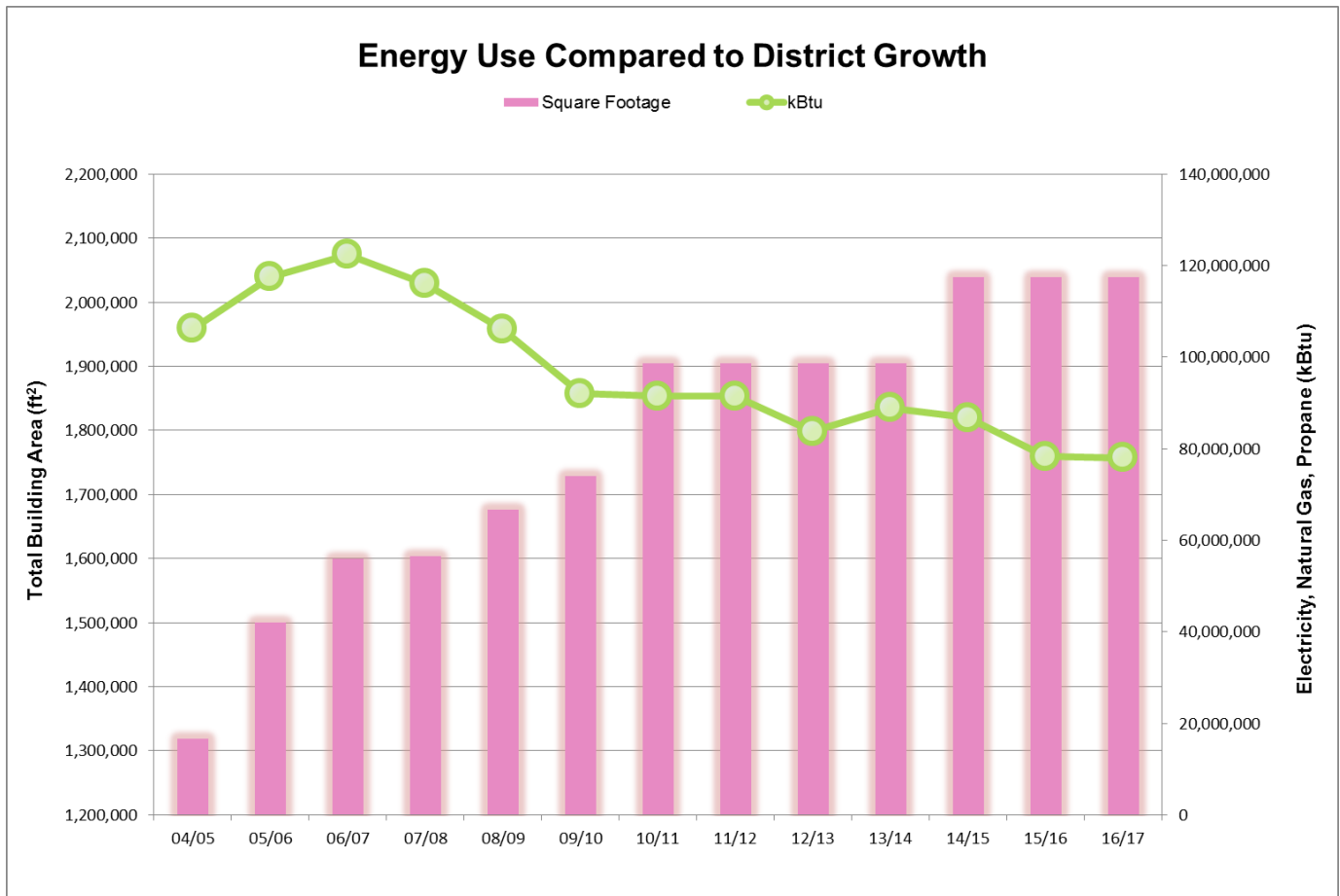


TABLE 1--COMPARING HEIGHT OF BCPS UTILITY USE TO THE 2016/2017 SCHOOL YEAR

Utility Type - Usage	2006/2007	2016/2017
Electric (kWh)	25,286,477	19,791,690
Natural Gas (ccf)	328,762	101,675
Propane (Gal)	24,321	0
Total Energy (kBtu)	122,365,317	78,001,771
Water/Sewer (Gal)	28,696,410	22,058,630
Utility Type - Cost	2006/2007	2016/2017
Electric (kWh)	\$ 1,878,962	\$ 2,199,326
Natural Gas (ccf)	\$ 326,271	\$ 111,118
Propane (Gal)	\$ 40,337	\$ -
Total Energy (kBtu)	\$ 2,245,570	\$ 2,310,444
Water/Sewer Cost	\$ 166,568	\$ 232,918
Total Building Area (ft ²)	1,600,859	2,039,528

ENERGY STAR®

As of the 2016/2017 school year, using ENERGY STAR's benchmarking tool (Portfolio Manager), the district has 17 ENERGY STAR® rated buildings.

TABLE 2—BCPS ENERGY STAR RATED BUILDINGS AND FY16 SCORES

School	Energy Star Rating
Brooks Elementary	94
Bullitt Lick Middle	91
Cedar Grove Elementary	91
Crossroads Elementary	96
Eastside Middle	77
Freedom Elementary	92
Hebron Middle	91
Lebanon Junction Elementary	91
Maryville Elementary	89
Mt. Washington Middle	91
Nichols Elementary	89
North Bullitt High School	92
Overdale Elementary	97
Pleasant Grove Elementary	88
Roby Elementary	89
Shepherdsville Elementary	93
Zoneton Middle	97

The EPA's energy performance rating system, based on source energy, accounts for the impact of weather variations as well as changes in key physical and operating characteristics of each building. A building score of 75 means that (from an energy consumption standpoint), the building performs better than 75% of all similar buildings nationwide.

Table 3 demonstrates the district’s utility use and cost for each year since 2004/2005.

Table 3 – Yearly Utility Use and Costs

Utility Type - Usage	2004/2005	2005/2006	2006/2007	2007/2008	2008/2009	2009/2010	2010/2011	2011/2012	2012/2013	2013/2014	2014/2015	2015/2016	2016/2017
Electric (kWh)	20,238,383	23,968,514	25,286,477	23,731,788	21,368,945	20,188,729	21,702,211	20,684,107	20,056,854	20,498,172	20,437,868	19,513,015	19,791,690
Natural Gas (ccf)	344,412	324,933	328,762	317,432	301,614	223,715	168,058	124,929	148,647	183,984	165,613	113,805	101,675
Propane (Gal)	18,307	24,547	24,321	26,067	22,637	738	726	264	0	0	0	0	0
Total Energy (kBtu)	106,202,889	117,494,719	122,365,317	116,053,487	106,048,368	91,994,115	91,424,347	91,423,984	83,744,627	88,890,115	86,792,145	78,300,322	78,001,771
Water/Sewer (Gal)	31,983,000	30,180,000	28,696,410	27,645,360	22,885,080	18,335,600	19,310,020	19,069,729	19,650,014	18,547,260	19,983,830	20,808,890	22,058,630
Utility Type - Cost	2004/2005	2005/2006	2006/2007	2007/2008	2008/2009	2009/2010	2010/2011	2011/2012	2012/2013	2013/2014	2014/2015	2015/2016	2016/2017
Electric (kWh)	\$ 1,347,257	\$ 1,731,618	\$ 1,878,962	\$ 1,874,410	\$ 1,888,880	\$ 1,841,316	\$ 2,052,474	\$ 2,052,474	\$ 2,131,190	\$ 2,225,301	\$ 2,282,901	\$ 2,183,273	\$ 2,199,326
Natural Gas (ccf)	\$ 361,814	\$ 500,245	\$ 326,271	\$ 359,626	\$ 413,207	\$ 182,260	\$ 155,724	\$ 155,724	\$ 131,426	\$ 170,870	\$ 159,694	\$ 106,868	\$ 111,118
Propane (Gal)	\$ 22,543	\$ 36,697	\$ 40,337	\$ 63,841	\$ 52,343	\$ 1,497	\$ 1,405	\$ 1,405	\$ -	\$ -	\$ -	\$ -	\$ -
Total Energy (kBtu)	\$ 1,731,614	\$ 2,268,560	\$ 2,245,570	\$ 2,297,877	\$ 2,354,430	\$ 2,025,073	\$ 2,209,602	\$ 2,209,602	\$ 2,262,616	\$ 2,396,171	\$ 2,442,595	\$ 2,290,141	\$ 2,310,444
Water/Sewer Cost	\$ 174,520	\$ 161,663	\$ 166,568	\$ 177,149	\$ 159,270	\$ 131,292	\$ 159,127	\$ 185,462	\$ 198,366	\$ 198,647	\$ 200,611	\$ 223,406	\$ 232,918
Total Building Area (ft ²)	1,319,733	1,501,305	1,600,859	1,604,359	1,677,440	1,729,599	1,906,093	1,906,093	1,906,093	1,906,093	2,039,528	2,039,528	2,039,528

***The only propane purchases that Bullitt County Public Schools continues to make are for the generator at Hebron Middle School.**

Tables 4 and 5 illustrate the energy usage per school, compared to their respective baseline. Energy savings and cost avoidance calculations account for changes in the number of days in the billing period, current costs (rates), and heating or cooling degree days (weather corrections). Figure 2 illustrates how the district’s buildings compare by energy use intensity (kBtu per square foot). Figures 3 through 5 illustrate the district’s non-adjusted energy profile per month, as compared to weather trends.

Tables 2 and 3 have columns that represent calculations to make adjustments for weather, or specifically the cooling and heating degree days. From July 2016 to June 2017, we had 336 more cooling degree days than the 2015/2016 school year and only 186 less heating degree days. Compared to our baseline data, we had 593 more cooling degree days and 509 less heating degree days. While the overall winter was mild for 2016/2017, we had abnormally more cooling degree days throughout the school year. Cooling degree days have a huge impact on electricity use (kWh), and the electricity demand (kW) charges from utility providers. We had significant cooling needs in July, August, September, October, March, April, May, and June of FY17.

Special note should also be made about the electricity use at Lebanon Junction and Nichols Elementary. Due to their previous renovations, both schools had a major change in energy use – shifting from propane to electricity. Both buildings have increased efficiency since their renovations, and the absence of propane clearly offsets the increased electricity consumption.

Table 4 – Electricity Cost Avoidance Report

Cost Avoidance Report								
Electric Consumption: 2016/2017 Compared to Baseline								
Building	Base Year Actual (kWh)	Base Year Weather Adjusted (kWh)	Evaluation Year Actual (kWh)	Use Avoidance Non-Adjusted (kWh)	Use Avoidance Weather Adjusted (kWh)	Change - Non Adjusted %	Change - Weather Adjusted %	Cost Avoidance Weather Adjusted \$
Bernheim	968,378	1,018,665	558,800	-409,578	-459,865	-42%	-45%	\$ (28,332)
Brooks	840,640	880,358	757,600	-83,040	-122,758	-10%	-14%	\$ (7,563)
Bullitt Central	1,749,023	1,850,638	1,412,091	-336,932	-438,547	-19%	-24%	\$ (27,019)
Bullitt East	2,058,205	2,158,692	1,584,931	-473,274	-573,761	-23%	-27%	\$ (35,349)
Bullitt Lick	1,199,102	1,256,517	670,200	-528,902	-586,317	-44%	-47%	\$ (31,393)
Cedar Grove	862,445	908,869	743,640	-118,805	-165,229	-14%	-18%	\$ (20,480)
Central Office	438,922	459,720	347,680	-91,242	-112,040	-21%	-24%	\$ (7,329)
Crossroads	828,036	866,318	661,800	-166,236	-204,518	-20%	-24%	\$ (8,281)
Eastside	1,677,878	1,753,242	1,257,984	-419,894	-495,258	-25%	-28%	\$ (30,513)
Freedom	1,196,862	1,243,099	673,200	-523,662	-569,899	-44%	-46%	\$ (23,201)
Hebron	1,364,982	1,433,153	768,800	-596,182	-664,353	-44%	-46%	\$ (27,046)
Lebanon Junction	474,697	499,381	563,280	88,583	63,899	19%	13%	\$ 4,180
Maintenance	70,569	72,909	72,440	1,871	-469	3%	-1%	\$ (36)
Maryville	847,754	879,023	610,800	-236,954	-268,223	-28%	-31%	\$ (25,303)
MW Elementary	1,293,255	1,366,676	553,600	-739,655	-813,076	-57%	-59%	\$ (50,094)
MW Middle	1,357,261	1,415,838	731,000	-626,261	-684,838	-46%	-48%	\$ (27,880)
Nichols	212,232	223,505	396,000	183,768	172,495	87%	77%	\$ 14,855
North Bullitt	2,494,791	2,626,416	1,617,722	-877,069	-1,008,694	-35%	-38%	\$ (101,128)
Old Mill	625,863	657,205	509,160	-116,703	-148,045	-19%	-23%	\$ (9,121)
Overdale	616,080	645,634	644,640	28,560	-994	5%	0%	\$ (40)
Pleasant Grove	1,173,670	1,236,287	740,160	-433,510	-496,127	-37%	-40%	\$ (32,452)
BAC/ROC	391,633	408,305	305,760	-85,873	-102,545	-22%	-25%	\$ (6,318)
Roby	877,360	915,938	808,880	-68,480	-107,058	-8%	-12%	\$ (7,003)
Shepherdsville	1,067,200	1,111,214	737,863	-329,337	-373,351	-31%	-34%	\$ (15,199)
Transportation	197,383	204,296	202,080	4,697	-2,216	2%	-1%	\$ (145)
Zoneton	1,678,209	1,749,303	838,600	-839,609	-910,703	-50%	-52%	\$ (81,490)
TOTAL	26,562,430	27,841,204	18,768,711	-7,793,719	-9,072,493	-29%	-33%	\$ (583,679)

Table 5 – Natural Gas and Propane Cost Avoidance Report

Cost Avoidance Report								
Natural Gas Consumption: 2016/2017 Compared to Baseline								
Building	Base Year Actual (ccf)	Base Year Weather Adjusted (ccf)	Evaluation Year Actual (ccf)	Use Avoidance Non-Adjusted (ccf)	Use Avoidance Weather Adjusted (ccf)	Change Non-Adjusted %	Change Weather Adjusted %	Cost Avoidance Weather Adjusted \$
Bernheim	19,203	17,945	3,481	-15,722	-14,464	-82%	-81%	\$ (9,736)
Brooks	17,874	16,773	0	-17,874	-16,773	-100%	-100%	\$ (10,377)
Bullitt Central	41,767	39,220	17,838	-23,929	-21,382	-57%	-55%	\$ (13,162)
Bullitt East	35,419	33,596	10,599	-24,820	-22,997	-70%	-68%	\$ (15,421)
Bullitt Lick	9,001	8,397	5,082	-3,919	-3,315	-44%	-39%	\$ (2,060)
Cedar Grove	22,476	21,000	2,616	-19,860	-18,384	-88%	-88%	\$ (11,318)
Central Office	244	226	42	-202	-184	-83%	-81%	\$ (114)
Crossroads								
Eastside								
Freedom	11,448	10,482	2,194	-9,254	-8,288	-81%	-79%	\$ (4,872)
Hebron	13,532	12,807	0	-13,532	-12,807	-100%	-100%	\$ (11,551)
Lebanon Junction	25,234	23,563	3,470	-21,764	-20,093	-86%	-85%	\$ (12,369)
Maintenance	1,567	2,539	5,955	4,388	3,416	280%	135%	\$ 2,096
Maryville	3,894	3,672	2,308	-1,586	-1,364	-41%	-37%	\$ (481)
MW Elementary	7,831	7,373	1,844	-5,987	-5,529	-76%	-75%	\$ (3,655)
MW Middle	13,549	12,596	8,691	-4,858	-3,905	-36%	-31%	\$ (2,169)
Nichols								
North Bullitt	12,371	11,618	10,789	-1,582	-829	-13%	-7%	\$ (503)
Old Mill	10,468	9,858	5,191	-5,277	-4,667	-50%	-47%	\$ (3,262)
Overdale	23,174	21,664	838	-22,336	-20,826	-96%	-96%	\$ (12,814)
Pleasant Grove	8,412	7,929	6,330	-2,082	-1,599	-25%	-20%	\$ (1,278)
Riverview/DT	8,784	8,217	6,022	-2,762	-2,195	-31%	-27%	\$ (1,723)
Roby	8,463	7,979	30	-8,433	-7,949	-100%	-100%	\$ (5,183)
Shepherdsville	3,201	3,036	1,821	-1,380	-1,215	-43%	-40%	\$ (744)
Transportation	3,159	2,944	2,887	-272	-57	-9%	-2%	\$ (182)
Zoneton								
TOTAL	301,071	283,435	98,028	-203,043	-185,407	-67%	-65%	\$ (120,880)

Cost Avoidance Report								
Propane Consumption: 2016/2017 Compared to Baseline								
Building	Base Year Actual (Gal)	Base Year Weather Adjusted (Gal)	Evaluation Year Actual (Gal)	Use Avoidance Non-Adjusted (Gal)	Use Avoidance Weather Adjusted (Gal)	Change Non-Adjusted %	Change Weather Adjusted %	Cost Avoidance Weather Adjusted \$
Cedar Grove	22,476	12,450	0	-22,476	-12,450	-100%	-100%	\$ (23,655)
Lebanon Junction	841	841	0	-841	-841	-100%	-100%	\$ (1,597)
Nichols	19,421	17,776	0	-19,421	-17,776	-100%	-100%	\$ (36,900)
Roby	8,412	8,412	0	-8,412	-8,412	-100%	-100%	\$ (15,982)
TOTAL	51,150	39,479	0	-51,150	-39,479	-100%	-100%	\$ (78,135)

Baseline Explanation

The baseline for the majority of the facilities is the average use of fiscal years 2004/2005 and 2005/2006, which are two years prior to the start of the energy management program. Schools such as Eastside, Zoneton, and Shepherdsville Elementary were constructed in mid-2005; therefore the 2006/2007 was used as their baseline. Old Mill Elementary had a building addition in 2005, so only the 2005/2006 year is used for their baseline. The Central Office added numerous computer servers, as well as a new air conditioning unit for the server room in 2006, therefore the 2006/2007 year is used for their baseline. With newly constructed buildings such as Roby, Brooks, Overdale, and Crossroads, their respective baselines have now been set as their first full year of energy use after opening.

The baseline has also been revised for schools that went under major renovation in the past five to six years: Cedar Grove (baseline 2011/2012), Hebron (2012/2013), Lebanon Junction (2011/2012), Nichols (2010/2011). These renovations had major changes made to their mechanical, electrical, and plumbing systems – causing significant changes in energy consumption. The district is still tracking and accounting for the significant change in energy usage since the original energy management baseline, and those changes are reflected in the cost savings/cost avoidance metrics.

Figure 2 – BCPS Building Energy Use Profile

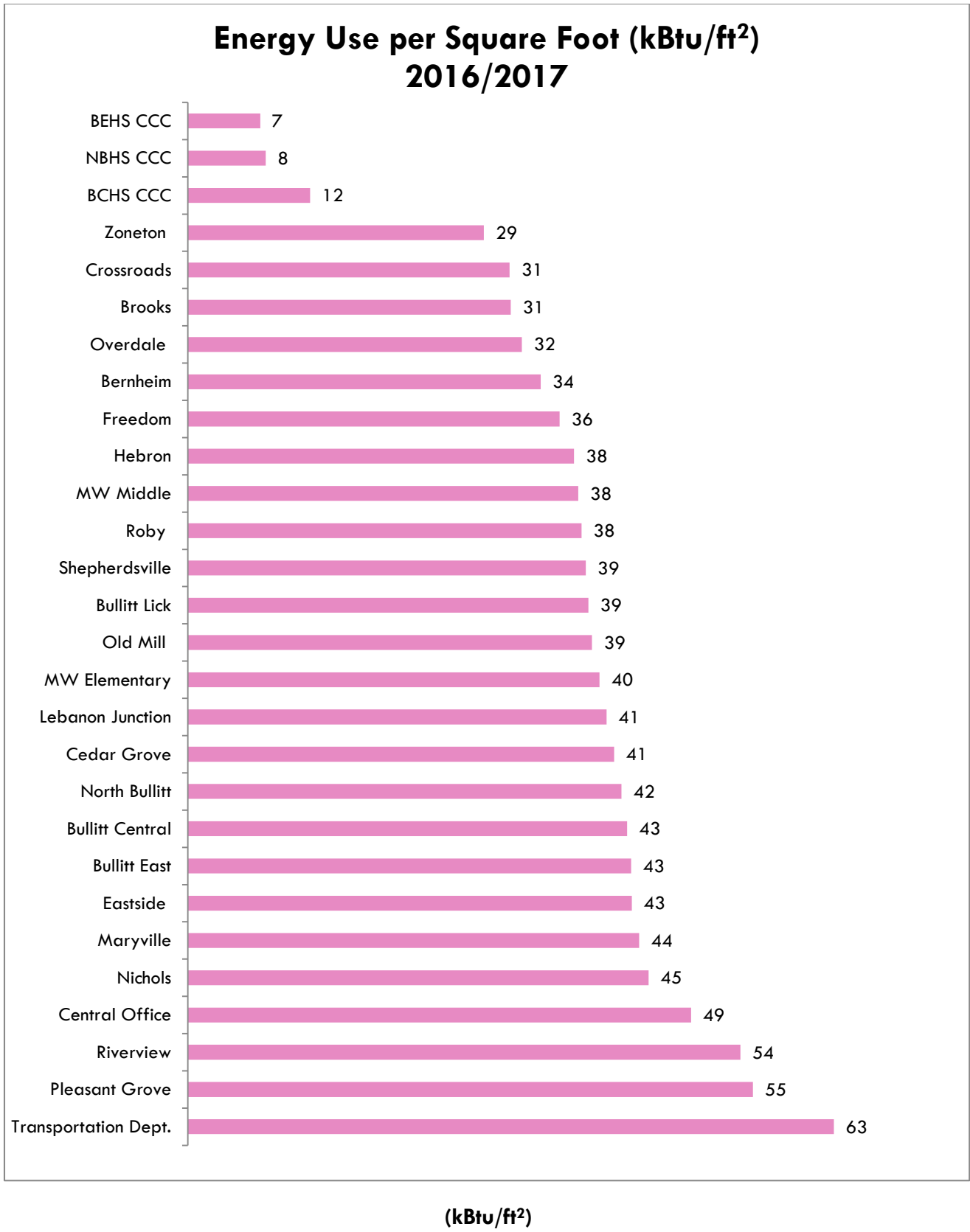


Figure 3 – Total, Non-Adjusted Energy Use (Electric, Gas, and Propane)

Month	Total Energy Usage (kBtu)				Weather Data			
	Baseline	2015/2016	2016/2017	% Change from Baseline	2016/2017		Baseline	
					CDD	HDD	CDD	HDD
Jul	7,842,724	4,719,894	4,590,967	-41%	461	0	429	0
Aug	9,163,947	6,590,064	7,365,472	-20%	478	0	389	5
Sep	9,724,941	7,135,709	7,649,295	-21%	327	23	218	17
Oct	8,119,551	5,284,257	5,719,759	-30%	138	114	47	167
Nov	8,785,461	6,096,541	6,264,059	-29%	29	415	4	436
Dec	11,421,630	6,607,618	7,586,541	-34%	3	842	0	910
Jan	11,009,598	8,359,872	7,684,517	-30%	2	713	0	725
Feb	10,839,871	8,900,542	6,650,321	-39%	14	468	0	702
Mar	9,523,164	6,220,367	6,729,346	-29%	23	495	0	595
Apr	7,649,624	5,518,387	5,119,131	-33%	129	142	45	171
May	8,102,269	5,895,376	5,900,394	-27%	186	93	93	97
Jun	7,672,321	4,771,262	4,212,103	-45%	343	10	317	0
Total YTD	109,855,102	76,099,890	75,471,904	-31%	2133	3315	1540	3824

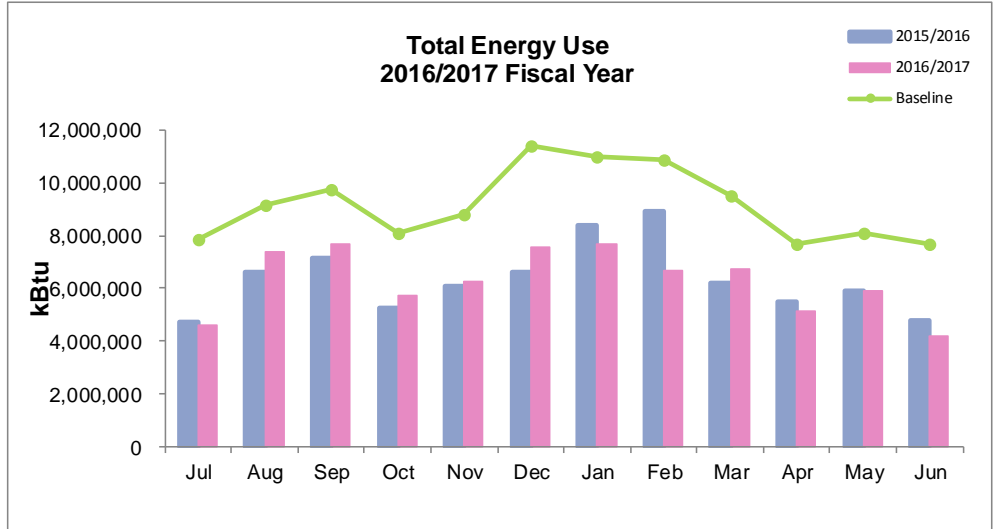


Figure 4 – Non-Adjusted Electricity Use

Month	Total Electric Usage (kWh)				Weather Data			
	Baseline	2015/2016	2016/2017	% Change from Baseline	2016/2017		Baseline	
					CDD	HDD	CDD	HDD
Jul	2,223,084	1,339,731	1,312,812	-41%	461	0	429	0
Aug	2,599,889	1,859,108	2,101,491	-19%	478	0	389	5
Sep	2,746,156	1,996,779	2,166,562	-21%	327	23	218	17
Oct	2,207,277	1,438,965	1,596,157	-28%	138	114	47	167
Nov	2,155,313	1,523,015	1,581,319	-27%	29	415	4	436
Dec	2,133,395	1,442,834	1,600,507	-25%	3	842	0	910
Jan	2,262,714	1,814,207	1,652,376	-27%	2	713	0	725
Feb	2,206,859	1,730,564	1,515,936	-31%	14	468	0	702
Mar	2,101,676	1,562,144	1,612,634	-23%	23	495	0	595
Apr	1,978,164	1,425,082	1,389,211	-30%	129	142	45	171
May	2,185,178	1,624,685	1,636,359	-25%	186	93	93	97
Jun	2,133,352	1,345,609	1,175,963	-45%	343	10	317	0
Total YTD	26,933,055	19,102,723	19,341,327	-28%	2133	3315	1540	3824

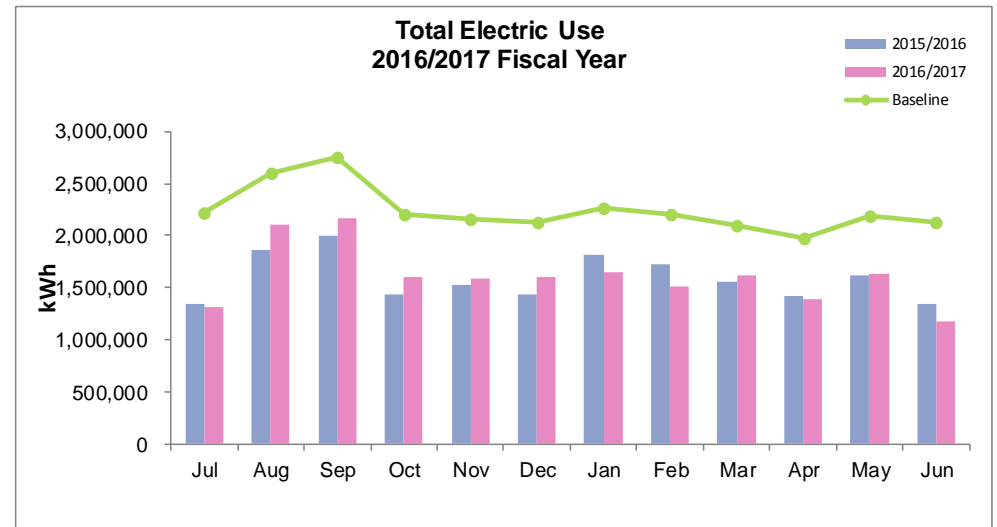


Figure 5 – Non-Adjusted Natural Gas Use

Month	Total Natural Gas Usage (CCF)				Weather Data			
	Baseline	2015/2016	2016/2017	% Change from Baseline	2016/2017		Baseline	
					CDD	HDD	CDD	HDD
Jul	4,621	1,444	1,084	-77%	461	0	429	0
Aug	5,811	2,396	1,895	-67%	478	0	389	5
Sep	6,417	3,133	2,495	-61%	327	23	218	17
Oct	8,363	3,636	2,657	-68%	138	114	47	167
Nov	18,053	8,738	8,433	-53%	29	415	4	436
Dec	45,479	16,356	20,637	-55%	3	842	0	910
Jan	37,859	21,066	19,870	-48%	2	713	0	725
Feb	37,649	29,086	14,349	-62%	14	468	0	702
Mar	26,774	8,644	11,913	-56%	23	495	0	595
Apr	11,774	6,369	3,681	-69%	129	142	45	171
May	9,139	3,417	3,079	-66%	186	93	93	97
Jun	5,827	1,748	1,939	-67%	343	10	317	0
Average	217,763	106,033	92,032	-58%	2133	3315	1540	3824

