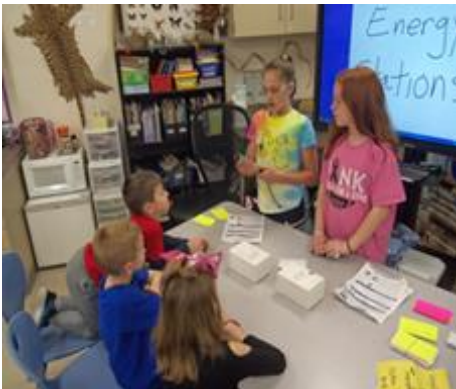




BULLITT COUNTY PUBLIC SCHOOLS ENERGY MANAGEMENT PROGRAM: 2018/2019 YEAR END REPORT



History

- BCPS began energy conservation program in November 2006 with KEEPS (Kentucky Energy Efficiency Program for Schools)
- Hired an energy manager, created an energy plan, promoted energy conservation, and made low cost/no-cost changes to reduce energy use
- 2008 Energy Savings Performance Contract (ESPC) with Harshaw Trane to address capital lighting and HVAC needs
- 2018 Energy Savings Performance Contract (ESPC) with Harshaw Trane to address LED lighting and additional HVAC needs

2018/2019 School Year

This report summarizes the energy usage for the 2018/2019 fiscal year. Actions used for energy savings are included, as well as goals for the upcoming year.

- Total district electric consumption was **36% less** than the baseline usage. This resulted in a cost avoidance of approximately **\$803,477**
- Total district natural gas consumption was **40% less** than the baseline usage. This resulted in a cost avoidance of approximately **\$115,365**
- 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 **\$78,084**

*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 **\$996,926 more** on the utility bills for the 2018/2019 school year.

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

- Approximately **\$7,536,343** in savings/avoided utility costs

Projects

Energy saving measures that were in place during the 2018/2019 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 13 schools during the 18/19 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, recognized as a national goal achiever
- Monitoring of indoor air quality (IAQ) – temperature, relative humidity, and CO₂
- Utility demand management program participation rebate of: **\$2,978**

Planned Projects for 2019/2020

- Continuation of student energy team program.
- ENERGY STAR® re-certification for eligible buildings
- 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
- Continue working as part of the facilities and construction teams with input on the upcoming new building project

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. From 2004/2005 to 2006/2007, the district started its growth period, and the utility use was increasing with it. The first column is the 2006/2007 school year, which was the peak of the district's energy use. The second column, for comparison, has the 2018/2019 school year utility use and cost data.

Since the start of the district's energy management program, the energy use (kBtu) is the lowest it has ever been – at a yearly total of 75,418,839 kBtu. FY19 was 38% lower in energy use than the highest use year of FY07. From just over 1.6 million square feet in 06/07, to the current square footage of just over 2.0 million square feet, the district is using 29.5% less electricity and 56.8% less natural gas. Comparisons like these, to the early years of our utility tracking, help to illustrate where the over \$7.5 million in cost savings/cost avoidance comes from. With utility rates continuing to increase year to year, the district is being fiscally responsible by participating and supporting an energy management program.

BCPS has received both local and national recognition for the energy management program:

- Louisville Energy Alliance Kilowatt Crackdown Winner 2019 (Eastside Middle)
- ENERGY STAR Partner of the Year 2019
- US Department of Energy Better Buildings Program – Goal Achiever 2019

FIGURE 1--ENERGY USE COMPARED TO DISTRICT GROWTH

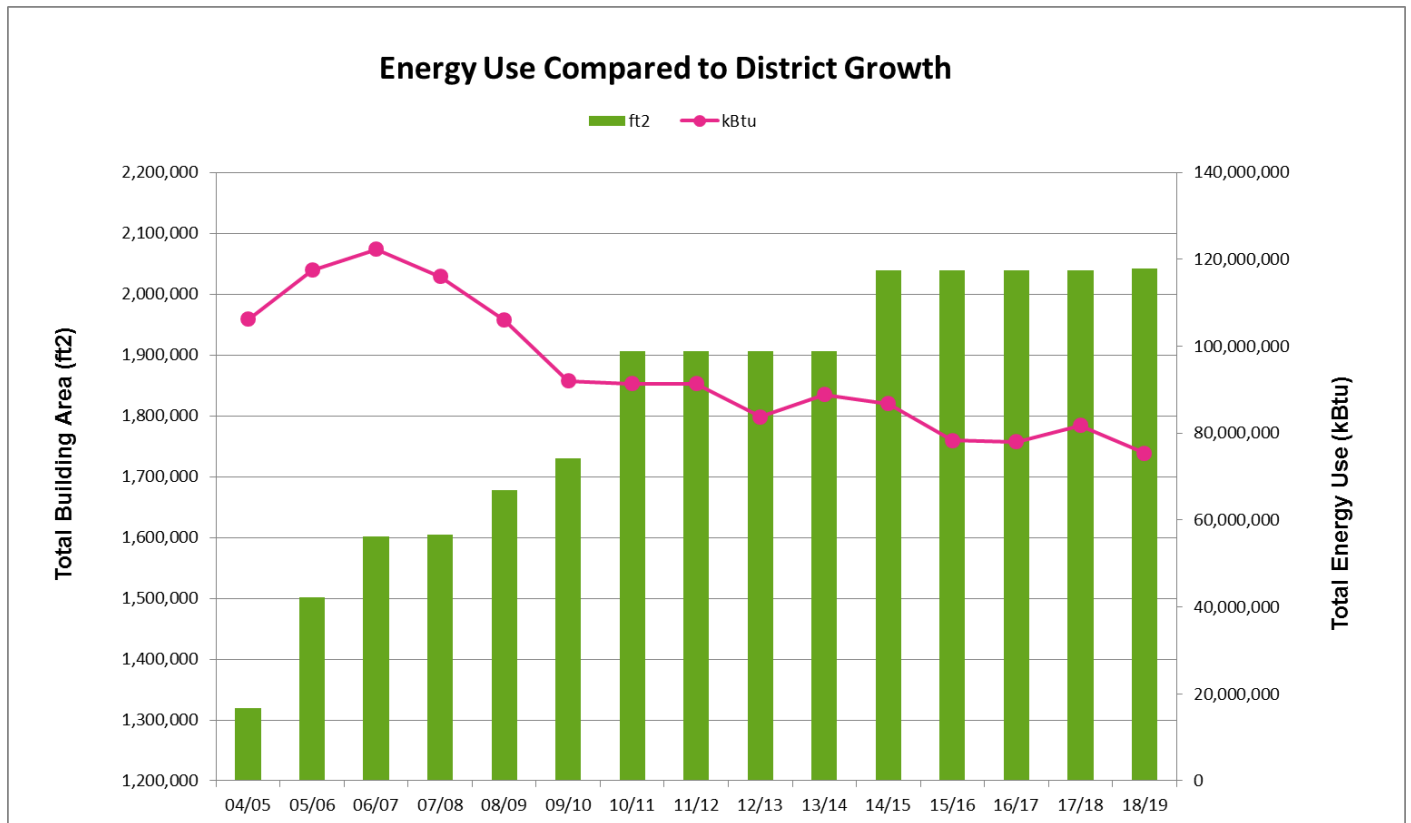


TABLE 1--COMPARING HEIGHT OF BCPS UTILITY USE TO THE 2018/2019 SCHOOL YEAR

Utility Type - Usage	2006/2007	2018/2019
Electric (kWh)	25,286,477	17,815,291
Natural Gas (ccf)	328,762	142,069
Propane (Gal)	24,321	0
Total Energy (kBtu)	122,365,317	75,418,839
Water/Sewer (Gal)	28,696,410	21,201,337
Utility Type - Cost	2006/2007	2018/2019
Electric (kWh)	\$ 1,878,962	\$ 1,974,403
Natural Gas (ccf)	\$ 326,271	\$ 145,752
Propane (Gal)	\$ 40,337	\$ -
Total Energy (kBtu)	\$ 2,245,570	\$ 2,120,155
Water/Sewer Cost	\$ 166,568	\$ 240,834
Total Building Area (ft²)	1,600,859	2,042,691

ENERGY STAR®

As of the 2018/2019 school year, using ENERGY STAR's benchmarking tool (Portfolio Manager), the district has 19 ENERGY STAR® certified buildings. The buildings below were recertified in 2018.

TABLE 2—BCPS ENERGY STAR RECERTIFICATIONS IN FY19 AND SCORES

School	Energy Star Rating
Brooks Elementary – 7 years certified	88
Bullitt Central HS (new 2018)	80
Bullitt Lick Middle – 6 years certified	80
Crossroads Elementary – 7 years certified	89
Eastside Middle – 6 years certified	87
Freedom Elementary – 7 years certified	81
Hebron Middle – 5 years certified	84
Maryville Elementary – 6 years	92
Mt. Washington Elementary – 2 years certified	93
Mt. Washington Middle – 5 years certified	83
North Bullitt High School – 6 years certified	89
Overdale Elementary – 7 years certified	90
Pleasant Grove Elementary – 6 years certified	77
Roby Elementary – 7 years certified	78
Shepherdsville Elementary – 7 years certified	84
Zoneton Middle – 7 years certified	92

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	2017/2018	2018/2019
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	19,750,114	17,815,291
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	139,692	142,069
Propane (Gal)	18,307	24,547	24,321	26,067	22,637	738	726	264	0	0	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	81,775,665	75,418,839
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	20,159,630	21,201,337
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	2017/2018	2018/2019
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	\$ 2,205,925	\$ 1,974,403
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	\$ 147,034	\$ 145,752
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	\$ 2,352,959	\$ 2,120,155
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	\$ 219,438	\$ 240,834
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	2,039,528	2,042,691

***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 2018 to June 2019, we had 437 more cooling degree days than the baseline school year, and our natural gas use reflects that we had 263 more heating degree days. Compared to the previous school year, FY18, we had just slightly fewer cooling degree days (24) and only 172 less heating degree days – so natural gas use was only slightly higher than the previous year. A huge impact to the reduction in our electric use can be attributed to the LED lighting project throughout the district, as well as the replacement of HVAC controls/equipment as part of the 2018 energy savings performance contract.

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: 2018/2019 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	1,060,370	485,200	-483,178	-575,170	-50%	-54%	\$ (34,010)
Brooks	840,640	913,573	713,920	-126,720	-199,653	-15%	-22%	\$ (11,805)
Bullitt Central	1,749,023	1,916,669	1,263,745	-485,278	-652,924	-28%	-34%	\$ (38,607)
Bullitt East	2,058,205	2,246,430	1,375,597	-682,608	-870,833	-33%	-39%	\$ (51,492)
Bullitt Lick	1,199,102	1,310,100	713,600	-485,502	-596,500	-40%	-46%	\$ (62,574)
Cedar Grove	862,445	921,890	735,360	-127,085	-186,530	-15%	-20%	\$ (21,356)
Central Office	438,922	480,093	293,680	-145,242	-186,413	-33%	-39%	\$ (11,731)
Crossroads	828,036	897,394	645,300	-182,736	-252,094	-22%	-28%	\$ (8,946)
Eastside	1,677,878	1,832,668	861,696	-816,182	-970,972	-49%	-53%	\$ (57,414)
Freedom	1,196,862	1,299,344	595,200	-601,662	-704,144	-50%	-54%	\$ (25,960)
Hebron	1,364,982	1,490,989	662,080	-702,902	-828,909	-51%	-56%	\$ (30,470)
Lebanon Junction	474,697	517,295	583,800	109,103	66,505	23%	13%	\$ 4,185
Maintenance	70,569	75,818	106,884	36,315	31,066	51%	41%	\$ 2,705
Maryville	847,754	918,276	432,600	-415,154	-485,676	-49%	-53%	\$ (50,291)
MW Elementary	1,293,255	1,414,859	436,960	-856,295	-977,899	-66%	-69%	\$ (57,823)
MW Middle	1,357,261	1,475,941	719,000	-638,261	-756,941	-47%	-51%	\$ (27,732)
Nichols	212,232	231,974	415,560	203,328	183,586	96%	79%	\$ 15,355
North Bullitt	2,494,791	2,721,687	1,321,671	-1,173,120	-1,400,016	-47%	-51%	\$ (131,898)
Old Mill	625,863	684,612	441,600	-184,263	-243,012	-29%	-35%	\$ (14,369)
Overdale	616,080	674,092	610,080	-6,000	-64,012	-1%	-9%	\$ (2,283)
Pleasant Grove	1,173,670	1,283,636	668,160	-505,510	-615,476	-43%	-48%	\$ (38,732)
BAC/ROC	391,633	423,382	281,920	-109,713	-141,462	-28%	-33%	\$ (8,365)
Roby	877,360	956,365	759,440	-117,920	-196,925	-13%	-21%	\$ (12,393)
Shepherdsville	1,067,200	1,162,263	653,133	-414,067	-509,130	-39%	-44%	\$ (18,672)
Transportation	197,383	213,275	196,560	-823	-16,715	0%	-8%	\$ (1,052)
Zoneton	1,678,209	1,824,996	783,600	-894,609	-1,041,396	-53%	-57%	\$ (107,749)
TOTAL	26,562,430	28,947,992	16,756,346	-9,806,084	-12,191,646	-37%	-42%	\$ (803,477)

Table 5 – Natural Gas and Propane Cost Avoidance Report

Cost Avoidance Report								
Natural Gas Consumption: 2018/2019 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	19,588	4,362	-14,841	-15,226	-77%	-78%	\$ (9,663)
Brooks	17,874	18,461	0	-17,874	-18,461	-100%	-100%	\$ (12,092)
Bullitt Central	41,767	42,530	28,352	-13,415	-14,178	-32%	-33%	\$ (9,306)
Bullitt East	35,419	36,880	12,033	-23,386	-24,847	-66%	-67%	\$ (15,594)
Bullitt Lick	9,001	9,243	6,680	-2,321	-2,563	-26%	-28%	\$ (1,673)
Cedar Grove	22,476	23,431	3,690	-18,786	-19,741	-84%	-84%	\$ (12,841)
Central Office	244	253	60	-184	-193	-75%	-76%	\$ (125)
Crossroads								
Eastside								
Freedom	11,448	11,822	3,335	-8,113	-8,487	-71%	-72%	\$ (5,549)
Hebron	19,885	20,813	0	-19,885	-20,813	-100%	-100%	\$ (13,583)
Lebanon Junction	25,234	26,285	5,347	-19,887	-20,938	-79%	-80%	\$ (13,638)
Maintenance	1,567	2,712	8,197	6,630	5,485	423%	202%	\$ 3,562
Maryville	3,894	4,060	5,204	1,310	1,144	34%	28%	\$ 1,132
MW Elementary	7,831	8,054	3,019	-4,812	-5,035	-61%	-63%	\$ (3,127)
MW Middle	13,549	14,311	8,919	-4,630	-5,392	-34%	-38%	\$ (3,511)
Nichols								
North Bullitt	12,371	12,530	15,881	3,510	3,351	28%	27%	\$ 2,180
Old Mill	10,468	10,898	8,147	-2,321	-2,751	-22%	-25%	\$ (1,518)
Overdale	23,174	23,811	2,014	-21,160	-21,797	-91%	-92%	\$ (14,197)
Pleasant Grove	8,412	8,733	8,507	95	-226	1%	-3%	\$ 68
Riverview/DT	8,784	9,099	8,926	142	-173	2%	-2%	\$ 74
Roby	8,463	8,786	33	-8,430	-8,753	-100%	-100%	\$ (5,501)
Shepherdsville	3,201	3,358	1,945	-1,256	-1,413	-39%	-42%	\$ (933)
Transportation	3,159	3,281	3,887	728	606	23%	18%	\$ 471
Zoneton								
TOTAL	307,424	318,940	138,538	-168,886	-180,402	-55%	-57%	\$ (115,365)

Cost Avoidance Report								
Propane Consumption: 2018/2019 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	12,424	0	-22,476	-12,424	-100%	-100%	\$ (23,605)
Lebanon Junction	841	841	0	-841	-841	-100%	-100%	\$ (1,597)
Nichols	19,421	19,449	0	-19,421	-19,449	-100%	-100%	\$ (36,900)
Roby	8,412	8,412	0	-8,412	-8,412	-100%	-100%	\$ (15,982)
TOTAL	51,150	41,125	0	-51,150	-41,125	-100%	-100%	\$ (78,084)

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

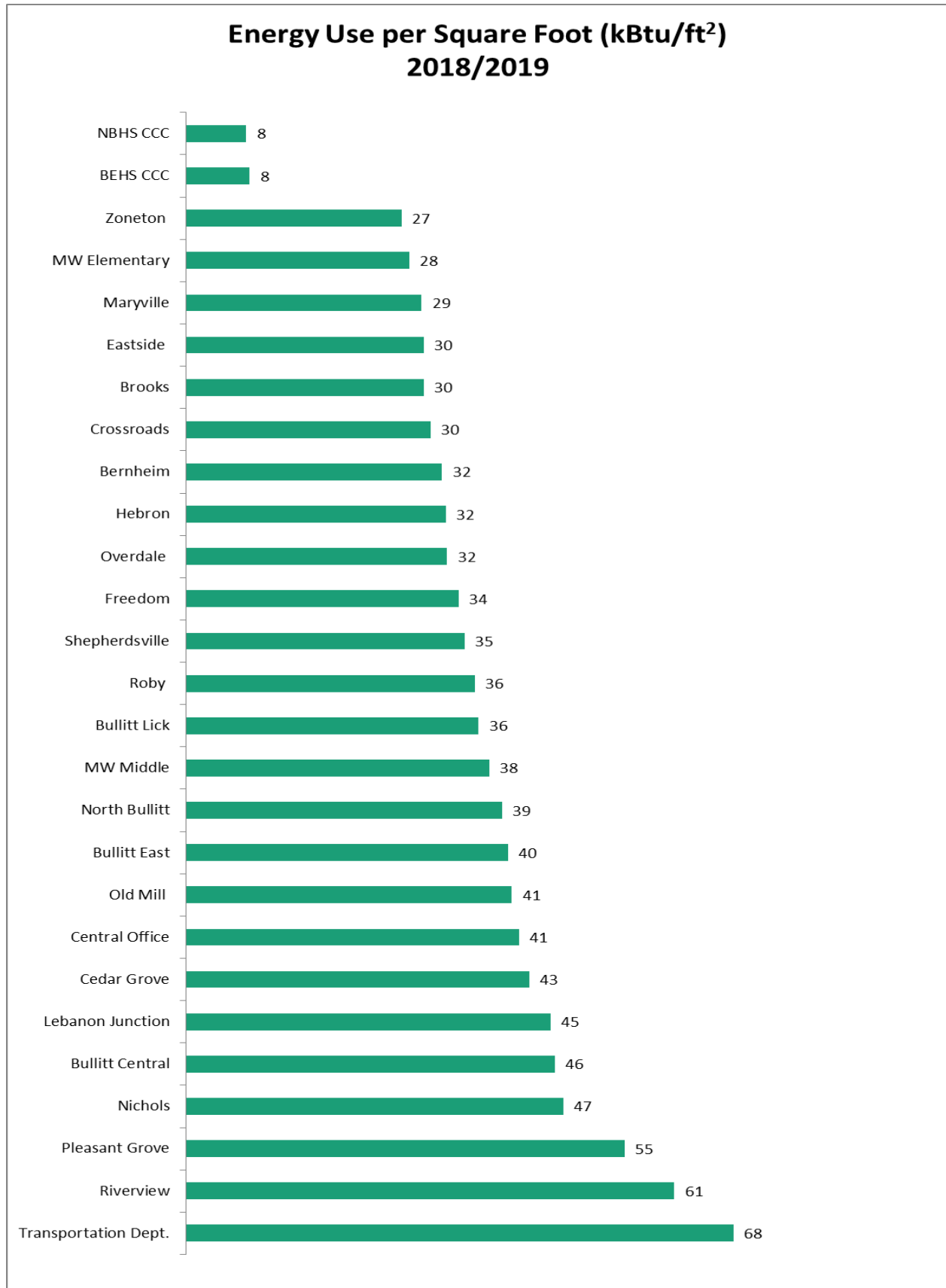


Figure 3 – Total, Non-Adjusted Energy Use (Electric, Gas, and Propane)

Month	Total Energy Usage (kBtu)				Weather Data			
	Baseline	2017/2018	2018/2019	% Change from Baseline	2018/2019		Baseline	
					CDD	HDD	CDD	HDD
Jul	7,842,724	4,550,132	4,986,947	-36%	457	0	429	0
Aug	9,163,947	6,791,127	6,839,779	-25%	437	1	389	5
Sep	9,724,941	6,186,245	6,341,120	-35%	305	21	218	17
Oct	8,119,551	5,970,219	5,616,913	-31%	136	264	47	167
Nov	8,785,461	6,202,029	6,443,200	-27%	0	654	4	436
Dec	11,421,630	7,773,031	7,054,510	-38%	0	697	0	910
Jan	11,009,598	9,587,272	8,436,580	-23%	0	921	0	725
Feb	10,839,871	7,013,487	7,322,009	-32%	2	624	0	702
Mar	9,523,164	6,903,097	6,425,324	-33%	8	634	0	595
Apr	7,649,624	5,661,526	4,551,802	-40%	84	204	45	171
May	8,102,269	6,655,933	5,087,021	-37%	238	58	93	97
Jun	7,672,321	5,391,496	3,386,211	-56%	310	9	317	0
Total YTD	109,855,102	78,685,593	72,491,414	-34%	1977	4087	1540	3824

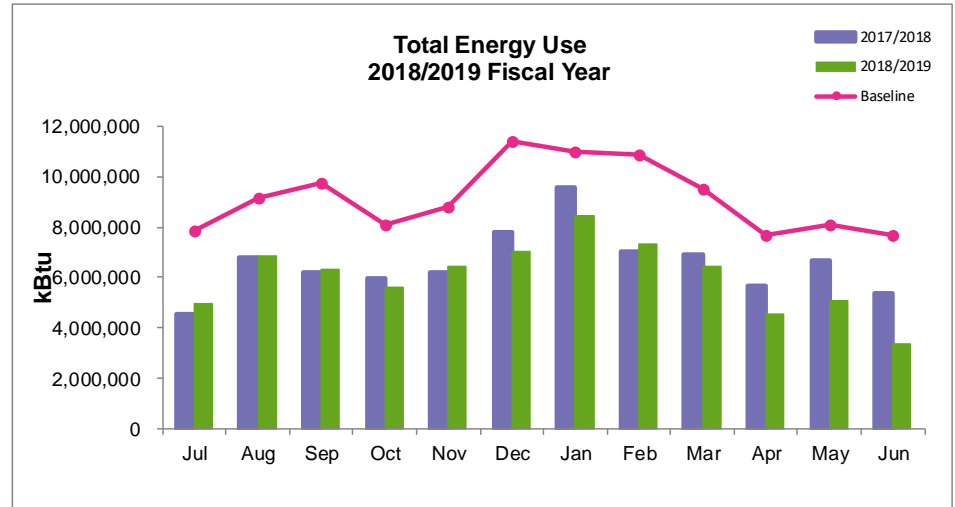


Figure 4 – Non-Adjusted Electricity Use

Month	Total Electric Usage (kWh)				Weather Data			
	Baseline	2017/2018	2018/2019	% Change from Baseline	2018/2019		Baseline	
					CDD	HDD	CDD	HDD
Jul	2,223,084	1,288,105	1,421,592	-36%	457	0	429	0
Aug	2,599,889	1,912,059	1,944,340	-25%	437	1	389	5
Sep	2,746,156	1,733,148	1,782,343	-35%	305	21	218	17
Oct	2,207,277	1,618,123	1,488,674	-33%	136	264	47	167
Nov	2,155,313	1,503,911	1,391,446	-35%	0	654	4	436
Dec	2,133,395	1,589,808	1,384,776	-35%	0	697	0	910
Jan	2,262,714	1,834,659	1,613,663	-29%	0	921	0	725
Feb	2,206,859	1,502,650	1,433,169	-35%	2	624	0	702
Mar	2,101,676	1,568,708	1,338,752	-36%	8	634	0	595
Apr	1,978,164	1,379,550	1,170,742	-41%	84	204	45	171
May	2,185,178	1,851,365	1,398,305	-36%	238	58	93	97
Jun	2,133,352	1,522,861	943,900	-56%	310	9	317	0
Total YTD	26,933,055	19,304,947	17,311,702	-36%	1977	4087	1540	3824

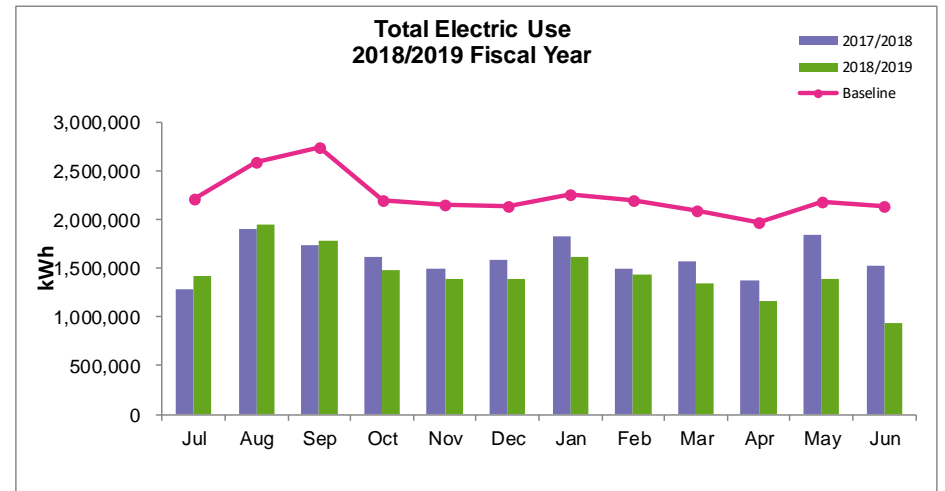


Figure 5 – Non-Adjusted Natural Gas Use

Month	Total Natural Gas Usage (CCF)				Weather Data			
	Baseline	2017/2018	2018/2019	% Change from Baseline	2018/2019		Baseline	
					CDD	HDD	CDD	HDD
Jul	4,621	1,506	1,325	-71%	457	0	429	0
Aug	5,811	2,594	1,997	-66%	437	1	389	5
Sep	6,417	2,648	2,522	-61%	305	21	218	17
Oct	8,363	4,361	5,219	-38%	136	264	47	167
Nov	18,053	10,395	16,462	-9%	0	654	4	436
Dec	45,479	22,802	22,618	-50%	0	697	0	910
Jan	37,859	32,305	28,454	-25%	0	921	0	725
Feb	37,649	18,315	23,612	-37%	2	624	0	702
Mar	26,774	15,055	18,034	-33%	8	634	0	595
Apr	11,774	9,267	5,410	-54%	84	204	45	171
May	9,139	3,292	3,068	-66%	238	58	93	97
Jun	5,827	1,898	1,608	-72%	310	9	317	0
Average	217,763	124,438	130,329	-40%	1977	4087	1540	3824

