



Bullitt County Public Schools  
Energy Management Program  
2013/2014 Year End Report

## *Summary*

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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 plan, promoting energy conservation and making low/no-cost changes to reduce energy consumption. In 2008 the district entered into an energy saving performance contract (ESPC) with Harshaw Trane and began implementing facility improvements such as new HVAC controls, lighting, and domestic water heater and boiler replacement.

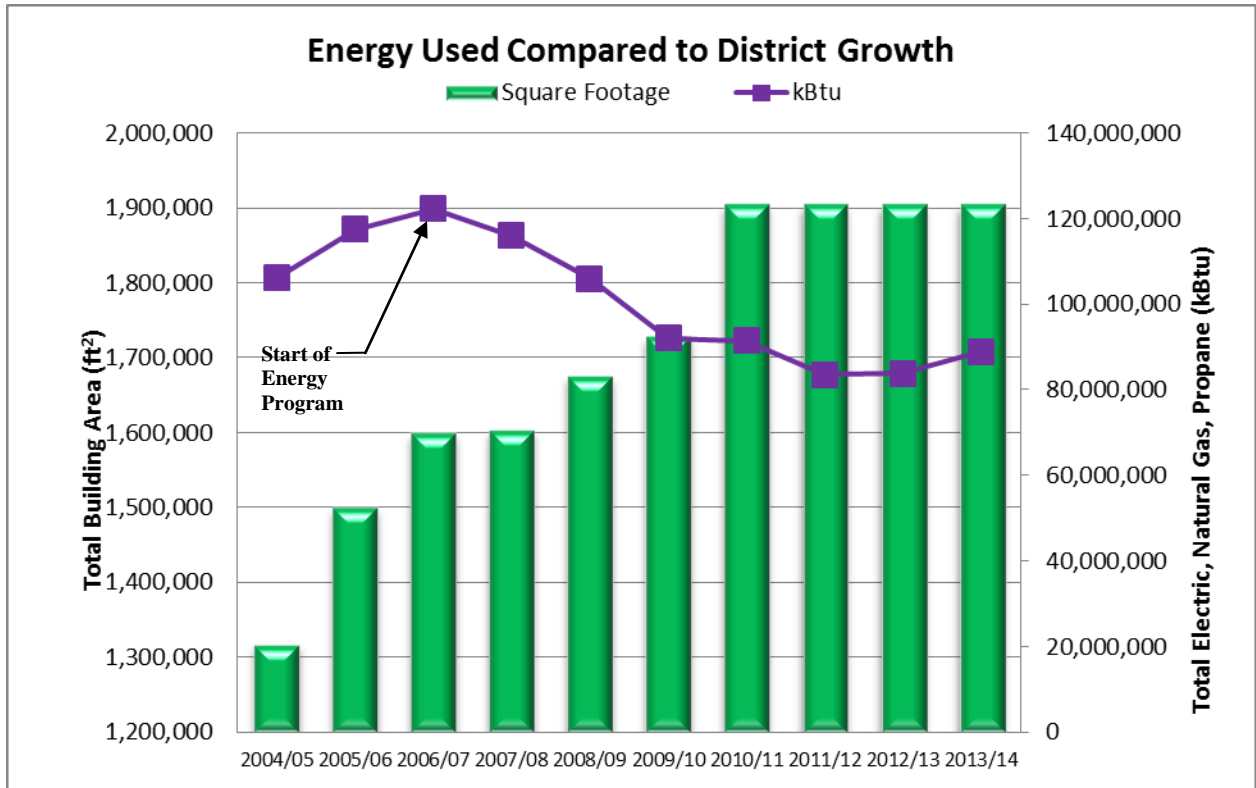
This report summarizes the energy usage for the **2013/2014** fiscal year. Actions used for energy savings are included as well as goals for the upcoming year. Total district electric consumption was **23% less** than the baseline usage resulting in a cost avoidance of approximately **\$562,901**. Natural gas usage was **34% less** resulting in cost avoidance of approximately **\$112,869**. Propane for heating and cooking has been eliminated across the district (replaced with electric or natural gas), resulting in a cost avoidance of approximately **\$78,135**. Had we not reduced our electric, gas and propane usage by these amounts, given today's rates, we would have spent approximately **\$753,905** more on our utility bills for the 2013/2014 school year.

The cost of the district's energy management program in 2013/2014 was approximately \$78,000 for the energy manager budget and salary, and approximately \$460,000 for the ESPC bond re-payment. This leaves a net savings of **\$215,905**. The district's investment through the ESPC not only provides energy savings, but also improves the learning environment for our students through increased reliability of lighting and HVAC systems and added comfort to our building occupants.

The total avoided utility cost since BCPS began the energy management program in 2006 is approximately **\$3,156,782**. The cost of the district's energy management program has averaged approximately \$72,000 annually, or \$504,000 since the program began. The bond re-payment for the performance contract project (since 2009/2010) has been a total of \$1,642,756 - leaving a net cost avoidance of approximately \$1,010,026.

Figure 1 shows our district's energy use compared to our increase in square footage since 2004/05.

Figure 1--Energy Use Compared to District Growth



## Projects

- Energy saving measures that were in place during the 13/14 school year include:
- Energy manager tracking utility usage and costs monthly
- Non-school hour energy conservation HVAC procedures including
  - Shutdowns over long breaks
  - Temperature Setbacks
  - Outside air units only operating during school hours
- Staff education and awareness such as
  - Turning off lighting when leaving a room
  - Turning off computer monitors at the end of the day
- Student energy teams active in 17 schools during the 13/14 school year
- School walkthroughs to monitor energy use behaviors and equipment operation.
- Daily monitoring of HVAC control systems to ensure proper equipment operation and scheduling.
- Utility rate review and evaluations
- Monitoring of indoor air quality (IAQ) – temperature, relative humidity, and CO<sub>2</sub>
- Requests for reimbursements from water and electric companies totaling **\$984.54**
- Partnership with Kentucky School Board Association (KSBA) and LG&E to receive a total of **\$12,280** in grant funding towards the Energy Manager’s salary

- As of 2013/2014, using ENERGY STAR's® benchmarking tool (Portfolio Manager), the district has 16 ENERGY STAR® rated buildings.

School	Energy Star Rating
Brooks Elementary	93
Bullitt Lick Middle	85
Cedar Grove Elementary	82
Crossroads Elementary	96
Eastside Middle	75
Freedom Elementary	88
Lebanon Junction Elementary	84
Maryville Elementary	87
Mt. Washington Middle	81
Nichols Elementary	76
North Bullitt High School	82
Overdale Elementary	97
Pleasant Grove Elementary	87
Roby Elementary	86
Shepherdsville Elementary	92
Zoneton Middle	94

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.

### *Planned Projects*

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Planned projects for next year (2014/2015) include:

- Continuation of student energy team program. There are 20 schools that have signed up to participate in the program for the 2014/2015 school year.
- Installation of lighting controls (occupancy sensors)
- ENERGY STAR® re-certification for eligible buildings
- Add new schools to the Trane EcoRate energy monitoring program
- Installation of LED lights as part of a small lighting project to replace inefficient lighting
- Continued monitoring of utility bills, utility rates, and building automation systems
- Continuation of building awareness throughout the district about energy efficiency and savings opportunities

## Energy Usage Information

The following table shows the district's utility use and cost for each year since 2004/2005.

**Table 1--Yearly Utility Use and Cost**

Utility Type - Usage	2004/2005	2005/2006	2006/2007	2007/2008	2008/2009	2009/2010	2010/2011	2011/2012	2012/2013	2013/2014
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
Natural Gas (ccf)	344,412	324,933	328,762	317,432	301,614	223,715	168,058	124,929	148,647	183,984
Propane (Gal)	18,307	24,547	24,321	26,067	22,637	738	726	264	0	0
<b>Total Energy (kBtu)</b>	<b>106,202,889</b>	<b>117,494,719</b>	<b>122,365,317</b>	<b>116,053,487</b>	<b>106,048,368</b>	<b>91,994,115</b>	<b>91,424,347</b>	<b>91,423,984</b>	<b>83,744,627</b>	<b>88,890,115</b>
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
Utility Type - Cost	2004/2005	2005/2006	2006/2007	2007/2008	2008/2009	2009/2010	2010/2011	2011/2012	2012/2013	2013/2014
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
Natural Gas (ccf)	\$ 361,814	\$ 500,245	\$ 326,271	\$ 359,626	\$ 413,207	\$ 182,260	\$ 155,724	\$ 155,724	\$ 131,426	\$ 170,870
Propane (Gal)	\$ 22,543	\$ 36,697	\$ 40,337	\$ 63,841	\$ 52,343	\$ 1,497	\$ 1,405	\$ 1,405	\$ -	\$ -
<b>Total Energy (kBtu)</b>	<b>\$ 1,731,614</b>	<b>\$ 2,268,560</b>	<b>\$ 2,245,570</b>	<b>\$ 2,297,877</b>	<b>\$ 2,354,430</b>	<b>\$ 2,025,073</b>	<b>\$ 2,209,602</b>	<b>\$ 2,209,602</b>	<b>\$ 2,262,616</b>	<b>\$ 2,396,171</b>
Water/Sewer Cost	\$ 174,520	\$ 161,663	\$ 166,568	\$ 177,149	\$ 159,270	\$ 131,292	\$ 159,127	\$ 185,462	\$ 198,366	\$ 198,647
<b>Total Building Area (ft<sup>2</sup>)</b>	<b>1,319,733</b>	<b>1,501,305</b>	<b>1,600,859</b>	<b>1,604,359</b>	<b>1,677,440</b>	<b>1,729,599</b>	<b>1,906,093</b>	<b>1,906,093</b>	<b>1,906,093</b>	<b>1,906,093</b>

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

Tables 2 and 3 show 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, and heating degree days and/or cooling degree days (weather corrections). Figure 2 shows how the districts' buildings compare by energy use intensity (kBtu per square foot). Figures 3 through 5 show 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 2013 to June 2014, we had 479 more heating degree days than the 2012/2013 school year. Out of the past 10 years of our data, this is the coldest winter we have experienced, with significant heating need in December, January, and February. Along with some major boiler and other mechanical failures, the weather helped contribute to the higher natural gas and electricity use. The impact of the weather can clearly be demonstrated with the Transportation Department's energy use index, which was directly correlated with the numerous winter days when buses had to be plugged in to prevent damage to the engines and ensure startup during the cold mornings.

Special note should also be made about the electricity use at Lebanon Junction Elementary and Nichols Elementary. Due to the 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 2—Electricity Cost Avoidance Report**

**Cost Avoidance Report**

**Electric Consumption: 2013/2014 Compared to Baseline**

<b>Building</b>	<b>Base Year Actual (kWh)</b>	<b>Base Year Weather Adjusted (kWh)</b>	<b>Evaluation Year Actual (kWh)</b>	<b>Use Avoidance Non-Adjusted (kWh)</b>	<b>Use Avoidance Weather Adjusted (kWh)</b>	<b>Change - Non Adjusted %</b>	<b>Change - Weather Adjusted %</b>	<b>Cost Avoidance Weather Adjusted \$</b>
Bernheim	968,378	1,055,482	639,600	-328,778	-415,882	-34%	-39%	\$ (25,623)
Brooks	840,640	911,127	801,120	-39,520	-110,007	-5%	-12%	\$ (6,778)
Bullitt Central	1,749,023	1,898,465	1,511,948	-237,075	-386,517	-14%	-20%	\$ (23,813)
Bullitt East	2,058,205	2,240,157	1,658,443	-399,762	-581,714	-19%	-26%	\$ (35,839)
Bullitt Lick	1,199,102	1,305,675	688,400	-510,702	-617,275	-43%	-47%	\$ (37,157)
Cedar Grove	862,445	936,432	828,720	-33,725	-107,712	-4%	-12%	\$ (17,022)
Central Office	438,922	480,464	361,200	-77,722	-119,264	-18%	-25%	\$ (7,801)
Crossroads	828,036	896,038	685,500	-142,536	-210,538	-17%	-23%	\$ (8,400)
Eastside	1,677,878	1,834,076	1,306,560	-371,318	-527,516	-22%	-29%	\$ (32,500)
Freedom	1,196,862	1,304,942	737,200	-459,662	-567,742	-38%	-44%	\$ (23,050)
Hebron	1,364,982	1,484,005	865,441	-499,541	-618,564	-37%	-42%	\$ (25,114)
Lebanon Junction	474,697	513,998	635,160	160,463	121,162	34%	24%	\$ 7,925
Maintenance	70,569	76,131	79,389	8,820	3,258	12%	4%	\$ 316
Maryville	847,754	924,615	552,960	-294,794	-371,655	-35%	-40%	\$ (33,693)
MW Elementary	1,293,255	1,403,900	673,536	-619,719	-730,364	-48%	-52%	\$ (44,998)
MW Middle	1,357,261	1,462,055	853,600	-503,661	-608,455	-37%	-42%	\$ (24,703)
Nichols	212,232	230,814	490,800	278,568	259,986	131%	113%	\$ 22,390
North Bullitt	2,494,791	2,708,555	1,674,251	-820,540	-1,034,304	-33%	-38%	\$ (102,575)
Old Mill	625,863	681,801	567,120	-58,743	-114,681	-9%	-17%	\$ (7,065)
Overdale	616,080	672,561	646,320	30,240	-26,241	5%	-4%	\$ (1,065)
Pleasant Grove	1,173,670	1,276,678	747,072	-426,598	-529,606	-36%	-41%	\$ (34,642)
Riverview/DT	391,633	424,093	324,160	-67,473	-99,933	-17%	-24%	\$ (6,157)
Roby	877,360	959,803	851,600	-25,760	-108,203	-3%	-11%	\$ (7,078)
Shepherdsville	1,067,200	1,164,626	781,206	-285,994	-383,420	-27%	-33%	\$ (15,567)
Transportation	197,383	214,568	306,360	108,977	91,792	55%	43%	\$ 6,004
Zoneton	1,678,209	1,827,057	956,400	-721,809	-870,657	-43%	-48%	\$ (78,897)
<b>TOTAL</b>	<b>26,562,430</b>	<b>28,888,116</b>	<b>20,224,066</b>	<b>-6,338,364</b>	<b>-8,664,050</b>	<b>-24%</b>	<b>-30%</b>	<b>\$ (562,901)</b>

**Table 3--Natural Gas and Propane Cost Avoidance Report**

Cost Avoidance Report								
Natural Gas Consumption: 2013/2014 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	21,092	6,252	-12,951	-14,840	-67%	-70%	\$ (9,429)
Brooks	17,874	19,781	0	-17,874	-19,781	-100%	-100%	\$ (14,354)
Bullitt Central	41,767	45,870	39,315	-2,452	-6,555	-6%	-14%	\$ (4,704)
Bullitt East	35,419	38,673	17,014	-18,405	-21,659	-52%	-56%	\$ (13,252)
Bullitt Lick	9,001	10,013	11,033	2,032	1,020	23%	10%	\$ 756
Cedar Grove	22,476	25,089	5,742	-16,734	-19,347	-74%	-77%	\$ (14,014)
Central Office	244	281	161	-83	-120	-34%	-43%	\$ (87)
Crossroads								
Eastside								
Freedom	11,448	12,855	4,217	-7,231	-8,638	-63%	-67%	\$ (6,343)
Hebron	19,885	21,877	0	-19,885	-21,877	-100%	-100%	\$ (15,664)
Lebanon Junction	25,234	28,161	5,735	-19,499	-22,426	-77%	-80%	\$ (16,229)
Maintenance	1,567	2,815	2,297	730	-518	47%	-18%	\$ (368)
Maryville	3,894	4,228	2,434	-1,460	-1,794	-37%	-42%	\$ (1,318)
MW Elementary	7,831	8,665	6,792	-1,039	-1,873	-13%	-22%	\$ (753)
MW Middle	13,549	14,764	15,710	2,161	946	16%	6%	\$ 821
Nichols								
North Bullitt	12,371	13,735	19,682	7,311	5,947	59%	43%	\$ 4,303
Old Mill	10,468	11,652	10,391	-77	-1,261	-1%	-11%	\$ (73)
Overdale	23,174	25,658	2,755	-20,419	-22,903	-88%	-89%	\$ (16,669)
Pleasant Grove	8,412	9,370	8,473	61	-897	1%	-10%	\$ 76
Riverview/DT	8,784	9,749	9,603	819	-146	9%	-1%	\$ 595
Roby	8,463	9,424	37	-8,426	-9,387	-100%	-100%	\$ (6,070)
Shepherdsville	3,201	3,498	2,299	-902	-1,199	-28%	-34%	\$ (858)
Transportation	3,159	3,545	4,204	1,045	659	33%	19%	\$ 764
Zoneton								
<b>TOTAL</b>	<b>307,424</b>	<b>340,795</b>	<b>174,146</b>	<b>-133,278</b>	<b>-166,649</b>	<b>-43%</b>	<b>-49%</b>	<b>\$ (112,869)</b>

Cost Avoidance Report								
Propane Consumption: 2013/2014 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	20,677	0	-19,421	-20,677	-100%	-100%	\$ (36,900)
Roby	8,412	8,412	0	-8,412	-8,412	-100%	-100%	\$ (15,982)
<b>TOTAL</b>	<b>51,150</b>	<b>42,380</b>	<b>0</b>	<b>-51,150</b>	<b>-42,380</b>	<b>-100%</b>	<b>-100%</b>	<b>\$ (78,135)</b>

**BASELINE EXPLANATION**

The baseline for the majority of facilities is the average use of fiscal years 2004/05 and 2005/06 which are the two years prior to the start of the energy program. Schools such as Eastside, Zoneton, and Shepherdsville Elementary were constructed mid 2005, therefore 2006/07 is the only year used for their baseline. Maryville Elementary had roof top heat pump replacements in 2005; therefore 2006/07 was also used as their baseline. Old Mill Elementary had a building addition in 2005 so 2005/06 was used for their baseline. The Central Office added numerous computer servers added as well as a new air conditioning unit installed for their server room prior to 2006; therefore, 2006/2007 is used for their baseline. With newly constructed buildings such as Brooks and Overdale, their respective baselines have now been set as their first full year of energy use.

Figure 2 - BCPS Building Energy Use Profile (kBtu/sq2)

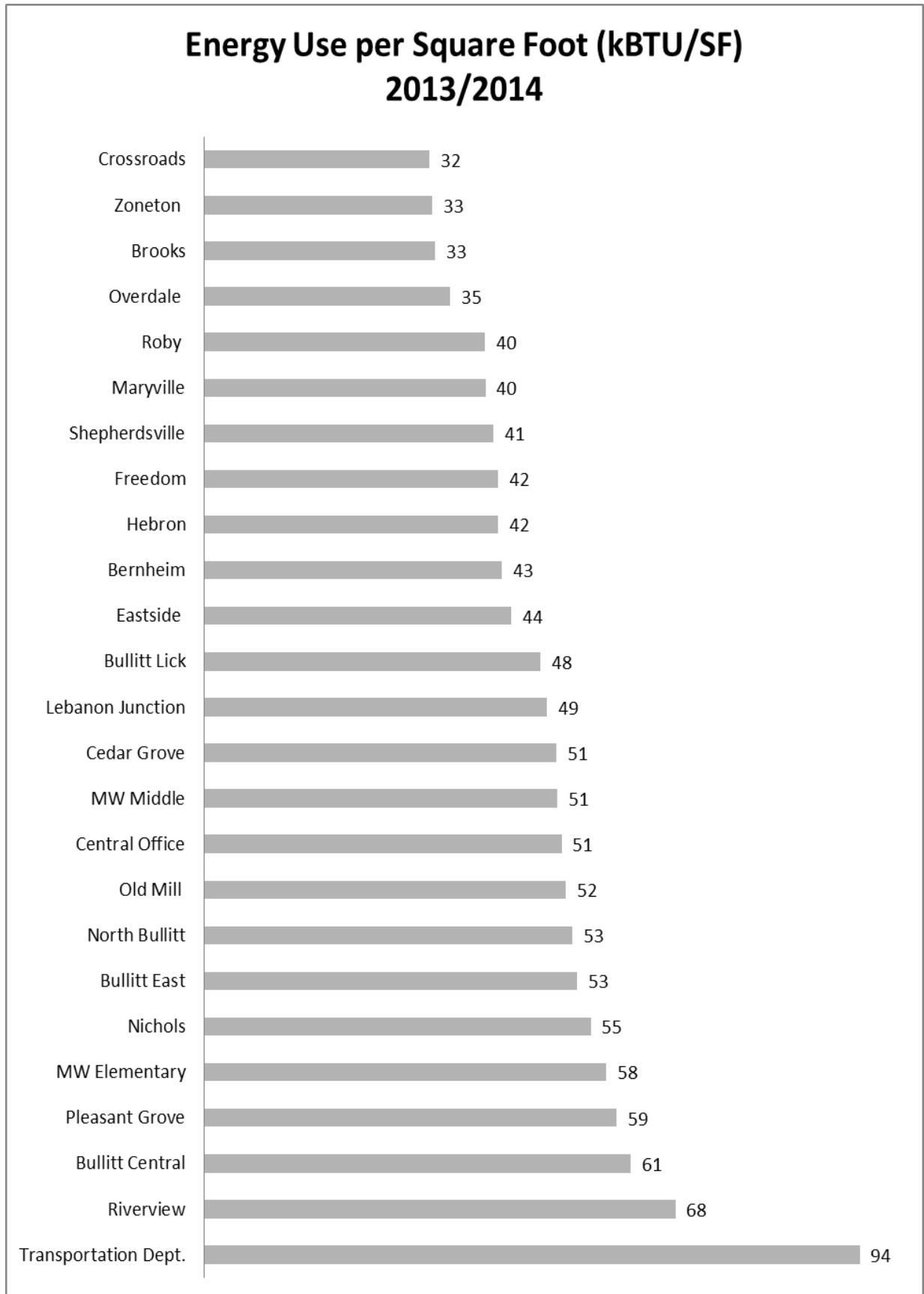


Figure 3—Total, Non-Adjusted Energy Use (Electric, Gas and Propane)

Month	Total Energy Use (kBtu)				Weather Data			
	2012/2013	2013/2014	Baseline	% Change from Baseline	2013/2014		Baseline	
					CDD	HDD	CDD	HDD
July	5,644,552	4,758,217	8,005,849	-41%	357	4	429	0
Aug	7,971,721	7,281,250	9,272,785	-21%	391	7	389	5
Sept	7,084,990	7,253,850	10,158,670	-29%	240	31	218	17
Oct	6,262,192	5,841,301	8,553,459	-32%	70	259	47	167
Nov	6,748,208	6,801,189	9,765,787	-30%	1	607	4	436
Dec	7,142,188	8,853,241	12,996,422	-32%	4	827	0	910
Jan	8,923,481	10,974,925	12,105,100	-9%	0	1136	0	725
Feb	8,469,252	10,331,658	11,871,489	-13%	2	902	0	702
March	7,848,004	7,086,041	10,630,920	-33%	6	668	0	595
April	5,849,424	5,643,676	8,206,387	-31%	69	221	45	171
May	5,641,765	6,338,008	8,539,969	-26%	215	90	93	97
June	4,531,446	5,201,248	7,989,551	-35%	370	3	317	0
Total YTD	82,117,224	86,364,603	118,096,386	-27%	1725	4755	1540	3824

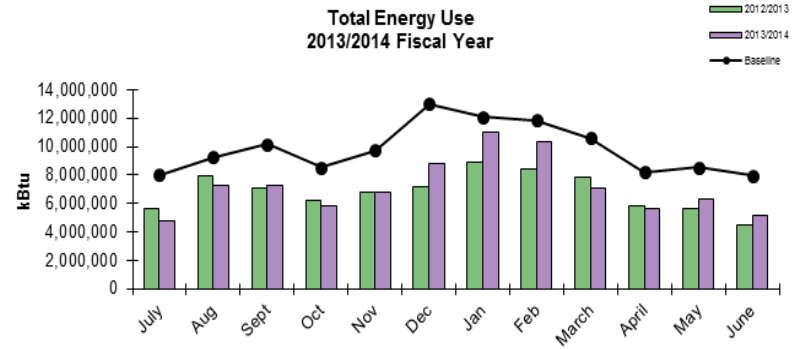


Figure 42--Non-Adjusted Electricity Use

Month	Total Electricity (kWh)				Weather Data			
	2012/2013	2013/2014	Baseline	% Change from Baseline	2013/2014		Baseline	
					CDD	HDD	CDD	HDD
July	1,605,933	1,340,850	2,196,237	-39%	357	4	429	0
Aug	2,238,721	2,041,276	2,519,798	-19%	391	7	389	5
Sept	1,961,930	2,014,650	2,734,260	-26%	240	31	218	17
Oct	1,661,131	1,571,736	2,172,748	-28%	70	259	47	167
Nov	1,535,448	1,578,990	2,074,133	-24%	1	607	4	436
Dec	1,524,099	1,653,186	2,031,215	-19%	4	827	0	910
Jan	1,732,608	1,968,069	2,094,100	-6%	0	1136	0	725
Feb	1,665,773	1,790,798	2,045,735	-12%	2	902	0	702
March	1,640,218	1,559,113	2,008,397	-22%	6	668	0	595
April	1,428,371	1,413,804	1,942,129	-27%	69	221	45	171
May	1,532,364	1,729,478	2,161,402	-20%	215	90	93	97
June	1,264,063	1,462,363	2,150,742	-32%	370	3	317	0
Total YTD	19,790,659	20,124,313	26,130,894	-23%	1725	4755	1540	3824

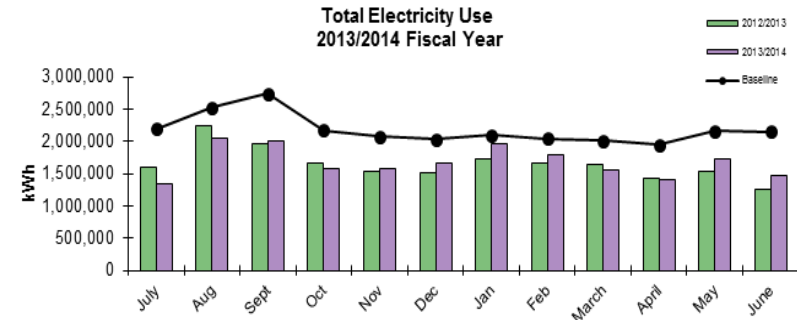




Figure 5--Non-Adjusted Natural Gas Use

Month	Total Natural Gas Use (ccf)				Weather Data			
	2012/2013	2013/2014	Baseline	% Change from Baseline	2013/2014		Baseline	
					CDD	HDD	CDD	HDD
July	1,603	1,779	4,881	-64%	357	4	429	0
Aug	3,235	3,072	6,138	-50%	391	7	389	5
Sept	3,795	3,688	6,872	-46%	240	31	218	17
Oct	5,771	4,646	10,210	-54%	70	259	47	167
Nov	14,653	13,725	23,829	-42%	1	607	4	436
Dec	18,854	31,190	54,793	-43%	4	827	0	910
Jan	29,241	41,358	44,735	-8%	0	1136	0	725
Feb	27,045	40,985	44,925	-9%	2	902	0	702
March	21,860	17,149	33,613	-49%	6	668	0	595
April	9,474	7,959	13,540	-41%	69	221	45	171
May	4,013	4,243	10,162	-58%	215	90	93	97
June	2,121	2,055	6,069	-66%	370	3	317	0
Total YTD	141,665	171,849	259,765	-34%	1725	4755	1540	3824

