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DEPARTMENT OF FACILITIES

Memo

To: Dr. Jesse Bacon

From: Andrea Rock 

Date: Wednesday, September 13, 2023

Re: Energy Management Report for September Board Meeting Presentations

Included for your information is the end of year energy report for the 2022/2023 school year. The report shows that our overall energy consumption is down 50% from our baseline year. This translates to a savings/cost avoidance of approximately **\$1,200,000**.

The total avoided energy costs/savings since the program began 16 years ago is approximately: **\$12,140,000**

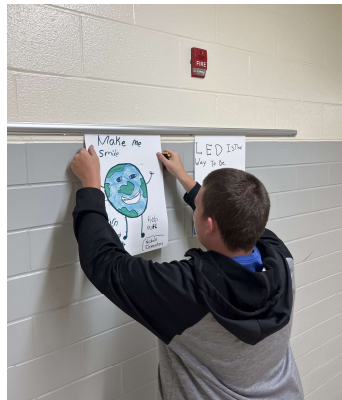
If you have any questions, please feel free to contact me.

OUR MISSION IS TO INSPIRE AND EQUIP OUR STUDENTS TO SUCCEED IN LIFE

BULLITT COUNTY PUBLIC SCHOOLS IS AN EQUAL EDUCATION AND EMPLOYMENT INSTITUTION



BULLITT COUNTY PUBLIC SCHOOLS ENERGY MANAGEMENT PROGRAM: 2022/2023 YEAR END REPORT



History

- BCPS began the 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) to address capital lighting and HVAC needs
- 2018 Energy Savings Performance Contract (ESPC) for district wide LED lighting upgrade and to address additional HVAC needs



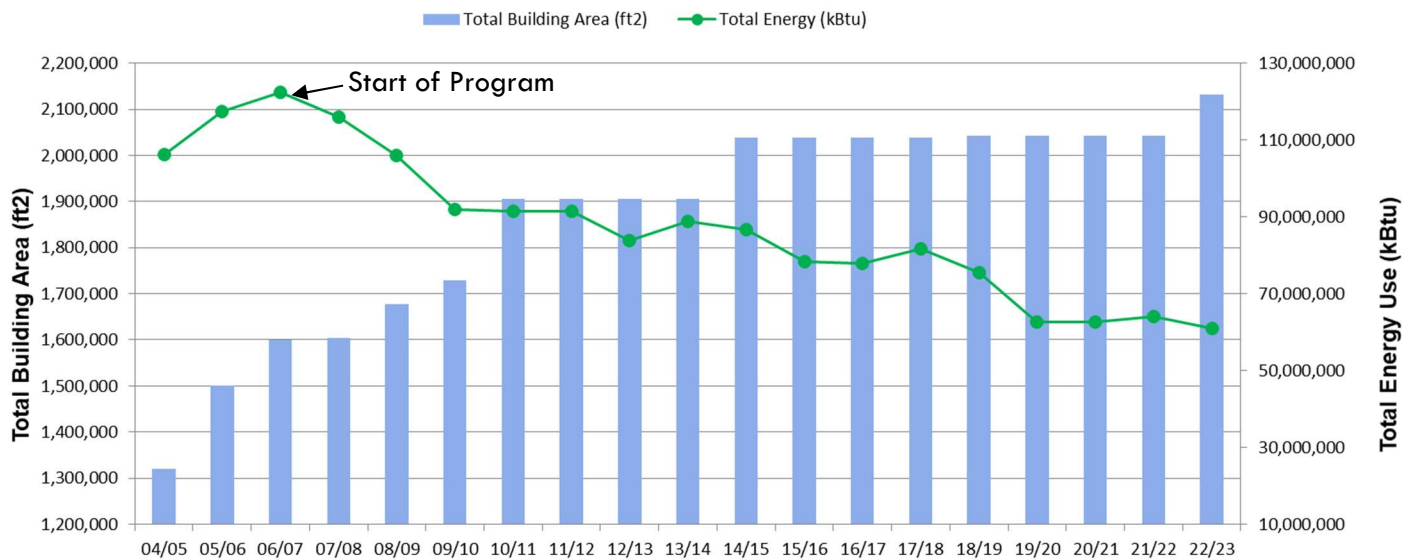
Executive Summary

Bullitt County Public Schools (BCPS) is dedicated to energy efficiency, sustainability, and conservation. We believe that energy efficiency and conservation is important to protect our environment, to preserve our natural resources, and to encourage responsible spending of our community’s tax dollars. Since 2006, the district total energy use has **decreased 50%** in spite of a tremendous amount of growth and increased building square footage. This has resulted in a cumulative cost avoidance of over **\$12 million**.

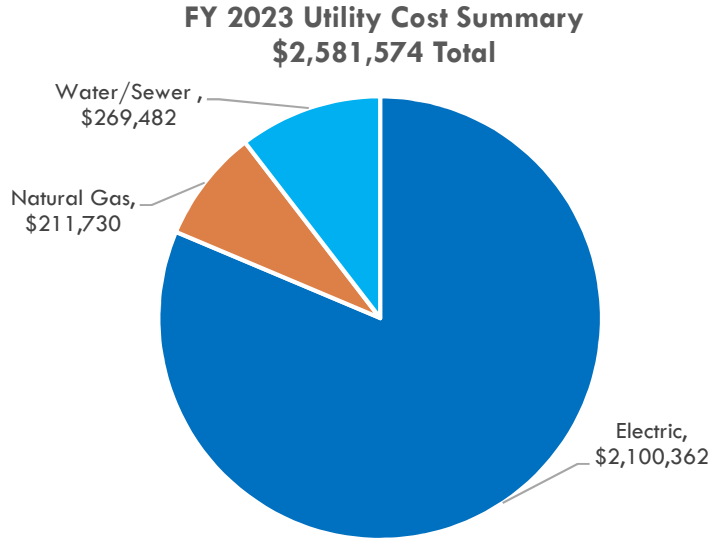
2022/2023 BCPS Energy Management Program Highlights

- ✓ Total district electric and natural gas consumption was **50% less** than the baseline usage.
- ✓ Refunds from utility companies for incorrect billings totaled **\$24,186**.
- ✓ Had we not reduced our electric (consumption and demand), natural gas, and propane usage by these amounts, given the adjustment with today’s utility rates, we would have spent approximately **\$1,238,471** more on utility bills for the 2022/2023 school year.
- ✓ BCPS was awarded the **Energy Star Partner of the Year for Sustained Excellence** - the 4th time receiving this type of award from the US Environmental Protection Agency.
- ✓ BCPS received ENERGY STAR certifications for **18** buildings in 2022
- ✓ **15** schools had student energy teams – Maryville Elementary Energy Team was awarded the NEED Rookie of the Year award and attended the national conference in Washington DC

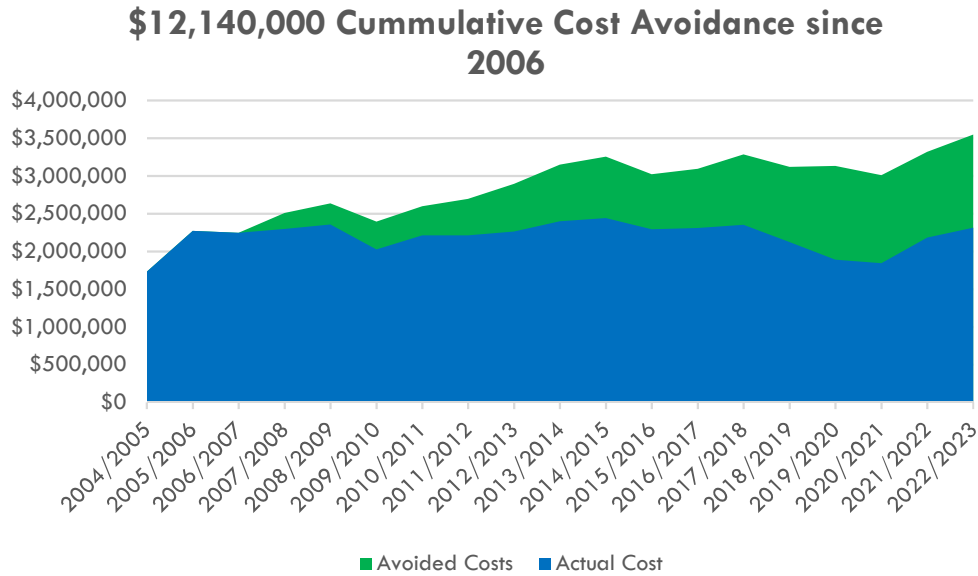
Energy Use Compared to District Growth



Utilities Overview



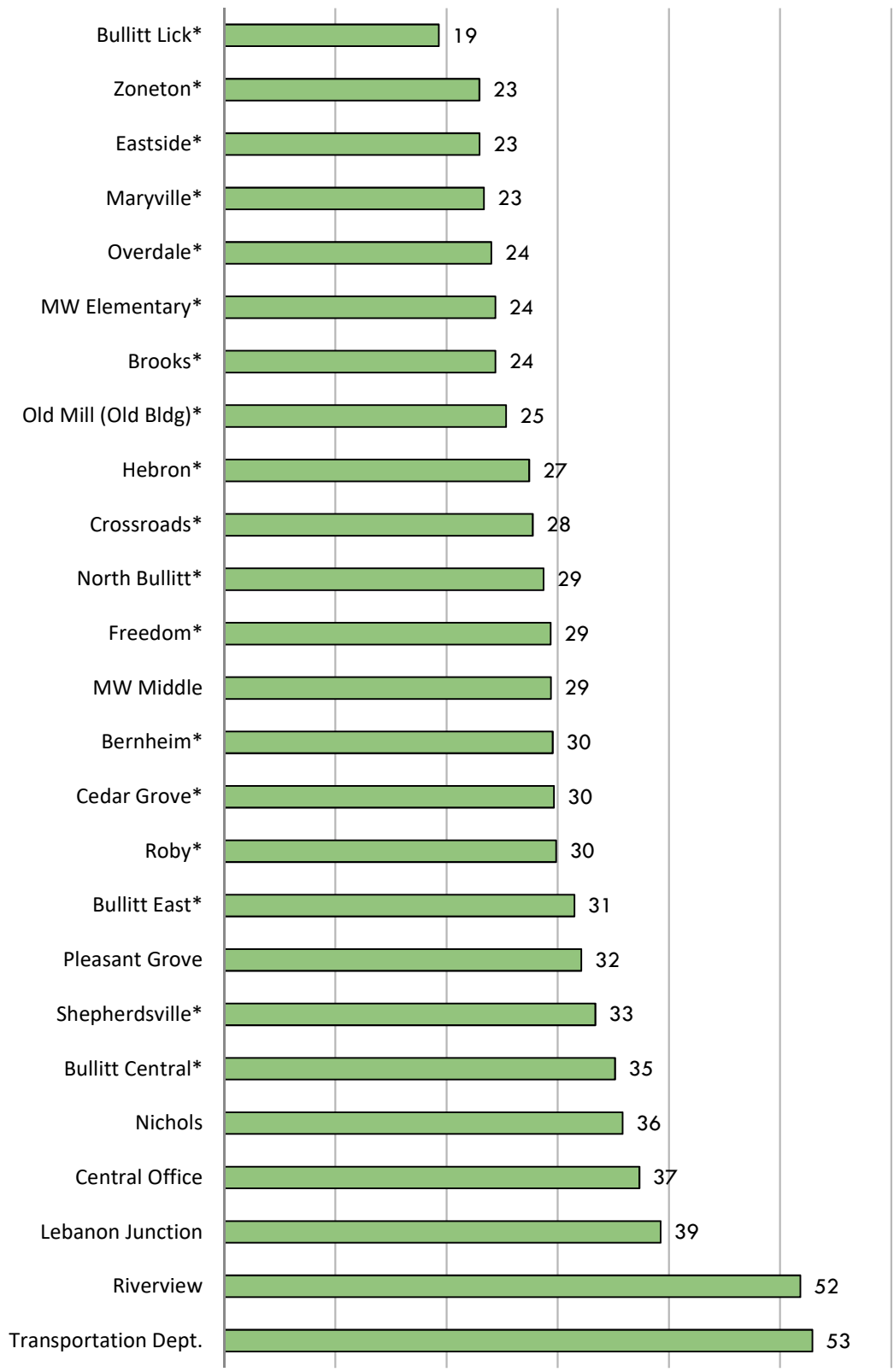
The cumulative district energy cost avoidance compared to the baseline of FY05 and FY06 is estimated at over \$12M. The avoided cost for the 2023 academic year is approximately \$1.2M. These numbers reflect combined energy savings, which include avoided electricity, natural gas and propane. Below is a graphical representation of overall avoided energy costs (area in green). The graph shows that even with the increased building square footage and increased utility rates, our utility costs have remained steady over the past 16 years.



Benchmarking School Buildings

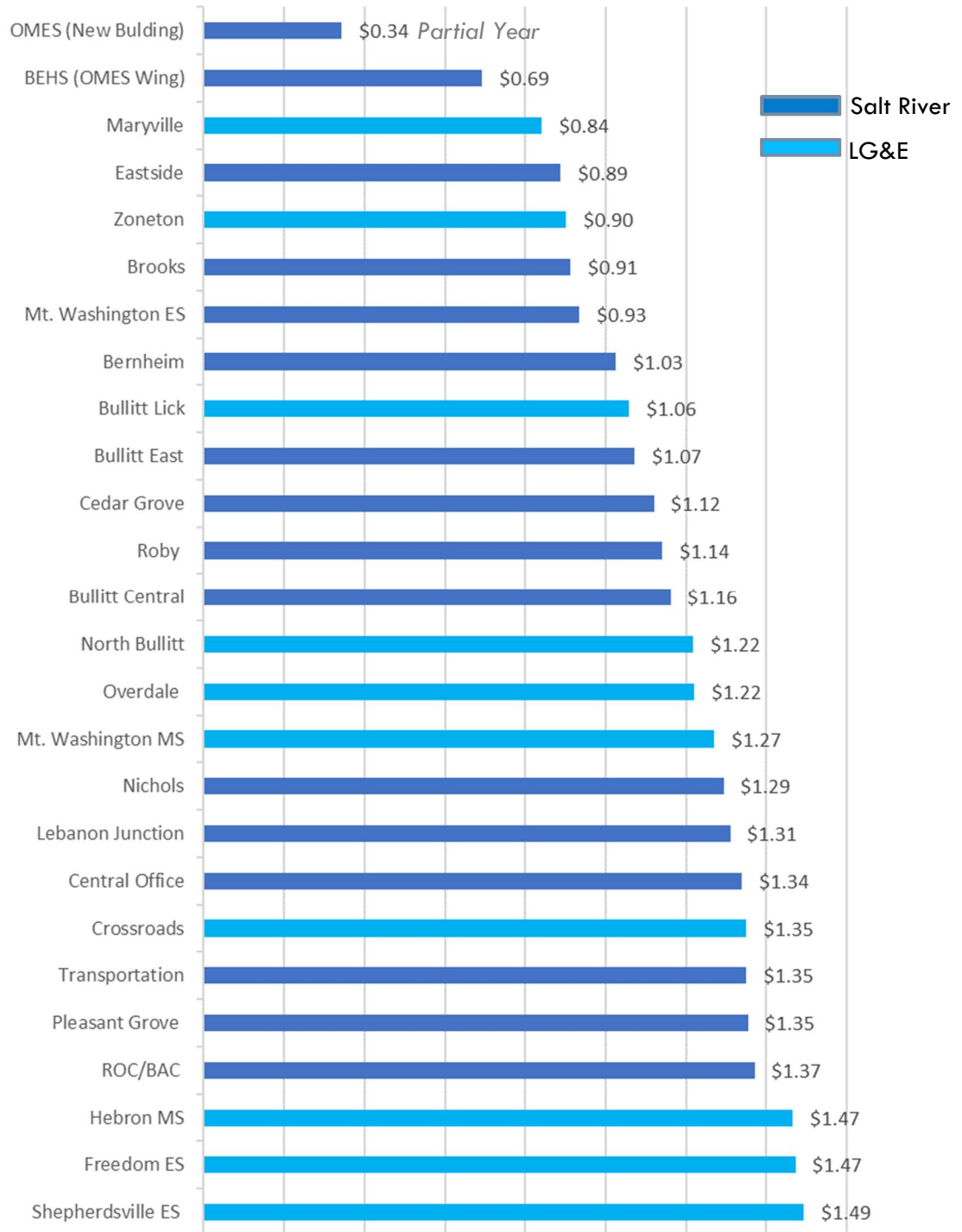
The following figure ranks our school buildings by total annual energy use per square foot (kBtu/ft²). Bullitt Lick Middle School is currently the most efficient school in the district. Almost all schools are operating well below the state average of 49 kBtu/ft². Schools with an asterisk (*) received the ENERGY STAR® certification during for 2022 and are eligible for recertification.

**Energy Use per Square Foot (kBtu/ft²)
2022/2023**



The figure below ranks our facilities by total annual energy cost per square foot (\$/ft²). Factors that affect cost are not only building efficiency but also utility provider and rate structure. Fuel source also plays a role as electric, on average, cost three times as much per btu than gas.

Energy Cost per Square Foot (\$/ft²) 2022/2023



*Maryville and Zoneton are served by LG&E but were grandfathered in on a General Service/All Electric School rate. Therefore, they do not have demand charges which significantly reduces their cost per square foot.

ENERGY STAR®

As of the 2022/2023 school year, using ENERGY STAR's benchmarking tool (Portfolio Manager), the district has 18 schools eligible for ENERGY STAR® certification.

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 must score at least 75 to be ENERGY STAR certified. A building score of 75 means that (from an energy consumption standpoint), the building performs better than 75% of all similar buildings nationwide.

Property Name	ENERGY STAR Certification - Years Certified (Score)
Bernheim Middle	2021 (94), 2022 (91)
Brooks Elementary	2011 (93), 2013 (93), 2014 (93), 2015 (93), 2016 (95), 2017 (94), 2018 (85), 2019 (88), 2021 (93), 2022 (94)
Bullitt Central High	2018 (77), 2019 (81), 2021 (89), 2022 (88)
Bullitt East High	2018 (76), 2021 (88), 2022 (90)
Bullitt Lick Middle	2010 (82), 2012 (85), 2014 (86), 2015 (90), 2016 (92), 2017 (91), 2021 (93), 2022 (95)
Cedar Grove Elementary	2012 (78), 2013 (84), 2014 (79), 2015 (85), 2016 (90), 2017 (91), 2021 (90), 2022 (94)
Crossroads Elementary	2011 (94), 2012 (95), 2014 (96), 2015 (97), 2016 (97), 2017 (96), 2018 (87), 2019 (90), 2021 (95), 2022 (93)
Eastside Middle	2009 (80), 2014 (75), 2015 (77), 2016 (79), 2017 (77), 2018 (76), 2019 (91), 2021 (99), 2022 (95)
Freedom Elementary	2009 (80), 2012 (89), 2014 (86), 2015 (89), 2016 (93), 2017 (92), 2018 (75), 2019 (80), 2021 (89), 2022 (86)
Hebron Middle	2014 (80), 2015 (87), 2016 (92), 2017 (92), 2018 (78), 2019 (85), 2021 (92), 2022 (92)
Lebanon Junction Elem	2012 (81), 2013 (89), 2014 (87), 2015 (85), 2016 (90), 2017 (91)
Maryville Elementary	2010 (78), 2013 (91), 2014 (90), 2015 (88), 2017 (90), 2018 (89), 2019 (93), 2021 (97), 2022 (95)
Mt. Washington Elem	2017 (93), 2018 (93), 2019 (93), 2021 (95), 2022 (94)
Mt. Washington Middle	2013 (86), 2014 (82), 2015 (82), 2016 (91), 2017 (91), 2019 (84)
Nichols Elementary	2012 (79), 2013 (83), 2014 (75), 2015 (82), 2016 (88), 2017 (89)
North Bullitt High	2013 (79), 2014 (78), 2015 (89), 2016 (93), 2017 (92), 2018 (82), 2019 (91), 2022 (97)
Old Mill Elementary	2019 (83), 2022 (93)
Overdale Elementary	2011 (97), 2013 (96), 2014 (98), 2015 (98), 2016 (97), 2017 (97), 2018 (90), 2019 (92), 2022 (96)
Pleasant Grove Elem	2013 (88), 2014 (87), 2015 (87), 2016 (89), 2017 (88), 2018 (75), 2019 (77)
Roby Elementary	2010 (82), 2012 (85), 2013 (85), 2014 (85), 2015 (86), 2016 (89), 2017 (89), 2018 (75), 2019 (78), 2021 (87), 2022 (87)
Shepherdsville Elem	2009 (79), 2012 (84), 2014 (90), 2015 (93), 2016 (90), 2017 (93), 2018 (80), 2019 (87), 2021 (96), 2022 (93)
Zoneton Middle	2009 (78), 2013 (88), 2014 (93), 2015 (94), 2016 (96), 2017 (97), 2018 (89), 2019 (92), 2021 (98), 2022 (96)

2022/2023 Projects

A summary of energy saving measures that were in place during the 2022/2023 school year are below.

- Tracking and analyzing utility usage and costs monthly
 - Identified NBHS incorrectly charged for parking lot lights for several years. Credit of \$24,186
- New energy dashboard in place and actively monitoring real time energy use (www.traneconnect.com)
- Monthly meetings with Trane Intelligent Services to identify equipment not operating as designed or other opportunities for operational savings
- Non-school hour energy conservation HVAC procedures including:
 - Shutdowns over long breaks
 - Temperature setbacks
 - Outside air units only operating during occupied school hours
- Student energy teams continued to be active in **15** schools during the 22/23 school year
 - Maryville Elementary Energy Team was awarded the NEED Rookie of the Year award and attended the national conference in Washington DC
- 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
- Participating in US Department of Energy Better Climate Challenge
- Monitoring of indoor air quality (IAQ) – temperature, relative humidity, and CO₂
- Ongoing support of preventative maintenance assisting with filtration and water treatment programs.

Planned Projects for 2023/2024

- Continuation of student energy team program and provide teams access to dashboard and utility data.
- Facilitate more student energy teams to attend the NEED conference in Washington DC
- ENERGY STAR® recertification for eligible buildings
- Continued participation in the Better Buildings and Better Climate Challenge
- Continued participation in LG&E's Enel X Program which provides incentives if we can shed load when asked to by LG&E during times of high electric demand
- 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
- Installation of a solar array as a part of Bernheim Middle's renovation project

Goals

- ✓ Through the Better Buildings Challenge we will continue to maintain our 35% energy reduction and a water reduction goal of 20% over the 2013 baseline.
- ✓ BCPS has joined the DOE Better Climate Challenge and has set a goal of a 50% reduction of greenhouse gas (GHG) emissions by 2027 (compared to a 2017 baseline)

2022/2023 Electric Use and Cost Avoidance Report

Cost Avoidance Report									
Electric Consumption: 2022/2023 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 %	kWh Cost Avoidance Weather Adjusted \$	Demand Cost Avoidance
Bernheim	968,378	976,952	424,160	-544,218	-552,792	-56%	-57%	\$ (33,090)	\$ (7,123)
Brooks	840,640	817,170	589,600	-251,040	-227,570	-30%	-28%	\$ (13,622)	\$ (4,395)
Bullitt Central	1,749,023	1,523,111	942,009	-807,014	-581,102	-46%	-38%	\$ (34,785)	\$ 519
Bullitt East	2,058,205	1,985,435	1,049,730	-1,008,475	-935,705	-49%	-47%	\$ (55,490)	\$ (5,294)
Bullitt Lick	1,199,102	1,165,963	416,000	-783,102	-749,963	-65%	-64%	\$ (25,214)	\$ (36,921)
Cedar Grove	594,405	549,855	491,640	-102,765	-58,215	-17%	-11%	\$ (7,168)	\$ 7,407
Central Office	438,922	428,453	264,240	-174,682	-164,213	-40%	-38%	\$ (10,480)	\$ (2,766)
Crossroads	828,036	752,285	587,892	-240,144	-164,393	-29%	-22%	\$ (4,863)	\$ (9,512)
Eastside	1,677,878	1,637,931	670,272	-1,007,606	-967,659	-60%	-59%	\$ (57,924)	\$ (10,666)
Freedom	1,196,862	1,193,338	516,400	-680,462	-676,938	-57%	-57%	\$ (22,759)	\$ (20,163)
Hebron	1,364,982	1,360,894	552,000	-812,982	-808,894	-60%	-59%	\$ (27,195)	\$ (29,880)
Lebanon Junction	474,697	457,397	470,280	-4,417	12,883	-1%	3%	\$ 822	\$ 4,612
Maintenance	70,569	69,909	88,563	17,994	18,654	25%	27%	\$ 1,554	
Maryville	847,754	831,093	391,200	-456,554	-439,893	-54%	-53%	\$ (52,149)	
MW Elementary	1,293,255	1,242,276	437,600	-855,655	-804,676	-66%	-65%	\$ (48,168)	\$ (19,633)
MW Middle	1,357,261	1,294,235	557,600	-799,661	-736,635	-59%	-57%	\$ (24,766)	\$ (49,359)
Nichols	212,232	202,230	317,160	104,928	114,930	49%	57%	\$ 9,810	
North Bullitt	2,494,791	2,339,527	890,800	-1,603,991	-1,448,727	-64%	-62%	\$ (138,624)	\$ 23,214
Old Mill	625,863	591,569	178,080	-447,783	-413,489	-72%	-70%	\$ (26,389)	\$ (13,478)
Overdale	616,080	563,239	457,440	-158,640	-105,799	-26%	-19%	\$ (3,557)	\$ (15,268)
Pleasant Grove	1,173,670	1,114,172	495,360	-678,310	-618,812	-58%	-56%	\$ (39,493)	\$ (7,099)
BAC/ROC	391,633	372,479	246,400	-145,233	-126,079	-37%	-34%	\$ (7,547)	\$ (1,591)
Roby	877,360	834,080	630,640	-246,720	-203,440	-28%	-24%	\$ (12,984)	\$ (5,298)
Shepherdsville	1,067,200	1,016,907	548,032	-519,168	-468,875	-49%	-46%	\$ (15,764)	\$ (37,578)
Transportation	197,383	189,317	117,840	-79,543	-71,477	-40%	-38%	\$ (4,562)	\$ (1,291)
Zoneton	1,678,209	1,641,122	669,800	-1,008,409	-971,322	-60%	-59%	\$ (115,150)	
TOTAL	26,294,390	25,150,941	13,000,738	-13,293,652	-12,150,203	-51%	-48%	\$ (769,554)	\$ (241,566)

Special note should be made about the electricity use at Cedar Grove, Lebanon Junction and Nichols Elementary. Due to their previous renovations, the schools had a major change in energy use – shifting from propane to electricity. These buildings have increased efficiency since their renovations, and the absence of propane clearly offsets the increased electricity consumption. Also, North Bullitt went from two meters (one of which had no demand charges) to one in 2007. This increased demand charges but additional savings were seen in electric kWh charges.

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.

2022/2023 Natural Gas Use and Cost Avoidance Report

Cost Avoidance Report								
Natural Gas Consumption: 2022/2023 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	19,691	4,914	-14,289	-14,777	-74%	-75%	\$ (18,218)
Brooks								
Bullitt Central	41,767	42,022	21,394	-20,373	-20,628	-49%	-49%	\$ (24,525)
Bullitt East	35,419	37,091	9,589	-25,830	-27,502	-73%	-74%	\$ (29,132)
Bullitt Lick	9,001	9,823	2,299	-6,702	-7,524	-74%	-77%	\$ (9,403)
Cedar Grove	22,476	24,077	3,199	-19,277	-20,878	-86%	-87%	\$ (25,676)
Central Office	244	272	80	-164	-192	-67%	-71%	\$ (237)
Crossroads								
Eastside								
Freedom	11,448	11,717	2,833	-8,615	-8,884	-75%	-76%	\$ (9,886)
Hebron	19,885	20,352	0	-19,885	-20,352	-100%	-100%	\$ (24,440)
Lebanon Junction	25,234	27,028	5,788	-19,446	-21,240	-77%	-79%	\$ (26,147)
Maintenance	3,165	3,783	7,505	4,340	3,722	137%	98%	\$ 5,019
Maryville	3,894	4,055	2,609	-1,285	-1,446	-33%	-36%	\$ (1,354)
MW Elementary	7,831	8,017	846	-6,985	-7,171	-89%	-89%	\$ (8,908)
MW Middle	13,549	14,362	7,035	-6,514	-7,327	-48%	-51%	\$ (8,967)
Nichols								
North Bullitt	12,371	13,974	13,029	658	-945	5%	-7%	\$ (978)
Old Mill	10,468	11,059	8,354	-2,114	-2,705	-20%	-24%	\$ (3,160)
Overdale	3,114	3,114	3,016	-98	-98	-3%	-3%	\$ (86)
Pleasant Grove	8,412	8,672	7,242	-1,170	-1,430	-14%	-16%	\$ (1,705)
Riverview/DT	8,784	9,360	7,438	-1,346	-1,922	-15%	-21%	\$ (2,251)
Roby	51	51	56	5	5	10%	10%	\$ (4)
Shepherdsville	3,201	3,281	4,540	1,339	1,259	42%	38%	\$ 1,590
Transportation	3,159	3,396	4,175	1,016	779	32%	23%	\$ 937
Zoneton								
TOTAL	262,676	275,197	115,941	-146,735	-159,256	-56%	-58%	\$ (187,531)

Cost Avoidance Report								
Propane Consumption: 2019/2020 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	1,180	1,180	0	-1,180	-1,180	-100%	-100%	\$ (1,323)
Lebanon Junction	841	841	0	-841	-841	-100%	-100%	\$ (1,597)
Nichols	19,421	19,913	0	-19,421	-19,913	-100%	-100%	\$ (36,900)
TOTAL	21,442	21,934	0	-21,442	-21,934	-100%	-100%	\$ (39,821)