



Energy Management Report FY2016 Annual Report To Kentucky Utilities

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Executive Summary

The application in Case No. 2013-00067 identified the primary goal of the Energy Management Program for Schools to “support school districts in utilizing energy more “wisely” with the overall objective for each school district to reduce consumption over time by an annual rate of 2.5% and achieve energy utilization indices (“EUI”) of fifty or lower. The participation goal was for all districts served by LG&E or KU to retain or employ an energy manager through at least FY2015 to maximize district response to KRS160.325. The dollars remaining from the original KU/LG&E grant covering FY2014 and FY2015 were approved in Case Nos. 2014 –00371 and 2014-00372 to extend the energy manager funding through FY2016.

Fayette County is separately reported as they continue a renovation strategy by which they renovate approximately 10% of their buildings each year using “best practice” energy efficient equipment. A part of this renovation strategy involved making a winter fuel mix change from natural gas to electric (geothermal and VRF). While this lowered the overall EUI and the summer demand of the district, it adds to the winter demand. .

From the FY2010 baseline, the KU districts (without FCPS) and FCPS achieved the following:

- August Demand Reduction (17.8%) (FCPS 6.5%)
- January Demand Reduction (13.4%) (FCPS -15.6%)
- Summer Energy Reduction (27.8%) (FCPS 2.2%)
- Winter Energy Reduction (14.4%) (FCPS 2.4%)

The August reduction is particularly significant as LG&E-KU is a summer peaking utility. 54 Districts receiving KU electric service participated in the program and 15 have district-wide EUI’s less than 50.

The partnership established between LG&E-KU and KSBA provides a means for the School Energy Management Project (SEMP) to maintain a major presence within schools in Kentucky. During FY2016 four school districts within the LG&E service territory and 54 within the KU service area have benefitted financially and technically from this work.

The School Energy Managers serving these school districts benefit from continuity of employment, technical training and improved skills due to the funding which was provided. They and their schools benefit from the knowledge that has been gained by positioning them on a continuous improvement path. Knowing that an expectation of 2.5% annual reduction provides leverage for energy and demand conservation measures which may not otherwise be undertaken. Future results and further technological upgrades will be impacted.

District Funding

	Total	LGE	KU
Project Management			
SEMP Staff	\$44,055	\$7,003	\$37,052
Outreach	\$25,367	\$4,032	\$21,335
Travel	\$4,914	\$781	\$4,133
Sub Total	\$74,336	\$11,816	\$62,520
District Energy Manager Funding/Support			
Technical	\$90,917	\$14,451	\$76,465
Training	\$45,246	\$7,192	\$38,054
Salary Match**	\$287,073	\$45,631	\$241,442
SubTotal	\$423,235	\$67,274	\$355,961
Total	\$497,571	\$79,090	\$418,481
Note: Indirect Costs @15% on all items except energy manager salary match			
Committed to date	\$1,359,940	\$209,167	\$1,150,773
**Amounts subject to revision upon final processing of district invoices			

Initiatives Implemented

A greater emphasis was placed on PLANS for Energy and Demand Conservation Measures during this year. Appendix A shows a summary of the plans established early in the year to achieve the energy and demand reductions. Most of these plans were or are now being executed. Here is a brief summary of the major aspects of those plans with the details appearing in Appendix A.

Lighting

Most KU/LG&E served districts have begun major lighting renovations. And the switch is on to LED. Though the LED technology has been around for some time, the cost of fixtures has delayed the implementation to lower energy fixtures. As you go through the project list you will see many LED retrofits for Gymnasium, 2X4 Troffers, and Outdoor Lights.

You will also see that many districts have employed a “maintenance strategy” by which as lamps burn out they are converted to LED. Some districts have begun stocking LED replacement fixtures where they once stocked Metal Halide or fluorescent lamps.

Chillers

Because chillers use large amounts of energy and demand several districts including Jefferson County have begun installing “demand shedding” devices which can be throttled back during peak periods.

Control Work

As major renovations are taking place in the districts, controls work continues to be popular. Many districts are upgrading their equipment and using what they have in terms of setbacks and set points. There is a migration to web-enabled controls as major renovations are taking place.

ENERNOC

As districts and buildings develop capability, more and more are enrolling in ENERNOC. Energy Contests

Energy Contests remain popular and are expanding as a way to engage students and staff in energy reductions. The contest costs are paid for from the energy savings that the school garners. So on a year to year basis the school is not out any money but pays for the cost of the energy contest through the savings.

Use of Students for Energy Audits

One of the state’s technical career centers is now using students enrolled in the energy program to perform energy audits in the district’s other buildings.

District Leadership

As seen in the plans, many districts have now incorporated meetings and training with building principals and district personnel to engage them in energy savings.

Renovation and New Construction

Finally you will see that as renovation and new construction occurs in a district, energy is no longer an afterthought. While the state's larger districts have an ongoing renovation plan, the smaller districts only renovate or build new on a periodic basis. Even so, all these districts are using energy savings technologies as a part of their building blueprint.

Energy Utilization Indices

One of the key indicators for measuring energy performance is district-wide Energy Use Intensity, EUI, measured in kBtu/sf/yr. This measure is slightly different from the Building Energy Use Intensity in that the district EUI is a measure of **all** the energy use in the district divided by the square footage of **conditioned** area. The statewide average for district-wide EUI in FY2010 was 64.2 kBtu/sf/yr. By FY2015, the district-wide EUI had dropped to 57.6 kBtu/sf/yr.¹ Lower EUI indicates a more energy efficient condition. The electric only EUI which calculates the EUI based on electrical usage only improved from 44.2 kBtu/sf/yr to 39.7 kBtu/sf/yr.

Table 1, on the following page, shows the data for LG&E and KU funded districts. The table shows that most districts have improved in both their electric and overall EUI.² This table also shows non-participating districts, the number of KU-LG&E served schools within the district and the number of ENERGY STAR schools which will be discussed later.

Statewide and for most districts the EUI has lowered. This can be attributed to several things. The enactment of KRS160.325 and the implementation of KSBA's School Energy Manager Project now supported by LG&E-KU have educated and focused school districts on the importance of valuing best energy management practices. While new school construction and renovation are very energy efficient, presentation of energy conservation measures such as seen in Table 1 by energy managers is leading to significant elimination of energy waste in both new and existing buildings.

¹ EUI's are not adjusted for weather and include all forms of energy use.

² FY2016 EUI Data will not be available until December 1 when all state districts are required to submit through KSBA-SEMP to the Legislative Research Commission and Energy and Environment Cabinet their Annual Energy Management Report.

Table 1, Data on KU served districts

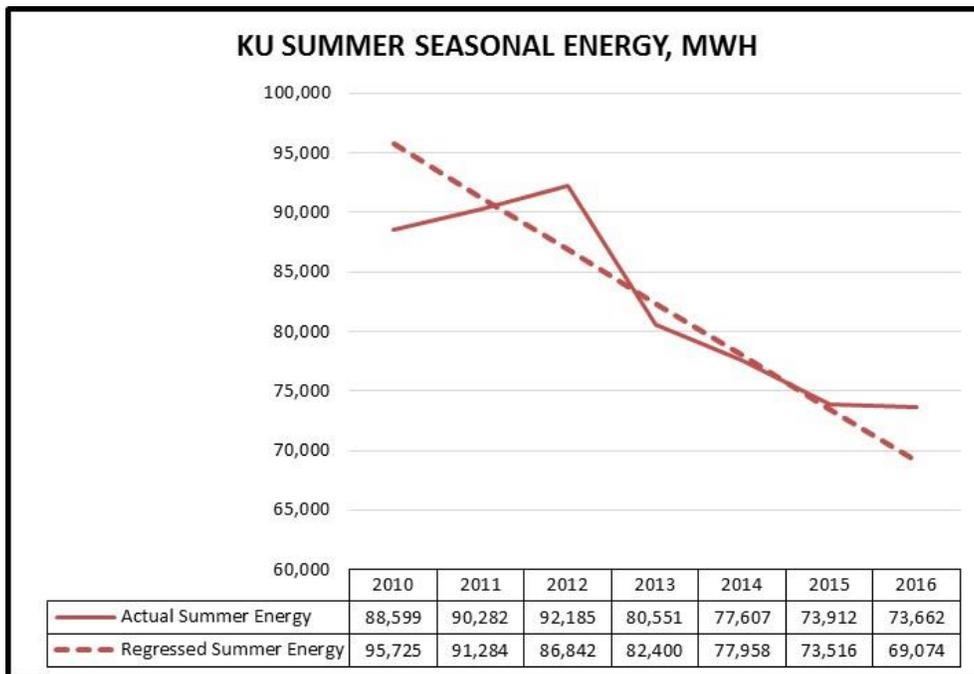
TABLE 1										
School Participation and Energy Data										
DISTRICT	KU K-12 Schools	LGE K-12 Schools	FY2016 SEMP Participation	KU SEMP Schools	LGE SEMP Schools	FY2010 EEUI	FY2015 EEUI	FY2010 EUI	FY2015 EUI	ENERGY STAR SCHOOLS
KU DISTRICTS										
Anderson	6		Y	6	0	38.5	32.3	52.3	42.0	3
Augusta	1		Y	1	0	39.0	37.7	55.6	55.9	
Ballard	3		Y	3	0	52.8	46.6	80.1	67.7	
Barren	2					42.6	46.3	49.8	53.3	1
Bath	3		Y	3	0	49.1	42.7	87.8	68.6	
Bell	7		Y	7	0	75.8	52.2	81.5	57.8	
Bourbon	6		Y	6	0	40.3	40.3	65.0	62.1	2
Boyle	5					47.8	39.2	65.9	55.5	1
Bracken	3					47.9	45.3	55.0	54.2	1
Burgin	2		Y	2	0	47.8	37.5	60.5	46.1	1
Campbellsville	3		Y	3	0	41.0	30.4	76.4	58.2	
Carroll	4		Y	4	0	45.8	37.2	82.9	63.6	1
Casey	5					46.1	40.7	49.5	47.2	
Caverna	3		Y	3	0	45.3	43.6	84.2	72.0	
Christian	1		Y	1	0	45.4	36.3	70.1	55.8	1
Clark	9					41.3	33.6	74.7	50.0	1
Clay	2		Y	2	0	43.6	41.4	63.3	61.1	
Crittenden	3		Y	3	0	41.2	35.2	57.1	54.0	2
Danville	5		Y	5	0	40.5	41.0	64.6	63.7	2
Dawson Springs	1		Y	1	0	39.9	37.7	61.0	53.7	
East Bernstadt	1						40.7		40.7	
Elizabethtown	5		Y	5	0	38.0	39.6	76.9	75.8	
Eminence	2					57.5	55.3	85.3	76.4	
Estill	3		Y	3	0	39.1	39.5	53.4	48.7	1
Fayette	50		Y	50	0	52.3	50.4	78.2	67.4	13
Fleming	3		Y	3	0	44.4	34.2	69.8	48.5	1
Gallatin	4		Y	4	0	51.2	41.9	60.0	44.6	2
Garrard	2		Y	2	0	39.4	45.9	51.5	61.1	
Grayson	5					41.1	40.4	60.0	52.7	4
Green	4					64.3	63.2	88.2	85.4	
Hardin	11		Y	11	0	42.4	36.9	54.3	47.4	3
Harlan County	8		Y	8	0	55.7	57.5	55.7	57.5	
Harlan Ind	3		Y	3	0	50.2	45.4	52.3	46.1	
Harrison	5					32.1	32.9	61.9	61.0	
Hart	6		Y	6	0	49.5	44.3	73.5	69.7	
Henderson	1					48.4	42.4	74.1	68.3	
Henry	5					48.3	32.9	67.7	43.8	4
Hickman	2					48.1	44.7	67.6	66.0	
Hopkins	7		Y	7	0	49.1	42.5	71.7	66.4	
Jessamine	3		Y	3	0	37.1	32.7	50.3	43.8	1
Knox	3					50.7	38.8	64.8	51.7	2

TABLE 1 (Continued)										
School Participation and Energy Data										
DISTRICT	KU K-12 Schools	LGE K-12 Schools	SEMP Participation	KU SEMP Schools	LGE SEMP Schools	FY2010 EEUI	FY2015 EEUI	FY2010 EUI	FY2015 EUI	ENERGY STAR SCHOOLS
LaRue	4					38.8	43.1	55.1	65.5	
Laurel	7		Y	7	0		58.9		68.1	
Lee	2		Y	2	0	52.5	29.9	78.3	52.5	
Lincoln	5					46.7	39.3	70.7	63.0	4
Lyon	3		Y	3	0	33.9	37.0	53.7	54.8	
Madison	12		Y	12	0	45.1	40.7	56.4	53.6	2
Marion	4					49.6	42.1	60.3	50.2	4
Mason	4		Y	4	0	35.6	30.0	59.2	58.3	1
McCracken	4		Y	4	0	39.7	36.2	62.7	59.1	1
McCreary	3		Y	3	0	70.2	69.2	94.8	92.3	
McLean	3		Y	3	0	32.7	32.7	45.9	47.4	3
Meade	1					42.1	33.9	48.7	45.3	
Mercer	3		Y	3	0	51.5	39.9	78.3	61.2	1
Middlesboro	4		Y	4	0	52.6	28.0	97.2	62.2	
Montgomery	7					50.6	50.8	70.2	69.5	
Muhlenberg	9		Y	9	0	46.7	46.4	68.5	62.3	
Nelson	3		Y	3	0	43.8	34.3	51.5	37.8	1
Nicholas	2					46.2	41.8	80.7	60.7	
Ohio	4					43.3	37.2	64.4	53.3	
Pendleton	1		Y	1	0	33.0	36.6	55.9	55.8	1
Pineville	2		Y	2	0	51.3	47.5	58.5	51.0	
Pulaski	7		Y	7	0	43.0	35.3	60.9	51.0	
Robertson	1		Y	1	0	69.0	33.5	114.5	42.8	1
Rockcastle	4					58.4	55.8	59.9	56.7	1
Rowan	2		Y	2	0	44.9	38.3	72.3	58.4	
Russell	4		Y	4	0	65.7	52.7	80.5	52.7	
Science Hill	1		Y	1	0	56.5	49.3	56.5	49.3	
Scott	12		Y	12	0	46.1	33.6	53.3	39.3	11
Shelby	8		Y	8	0	60.9	37.3	71.6	44.6	5
Somerset	3		Y	3	0	47.4	44.0	89.8	79.7	
Taylor	3		Y	3	0	47.8	43.6	64.7	62.2	
Trimble	2					32.6	26.8	52.3	45.0	2
Union	5		Y	5	0	39.1	35.1	69.1	62.1	
Washington	2		Y	2	0	64.7	49.7	83.5	54.5	
Webster	5		Y	5	0	45.2	32.0	75.5	55.2	1
Williamsburg	1					43.6	46.1	54.9	56.1	
Woodford	7		Y	7	0	49.4	38.4	63.5	46.1	4
Totals	361	0	54	275	0					90
	Total Districts		78							

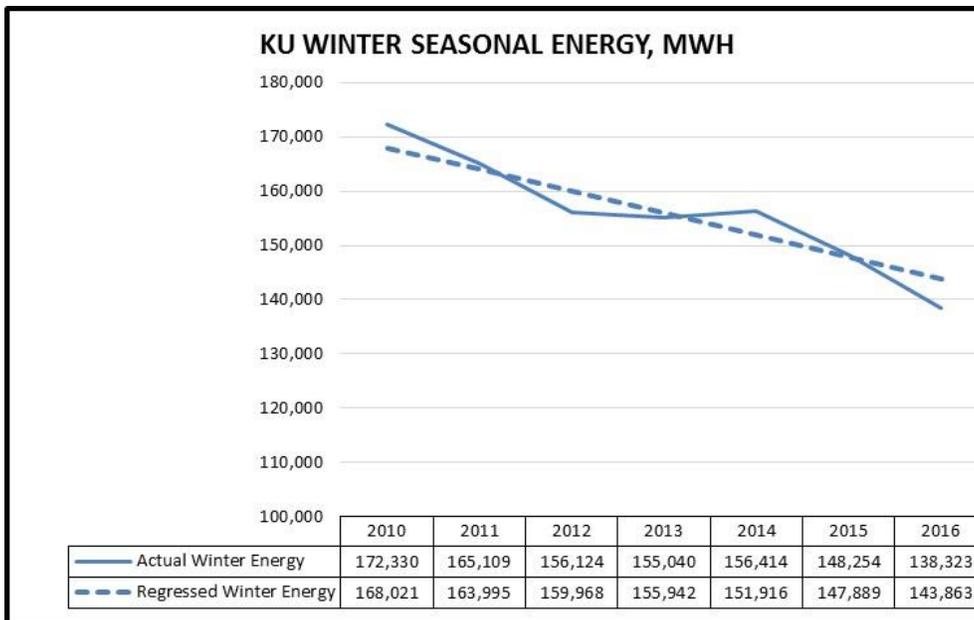
Note: Highlighted districts do not have a participating energy manager

Consumption Reduction and Annual Comparison

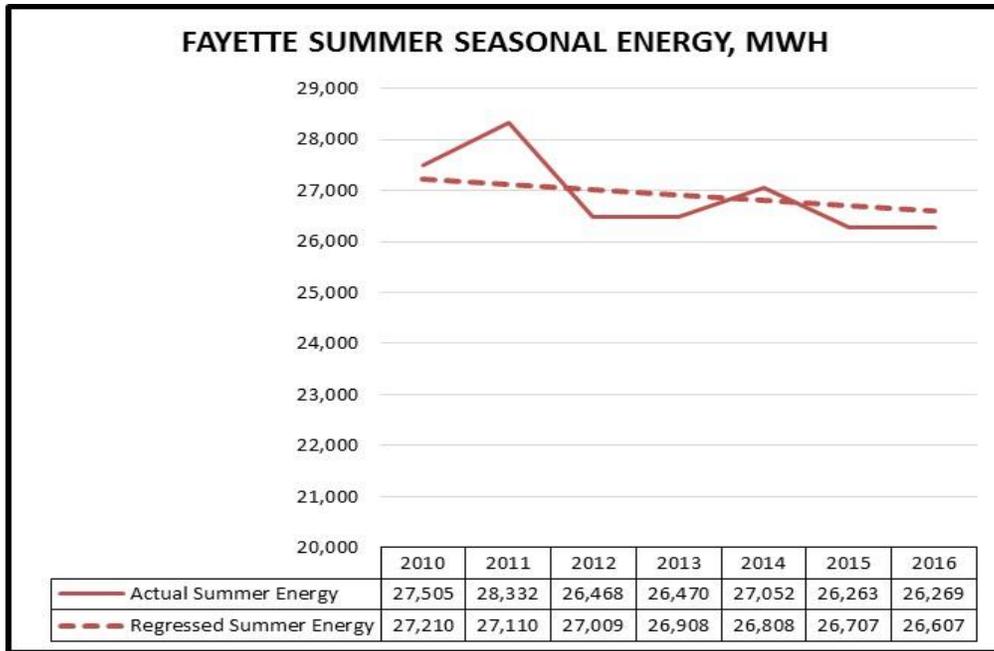
ENERGY REDUCTION (MWH)



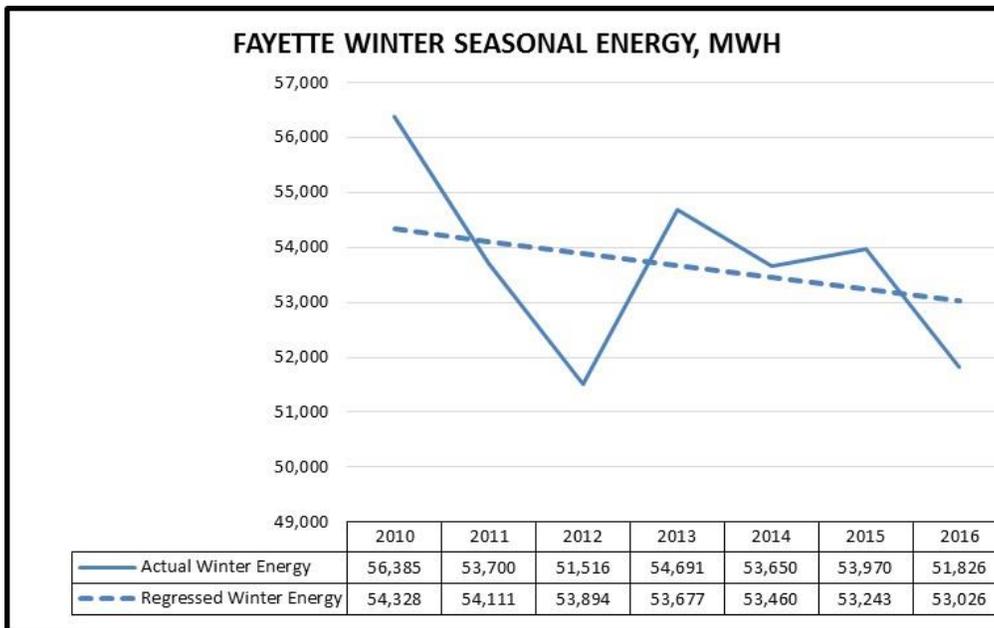
KU(without FCPS) Summer Seasonal Energy Reduction of 27.8% since fiscal year 2010.



KU (without FCPS) Winter Seasonal Energy Reduction of 14.4% since fiscal year 2010.

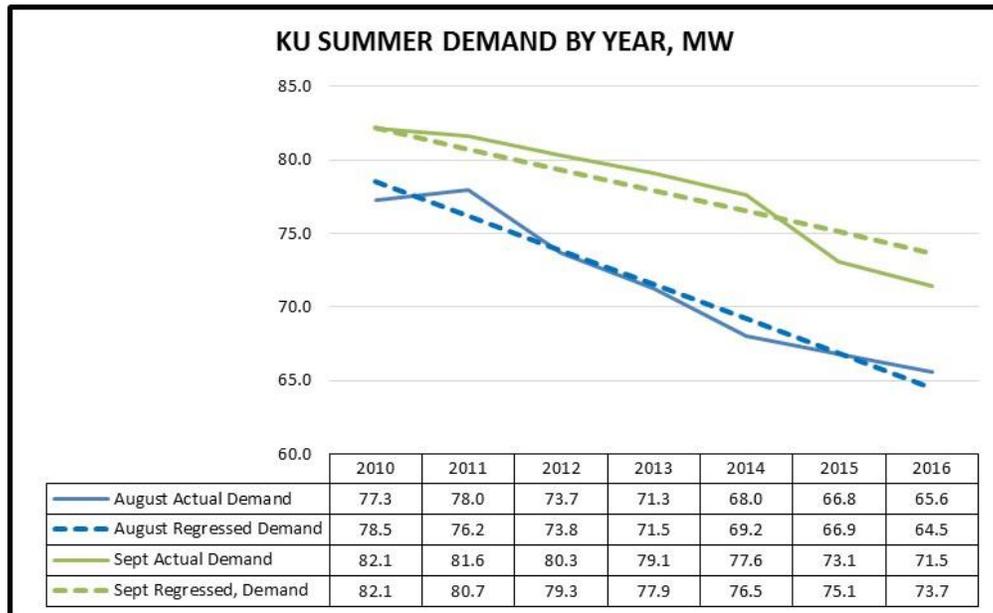


Fayette County Public Schools Summer Seasonal Energy Reduction of 2.2% since FY2010.

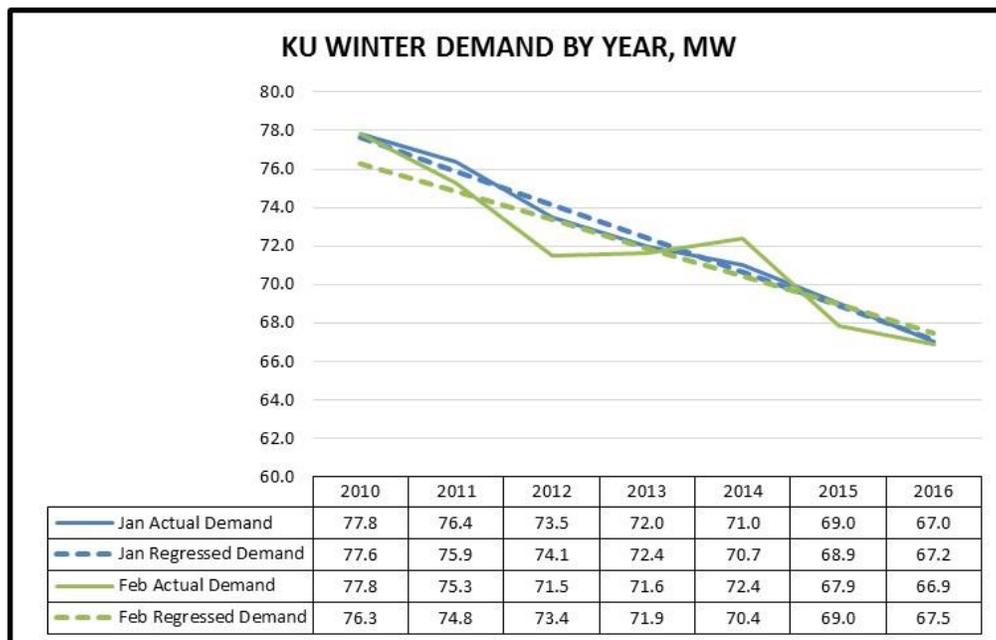


Fayette County Public Schools Winter Seasonal Energy Reduction of 2.4% since FY2010.

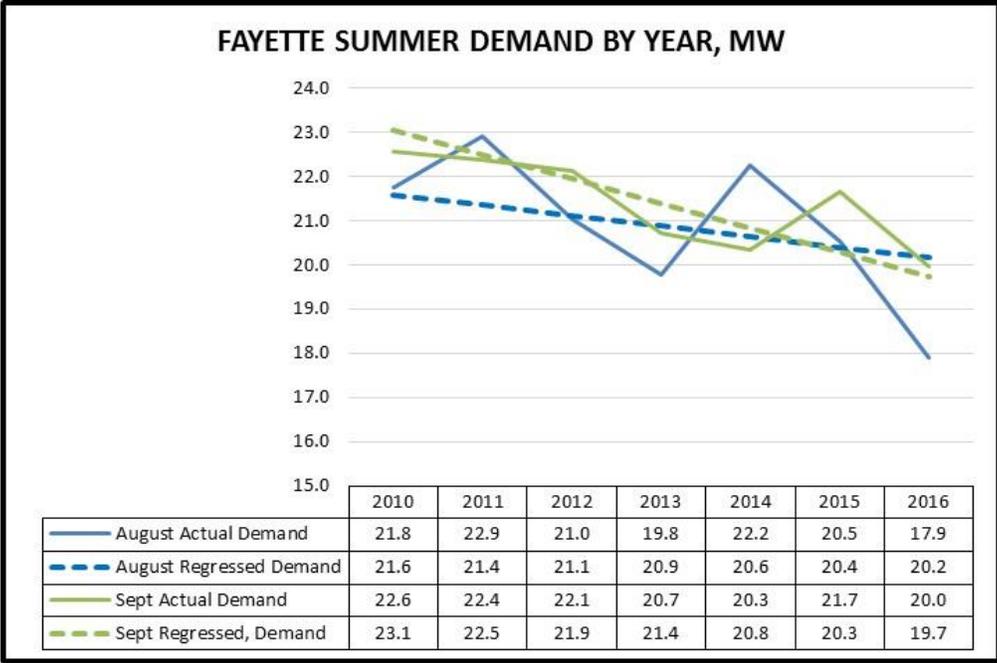
DEMAND (KW) REDUCTION



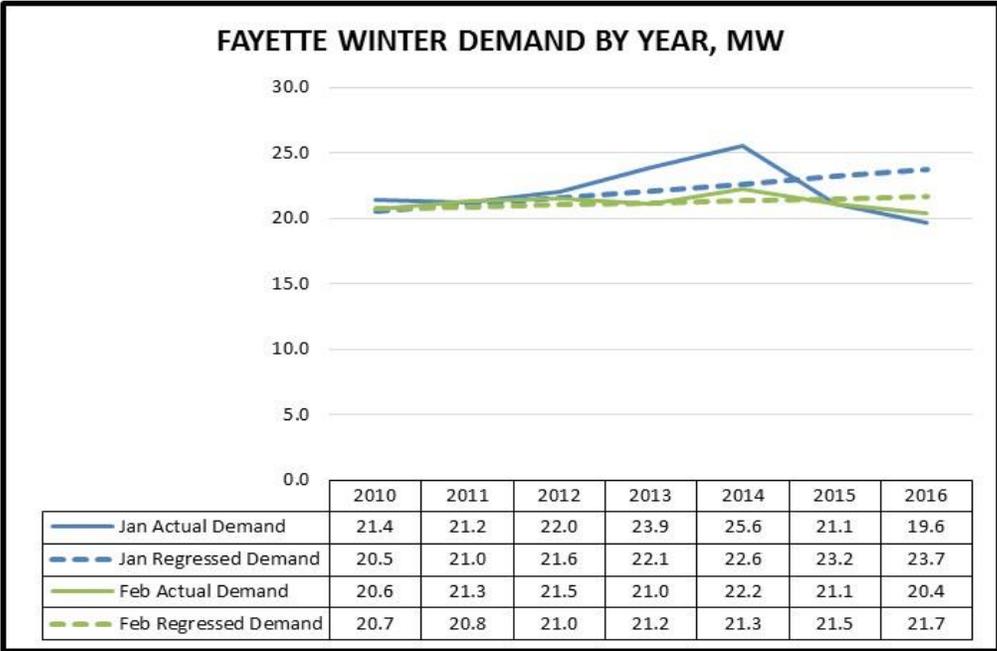
KU (without FCPS) August Demand Reduction of 17.8% since FY2010.



KU (without FCPS) January Demand Reduction of 13.4% since FY2010.



Fayette County Public Schools August Demand Reduction of 6.5% since FY2010.



Fayette County Public Schools January Demand Increase of 15.6% since FY2010.

ENERGY STAR Schools

A major focus of SEMP is district achievement of ENERGY STAR certification for its K-12 schools. While there are many agencies which offer or provide external certification, ENERGY STAR was chosen as a metric because ENERGY STAR certification provides independent verification of actual energy efficiency measures from sound energy management practices and not measures or credits for non-energy related activities. Having a building which is ENERGY STAR labeled is international recognition for energy efficiency and contrary to other certifications such as LEED, ENERGY STAR only acknowledges energy efficiency in their scoring methodology. i.e. ENERGY STAR doesn't give extra scoring if you have a "rain garden" on your property since rain gardens contribute little to energy efficiency. The significance of this number is not just the award but is confirmation by an outside organization of school district stewardship and fiscal responsibility. Currently over 24% of Kentucky's eligible public school buildings are ENERGY STAR labeled. That compares to approximately 10% nationally.

Additional recognition has been given for the districts that have all schools ENERGY STAR labeled. In total there are currently thirteen districts, five of who have a school served by KU. Those five districts are: Burgin Independent, Crittenden County, Pendleton County, Robertson County and Scott County. Figure 1 shows the number of KU served ENERGY STAR labeled buildings has grown steadily since FY2010 indicating greater energy efficiency.

Figure 1

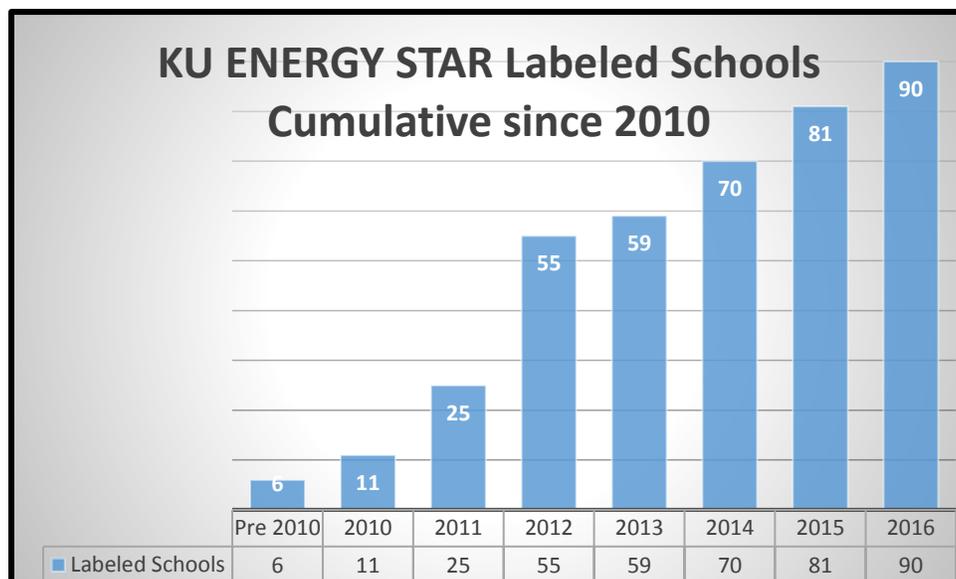
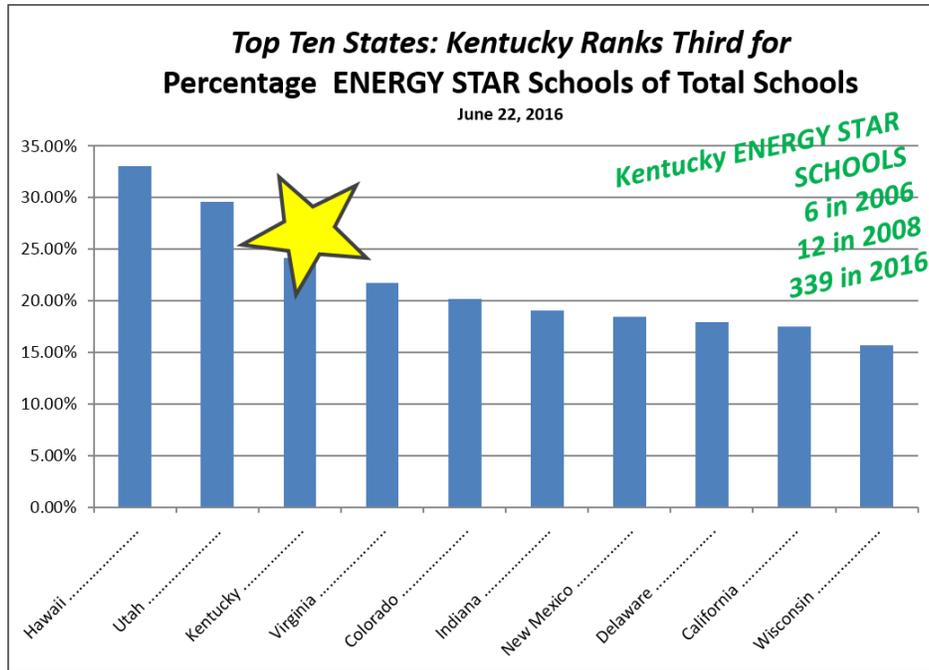


Figure 2 shows that Kentucky now ranks third in the nation in percentage of ENERGY STAR labeled schools.

Figure 2.



Schools in the LG&E and KU service territories account for 43% (145 of 339) of the ENERGY STAR schools in Kentucky. The increased energy efficiency in becoming an ENERGY STAR school has helped several districts in realizing thousands of dollars in operational cost savings.

Participation

The participation goal was for all districts served by LG&E or KU to retain and employ an energy manager to maximize response to KRS 160.325. From a practical standpoint, some districts do not participate because the number of KU or LG&E schools in their district is small leading to smaller grant awards.

Table 2

Participation			
K-12 Schools	LGE	KU	Total
Total	169	361	530
Participating	167	275	442
Districts			
Total	6	78	84
Participating	4	54	58

***1 District in the LG&E Service Territory and 3 Districts in the KU Service Territory did not participate this year due to an energy manager transition.*

Energy and Demand Savings Compared to Application Metrics

The Application in Case No. 2013-0067 (and subsequently in Case Nos. 2014-00371 and 2014-00372) identified the primary goal of the Energy Management Program for Schools to “support school districts in utilizing energy more wisely” with the overall objective for each school district to reduce consumption over time by an annual rate of 2.5 percent and achieve energy utilization indices (EUI) of 50 kBtu/sf/yr or lower.

Demand and Energy Reduction

The SEMP base year is FY2010 and the first reporting year under the KU program was FY2014. The data reported in Section V is for metered energy and demand for continuous accounts from the base year through FY2016. The reported demands are the summation of metered demands for demand billed accounts and calculated demands for the energy only billed accounts and are thus the accumulated non-diversified class demand. Next the accumulated demands were normalized for weather and then as in the Application a seventy five percent coincident factor was assumed for converting the accumulated demands to a system peak demand.

It should be noted that the demand reductions are conservative for two reasons:

1. A 75% coincident peak factor has been assumed for calculating coincident demands the even though the actual factor may be closer to 90%.
2. FY2010 is denoted the base year even though the first year of having energy managers in place was FY2011. Using FY2011 where the data reported is believed to be more accurate as the base year, the percentage improvements would be much greater.

Even with these conservative approaches, the KU districts nearly meet the 2.5% annual reduction target for coincident peak demand reduction in August and greatly exceed the annual energy reduction target.

The following table lists the demand results for August and the annual energy usage by year.

KU Data

(Data is shown in fiscal years)

August MW														
	Actual						Normalized					Norm Class CP		
		incr	%	cum	%			incr	%	cum	%			
2010	77.3						78.5						58.9	
2011	78.0	-0.7	-0.91%	-0.7	-0.91%		76.2	2.3	2.96%	2.3	2.96%		57.1	2.96%
2012	73.7	4.3	5.52%	3.6	4.66%		73.8	2.3	3.05%	4.7	5.93%		55.4	5.93%
2013	71.3	2.4	3.23%	6.0	7.74%		71.5	2.3	3.15%	7.0	8.89%		53.6	8.89%
2014	68.0	3.3	4.57%	9.2	11.96%		69.2	2.3	3.25%	9.3	11.85%		51.9	11.85%
2015	66.8	1.2	1.79%	10.5	13.54%		66.9	2.3	3.36%	11.6	14.81%		50.2	14.81%
2016	65.6	1.2	1.87%	11.7	15.15%		64.5	2.3	3.48%	14.0	17.78%		48.4	17.78%

TOTAL MWH														
	Actual						Normalized					Norm Class CP		
		incr	%	cum	%			incr	%	cum	%			
2010	260,929						263,746.3							
2011	255,391	5,537.8	2.12%	5,537.8	2.12%		255,278.2	8,468.2	3.21%	8,468.2	3.21%			
2012	248,309	7,081.7	2.77%	12,619.5	4.84%		246,810.0	8,468.2	3.32%	16,936.3	6.42%			
2013	235,592	12,717.9	5.12%	25,337.4	9.71%		238,341.8	8,468.2	3.43%	25,404.5	9.63%			
2014	234,021	1,570.6	0.67%	26,908.0	10.31%		229,873.6	8,468.2	3.55%	33,872.7	12.84%			
2015	222,166	11,854.9	5.07%	38,762.9	14.86%		221,405.5	8,468.2	3.68%	42,340.9	16.05%			
2016	211,985	10,181.2	4.58%	48,944.1	18.76%		212,937.3	8,468.2	3.82%	50,809.0	19.26%			

Fayette County Public School Data

(Data is shown in fiscal years)

August MW														
	Actual						Normalized					Norm Class CP		
		incr	%	cum	%			incr	%	cum	%			
2010	21.8						21.6						16.2	
2011	22.9	-1.2	-5.41%	-1.2	-5.41%		21.4	0.2	1.10%	0.2	1.10%		16.0	1.10%
2012	21.0	1.9	8.32%	0.7	3.36%		21.1	0.2	1.11%	0.5	2.19%		15.8	2.19%
2013	19.8	1.3	5.96%	2.0	9.12%		20.9	0.2	1.12%	0.7	3.29%		15.7	3.29%
2014	22.2	-2.5	-12.51%	-0.5	-2.25%		20.6	0.2	1.13%	0.9	4.38%		15.5	4.38%
2015	20.5	1.7	7.64%	1.2	5.56%		20.4	0.2	1.15%	1.2	5.48%		15.3	5.48%
2016	17.9	2.6	12.87%	3.9	17.71%		20.2	0.2	1.16%	1.4	6.58%		15.1	6.58%

TOTAL MWH														
	Actual						Normalized					Norm Class CP		
		incr	%	cum	%			incr	%	cum	%			
2010	83,890						81,538.5							
2011	82,032	1,858.5	2.22%	1,858.5	2.22%		81,220.8	317.7	0.39%	317.7	0.39%			
2012	77,984	4,047.9	4.93%	5,906.4	7.04%		80,903.0	317.7	0.39%	635.5	0.78%			
2013	81,161	-3,176.7	-4.07%	2,729.7	3.25%		80,585.3	317.7	0.39%	953.2	1.17%			
2014	80,701	459.2	0.57%	3,188.9	3.80%		80,267.6	317.7	0.39%	1,270.9	1.56%			
2015	80,233	468.3	0.58%	3,657.2	4.36%		79,949.8	317.7	0.40%	1,588.7	1.95%			
2016	78,096	2,137.5	2.66%	5,794.7	6.91%		79,632.1	317.7	0.40%	1,906.4	2.34%			

Process

Energy Manager Training

Because of limited funding, one on one and small group training sessions were held with each energy manager to discuss energy plans, standardized data collection and reporting formats. There were new districts which participated in the funding this year so the training included information for new energy managers as well as training for experienced managers.

- August 2015 – Webinars for newly funded energy managers:
 - Utility Grant Funding Basics
 - Utility Tracking
 - Energy Auditing
 - Converting Utility Tracking to Grant Reporting
 - District Communications
- January/February 2016 – Energy Manager Project Review sessions
- March 2016 - Performance contracting basics

KSBA also had the help of a part-time energy manager on staff who served districts and worked with them to establish and execute energy goals. This service worked well to jump start small districts who were struggling with the concepts of energy management, or districts that were not located such as to participate in the sharing of an energy manager.

Outreach and Awareness

An important deliverable for SEMP is to keep school district board members, leadership and staff; governmental officials; and local communities informed of energy efficiency opportunities and to highlight district success stories. With a district's primary mission of education, and adjusting to the ever-changing educational standards, there is a continual need to educate stakeholders of resources to support the district's mission. Funds provided by LG&E-KU along with other funding made possible presentation, exhibits, and monthly newsletters to fulfill this objective during the reporting period.

Presentations were made to the following:

- July 2015 – Kentucky Organization of School Administrative Assistants (KOSAA) - "My role in Energy Management"
- July 2015 – KSBA Summer Leadership Conference - "Leadership and Energy Management: A Board Member's Role"
- October 2015 - Kentucky School Plant Management Association (KSPMA) Annual Conference - "Becoming Your School's Energy Champion" and "Selling State of the Art Lighting"
- December 2015 - KSBA Winter Symposium - "Forewarned is Forearmed"
- February 2016 - KSBA Annual Conference - "Why Districts Cannot Ignore Energy Efficiency"
- February 2016 - Joint Meeting of Kentucky and Tennessee School Plant Management Associations - "What's Affecting and How High Will Electricity Rates GO?"

- April 2016 - National School Boards Association (NSBA) Annual Meeting - “Leadership and the Energy Management Process –Getting the Bang for Your BTUs”.

Newsletters in FY2016 that included mention of KU/LGE district are included in Appendix B, and noted below:

- Muhlenberg County Schools . . . leaders are convinced that energy management is worth the effort (July 16)
- Savings because of Competition (Hopkins County) and Special Subcommittee on Energy with two KU Energy Managers participating in the reporting. (August 16)
- Taking Energy Efficiency to the Next Level - Student Energy Teams Making a Difference – note Scott County and Bullitt County are recognized (September 16)
- Different Districts, Different Needs – Energy manager takes individualized approach in serving seven districts – focus on Terry Anderson, Fleming County Partnership (October 16)
- Successful Setbacks: A major opportunity to save during holiday breaks – focus on Scott Caslow, Russell County Partnership (November 16)
- Six Years of Energy Savings Totaling \$68 Million (December 16)
- Energy Efficiency . . . Funding Education by Eliminating Waste (Jan/Feb 16)
- Energy Voices from around Kentucky – nine KU/LGE funded Energy Managers contributed to article. Listing of all schools participating in Kentucky’s Battle of the School Building. (March 16)
- Celebrating ENERGY STAR Schools – multiple KU/LGE districts recognized. (April 16)
- Advantages of a Local Energy Manager (May 16)
- “It’s an OLD building so it’s going to be an energy hog - Garth blows that myth...” – Scott County school (June 16)

Data Gathering

Energy Usage and Demand data was gathered by account by month for each district beginning with July 2009 through June 2016.¹ School districts use a range of data collection tools ranging from Purchased Software (EnergyCap, Energy Watchdog, and SchoolDude) to excel spreadsheets. Where historical data was missing from district records, LG&E-KU regional customer support managers were contacted to fill in the required data.

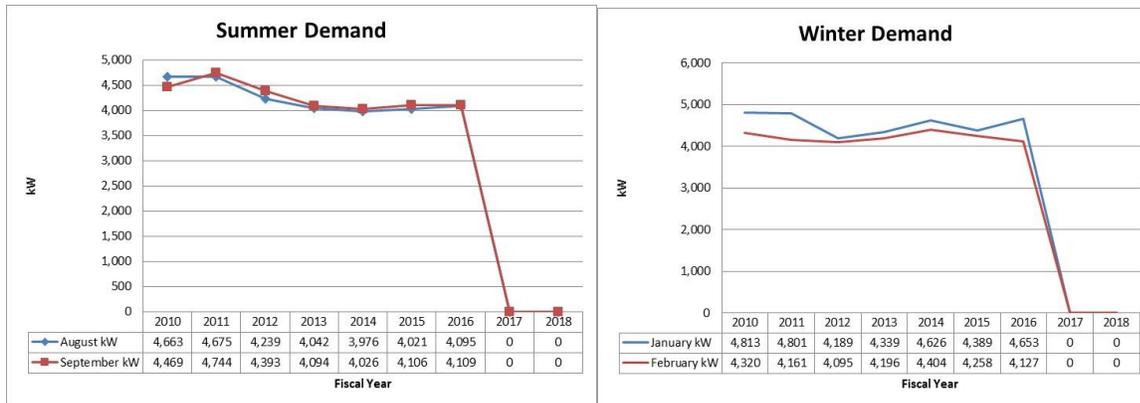
Data Scrubbing

Only those accounts which were present in FY2010 and still remaining today were analyzed. Accounts which have been vacated since FY2010 were eliminated from the data analysis. Accounts which are new since July 2009 are reflected in the overall district EUI but not in the demand or usage results. Accounts which had usage and demand changes due to renovations were either eliminated from the data base or reconciled by square footage calculations.

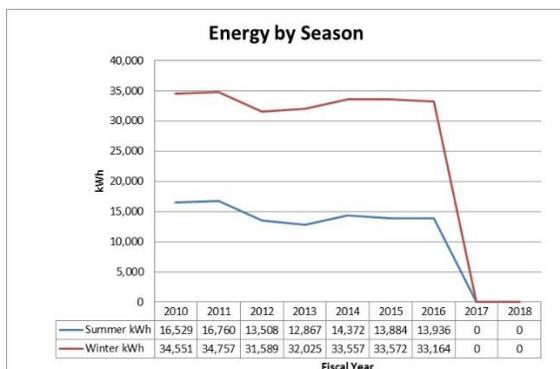
Data Analysis

Following the scrubbing of the data, each district's data was graphed showing the individual performance on energy and demand reductions. For the demand accounts, data was plotted as Summer Demand, Winter Demand and Energy by Season. For the non-demand accounts, a load factor was calculated using the demand accounts and then applied to calculate a demand value for the accounts where demand was not captured. Samples of the district-level non-normalized graphs are shown below.

Finally, all data was rolled-up into an LG&E or KU Summary and weather normalized.



¹ Data is provided to KSBA for analysis and reporting on a quarterly basis. Since June 2016 data as not completely available for all districts at the due date of this report, the June 2015 data was used as a proxy where necessary.



Appendix A ENERGY AND DEMAND REDUCTION PLAN

<u>District</u>	<u>KW REDUCTION PLANS</u>
Anderson	Summer and Break Setback Plans
Augusta	Lighting Retrofits
Augusta	Break Shutdown Schedules
Augusta	LED Gym fixtures with Occy sensors
Augusta	Participate in KU's DSM Program for AC units
Augusta	Install new winds and doors in old section of building
Augusta	Retrofit 105 T12 fixtures to LED
Ballard	Focus on Shutdown during major breaks
Ballard	Focus on setback procedures
Bath	Shutdown guidelines followed for Spring, Fall/Winter, Summer Breaks
Bath	Shutdown football concessions stand during winter months.
Bath	Drain hot water tank so the facility's heat pump can be turned off during these unused months.
Bath	Retrofitted all remaining T12s with LED
Bath	Install timers on bus garage heater blocks
Bath	Install new HVAC in Owingsville Elem.
Bell County	Complete Lighting retrofit at Bell Central MS to LED (\$92k)
Bell County	HS lighting retrofit planned
Bourbon	Install LED lights in Cane Ridge Elementary Gym
Bourbon	(2) Install LED lights in Ag Building
Bourbon	(3) Install LED exit signs in various buildings
Bourbon	(4) Install HVAC control system at Bourbon County Elementary School that now allows setbacks
Bourbon	(5) Convert T12 to T8 at North Middletown Elementary School.
Bullitt	Middle School renovation from Roof Top Units to Geothermal and all LED lights
Bullitt	Mini Contract with TRANE to do Demand Limiting on some equipment. TRANE will monitor and lim
Bullitt	All new lights are LED in gyms/parking areas/wall packs
Bullitt	Also has a window tinting project
Campbellsville	Rezoning and Staging all Buildings
Campbellsville	Heating and Cooling Renovation to be done at HS/MS by July 2016
Carroll	MS Renovation
Carroll	HS Chiller 2015
Caverna	Completed Renovation on HVAC in FY2015
Caverna	Starting to look at Lighting
Clay	Lighting Projects
Clay	KU Middle School Project -- expanded district wide nothing yet
Clay	Also Controls Vendors / Audits
Clay	Possible Performance Contract
Crittenden	Maintenance plan is to replace burned out fluorescents, wall packs and recessed lighting with LED a
Elizabethtown	Rezoning and Staging all buildings
Elizabethtown	New Performance Contract this year w/ controls at HS and Morningside TK
Estill	Install LED exit lights at Estill Springs Elementary.
Estill	(2) Install LED lights at South Irvine

Estill	(3) Install LED lights Estill Springs Elementary
Fayette	Summer Renovations -- Efficiency Upgrades in HVAC and lighting (5 schools)
Fayette	Pilot altered HVAC setpoints & schedules
Fayette	One-on-one campus foreman & associate principal listening/training sessions (in progress)
Fayette	Soft launch of Energy Dashboard (Hosted 1st energy competition Earth week) with a public launch
Fayette	Teacher & student training on energy monitoring software
Fayette	Portable building audits
Fleming	Replace coal-fired boiler and window A/C units with new energy-efficient HVAC system
Fleming	Install HVAC controls to allow for scheduling and night setback during unoccupied periods
Fleming	Replace old windows and doors
Fleming	Replace or Retrofit (153) 2-lamp T12 fixtures with T8 lamps and ballasts or LED fixtures
Fleming	Replace or Retrofit (30) 4-lamp T12 fixtures with T8 lamps and ballasts or LED fixtures
Fleming	Retrofit (26) incandescent bulbs with low wattage CFL or LED screw-in bulbs
Fleming	Replace (4) old exit signs with new LED exits.
Fleming	Replace or retrofit (15) 175 watt metal halide fixtures with low wattage-pulse start metal halide lamps
Fleming	Replace or retrofit (11) 175 watt MH exterior wall packs with lower wattage, pulse-start, ceramic metal halide
Fleming	Retrofit (5) exterior fixtures with energy-efficient CFL or LED screw-in bulbs
Gallatin	Control System Integration
Gallatin	HS Control system
Gallatin	HS Gym Lights
Hardin	Ongoing Performance Contract with TRANE
Hardin	Utilizing Energy Teams at Career Center to do energy audits.
Harlan Co.	Meetings with Principals
Harlan Co.	Building Audits
Harlan Co.	3 Schools enrolled in Enernoc
Harlan	
Independent	New Cafeteria Renovation
Hart County	5 Gym Lighting Retrofits from MH to LED
Hart County	New Renovation at HS Soon
Hart County	Replacing Controls & Timers at MS
Jefferson	3-5 Schools Renovated per year (Gilmore Lane Elem., Schaffner Elem, Fern Creek HS)
Jefferson	Gym Lighting -- LED during renovation
Jefferson	8 Demand Limiting Chillers Installed
Jefferson	Expanding ENERNOC Program
Jefferson	Domino effect of removal of T8 during renovation used to replace T12 in other parts of district.
Jefferson	13 Schools enrolled in ENERNOC
Laurel County	Installation of automated controls and server to run all building's HVAC from the board office
Livingston	Focus on Shutdown during major breaks
Livingston	Focus on setback procedures
Lyon	Focus on Shutdown during major breaks
Lyon	Focus on setback procedures
Lyon	HS Gym Lighting converted to LED
Madison	3 elementary renovations in KU schools
Madison	"Poor Man's Control System" being installed in some buildings

Madison	Madison Central HS GYM lights T5 to LED
Madison	Parking Lot Lights being converted to LED
Madison	ALL Gyms in district now LED or T5
Mason	STEAM Academy Renovation
Mason	Replace all 8 ft, 2 lamp T12s with LED
Mason	Replace 2x4 4 lamp T12s with LED
Mason	Replace 2x2 2 lamp T12 with LED
Mason	Change EXIT signs to LED
Mason	Install Occy Sensors
Mason	Change HVAC to VRF System
Mason	Install Control System
Mason	Replace 59 CFL Fixtures in HS Gym
Mason	Replace 10 CFL in Commons Area
Mason	Replace 7 CFL Cans to LED
Mason	Replace all remaining T12s
McCracken	District Wide Energy Contest
McCracken	Building Audits
McCracken	focus on shutdown procedures
McCreary	Tighter scheduling of control system for HS
McCreary	Earlier shutdown of chilled water system at Middle School
McCreary	Shorted Occy schedule for Whitley City Elementary and staggered start-up
Middlesboro	Complete Lighting retrofit at HS to LED
Nelson	Performance Contract with CMTA completed in 2015
Nelson	Possible Phase 2 Contract for Bloomfield Elementary and Middle School + New Haven (BMS has pro
Nelson	Phase 2 will also replace old controls at BMS and BES
Oldham	South Oldham Middle Renovation
Oldham	Enernoc Program enrollment
Pendleton	District wide LED lighting plan coordinated with LHI
Pendleton	Buying fixtures first with anticipation of replacing throughout the year
Pendleton	Front End upgrade on controls
Pineville	LED Installation at either the HS or ES
Pulaski	Expanded Set Backs
Pulaski	Future -- All Single Stats shifted to Johnson Controls
Pulaski	Lighting -- replacing burned out wall packs with LED
Pulaski	Pilot LED in Memorial Elementary
Pulaski	Focus on behavior -- Team Leaders do projects w/I schools
Pulaski	Wall Pack LED Replacement Strategy Started
Pulaski	All Schools participated in Energy Learning Project with students
Robertson	Shutdown list emailed for breaks
Robertson	Install new dark window shades for reducing heat transfer in cafeteria
Robertson	Replace 35 faulty ballasts load transfer controls that were leaving lights on when unoccupied
Robertson	Program lighting controls for lights staying on too long
Robertson	Repair multi stack units on Chilled Beam system to improve efficiency
Rowen	Replaced 47 F40T12 4 tube wrap fixtures with 43 (88 watt LED)

Rowen	Replace 5 (100 watt) HPS canopy lights with (36 watt) LED
Rowen	Replaced old window AC units it more efficient units
Russell	Renovation to HS HVAC, lighting and control systems
Russell	Major reduction in runtime at Auditorium and Natatorium
Science Hill	Increased staff communication for staff to do manual shutdown, weekends, holidays, breaks
Scott	Install LED lights in SCHS halls
Scott	(2) Install LED lights in SCHS offices
Scott	(3) Install LED lights in SCHS Parking Lots
Scott	(4) install LED lights in Northern Elementary Gym
Scott	(5) install LED lights in Bus Garage
Somerset	Renovation to Hopkins Elem. Lighting, HVAC and controls
Somerset	Tighter HVAC scheduling at HS
Taylor	Retrofit 2 gyms with 400W and 1000 W MH to LEDs
Taylor	Maintenance Plan to replace MH wall packs with LED
Taylor	2 buildings with new construction
Taylor	Replaced Seller boiler with new AOSmith On Demand for Hot water
Taylor	Now has night setbacks at board office
Union	Retrofitted 4 gyms with T5 fluorescents
Union	Enrolled in ENERNOC Program
Union	New Chiller at Middle School
Union	Major HVAC work at High School -- replacing Pneumatic Controls with an Allerton Control System
Union	300 Ton Chiller is being downsized during renovation (Spring FY2016)
Webster	Performance Contract
Webster	Innovative DEMAND Shedding Project with TRANE
Webster	LED Retrofitting as part of Maintenance Plan
Woodford	Lighting Retrofits
Woodford	Setback Audits
West Point	Lighting upgrade in gym
West Point	Lighting upgrade in office, library, computer lab

APPENDIX B -- Newsletters