Energy Management Program

FY2015 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 percent and achieve energy utilization indices ("EUI") of fifty or lower. The participation goal was for all districts served by LGE or KU to retain or employ an energy manager through at least FY2015 to maximize district response to KRS 160.325.

Fayette County Public Schools (FCPS) are being reported separately from the rest of the KU-served districts. Reporting separately provides a consistent comparison to last year's data and FCPS has made a significant fuel change from natural gas to electricity as they have renovated schools over the last several years.

The KU districts have achieved from a FY2010 baseline the following:

August Demand Reduction (15.9%)
January Demand Reduction (10.8%)
Summer Energy Reduction (17.5%)
Winter Energy Reduction (13.6%)

The August reduction is particularly significant as LGE-KU is a summer peaking utility. Fifty-three (53) districts receiving KU electric service participated in the program and twelve have district-wide EUI's less than 50.

The partnership established between LGE-KU and KSBA has provided a means for the School Energy Managers Project (SEMP) to maintain a major presence within schools in Kentucky. Five School Districts within the LGE-service area and 53 School Districts within the KU-service area have benefitted financially and technically from this work.

The School Energy Managers serving these school districts have benefited from continuity of employment, technical training and improved skills, due to the funding which was provided. They and their school districts benefit from the

knowledge that has been gained by positioning them on a continuous improvement path. Knowing that an expectation of a 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

LGE-KU SCHOOL ENERGY MANAGEMENT PROGRAM

FUNDING DISTRIBUTION

FY2015

	Total	LGE	KU
Project Management			
SEMP Staff	$41,171	$5,270	$35,901
Outreach	$28,186	$3,608	$24,578
Travel	$3,985	$510	$3,475
Sub Total	$73,341	$9,388	$63,953
District Energy Manager Funding/Support			
Technical	$55,456	$7,098	$48,358
Training	$67,571	$8,649	$58,922
Salary Match	$188,283	$39,319	$148,964
Sub-total	$311,310	$55,066	$256,244
Total	$384,651	$64,454	$320,197

*Indirect Costs @15% on all items except energy manager salary match

Committed to date	$862,369	$130,077	$732,293

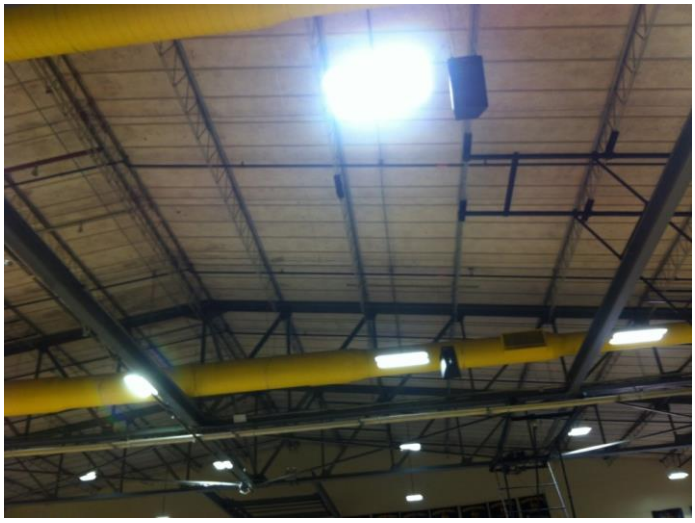
Initiatives Implemented

The following is a summary of significant work projects carried out since fiscal year 2010 which lower the electric and total district Energy Usage Intensity, EUI. They are categorized by the type of work project.

Lighting Retrofits

Lighting is an important energy savings opportunity for schools. Approximately 25% of the energy use in schools is lighting. Technology improvements in lighting allow schools to improve the quality of lights and lower their operating costs with minimal impact to building occupants. Consequently most school districts have completed lighting retrofits during this timeframe. The leading districts for "lighting the way" with LED technology continue to be Scott County and Madison County with other districts now expected to utilize LED fixtures in new and renovated facilities.

This picture from Madison County shows an LED replacement (left) of a typical exterior metal halide fixture (right). Note the amount of light cast on the building with the LED providing an additional safety benefit.



This picture shows a gymnasium in Scott County which was converted from metal halide fixtures to LED fixtures.

Shown below are the results of the implementation of an Energy Management Plan[1] by Bath County which highlights lighting retrofits, typical of many districts.

- **Bath County High School (Lighting Project -June 2014-April 2015)**
  1. **Retrofitted (16) 2 Ft, 3-lamp T12 Fixtures with new T8 lamps and ballasts**
  2. **Retrofitted (1) 3 Ft, 1-lamp T12 Fixture with a T8 lamp and ballast**
  3. **Retrofitted (3) 4 Ft, 1-lamp T12 Fixture with T8 lamps and ballasts**
  4. **Retrofitted (284) 4 Ft, 2-lamp T12 Fixtures with T8 lamps and ballasts**
  5. **Retrofitted (374) 4 Ft, 2-lamp T12 Fixtures with T8 lamps and ballasts**
  6. **Retrofitted (46) 4-Ft, 4-lamp T12 Fixtures with T8 lamps and ballasts**
  7. **Replaced (10) 250 Watt MH Gym Fixtures with (10) 4 Ft, 4-lamp High Bay Fixtures**
  8. **Replaced (36) 400 Watt MH Gym Fixtures with (36) 4 Ft, 6-lamp High Bay Fixtures**
  9. **Replaced (1,877) 32-Watt, T8 Lamps with 28-Watt, T8 Lamps**
  10. **Replaced (10) 100 Watt Incandescents bulbs with 23 Watt CFL Bulbs**
  11. **Replaced (1) 30-Watt Incandescent Exit Sign with (1) 3-Watt LED Exit**
  12. **Replaced (8) 75-Watt Fixtures with 15 Watt LED Fixtures**
  13. **Replaced (44) 32-Watt Fixtures with 15 Watt LED Fixtures**
  14. **Replaced (1) 175 Watt Lamp with 57 Watt LED**
  15. **Retrofitted (12) 175 Watt MH Fixtures with 100 Watt MH Pulse Start Fixtures**
  16. **Retrofitted (8) 400 Watt MH Fixtures with 200 Watt MH Pulse Start Fixtures**
  17. **There were no unoccupied temperature settings for this building and no dead-band for the cooling tower loop. This is a water source heat pump building. Cooling tower cools the loop and boiler heats the loop. The boilers heat the loop up to 83F then the tower cools back down to 80F. Tower fan was running more hours than it should each year. Installed new temperature controls, implementing unoccupied temperature settings, fixed issue with dead-band on the hydronic loop so tower fan would not run as much.**

- **Bath County Middle School (Lighting Project -June 2014-April 2015)**
  1. **Retrofitted or replaced (154) 2X4, 2-lamp, T12 Fixtures with T8 Lamps and Ballasts**
  2. **Retrofitted or replaced (327) 2X4, 3-lamp, T12 Fixtures with T8 Lamps and Ballasts**
  3. **Retrofitted or replaced (65) 2X4, 4-lamp, T12 Fixtures with T8 Lamps and Ballasts**
  4. **Replaced (24) 400 Watt MH Fixtures with (24) 4 Ft 6-Lamp High Bay Fixtures**
  5. **Replaced (1,549) 32 Watt T8 lamps with 28 Watt T8 lamps**
  6. **Replaced (8) 100 Watt Incandescent Bulbs with 23 Watt CFL**
  7. **Replaced (23) 75 Watt Fixtures with (23) 15 Watt LED Fixtures**
  8. **Replace (1) 500 Watt Inc. Floodlight to (1) 30 Watt LED Fixture**
  9. **Replaced (3) 250 Watt MH to (3) 125 Watt MH Pulse Start Lamp.**
  10. **Installed Daylight Dimmer Sensors in Cafeteria**
  11. **Installed New Programmable Thermostats to take advantage of savings during unoccupied times.**

[1] KRS 160.325 led to the adoption by Kentucky's public school districts board policies requiring development, implementation and monitoring of Energy Management Plans (EMP).

Control Work

HVAC System controls are vitally important to schools because schools are only occupied about 25%-30% of the time on an annual basis. However, Control Systems and district-wide integration are expensive investments for schools.

The following article published in our November 2014 Newsletter showcases several energy managers including Kimberly Joseph in Bullitt County.

Let's Save Energy

School Energy Managers Project

ENERGY STAR AWARD 2014 PARTNER OF THE YEAR

November 2014

Load Profiles . . .

Why should I care?

In electrical terms, a **load profile** is a picture of the use of electricity throughout the day, week or month. The load profile shows how the magnitude of energy use varies throughout the period as equipment and lighting are turned on and off as temperatures and room occupancy change throughout the period. Electric utility companies use this information to plan how much electricity they will need to make available at any given time.

Why is this important for a school board member to understand? The answer has to do with money.

The greatest (peak) amount of electricity a utility company provides is typically during a weekday – the same time that schools are in session. Load profiles help to identify this peak. To meet this peak, utilities construct large generating facilities such as the Kentucky Utilities Ghent Power Plant in Gallatin County. Because power plants are becoming increasingly more expensive, utilities encourage customers to manage their electrical usage, not only throughout the day, but at these peak times. To recognize the cost to supply the peak, utility rates have been established that will charge a significantly higher rate for the peak usage as compared to usage at other times during the day.

Board members impact the district's energy usage through decisions made regarding inclusion of energy management technologies to more efficiently manage building temperatures when constructing new or renovating facilities. Because of the technical aspect and the changing technology in this area, these are not simple decisions to be taken lightly, but if not carefully considered can lead to waste of thousands of taxpayer dollars over the life of the facility. Using technology to identify a building's load profile 'is and extremely cost effective investment.

Energy Managers in ACTION . . . Load profile control

Energy managers Chris Baker, Kimberly Joseph and Jimmy Arnold discuss the use of load profiles in managing their district energy resources during a recent SEMP training session.

Technology has vastly improved over the past decade. This can be seen by the various "demand response" technologies to identify a load profile now available that provide live data for energy managers to use in reducing their amount of electricity being used at peak.

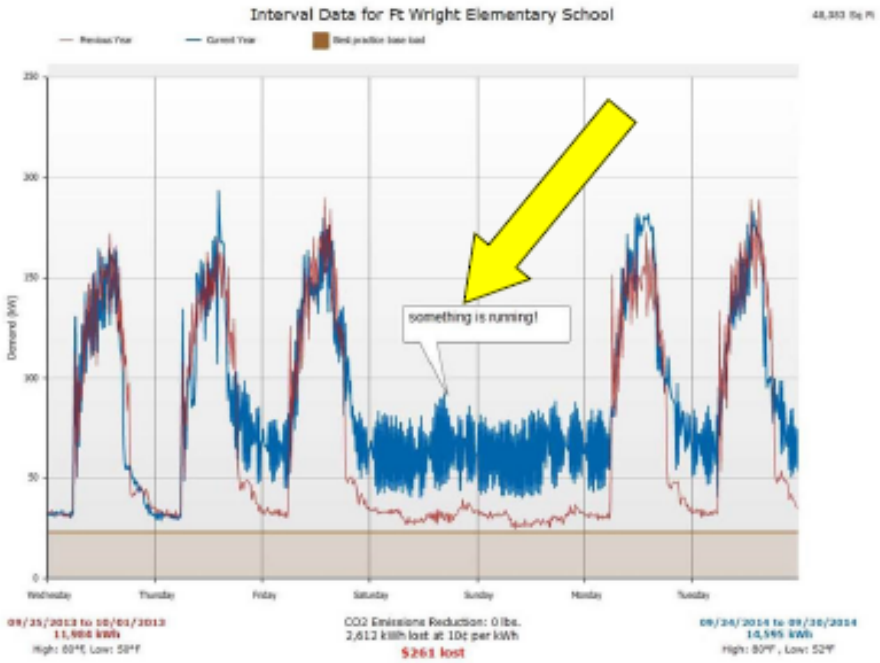
Several Kentucky school districts have become among the leaders in use of these technologies. Chris Baker (Kenton County), Kimberly Joseph (Bullitt County) and Jimmy

Energy Managers is Action . . .

(continued from page 1)

Arnold (Butler County) recently participated in the panel discussion at the School Energy Managers Training in October in Lexington.

Baker began the discussion by painting the picture. As she described the weekend load for Fort Wright Elementary School, she noted that on the surface it appeared that all mechanical systems were working properly and the building temperatures were on unoccupied. In viewing the building's load profile, she found that something *is* running and registering an abnormally high usage. Working quickly with the building automation system, they found that a recent controls upgrade had caused the chiller to run 24/7. In one weekend, the situation cost the district almost $200 in electricity costs. Without access to real-time interval data and load profiles, it could have taken months or longer to discover this issue.



Before Fall Break, energy manager Chris Baker carefully analyzed load profiles for Kenton County Schools to ensure mechanical systems were working properly. The profile above identified a mechanical issue that was corrected before the break ensuring proper setback of temperatures.

Joseph described similar findings in Bullitt County through use of a load profile. The system she uses not only provides live load-profile data, but allows for direct temperature control of the majority of the district's facilities. This has been important for energy savings and providing the best environment for their students and teachers.

Joseph was quick to add that their monitoring systems have identified mechanical systems problems before they have become a huge problem. "Our building automation system provides alarming on all HVAC equipment, from individual heat pumps to cooling towers," she added.

Joseph went on to describe the numerous minor problems the alarms have identified and her response of generating a work-order for the HVAC techs. "Better to catch something when it has a loose belt or simply a dirty filter, before it becomes a burnt up motor or damage has been done to a compressor," she said. The alarms on the HVAC equipment and freezers/coolers have saved tens of thousands of dollars over the years.

Arnold is known to other energy managers in the state as being tight when it comes to resources spent on energy.

"During the day, my goal is to keep teachers, staff and student comfortable," he said, "but as soon as school is out for the day, the building is mine." He checks his monitoring systems routinely to ensure the buildings are moving to unoccupied mode properly. Arnold has also monitored the buildings long enough to know that he can reduce energy consumption an hour before school is out, without impacting the learning environment, but yet avoiding the most costly time of day for electricity.

Culture Change

Technology upgrades are great and badly needed in many districts. However, even the best technologies can be defeated with poor behaviors. LGE-KU funded energy managers are helping their districts utilize technologies already installed to capture otherwise lost energy savings opportunities due to availability of trained personnel for fully enabling building automation systems (BAS) or had not facilitated acceptance of a change in building operation culture. Unlike a business culture where a management edict can drive change, schools require a much more collaborative environment for enactment. There are many aspects of changing to a culture of energy efficiency and only a few are mentioned here.

Communication throughout the system

Many strategies are used to involve faculty, staff and students, such as an Energy Contests, shown at Northern Elementary School

A partnership was formed between Scott and Woodford Counties. The additional technical support and coaching was significant, but the additional communications to the school board, administrators, teachers and students was instrumental in creating a depth of understanding of the importance of managing our energy resources. The energy manager undertook extra involvement and visited every classroom for a few minutes to explain to teachers and students what they were doing and why it was important. Detailed monthly reports were provided to the Board and Superintendent that compared each school in the district. The success of this involvement is shown in Woodford County Schools reducing 10.2% during the past year. Woodford County was recognized as 8th in the Nation in the ENERGY STAR Battle of the Buildings.

Energy Contests

Several Districts have implemented energy contests which return some of the monthly or annual energy dollar savings to the schools which generated them. Savings awards are either given as a flat amount ($500 annually) or as a percentage of the savings generated. This approach is significant is fostering end-user ownership of energy management as energy bills are processed by a district's central office and otherwise never appear within eyesight of the school occupants.

An example in this area includes Hopkins County

Hopkins County Schools recognize performance for reducing energy consumption by presenting a check to all schools that achieve a targeted goal as occurred when energy manager Bruce Sauer awarded school principal, Phyllis Sugg with a check.

Energy Teams

Several districts have established student energy teams which have activities ranging from building walkthrough audits to recycling.

Examples in this area are Henry and Oldham.

Henry County Student Energy Team.

Oldham County Energy Manager Nancy Wentz works closely to support Student Energy Team.

District Leadership

Tops down leadership and support are important to making things happen within a school district.

Here is a recent article highlighting Middlesboro Energy Manager, Chris Taylor and Superintendent, Steve Martin. The two of them were successful in achieving significant savings for Middlesboro Independent Schools.

Let's Save Energy

School Energy Managers Project

ENERGY STAR AWARD 2015 PARTNER OF THE YEAR

March/April 2015

Teamwork leads Middlesboro to $185,000 savings

The Middlesboro Independent school board took two steps in mid-2013 that have since resulted in the district saving $185,000 in energy costs: the board hired a new superintendent and it joined the Knox County Energy Management Partnership.

Superintendent Steve Martin, whose goal is to work with "relentless dedication to motivate and inspire student success," recognized the importance of supporting energy-related initiatives as he began working with the regional partnership's certified energy manager, Chris Taylor.

Middlesboro Supt Steve Martin recognized opportunity for savings by supporting energy management efforts.

Because the district had Taylor's services an average of only five hours per week, he tried to identify the best use of his time. Since it would take an estimated two hours monthly just to track, review and report utilities, Taylor had even less time to assess the school buildings to look for potential energy projects.

With Taylor identifying a change in rates that saved the district $34,000 since that time, the district realized immediate savings from joining the partnership. Meanwhile, he and Martin began working with others in the district to create awareness and buy-in for saving energy.

Following Martin's lead, the district staff began working with Taylor to implement a tightly controlled HVAC schedule for all school breaks. Because of the attention given, the district has saved over $151,000 in the past 20 months from a reduction in demand (kW) and consumption (kWh).

"It has truly been a team effort in our district," says Martin. "I have been impressed with their dedication to be efficient and to reduce our energy consumption."

As the district continues to support student success, its leaders have recognized that with some effort, the system can achieve energy savings while creating the best learning environment for students.

"The support leadership has given to improving the district Energy Utilization Index should be recognized," Taylor says. "As soon as the district understood the opportunity to save, energy management became a priority."

Working with five districts, CEM Chris Taylor works with district leadership to implement energy management efforts.

Rate Changes

Energy managers stay informed regarding utility tariffs to insure appropriate rate application as change in usage and tariff charges and service provisions can provide opportunities for monetary savings that can help fund energy efficiency improvements

Union County, Hopkins County and Fleming County were early adopters and have saved their districts thousands of dollars which were in part reinvested in energy projects.

Performance Contracting

Because of the costs of many capital improvements, many districts do not have the funding or bonding potential to invest in needed building upgrades. Some districts have entered into energy savings performance contracts to meet their needs. What we have seen as a winning combination is an energy manager paired with a performance contractor.

The leading LGE-KU served districts in performance contracting are Bullitt County and Henry County. These districts have outstanding energy managers who work closely with the performance contractors to monitor performance and ensure that the details of the contract are met.

Other LGE-KU districts that have performance contracts include: Jessamine, Muhlenberg and Rowan Counties.

The following article was published in our July 2015 Newsletter based on work done in Muhlenberg County earlier in 2015, who has a Performance Contract in place.

LET'S SAVE ENERGY
School Energy Efficiency News

KSBA-SEMP ... Cultivating energy efficiency, best practices in Kentucky school districts

July 2015

Muhlenberg County Schools

leaders are convinced that energy management is worth the effort

When the last Energy Management Report showed that Muhlenberg County ranked 145th out of 173 districts Eric Bletzinger, the district's finance officer and energy manager, took action. He saw that his district was well above the state Energy Utilization Index* (EUI) average of 60, which translated into significant opportunity for dollar savings. As finance officer, Bletzinger also knew the significant financial issues the district was facing and was looking for any way to reduce district costs.

In February 2015, Bletzinger attended his first SEMP training session and learned one of the most efficient school districts in the state was right next door – Butler County Schools. As he listened to discussions about building a successful Energy Management Plan and ways to maximize building automation systems, he wanted to learn more from Butler County Energy Manager and Chief Information Officer Jimmy Arnold. That is where a new partnership began.

Bletzinger and Arnold agreed to walk through the Muhlenberg County buildings on a Saturday to see how the control system was working. "You can have the best systems in the world, but nothing replaces seeing for yourself if the controls were overridden," Arnold said. As the two continued their work together over the next weeks, they talked with custodians, principals and maintenance staff to identify how the buildings were being used.

From there they adjusted the buildings' controls schedule, and recognized how to "ramp-up" the building in stages. With those initial steps, they were able to eliminate over 32,000 hours of HVAC runtime, which over a three-month period translated into a savings of over $60,000.

Those initial results sold Bletzinger on the idea that time spent on energy management will provide an opportunity for saving dollars that can be used for the classroom. On opening day August 5, he plans to ensure that new procedures are in place for scheduling the control system in each building. "Our goal is to seek ways to achieve savings without impacting the teaching and working environment. We will communicate the successes we are having, to help faculty and staff understand the need for scheduling," said Bletzinger. "We may even consider some friendly competition between the schools to increase the interest to conserve.

Eric Bletzinger, Finance Officer & Energy Manager, (right) and Jimmy Fleming, Maintenance Director, review the HVAC controls schedule for Muhlenberg County to ensure efficient schedule for summer maintenance.

"Through our recent performance contract we were fortunate to have had the building automation systems in place. However, because we were operating outside of the recommended parameters, we were not utilizing the systems we had. That resulted in overspending by our district in a time where we couldn't afford to overspend," added Bletzinger.

Plans for the partnership continue to evolve. Because energy management requires a hands-on process, Arnold will monitor electric usage with Bletzinger over the next few seasons. In looking to other significant opportunities, limiting electrical demand is a future goal.

New Construction

The leader in new construction is Robertson County. By replacing the Deming School, Robertson County lowered their district-wide EUI from 114 to 40 kBTU/sf. This construction included a Chilled Beam System and Building Control System inclusive of lighting.

New construction since the program began, is leading to building higher efficiency buildings.

Renovation

Several districts have completed renovations during this timeframe. Examples include: Cartmell Elementary and Carroll Middle School in Carroll County, Centerfield Elementary in Oldham County, , the Lower Elementary, Upper Elementary and Middle School in Gallatin County, Painted Stone Elementary Stone in Shelby County and TT Knight Middle School in Jefferson County to mention a few. All these schools lowered their EUI building scores and consequently lowered their overall district scores. These renovations contain many of the elements listed above.

As mentioned earlier, Fayette County has completed several renovations since 2010 with a major heating fuel switch from natural gas to electricity. The change to electricity includes geothermal and VRF systems which are very efficient. The summer and winter energy usage is reflected in this changeover.

Energy Utilization Indices

One of the key indicators for measuring energy performance is district-wide Energy Use Intensity, 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 a district divided only by the square footage of the ***conditioned*** area. The statewide average for district-wide EUI in FY2010 was 64.2kBtu/sf/yr. By FY2014 the district-wide EUI had dropped to 60.9 kBtu/sf/yr.[2] 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 41.3 KBTU/sf/yr.

Statewide and for most districts the EUI was lowered. This can be attributed to several things. The enactment of KRS 160.325 and implementation of KSBA's School Energy Manager Project now supported by LGE-KU has educated and focused districts on the importance and value of implementing best energy management practices. While new school construction and renovations are more energy efficient, presentation of energy conservation measures such as lighting or HVAC projects by energy managers is leading to significant elimination of energy waste in both new and existing buildings.

Table 1, on the following page, shows the data for KU funded districts. The table below shows that most districts have lowered both their electric and overall EUI.[3]

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

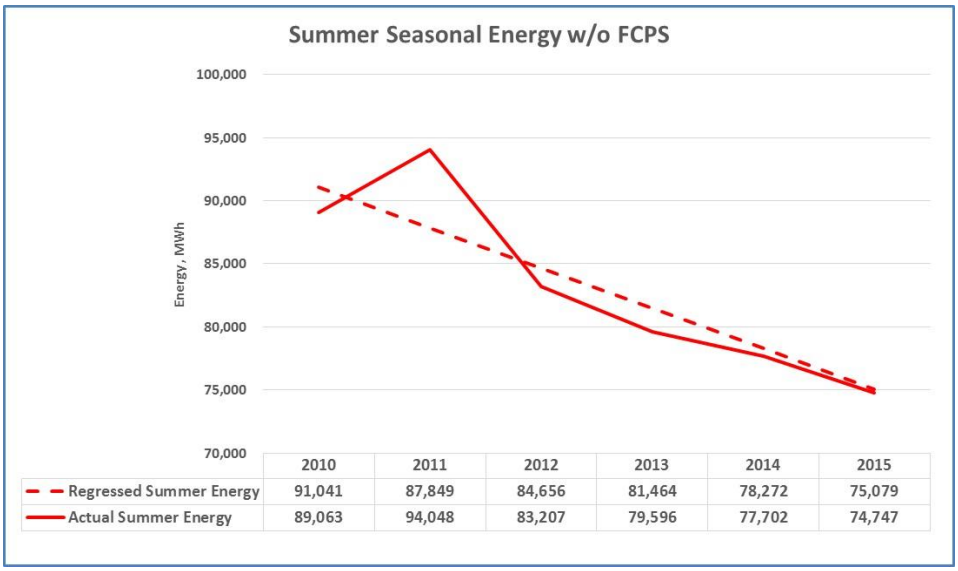
[3] *FY2015 EUI data will not be available until October 1 when all state districts are required to submit through KSBA-SEMP to the Legislative Research Commission and Energy and Environment Cabinet their Annual Energy Management Report.*

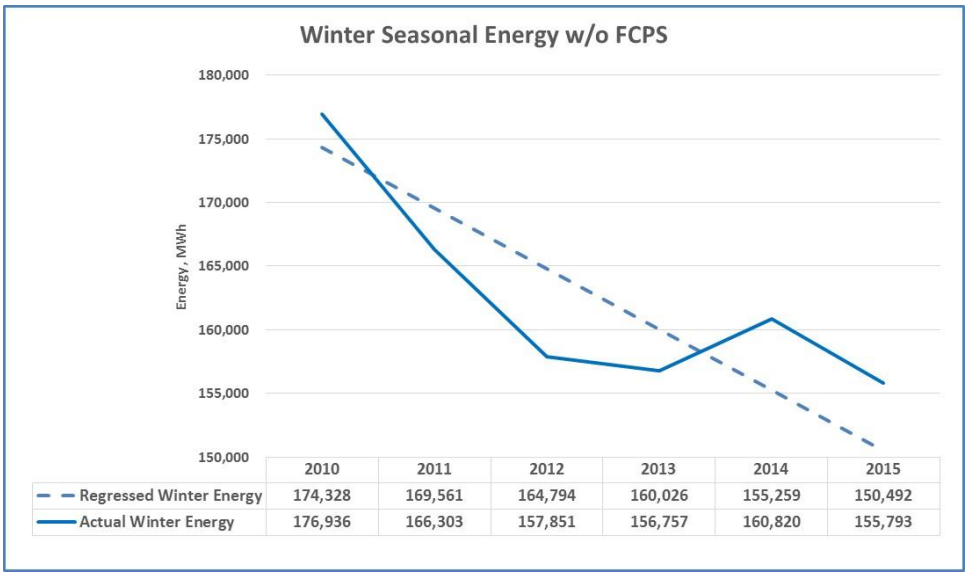
TABLE 1									
EUI HISTORY (kbtu/sf)									
KU Funded Districts									
District	2010 Electric EUI	2014 Electric EUI	2010 total EUI	2014 total EUI	District	2010 Electric EUI	2014 Electric EUI	2010 total EUI	2014 total EUI
Anderson	38.5	33.0	52.3	43.4	Laurel	NA	59.2	NA	66.8
Augusta	39.0	36.6	55.6	55.9	Lyon	33.9	36.2	53.7	58.7
Ballard	52.8	48.6	80.1	66.5	Madison	45.1	42.5	56.4	59.8
Bath	49.1	46.2	87.8	78.0	Marion	49.6	45.0	60.3	55.0
Bell	75.8	65.7	104.3	69.0	Mason	35.6	32.6	59.2	60.9
Bracken	47.9	48.2	55.0	57.2	McCracken	39.7	33.7	62.7	55.9
Burgin	47.8	36.5	60.5	44.5	McCreary	70.2	68.6	94.8	94.5
Carroll	45.8	39.3	82.9	69.0	McLean	32.7	33.7	45.9	50.1
Caverna	45.3	36.4	84.2	81.4	Middlesboro	52.6	41.7	52.6	84.7
Clay	43.6	40.3	63.3	63.2	Muhlenberg	46.7	52.1	68.5	70.4
Crittenden	41.2	35.2	57.1	53.8	Nelson	43.8	46.5	43.8	60.2
Danville	40.5	43.6	64.6	68.9	Pendleton	33.0	29.0	55.9	51.6
Dawson Springs	39.9	36.0	61.0	47.7	Pineville	53.7	47.2	54.7	56.4
Fayette	52.3	52.6	78.2	72.0	Pulaski	37.0	37.7	52.4	56.4
Fleming	44.4	39.9	69.8	54.6	Robertson	69.0	37.9	114.5	48.5
Gallatin	51.2	42.9	60.0	45.6	Rowan	44.9	39.0	72.3	60.9
Garrard	39.4	45.3	51.5	64.4	Russell	65.7	46.0	80.5	46.0
Green	64.3	67.5	88.2	92.5	Science Hill	56.5	54.1	56.5	54.1
Hardin	42.4	37.1	54.3	48.9	Scott	46.1	36.4	53.3	42.7
Harlan County	55.7	60.0	55.7	60.0	Shelby	60.9	40.0	71.6	47.2
Harlan Ind	50.2	47.0	52.3	50.5	Somerset	47.4	46.6	89.8	82.5
Hart	49.5	48.8	73.5	79.5	Trimble	32.6	29.2	52.3	50.5
Henry	48.3	34.7	67.7	45.4	Union	39.1	39.1	69.1	73.1
Hopkins	49.1	46.0	71.7	74.0	Williamsburg	43.6	42.7	54.9	54.6
Jessamine	37.1	34.5	50.3	47.8	Woodford	49.4	43.3	63.5	53.1
Knox	50.7	40.6	64.8	53.5					

The total average EUI for KU-funded districts has reduced from 68.2kBtu/sf/yr in 2010 to 61.2kBtu/sf/yr in 2014. The total average Electric EUI moved from 47.7 kBtu/sf/yr to 44.3 kBtu/sf/yr during that same timeframe. Since the inception of the program twelve districts are below the target of 50 kBtu/sq/yr.

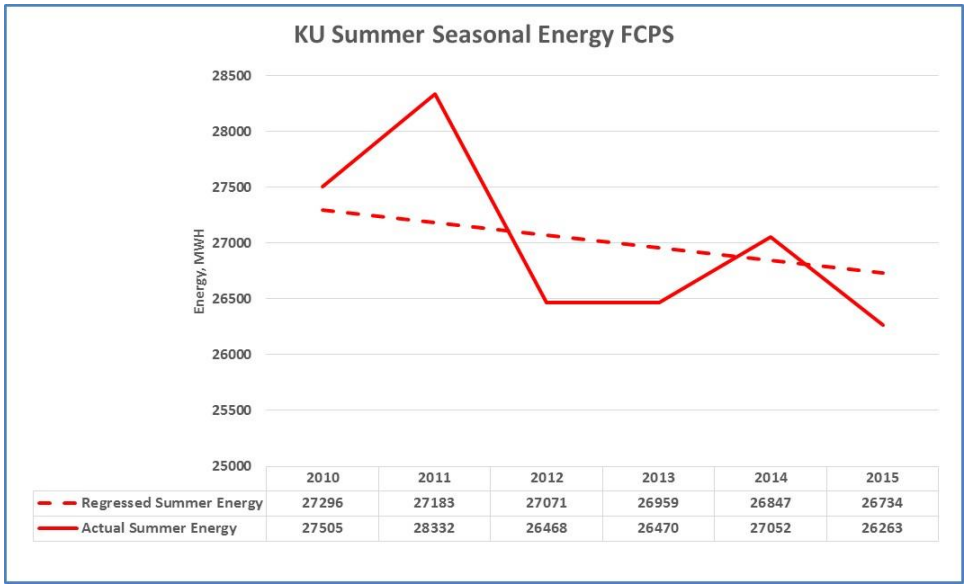
Consumption Reduction and Annual Comparison

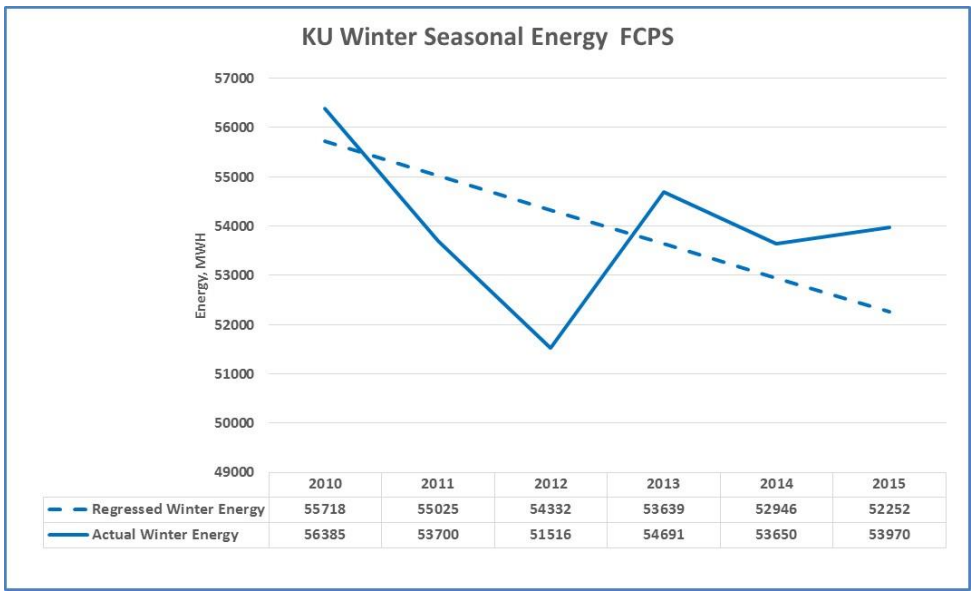
ENERGY (MWH) REDUCTION





The KU-served districts reduced their summer energy usage by 17.5% and winter energy usage by 13.7% over the base period.





Fayette County Public Schools reduced their summer energy usage by 2.1% and winter energy usage by 6.2% over the base period.

As shown in the above graphs, Fayette County has been reported separately from the rest of the Kentucky Utility service territory. Fayette County has an aggressive renovation strategy and over the last 5 years, they have renovated roughly 1/3 of their portfolio of school buildings. A part of their strategy has been a heating fuel change from natural gas to electric geothermal and VRF systems.

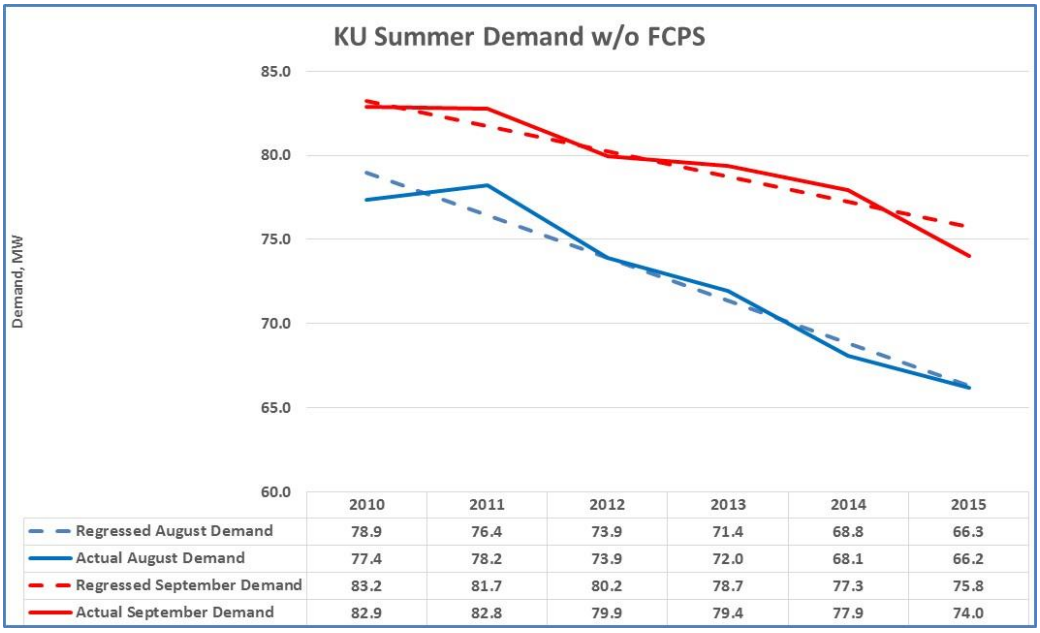
Fayette County's EUI over that time period has dropped from 78.2 to 72 with an anticipated EUI for FY2015 around 68 reflecting a net overall energy reduction driven by reduced natural gas offset by increased electric usage in the heating season. The electric energy usage is otherwise more efficient as natural and energy efficient lighting such as LED lighting retrofits have occurred during renovation. By employing current geothermal and VRF technologies and practices Fayette has avoided electric usage otherwise required from predecessor vintage electric fueled systems.

DEMAND (MW) REDUCTION

Individual school district measured demand data was rolled up into an LGE or KU summary. (Demand values for non-demand billed accounts were calculated monthly using respective monthly load factor for the demand billed accounts.) The non-diversified demand data was then analyzed for Summer Demand (August and September) and Winter Demand (January and February).

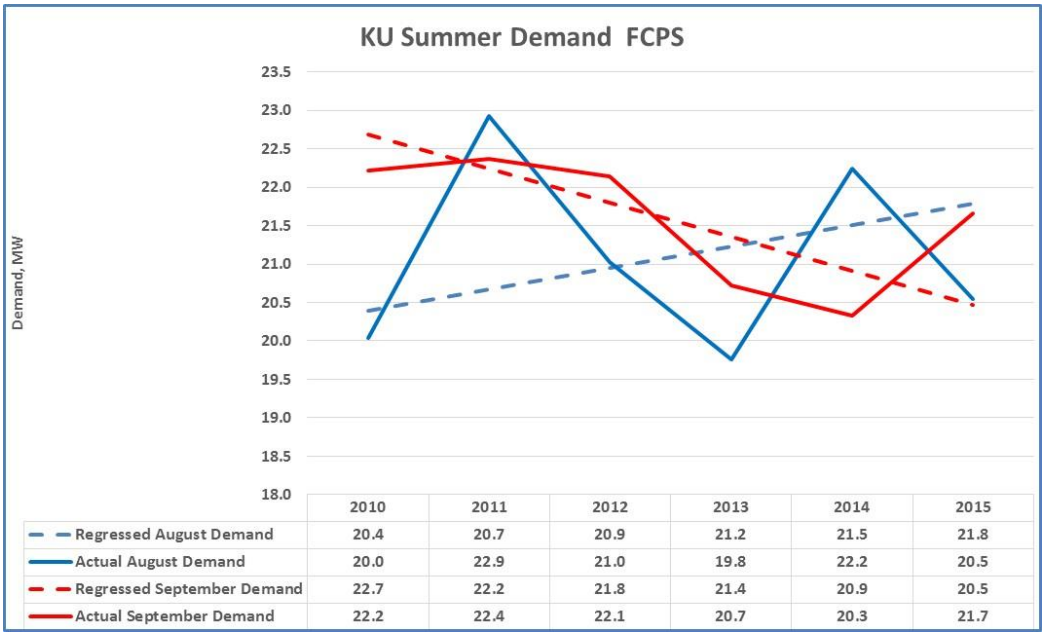
Summer Demand Reductions

The summer peak demand for schools coincides with the start of the school year when buildings are being taken out of summer setback and unoccupied modes and returning to a student-occupied mode.



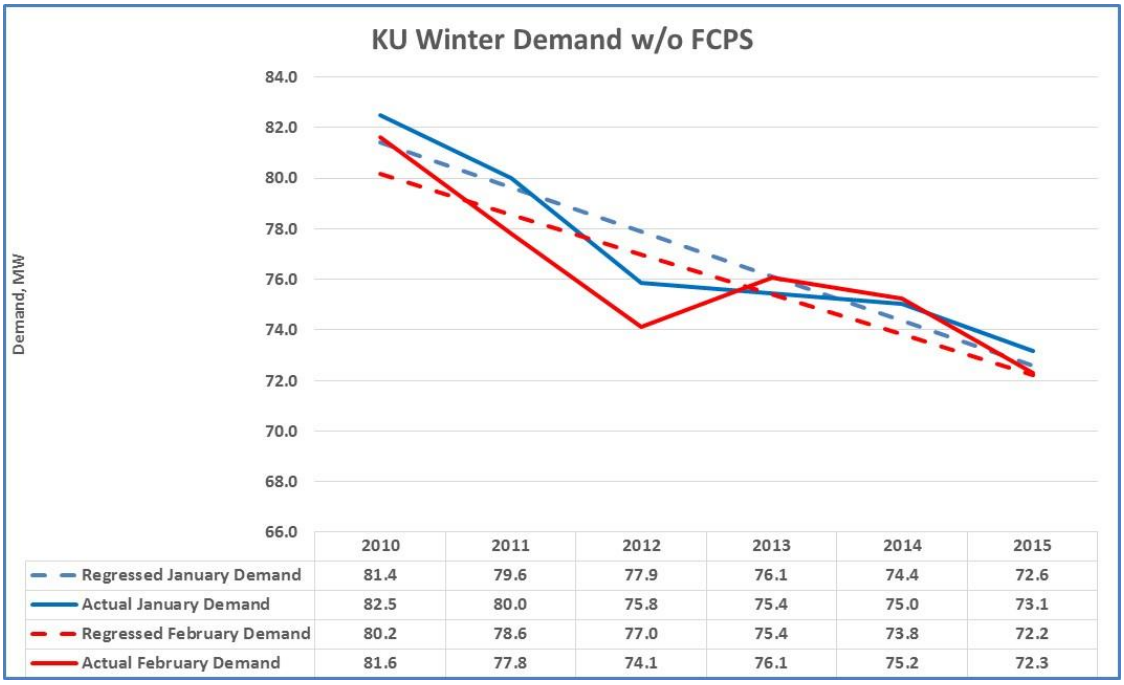
	2010	2011	2012	2013	2014	2015
Regressed August Demand	78.9	76.4	73.9	71.4	68.8	66.3
Actual August Demand	77.4	78.2	73.9	72.0	68.1	66.2
Regressed September Demand	83.2	81.7	80.2	78.7	77.3	75.8
Actual September Demand	82.9	82.8	79.9	79.4	77.9	74.0

The Summer Demand reduction for KU –served districts dropped 16% for August and 8.9% for September during the measured timeframe.



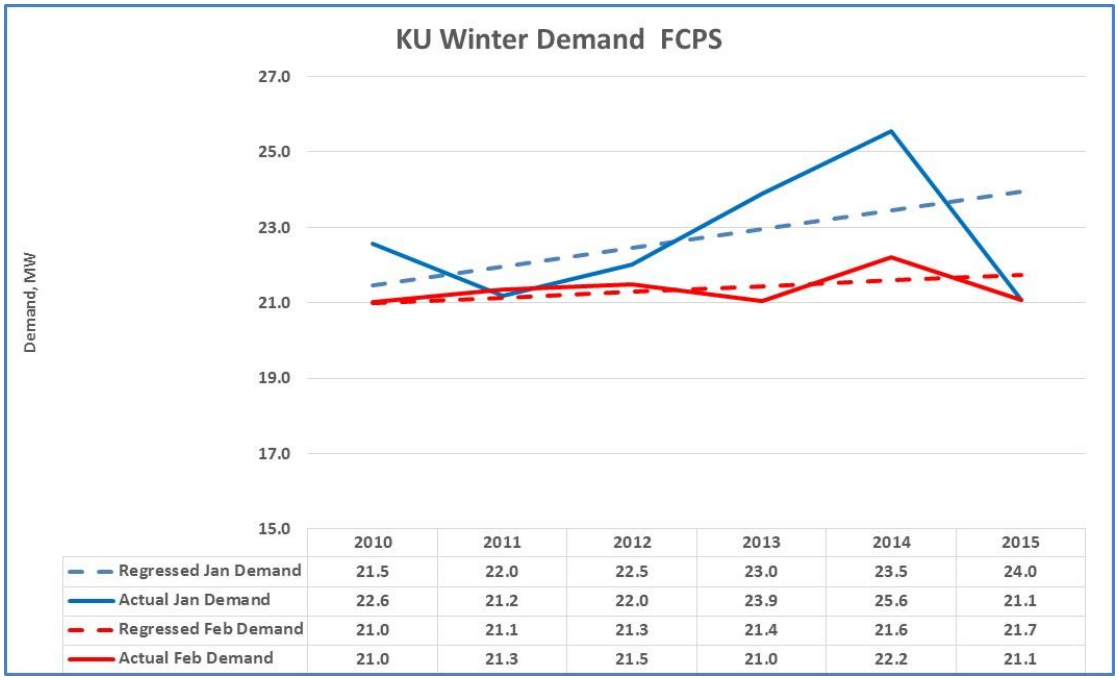
	2010	2011	2012	2013	2014	2015
Regressed August Demand	20.4	20.7	20.9	21.2	21.5	21.8
Actual August Demand	20.0	22.9	21.0	19.8	22.2	20.5
Regressed September Demand	22.7	22.2	21.8	21.4	20.9	20.5
Actual September Demand	22.2	22.4	22.1	20.7	20.3	21.7

Winter Demand Reductions



	2010	2011	2012	2013	2014	2015
Regressed January Demand	81.4	79.6	77.9	76.1	74.4	72.6
Actual January Demand	82.5	80.0	75.8	75.4	75.0	73.1
Regressed February Demand	80.2	78.6	77.0	75.4	73.8	72.2
Actual February Demand	81.6	77.8	74.1	76.1	75.2	72.3

The KU-served districts show a 10% reduction in January Demand and a 9.9% reduction in February Demand over the base period.



	2010	2011	2012	2013	2014	2015
Regressed Jan Demand	21.5	22.0	22.5	23.0	23.5	24.0
Actual Jan Demand	22.6	21.2	22.0	23.9	25.6	21.1
Regressed Feb Demand	21.0	21.1	21.3	21.4	21.6	21.7
Actual Feb Demand	21.0	21.3	21.5	21.0	22.2	21.1

As noted in the prior section Fayette County has undergone an aggressive renovation strategy over the last 5 years in roughly 1/3 of their portfolio of school buildings including a heating fuel change from

natural gas to electric geothermal and VRF systems. As expected their winter metered demand is increasing with the heating fuel change. Metered summer demand reflected in September has been declining as expected with the installation of efficient technologies. However, contrary to expectations normalized August summer metered demand since the FY2010 base period shows an increase. If FY2010 is excluded from the normalization a similar down trend to August is occurring.

ENERGY STAR Schools

The number of ENERGY STAR Labeled School Buildings is a significant measure of progress. Having a building which is ENERGY STAR labeled is international recognition for energy efficiency. Receipt of the ENERGY STAR label provides districts with recognition of achievement and showing of prudent use of tax payer funding of public schools. Figure 1 shows that the number of KU served ENERGY STAR labeled buildings has grown steadily since 2010 indicating greater energy efficiency.

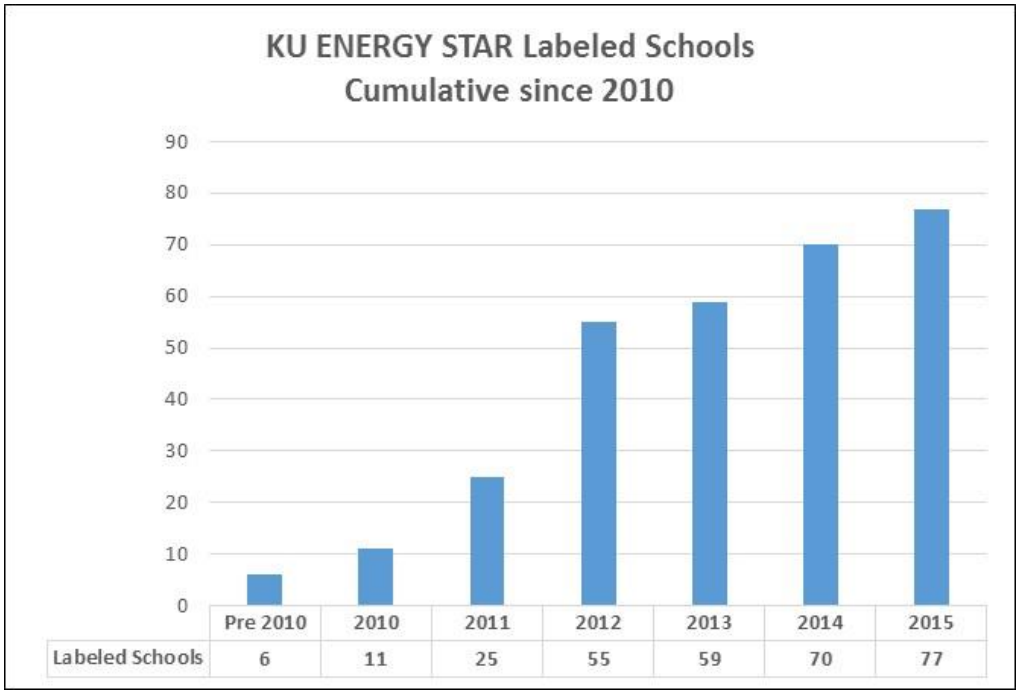
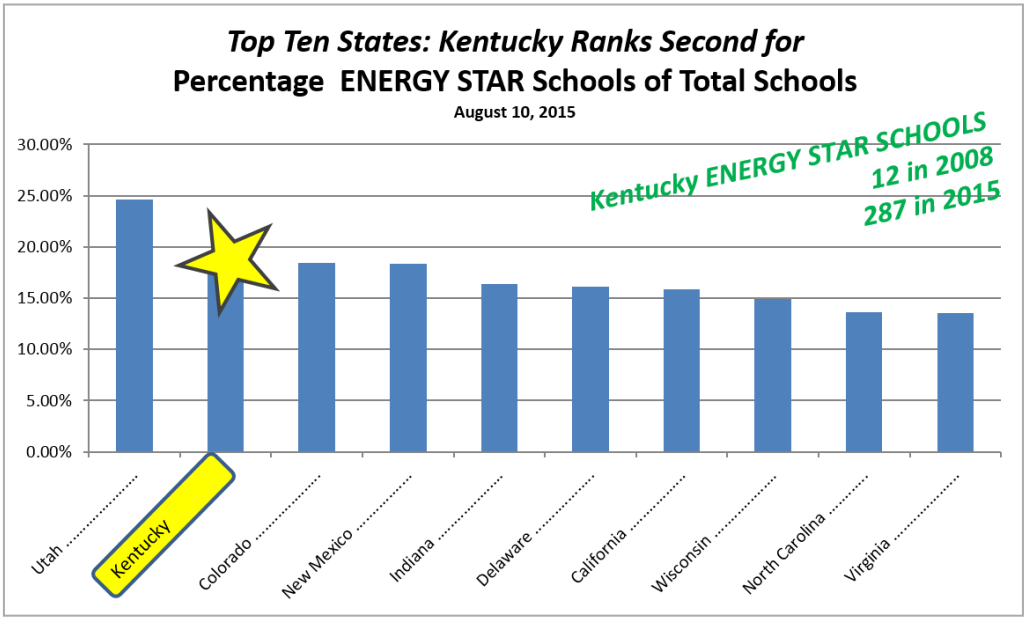


Figure 1, Cumulative ENERGY STAR labeled schools in KU served districts by year since 2010.



Kentucky now ranks 2nd in the nation in percentage of ENERGY STAR labeled schools.

Participation

The participation goal was for all districts served by LGE or KU to retain or employ an energy manager through at least FY2015 to maximize district response to KRS 160.325.

Participation

K-12 Schools:	**Total**	**LGE**	**KU**
Total	555	168	374
Participating	453	168	285
Districts:			
Total	84	5	79
Participating	58	5	53

Energy and Demand Savings Compared to Application Metrics

The Application in Case No. 2013-00067 identified the primary goal of the Energy Management Program for Schools to be "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 fifty or lower.

Demand and Energy Reduction

The SEMP base year is FY2010 and the first reporting year under LGE-KU program is FY2014. The data reported in Section V is for metered energy and demand for continuous accounts from the base year through FY2015. The reported demands are the summation of metered demands for demand billed accounts and calculated demands for 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 coincident peak demand.

The KU districts exceed the target for coincident peak demand reduction in August, and also exceed the target for energy. The table below lists the demand results for August and the annual energy usage by year.

August MW												
Actual						Norm					Norm Class CP	
	Incr		Cum			Incr		Cum				
77.4						78.9					59.2	
78.2	-0.8	-1.03%	-0.8	-1.03%		76.4	2.5	3.17%	2.5	3.17%	57.3	3.17%
73.9	4.3	5.50%	3.5	4.52%		73.9	2.5	3.27%	5	6.34%	55.4	6.34%
72	1.9	2.57%	5.4	6.98%		71.4	2.5	3.38%	7.5	9.51%	53.6	9.51%
68.1	3.9	5.42%	9.3	12.02%		68.8	2.6	3.64%	10.1	12.80%	51.6	12.80%
66.2	1.9	2.79%	11.2	14.47%		66.3	2.5	3.63%	12.6	15.97%	49.7	15.97%

TOTAL MWH										
Actual						Norm				
	Incr		Cum			Incr			Cum	
265,999						265,369				
260,351	5,648	2.12%	5,648	2.12%		257,410	7,959	3.00%	7,959	3.00%
241,058	19,293	7.41%	24,941	9.38%		249,450	7,960	3.09%	15,919	6.00%
236,353	4,705	1.95%	29,646	11.15%		241,190	8,260	3.31%	24,179	9.11%
238,522	-2,169	-0.92%	27,477	10.33%		233,531	7,659	3.18%	31,838	12.00%
230,540	7,982	3.35%	35,459	13.33%		225,571	7,960	3.41%	39,798	15.00%

Process

KSBA-District Memorandum Of Agreement

From the Kentucky School Boards Association standpoint, the process began with execution of a Memorandum of Agreement (MOA) with a "Lead" school district in a LGE or KU-served area who wanted to participate in the program. The MOA outlined the obligations of the district in terms of employing an energy manager, data collection, reporting, energy and demand reduction goals, and also financial remuneration based on the number of LGE/KU K-12 schools within each school district who may have partnered with the Lead to share in the costs and services of the energy manager. A sample of the Obligations of the District from the MOA are shown here:

1. 1. OBLIGATIONS OF The DISTRICT

1.1 The DISTRICT shall undertake the following obligations for itself and each of the Partners for LGE-KU served K-12 schools and further agrees that such terms shall be binding as applicable on the partnering districts sharing resources as provided in the premises:

1.1.1 Employ an Energy Manager to comply with the energy management grant awarded to District by KSBA beginning July 1, 2013 and continuing through June 30, 2015 to serve itself and the Partners;

1.1.2 Develop and implement an Energy Management Plan ("EMP") and identify anticipated savings as consistent with KRS 160.325;

1.1.3 Provide for its Energy Manager to participate in energy management training, as coordinated by KSBA;

1.1.4 Submit to KSBA within 30 days of the last day of each calendar quarter for FY2013-14 and FY2014-15 the following information as required by the Program Agreement for itself and each of its partners:

a. Energy management initiatives implemented in the quarter.

b. Total monthly electric and gas demand and energy usage separated by LGE-KU and non LGE-KU service and by demand billed and non-demand billed on forms provided KSBA.

1.1.5 Develop a job description for the energy manager position that includes the following responsibilities:

- Assist district energy committee with implementation and maintenance of district EMP.
- Analyze utility bill correctness and develop baselines to facilitate computation of ongoing energy savings.
- Facilitate and/or conduct building energy assessments and identify actions to enhance efficient use of energy.
- Review existing building operation procedures and implement revised procedures to facilitate more efficient energy use practices.
- Implement and support Energy Teams at the individual school level.
- Maintain accurate records and databases for efficient program monitoring and evaluation.
- Communicate efficient energy usage practices and achievements to faculty, staff, students and the community.
- Evaluate opportunities for ENERGY STAR Certification and develop and implement practices to achieve such certification.
- Participate in Professional Development opportunities to better understand relationship between energy management, school districts and its relationship to educational, financial and environmental goals and objectives.
- Collaborate with teachers in developing energy efficiency as a core curriculum element.

1.1.6 Coordinate with KSBA an annual work plan for the Energy Manager to facilitate the following goals for LGE-KU served K-12 schools:

- Reduction of school Energy Utilization Index by 2.5 percent
- Compliance with KRS160.325 and Board Policy
- Completion up to five building energy assessments
- Certification of one or more new ENERGY STAR Rated Schools as applicable
- Support of student energy team projects

1.1.7 Provide invoice(s) and supporting documentation quarterly as required to KSBA for costs to be reimbursed subject to terms of this Agreement;

1.1.8 Provide KSBA monthly timesheets for the Energy Manager that shows time spent for each district served by the Energy Manager;

1.1.9 Comply with the applicable requirements of the attached Program Agreement, which is attached and is hereby incorporated into this AGREEMENT;

1.1.10 Retain all records relating to the Project for at least three (3) years after the end of the term of this AGREEMENT;

Since many Energy Managers cover multiple school districts, it was up to the lead school district in a partnership to set up a partnership agreement with each participating partner. This example illustrates the complexity of dealing within multiple district partnerships each having a different percentage of LGE-KU K-12 schools.

Energy Manager Training

As soon as the district MOA's were in place, one-on-one meetings began with each energy manager to discuss standardized data collection and formats. With a wide-range of experience in energy and energy management, several strategies were used to build the depth of knowledge for energy managers. It was also important to recognize this group being the "boots on the ground" in the district, have daily contact with the building users, thus having an impact on the culture surrounding energy usage. This effort was supported by the LGE-KU grant and other funding opportunities. The training was available to all LGE-KU served districts whether or not their energy manager was funded in part by the LGE-KU grant.

James Gardner, Vice Chairman, PSC presents issues for energy managers to consider in their planning.

The following professional development opportunities were provided:

- Two (2) training conferences for funded energy managers with 40 attendees with the following topics:
    - Performance Contracting
    - What to do with your Load Profile
    - What's new in Geothermal!
    - Before you Buy VRF…. Considerations from ASHRAE
    - UK Tours
        - The Delta Room – Take a sneak peek inside The University of Kentucky's 24/7 Building Automation Control Center. This process save more than $3 million dollars annually.
        - UK Power Demand Management – UK operates three electricity substations with a combined peak of over 70MW. Examples of demand management strategies will be shared, including power factor savings and the benefits of load scheduling.
        - Renewable Energy on UK's Campus – Student interest and educational benefits are driving the University to explore more renewable energy options. Existing installations, curricular integration, and options for the future will be reviewed.
        - WALK-THROUGH the Cooling Plant: UK operates four large central chiller plants to serve the campus cooling needs. Two of the chillers are 5,000 ton units!

- Getting value from the energy management process
- HVAC side of Maintenance
- Selling an Energy Conservation Measure

- Four (4) regional training sessions covering the following topics:
  - Changes in the Energy Landscape
  - Successful Energy Management
  - Rebates . . . Money Lost if not Pursued
  - LED Lighting – Options & Considerations
  - Strategies to Maximize Building Control Systems

- Numerous remote sessions to provide individual instruction on utility tracking, rate comparison, as well as EXCEL training

Technical updates were coordinated with experts such as Joe Harrell, VP Operations for University of Cincinnati.

Outreach and Awareness

An important deliverable of 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 LGE-KU along with other funding made possible presentations, exhibits, and monthly newsletters to fulfill this objective during the reporting period.

KSBA-SEMP Staff participated in initial planning discussions for the US Dept. of Education's Green Ribbon Schools' tour in Kentucky. This recognition included Scott County Schools' Georgetown Middle School and Fayette County Schools' Wellington Elementary. Both schools are in the Kentucky Utilities Company service territory.

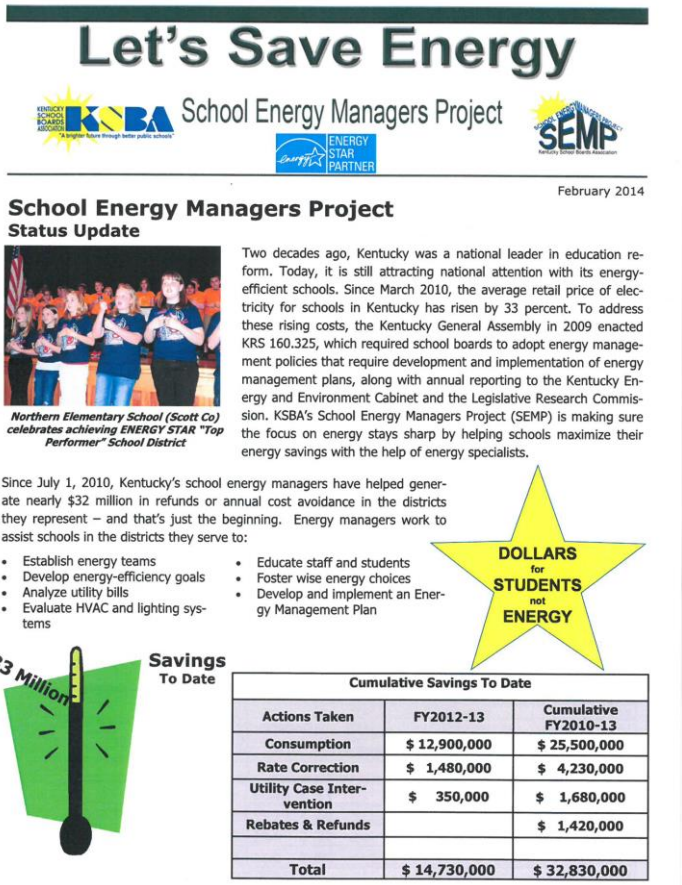
Presentations were made to the following:

- Kentucky General Assembly Special Subcommittee on Energy
- KSBA's Annual Conference – "Tight Budgets, Leaky Roofs, Failing HVAC Equipment: What's a Board Member To Do?"
- Kentucky Association of School Business Officials -- two-part presentation on the "Impact of Energy on Finance". KSBA fall regional board member training sessions (12 sessions with over 170 attendees)
- National School Boards Association Annual Meeting held in Nashville, TN - "*Energy Efficiency: The Untapped Fuel That Can Fund Your School District"*
- Received the 2015 ENERGY STAR Partner of the Year Award for Energy Program Delivery in Washington, D.C. for the second consecutive year

Exhibitor at the following conferences:

- Kentucky School Plant Management Association Annual Conference
- Kentucky School Boards Association Annual, Summer Leadership and Winter Symposium Conferences
- Kentucky Association of School Business Officials Fall and Spring Conferences

Connecting with board members, superintendents, finance officers, and facility directors at various conferences is important in helping districts understand how to be successful in energy management.



Let's Save Energy

School Energy Managers Project

February 2014

School Energy Managers Project
Status Update

Two decades ago, Kentucky was a national leader in education reform. Today, it is still attracting national attention with its energy-efficient schools. Since March 2010, the average retail price of electricity for schools in Kentucky has risen by 33 percent. To address these rising costs, the Kentucky General Assembly in 2009 enacted KRS 160.325, which required school boards to adopt energy management policies that require development and implementation of energy management plans, along with annual reporting to the Kentucky Energy and Environment Cabinet and the Legislative Research Commission. KSBA's School Energy Managers Project (SEMP) is making sure the focus on energy stays sharp by helping schools maximize their energy savings with the help of energy specialists.

Northern Elementary School (Scott Co) celebrates achieving ENERGY STAR "Top Performer" School District

Since July 1, 2010, Kentucky's school energy managers have helped generate nearly $32 million in refunds or annual cost avoidance in the districts they represent – and that's just the beginning. Energy managers work to assist schools in the districts they serve to:

- Establish energy teams
- Develop energy-efficiency goals
- Analyze utility bills
- Evaluate HVAC and lighting systems
- Educate staff and students
- Foster wise energy choices
- Develop and implement an Energy Management Plan

DOLLARS for STUDENTS not ENERGY

$33 Million Savings To Date

Cumulative Savings To Date		
Actions Taken	FY2012-13	Cumulative FY2010-13
Consumption	$ 12,900,000	$ 25,500,000
Rate Correction	$ 1,480,000	$ 4,230,000
Utility Case Intervention	$ 350,000	$ 1,680,000
Rebates & Refunds		$ 1,420,000
Total	$ 14,730,000	$ 32,830,000

Let's Save Energy is distributed to all school board members, superintendents, and other stakeholders monthly.

Monthly Newsletter sent to over 2000 stakeholders, focusing on:

- Impact of achieving ENERGY STAR Labeled school certification
- HVAC Controls implementation scheduling
- School district planning process for energy project implementation
- Evaluation of energy management skills
- Recognition of schools participating in the EPA National Battle of the Building for energy reduction
- Benchmarking best practices
- New technologies
- Education of energy related terms, i.e., Energy Utilization Index (EUI), load profiles, demand, consumption, etc.
- Recognition of schools/districts and energy managers who are succeeding with energy management efforts
- Discussion of factors impacting energy
- Emerging Energy Issues

Data Gathering

Energy Usage and Demand data was gathered by month for each district beginning with July 2009 through June 2015.[4] School districts do not have a standardized tool for collecting and recording data so this involved multiple collection tools ranging from Purchased Software (EnergyCap, EnergyWatchdog, and SchoolDude) to excel spreadsheets. Where historical demand and usage data was missing from district records, LGE-KU regional customer support managers were contacted to fill in the required data.

Data Scrubbing

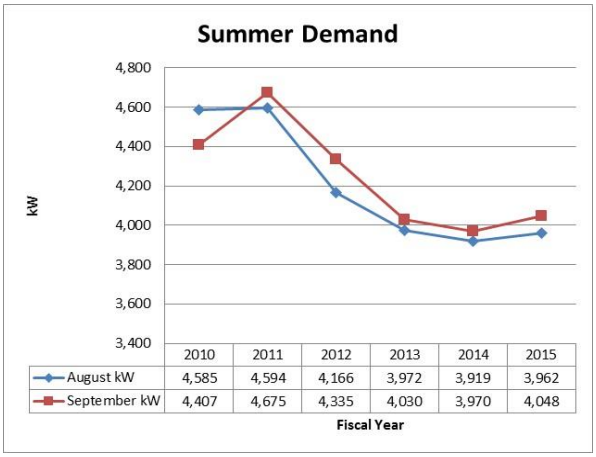
[4] Data is provided to KSBA SEMP for analysis and reporting on a quarterly basis. Since June 2015 data was not completely available for all districts at the due date of this report, April through June 2014 was used as a proxy for FY2015 Q4.

Only those accounts that were present since July 2009 and still remaining today were analyzed. Accounts which have been vacated since July 2009 were eliminated from the data analysis. Accounts which are new since that were 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 dues to renovations were either eliminated from the data base or reconciled by square footage calculations.

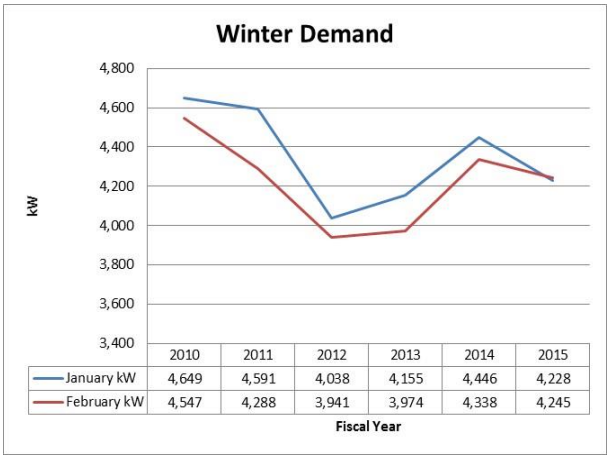
Data Analysis

Following the scrubbing of the data, each district's data was graphed showing 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.

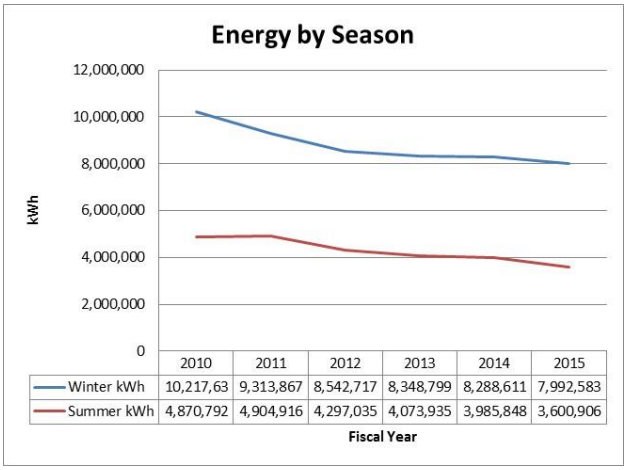
Finally, all data was rolled-up into an LGE or KU Summary and weather normalized.



	2010	2011	2012	2013	2014	2015
August kW	4,585	4,594	4,166	3,972	3,919	3,962
September kW	4,407	4,675	4,335	4,030	3,970	4,048



	2010	2011	2012	2013	2014	2015
January kW	4,649	4,591	4,038	4,155	4,446	4,228
February kW	4,547	4,288	3,941	3,974	4,338	4,245



	2010	2011	2012	2013	2014	2015
Winter kWh	10,217,63	9,313,867	8,542,717	8,348,799	8,288,611	7,992,583
Summer kWh	4,870,792	4,904,916	4,297,035	4,073,935	3,985,848	3,600,906