

Energy Use and the University of Kentucky

Info Sheet and Frequently Asked Questions

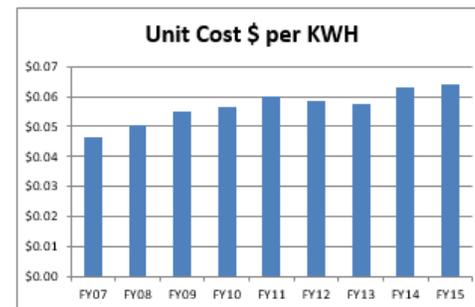
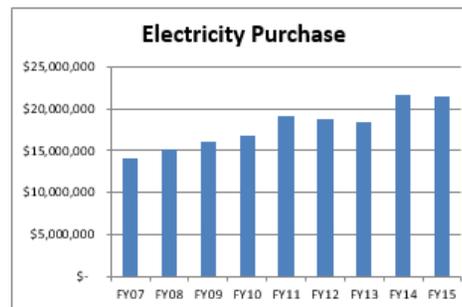
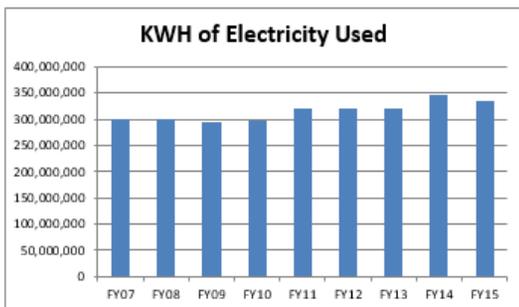
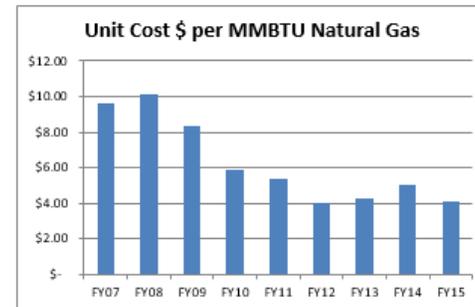
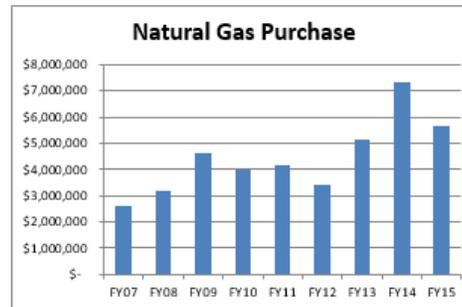
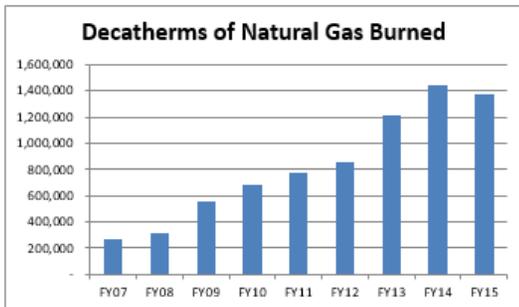
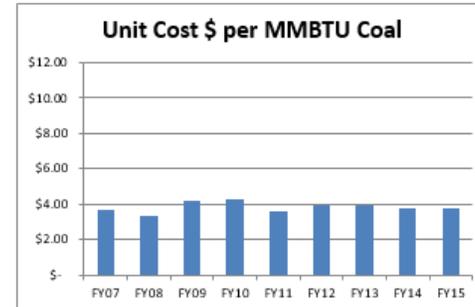
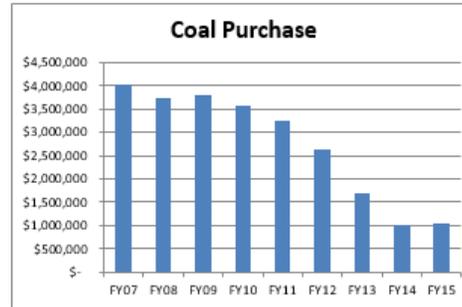
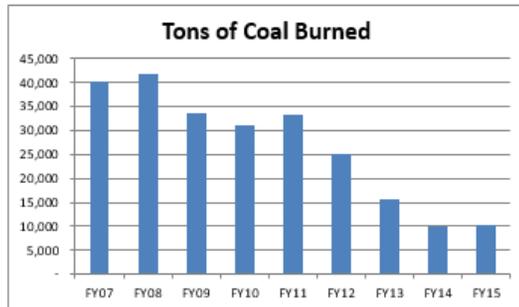
Students, faculty and staff of the University of Kentucky are increasingly interested in the status of our environment, both locally and globally. A key component of this environmental interest is often focused on greenhouse gas emissions and our institutional “carbon footprint.” Questions often turn to the issue of energy production and its relationship to various decisions we collectively and/or individually make regarding the way we use and produce power and heat for our homes, offices and institutions. What are the impacts of these decisions on operating costs, budget affordability and campus sustainability? A variety of complex facets are associated with these issues. They can often involve conflicting environmental, social and financial goals. At UK, the carbon footprint question has produced significant ongoing discussion, advocacy and disagreement on the most important goals and strategies to consider. These debates and discussions are integral and central to life on a university campus. Given this interest, it is important to set forth some basic facts regarding how the University of Kentucky institutionally powers and heats our facilities and a list of current efforts by the university to reduce our overall campus carbon footprint. To that end, this set of Frequently Asked Questions has been produced by UK Facilities Management Offices.



1) What are the sources of our energy usage and how do these relate to UK's carbon footprint?

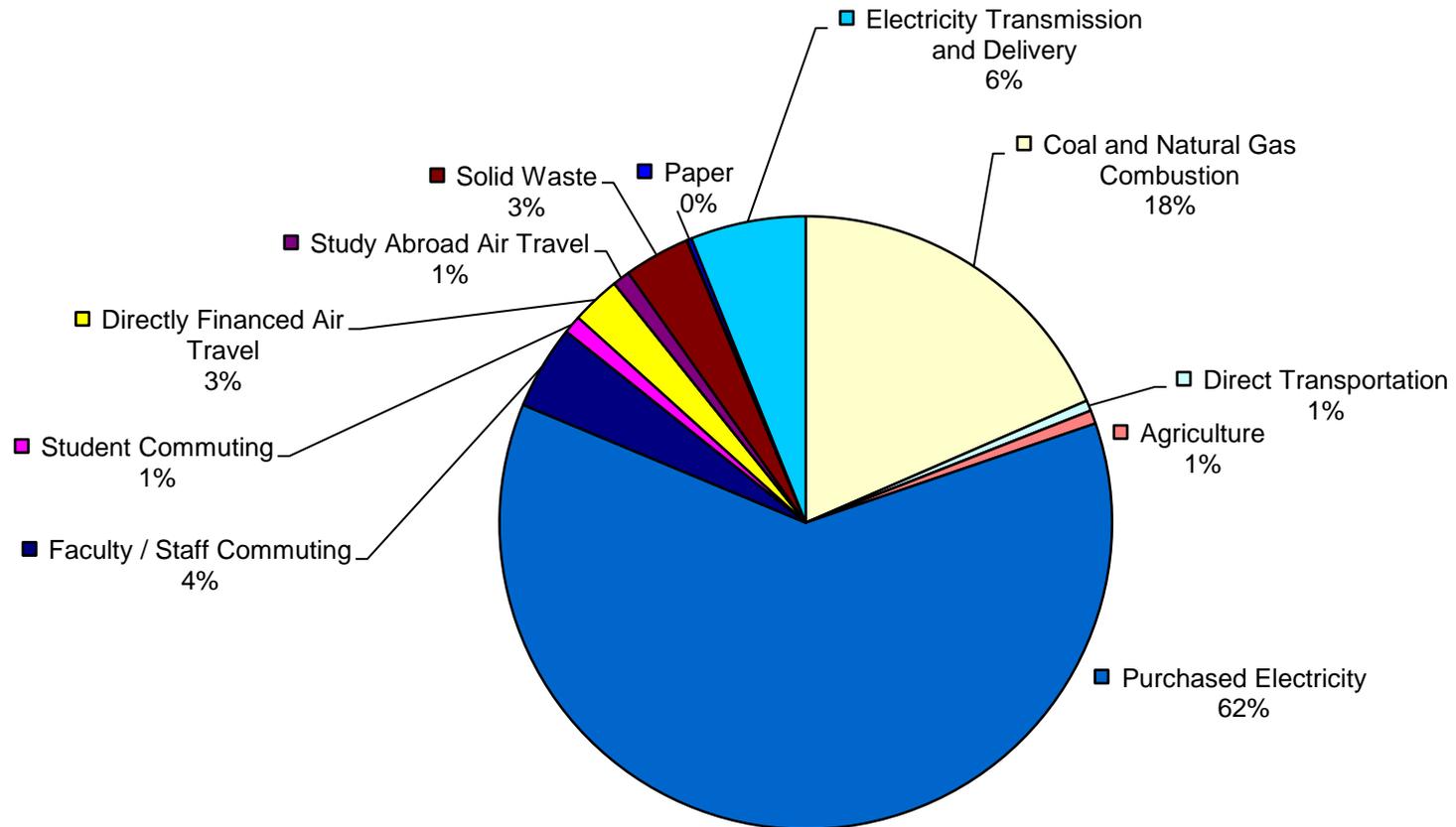
Answer:

Energy to heat, cool and power the University of Kentucky's facilities comes from three main sources: purchased electricity from a private utility company for power and cooling capacity, and on-site combustion of coal and natural gas to produce steam for heating campus facilities. The graphs below detail the 9 year (fiscal years- July 1-June 30) trends for each of these energy sources. Some additional electricity and natural gas used for miscellaneous purposes is not captured in these trends.



UK's greenhouse gas (GHG) emissions result from a wide variety of sources, but are primarily attributed to our purchased electricity, including transmission and delivery (68%) and our on campus combustion of coal and natural gas (18%). The chart below represents the University's emissions in FY 2012.

UNIVERSITY OF KENTUCKY 2012 GREENHOUSE GAS EMISSIONS:
524,831.5 metric tons of CO₂ equivalent



2) Electricity consumption is the largest element of the university's carbon footprint. Where does this electricity come from and how much do we use?

Answer:

UK purchases almost 100% of its electricity from the privately owned Kentucky Utilities Company at a cost of \$21.44 million in fiscal year 2015. The Davis Marksbury Building has a small, 30 kW solar photovoltaic array that generates several thousand kWh annually.

3) What can UK do to reduce the campus carbon footprint from the purchased electricity component of operations?

Answer:

The promotion of conservation and efficiency will have the most immediate impact on reducing greenhouse gas emissions.

UK Facilities operates a sophisticated centralized energy management control center, which is staffed 24/7, that monitors and controls the majority of the heating, ventilation, air conditioning, and other equipment on campus. This facility controls (reduces) energy use and seeks savings in off-peak hours, particularly during holidays and breaks when students are not on campus. For years, this central control system has lowered campus energy use and reduced our carbon footprint. Currently, it is saving more than \$3 million annually. By further extending night setbacks and other energy reduction strategies, the university recently became even more aggressive in central energy control in order to decrease campus utility bills.

The University also aggressively pursued electricity conservation and efficiency through a recent \$25-million partnership with Ameresco, an Energy Service and Performance Company. This involved installation and retrofit of more-efficient lighting, plumbing fixtures and building equipment. Through this project, UK reduced electricity consumption by more than 10 percent in the 61 buildings that are part of the project. For more information on this large-scale UK project as well as energy-saving tips for individuals, please visit www.sustainability.uky.edu.

4) How many central heating plants does UK operate? Are they all coal-fired plants? What do they produce and for what purpose?

Answers:

UK operates three central heating plants. The Medical Center Plant (located near the hospital) and the Central Heating Plant (located off Upper Street) have both coal and natural gas boilers. UK's third and most recently constructed plant, the Central Utilities Plant (CUP) (located off Press Avenue), is a natural gas-only facility with ultra-low nitrogen oxide (NO_x) burners. The CUP boilers have the ability to burn fuel oil if natural gas becomes unavailable. The CUP facility became operational in early 2010. All three facilities produce steam, which is then piped throughout the campus to produce hot water and building heat. UK does not produce electricity in any of these facilities.

5) How many tons of coal does UK burn? What percentage of our campus heating needs is supplied by coal versus natural gas? How much do we spend on these fuel sources?

Answer:

In 2013, UK burned 8,390 tons of coal providing 14% of campus heating demand met by the central heating plants. The remaining 86% of campus heating demand was met by burning natural gas. In FY2013 the University spent \$850,000 purchasing coal and \$6.36 million purchasing natural gas for steam production.

Steam production for each fuel stock is measured and compared in terms of MMBTUs (1,000,000 British Thermal Units). The price per MMBTU for each of these fuel stocks has shown significant fluctuations over time. Over the past seven years, the fuel cost to produce one MMBTU with natural gas has been as much as 191% higher than the cost of producing the one MMBTU with coal (\$9.64ng vs. \$3.31 coal). However, in recent years the price of natural gas has dropped sharply. In 2013, the delivered fuel price for one MMBTU of coal was \$3.74, compared to an average of \$4.48 per MMBTU by burning natural gas. In addition to the delivered price of coal there are costs of operating and maintaining the boilers which are higher for the coal-fired boilers.

6) UK is under a restriction on the total amount of coal we are permitted to burn each year under our Title V Air Quality Permit. What is that restriction and how will it impact the way UK provides heat to future campus growth?

Answer:

The University's Title V Air Quality Permit does set a limit on the amount of coal that can be burned on campus. In recent years the pollution content of coal available on the market has increased resulting in a decrease in the number of tons the University can burn per year without exceeding the thresholds set by our permit. In the fall of 2013 the University submitted an application to renew its Title V permit and expects the maximum coal burn allowed, given the pollution content of available coal, to be 20-23 thousand tons annually.

As a result, to remain in compliance and meet the heating needs of the university the most recently constructed Central Utility Plant (CUP) is fueled primarily by natural gas and uses fuel oil only when natural gas is unavailable. The heating needs that result from future campus growth will be met with expanded natural gas use as opposed to coal given permit restrictions.

7) What is the UK campus doing to reduce our institutional carbon footprint?

Answer:

The University administration believes it a worthy goal to reduce our institutional carbon footprint. To that end, the bulk of UK's efforts have focused on the largest element of our footprint, our overall electrical demand. UK has aggressively implemented and continues to move forward with energy efficient design standards and building operating efficiencies that are intended to curb our electrical demand and reduce our carbon footprint. These efforts include:

- Investing nearly \$25 million in the retrofitting of lighting and upgrading of mechanical equipment in several dozen campus buildings through an energy performance contract with Ameresco. The goal of this project is to reduce energy use by 10-15 percent annually.
- UK Facilities Management operates a sophisticated 24/7, centralized energy management control center which monitors and controls the majority of HVAC and other equipment on campus. This facility controls (reduces) energy use and seeks savings in off-peak hours, particularly during holidays and breaks. For years, this central control system has lowered campus energy use, reduced our carbon footprint, and is estimated to currently save more than \$3 million annually.
- All new construction and major renovation projects on UK's Campus will meet or exceed LEED Silver Certification. LEED, or Leadership in Energy & Environmental Design, is a program that sets forth prerequisites and goals for designing and constructing high performance facilities. Reducing the carbon footprint of new or renovated facilities is only one of many benefits associated with a LEED facility. To learn more, visit www.usgbc.org/LEED.

UK is also pursuing sustainable practices in other areas of operation:

- UK encourages carpooling for employees and operates a free transit service on campus. Through Parking and Transportation Services, UK is also promoting ride sharing and working to improve bicycling as an attractive and safe means of transportation.
- The University operates a bicycle library of nearly 150 bikes, which are available to all faculty, staff and students free of charge.
- To learn more about UK's numerous efforts to promote an institutional culture of sustainability, and in the process further reduce greenhouse gas emissions, please visit: www.sustainability.uky.edu

8) The questions surrounding campus coal usage have generated significant debate and discussion. What educational opportunities have taken place?

Answer:

The University of Kentucky, as a diverse community focused on higher education, will naturally be home to various viewpoints regarding issues related to energy. A variety of forums and educational activities have already taken place allowing each of the various, and often divergent, viewpoints to be expressed. UK also holds open houses in our central control facility, tours of our boiler operations, joint projects with researchers, and other activities to promote education and awareness on the overall topic of energy use and consumption. Kentucky Kernel [multi-media coverage](#) of 2.1.2012 tour of the Central Heating Plant.