

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 is 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.

FREQUENTLY ASKED QUESTIONS:

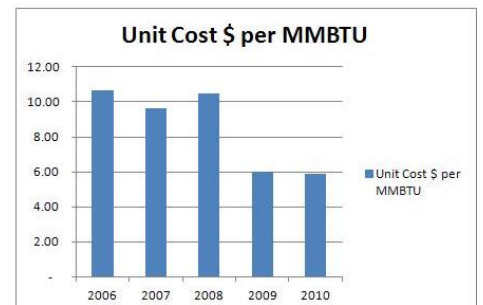
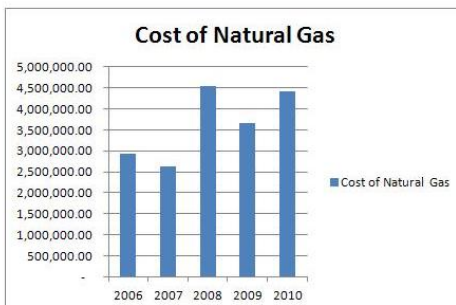
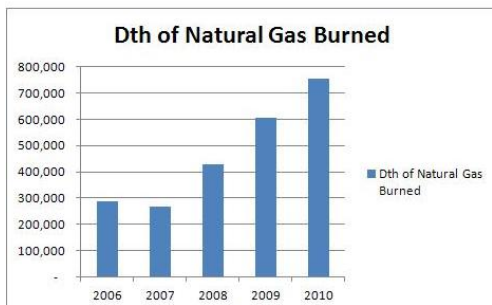
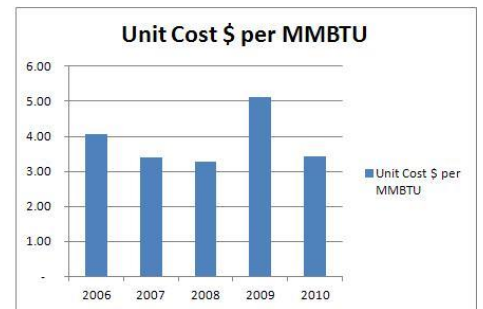
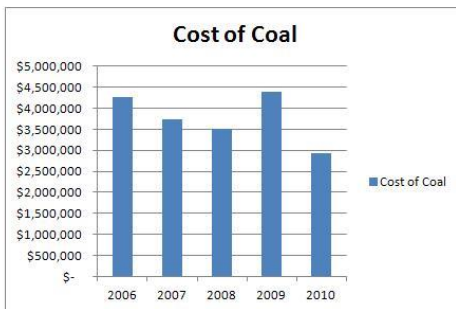
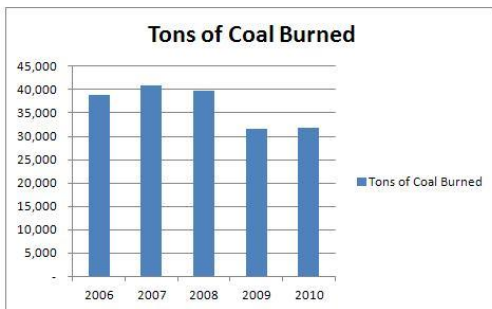
1) What are the sources of our energy usage and how do these relate to UK’s carbon footprint?

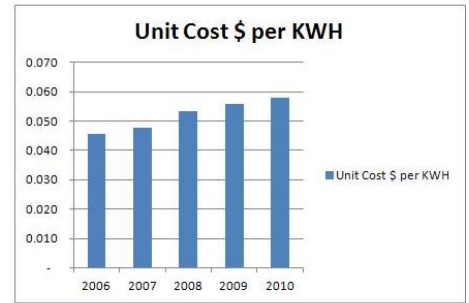
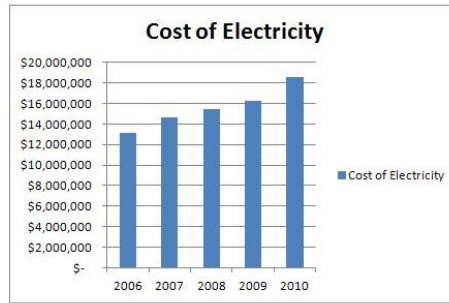
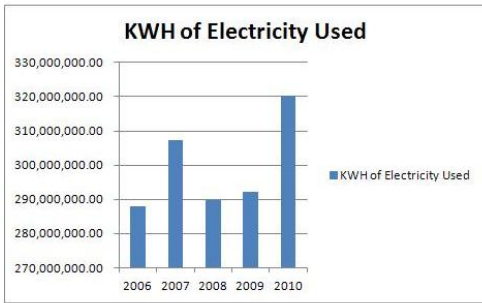
Answer:

Energy to heat, cool and power the University of Kentucky’s facilities comes from three main sources:

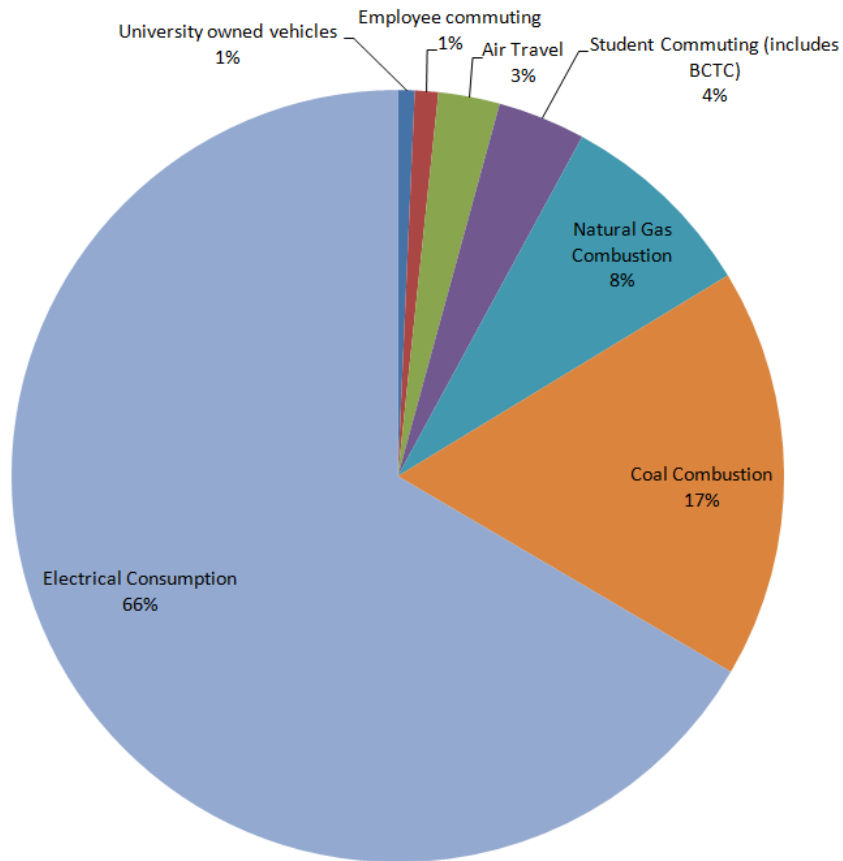
1. On-site coal combustion to produce steam heating of campus facilities
2. On-site natural gas combustion for steam heating of facilities
3. Purchased electricity from a private utility company for power and cooling capacity. *UK does not produce electricity for power or production of cooling capacity.*

The graphs below detail the 5 year trends for each of these energy sources.





UK's greenhouse gas (GHG) emissions come primarily from five sources: electrical consumption, coal combustion, natural gas combustion, auto emissions, and air travel. Auto emissions are divided into three categories: University owned vehicles, employee commuting, and student commuting. The greenhouse gas emissions from these sources in 2010 were 483,929 tons of carbon dioxide equivalent. Auto and air travel emissions in the chart below are based on 2006 data.



**UNIVERSITY OF KENTUCKY 2010 CARBON FOOTPRINT:
483,929 tons of CO₂equivalent**

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 an annual cost of a little more than \$19 million. The newly opened Davis Marksbury Building has a small, 30 kW solar photovoltaic array that generates several thousand kWh annually (a very small fraction of the overall consumption).

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 an estimated \$1.5 to \$2.0 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 is also aggressively pursuing electricity conservation and efficiency through a nearly completed \$25-million partnership with Ameresco, an Energy Service and Performance Company. This has involved installation and retrofit of more-efficient lighting, fixtures and building equipment. Through this project, UK plans to reduce 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 each year? What percentage of our campus heating needs is supplied by coal versus natural gas? How much do we spend on these fuel sources?

Answer:

UK's five-year average coal usage is 36,565 tons per year. On average 68 percent of our heat has been produced by burning coal and 32 percent is produced by burning natural gas. In 2010 the split was 53 percent coal and 47 percent natural gas; this was due to low natural gas prices. Exact percentages will vary by year due to pricing fluctuations and weather conditions. UK on average spends \$3.6 million per year for natural gas and over \$3.7 million per year for coal.

6) What is the bottom line cost differential for steam production based upon coal versus gas in a given typical year?

Answer:

Steam production for each fuel stock can be measured and compared in terms of MMBTUs (1,000,000 British Thermal Units). Prices for each of these fuel stocks can and have shown significant fluctuations over time. Over the past five years, the cost to produce 1 MMBTU with natural gas has been as much as \$10 dollars higher than the cost of producing the same MMBTU with coal. This would result in an increase of approximately \$7,000,000 annually in utilities cost. In recent years we have seen the cost for natural gas drop sharply. In 2010, this cost difference was only \$2.46 per MMBTU. To burn only natural gas would still have increased the cost of utilities by \$2,054,472.

7) Is UK considered a large purchaser of coal? Where does UK's coal actually come from?

Answer:

UK is a relatively small purchaser of coal in Kentucky. Power companies are the largest consumers of coal. All of the coal burned on campus is sourced from underground mines in Perry County, Kentucky. The contract to supply the university's coal is competitively bid and includes very strict quality standards.

8) 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 does that mean future campus growth will be heated by gas?

Answer:

The University is currently capped via the Federal/State air quality permit at a maximum annual coal burn of 47,250 tons. 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.

9) 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 is also revising its purchasing policies to encourage the purchase of energy efficient products.
- The University has recently opened its first LEED-certified building, the Davis Marksbury Building in the Digital Village, was awarded a Gold rating by the US Green Building Council. UK is incorporating LEED principles into the design and construction of all new facilities.
- 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 \$1.5 to \$2.0 million annually.

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.
- UK Dining Services have invested heavily in local food products, thus reducing the greenhouse gas emissions associated with transporting these items.
- 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

10) Cost of operations is an important issue in the overall affordability of a UK education. How are the issues of our energy consumption and heat production involved in this question?

Answer:

Changing the way steam heat is produced and consumed on campus would have a direct impact on this issue. In the short-term, investment in new infrastructure and equipment or expanded use of more expensive fuels would increase pressure on UK's finances. At the present time and for the foreseeable future, UK administration believes that we utilize the most cost-efficient mix of fuel sources, allowing us to keep our operations at a reasonable cost. Our immediate goal of carbon reduction is to focus on reducing our electrical consumption, which results in savings to bottom line of the university.

11) 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.

<p>Prepared by The Office of the Vice President for Facilities Management 225 Frank D. Peterson Service Building</p>
--