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KENTUCKY DEPARTMENT for ENERGY DEVELOPMENT & INDEPENDENCE

Kentucky Energy Profile 2010

Kentucky Energy & Environment Cabinet

Foreword

Fellow Kentuckians,

The Energy and Environment Cabinet and the Department for Energy Development and Independence offer this first edition of the Kentucky Energy Profile to provide the public with a snapshot of energy production, delivery, and consumption as well as trends in the energy industries of Kentucky. All of the information contained in the profile has been obtained from public sources, primarily source data from the Energy Information Administration (EIA). It is our hope that this document is informative and useful to the energy consumers and producers of Kentucky. If you have comments or questions, please direct them to Robert A. Amato, Director, Division of Energy Generation, Transmission, and Distribution. (Bob.Amato@ky.gov). We welcome your feedback.

Kentucky is the nation's third largest producer of coal, with rich deposits of low sulfur coal in the Appalachian mountains of Eastern Kentucky as well as deposits of Illinois Basin coal in Western Kentucky. The Commonwealth also produces natural gas and a limited amount of crude oil. Additionally, Kentucky has a 212,000 barrel per day petroleum refinery and two ethanol production facilities.

Historically, Kentucky has substantially relied on coal to produce electricity. In 2008, 94% of electricity within the Commonwealth was produced by coal fired power plants. Hydroelectric energy, biomass, petroleum, and natural gas resources accounted for the remainder of electricity generation.

Furthermore, Kentucky continues to be a national leader in energy production, and consequently enjoys some of the lowest electricity rates in the Country. However, the industries and economy of the Commonwealth face a regulatory environment that is quickly and dramatically changing. Regulations proposed or promulgated by the Environmental Protection Agency, intended to reduce pollution associated with the extraction and combustion of coal, put Kentucky's low cost electricity at risk. Furthermore, proposed Federal initiatives to reduce greenhouse gas emissions create greater uncertainty for electric energy industries accustomed to relying on greenhouse gas intensive fossil fuels.

This energy profile provides both a resource for understanding the current dynamics of energy production, delivery, and consumption within the Commonwealth, as well as a foundation for discussing Kentucky's energy future.

Sincerely,
Secretary Leonard K. Peters,

Kentucky Energy and Environment Cabinet

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Executive Summary

The inaugural edition of the *Kentucky Energy Profile* is offered to the public to serve as an impartial point of reference for data and issues regarding energy within the Commonwealth of Kentucky. A product of extensive research, database construction, and quantitative analysis, the profile is designed to help identify and explain the dynamics of energy consumption and energy production that are particular to the Commonwealth. Using summary statistics and time series analyses, the *Kentucky Energy Profile 2010* seeks to relay detailed information on energy consumption and production concerning fuel types and energy resources, as well as establish how energy is utilized by specific sectors of the economy. Additionally, great effort is focused on supplying the reader with the most recent, available data whenever possible, sometimes resulting in alternating years of analysis.

This document is divided into four general sections: Energy Commodity Costs, Energy Consumption, Energy Production, and Electricity. The division of this material is designed to focus information and analysis on particular areas of interest, while providing a holistic perspective on the dynamics of energy. It is the desire of the Kentucky Department for Energy Development and Independence (DEDI) that this document be used by policy-makers, researchers, businesses, and interested citizens to frame and inform discussions and decisions related to energy policy within the Commonwealth of Kentucky.

For matters relating to energy consumption in Kentucky, data are divided between the usage of fuels (or energy resources) and the energy requirements of specific economic sectors. In 2008, the Commonwealth consumed 1,982,844 Billion BTU of energy, ranking Kentucky 18th in total energy consumption (7th in energy consumption per capita). This amount represented a 2.14% decline in total energy consumption compared with 2007. Fuel usage in the Commonwealth in 2008 was led by coal, which contributed to 51% of Kentucky's energy requirements. This usage was distributed almost exclusively between the electric power sector and the industrial sector. The second leading fuel source was petroleum (and its associated products) with 34% of energy consumption, and was divided between the transportation sector and industrial processes. The remainder of energy consumption for the Commonwealth was fulfilled by natural gas and renewable resources in 2008.

From an economic perspective, the industrial sector of Kentucky was by far the largest consumer of energy in 2008, accounting for approximately 45% of total energy consumption. This position for industry is unique to Kentucky, as the national average for industrial sector energy consumption is less than one-third of total energy consumption. The substantial energy demands of Kentucky's industrial sector can be linked to energy intensive industries such as steel, aluminum, and manufacturing within the Commonwealth. The remaining balance of energy consumption in 2008 was divided between the transportation, residential, and commercial sectors (in order of consumption).

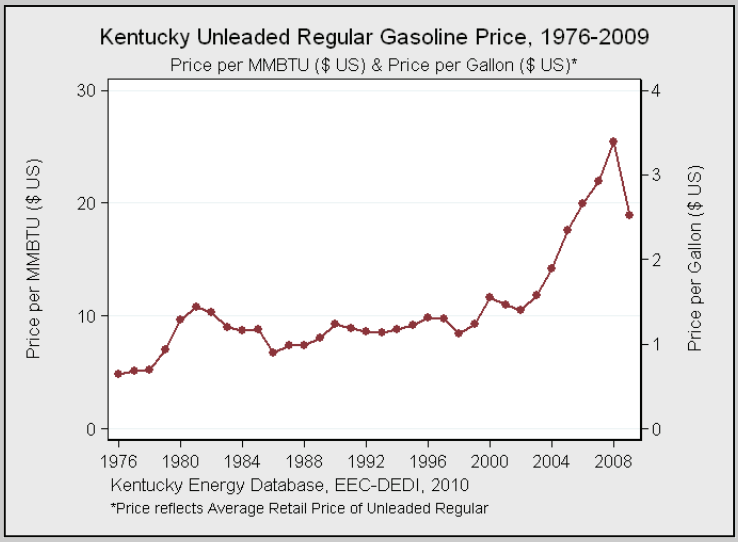
Energy production within the Commonwealth of Kentucky involves both the extraction or collection of fossil fuels and renewable energy sources, and has been historically dominated by coal production. In 2008, the Commonwealth produced 3,119,573 Billion BTU of energy, making Kentucky a net exporter of energy. This amount represented a 2.59% increase in total energy production compared with 2007, and qualified Kentucky as the fifth largest energy producer in the nation. Of this amount, coal accounted for 94% of all energy production in Kentucky in 2008, and positioned Kentucky as the nation's third largest producer of coal. Natural gas and renewable energy resources comprised 5% of total energy production in the Commonwealth, with crude oil production constituting a minimal component of total energy production.

The electric power sector, profoundly influential in the demand and consumption of energy supplies as well as economic activity, consumed 1,030,185 Billion BTU of energy in 2008 while generating 97,553 Gigawatt-hours of electricity. Representing a 3.37% increase in electricity generation compared with the previous year, the vast majority (94%) of this electricity generation was fueled by the combustion of coal. Petroleum was the next largest fuel source for electricity production, contributing 3% of the fuel requirements for generation. Hydroelectric power, natural gas, wood products, and biomass comprised the remaining 3% of electricity generation for the year.

The average price for electricity across economic sectors in Kentucky through 2008 was 6.26 cents per kilowatt-hour. This multi-sector average gave the Commonwealth the fourth lowest average electricity rates in the nation. These low rates directly affect the consumption of electricity across all sectors. The industrial sector led all other sectors in 2008, accounting for

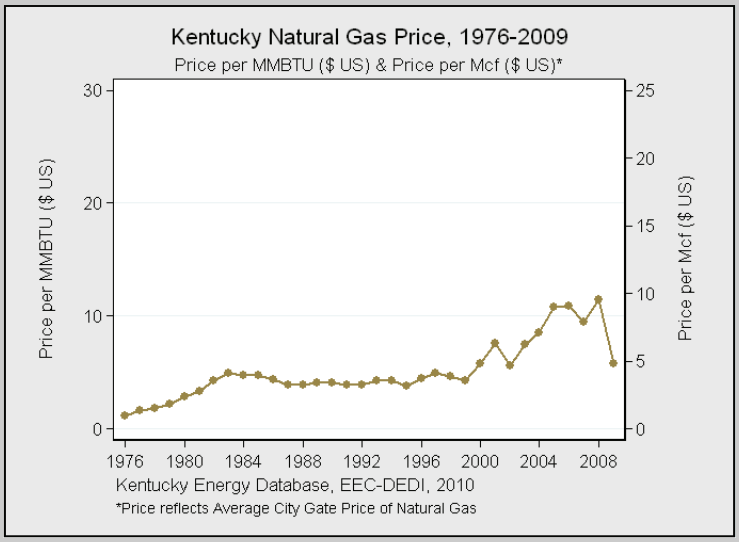
approximately half of total electricity demand. The industrial sector's significance in the consumption of electricity and the economy is much greater in Kentucky than in most other states. An average national electricity portfolio apportions just 27% of total electricity use to the industrial sector, which would meet little over half of Kentucky's industrial requirements. The residential sector was the next largest consumer of electricity, registering nearly 30% of total consumption and ranking 8th nationally in terms of per capita electricity consumption. The commercial sector consumed the remaining 21% of electricity in 2008. Additionally, Kentucky exported a net 7% (or 7,314 GWh) of the electricity it generated for the year.

Kentucky Commodity Prices



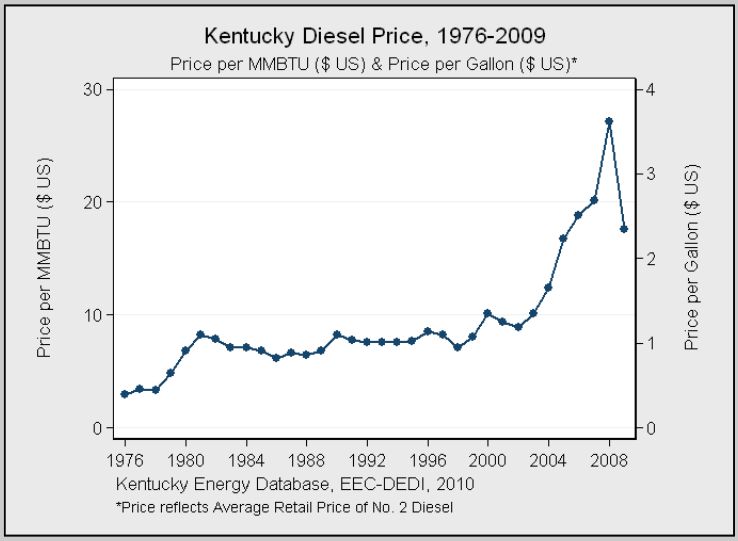
Fuel Type	($US)/MMBTU	($US)/Gallon
Gasoline	18.92	2.35

The average price of gasoline in Kentucky in 2009 was $2.35 per gallon. This represented a 28% decrease in the price of gasoline compared with 2008, and was measured by the average retail sales price of gasoline.



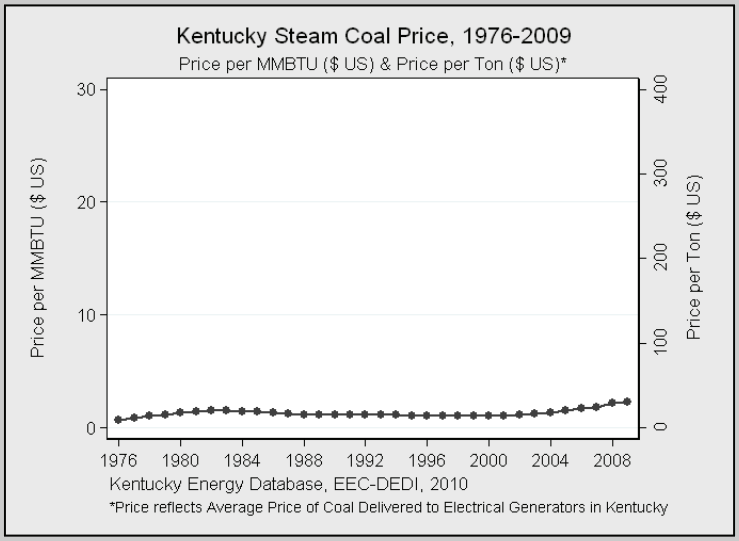
Fuel Type	($US)/MMBTU	($US)/Mcf
Natural Gas	5.82	5.98

The average price of natural gas in Kentucky in 2009 was $5.98 per thousand cubic feet. This represented a 41% decrease in the price of natural gas compared with 2008, and was measured by the average city gate price of natural gas.



Fuel Type	($US)/MMBTU	($US)/Gallon
Diesel	17.55	2.43

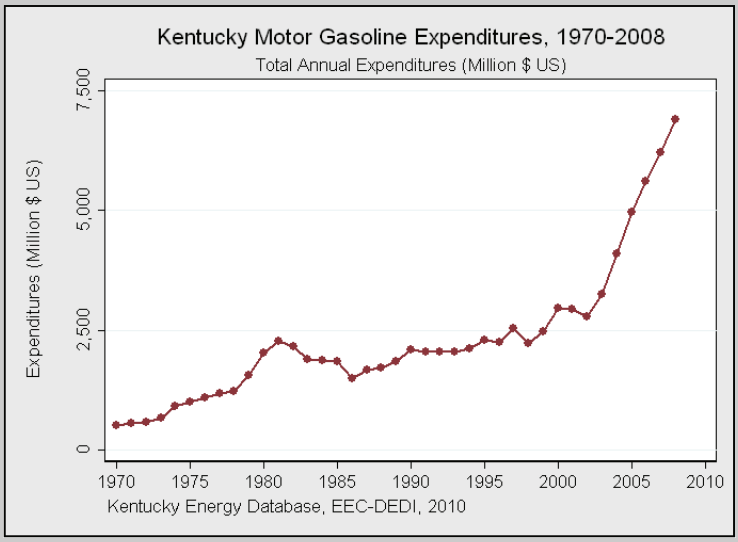
The average price of diesel in Kentucky in 2009 was $2.43 per gallon. This represented a 35% decrease in the price of diesel compared with 2008, and was measured by the average retail sales price of diesel.



Fuel Type	($US)/MMBTU	($US)/Ton
Coal	2.33	43.94

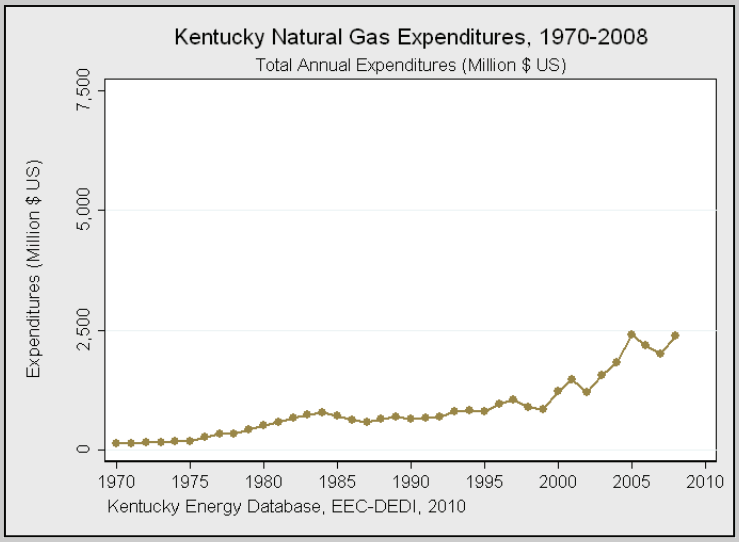
The average price of steam coal in Kentucky in 2009 was $43.94 per ton. This represented a 7% increase in the price of steam coal compared with 2008, and was measured by a weighted average of steam coal prices from the particular coal mine states of origin.

Kentucky Energy Expenditures



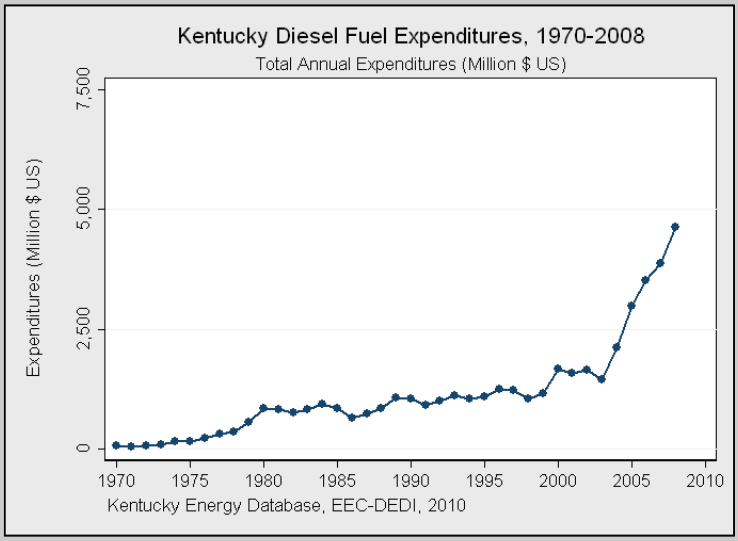
Fuel Type	(Million $ US)	% of Total
Gasoline	6,900	43%

Residents, businesses, and industries in the Commonwealth of Kentucky spent approximately $6,900 Million on gasoline in 2008. This amount represented an 11% increase in gasoline expenditures compared with 2007, and accounted for 43% of total energy expenditures in the State.



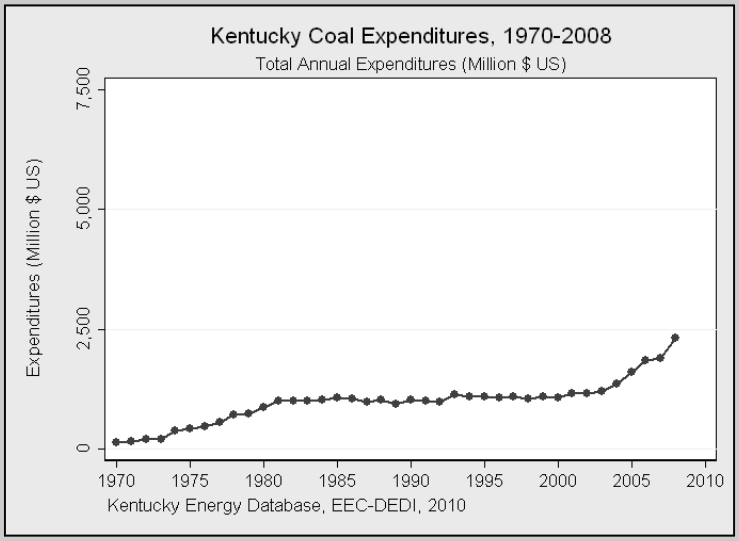
Fuel Type	(Million $ US)	% of Total
Natural Gas	2,369	15%

Residents, businesses, and industries in the Commonwealth of Kentucky spent approximately $2,369 Million on natural gas in 2008. This amount represented an 18% increase in natural gas expenditures compared with 2007, and accounted for 15% of total energy expenditures in the State.



Fuel Type	(Million $ US)	% of Total
Diesel	4,630	29%

Residents, businesses, and industries in the Commonwealth of Kentucky spent approximately $4,630 Million on diesel in 2008. This amount represented a 20% increase in diesel expenditures compared with 2007, and accounted for 29% of total energy expenditures in the State.



Fuel Type	(Million $ US)	% of Total
Coal	2,318	14%

Electric utilities, electric power companies, and industries in the Commonwealth of Kentucky spent approximately $2,318 Million on coal in 2008. This amount represented a 22% increase in coal expenditures compared with 2007, and accounted for 14% of total energy expenditures in the State.

Energy Consumption Introduction

Description:

Energy consumption is the process of converting a quantity of an energy resource (coal, natural gas, solar, etc.) into a more useful form such as heat, steam, or locomotion. Following this conversion, the new form of energy may be utilized to generate electricity, facilitate industrial processes, heat and cool buildings, enable the cooking of foods, and power automobiles and machinery for transportation. Consequently, it is of interest to quantify the total consumption of energy by both the fuel source that supplies this consumption, as well as how and where this energy is consumed, in order to understand the requirements and dynamics of energy usage in the Commonwealth of Kentucky.

Accounting:

For the purposes of standardized measurement and accounting, energy consumption within the Commonwealth is quantified by converting all supplies of energy into a British Thermal Unit (BTU) value. Though more widely used measurements may be included to reflect usage of a particular energy resource, this conversion is necessary to form a balanced comparison of consumption across energy supplies. Subsequently, energy consumption is then measured in terms of fuel type and/or by economic sector. Measurements of energy consumption by fuel type (coal, natural gas, solar, etc.) can help explain which resource(s) is enabling activities associated with energy consumption. Measurements of energy consumption by economic sector (Industrial, Commercial, Residential, Transportation, Electric Power) can help explain where and how energy resources are being utilized to enable activities associated with energy consumption.

An important distinction must be made between accounting for "primary" energy consumption and "end-use" energy consumption. Primary energy consumption reflects the total, potential BTU value of all energy resources consumed within the Commonwealth within a given period. Therefore, primary energy consumption should be understood as total energy consumption. End-use energy consumption reflects the ultimate, functional use of energy within the Commonwealth, subtracting conversion processes, energy losses, or energy inefficiencies. End-use energy consumption should be understood as the quantification of how energy is ultimately used within an economic sector. Energy consumption data is provided for the most recent year of observation, usually 2008.

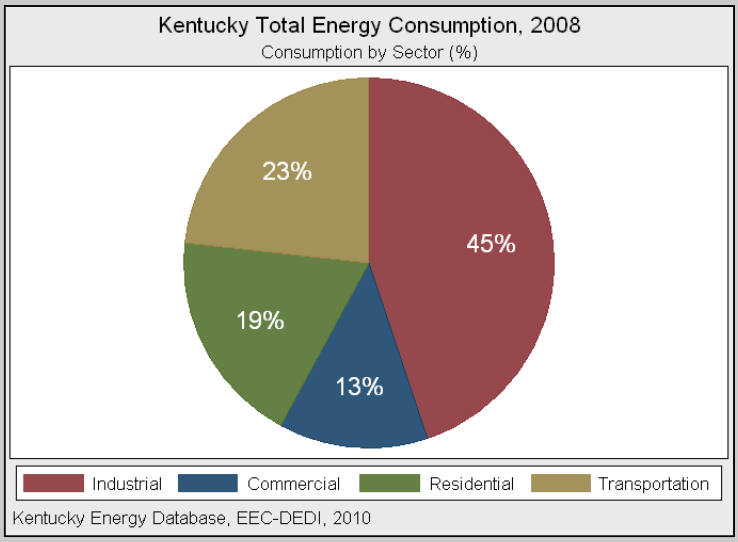
Summary:

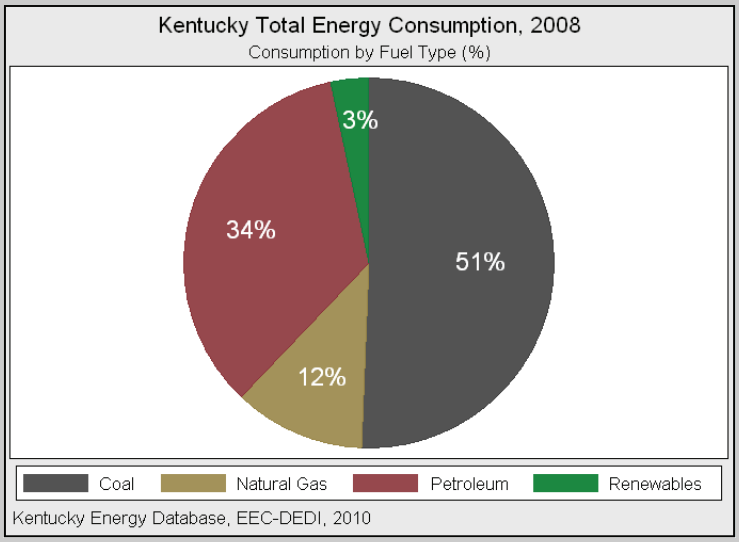
In 2008, the Commonwealth of Kentucky consumed 1,982,844 Billion BTU of energy. This amount reflected a 2.14% decline in total energy consumption, compared with 2007. The decline in total energy consumption within the Commonwealth can be mostly attributed to a decrease in the consumption of transportation fuels for the period 2007-2008.

In terms of energy consumption by fuel type, coal remained Kentucky's single largest energy source, supplying 51% of the Commonwealth's energy requirements. This sustained position of importance for coal can be explained by predominant coal-fired electricity generation and industrial coal usage within the Commonwealth. Petroleum products, utilized mainly for transportation and industry, were the second largest source of energy consumption (34%). A portion of energy consumption was supplied by natural gas (12%), which contributes primarily to electricity generation, industrial processes, and home heating. Renewable energy sources constituted 3% of energy consumption, and are typically a fuel source for home heating and electricity generation.

End-use energy consumption was led by the industrial sector (45%) in Kentucky in 2008. This dynamic is explained by the location of numerous energy intensive industries within the Commonwealth (such as steel production, aluminum production and manufacturing), which require substantial supplies of electricity, coal, natural gas, and petroleum products. The remainder of end-use energy consumption in Kentucky was comprised by the transportation sector (23%), residential sector (19%), and commercial sector (13%).

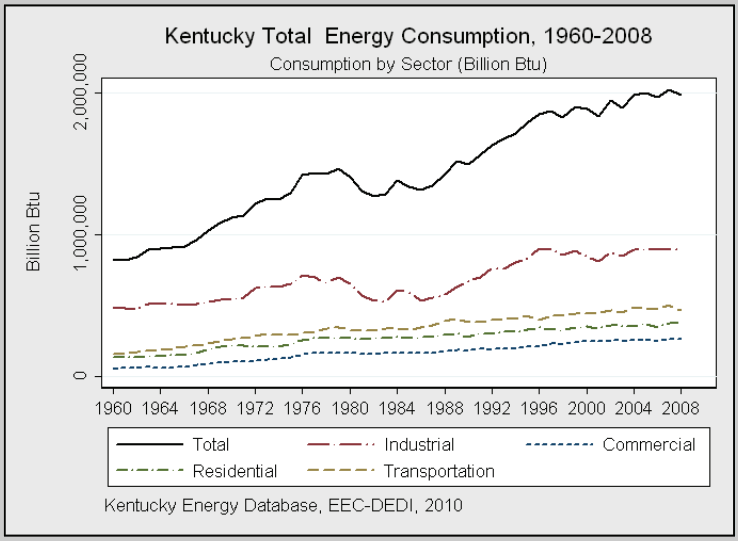
Kentucky Total Energy Consumption

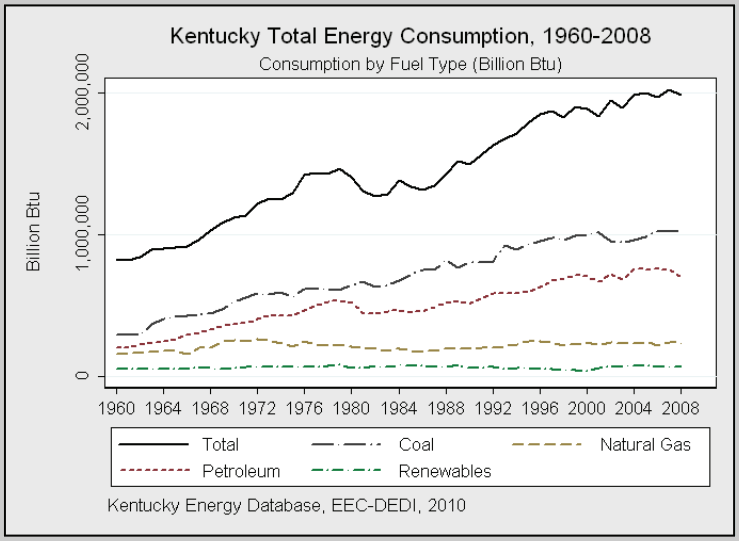




Sector	Billion BTU	Percentage
Total	1,982,844	100%
Industrial	890,569	45%
Transportation	460,830	23%
Residential	373,259	19%
Commercial	258,186	13%

Fuel Type	Billion BTU	Percentage
Total	1,982,844	100%
Coal	1,004,069	51%
Petroleum	684,071	34%
Natural Gas	228,303	12%
Renewables	66,400	3%

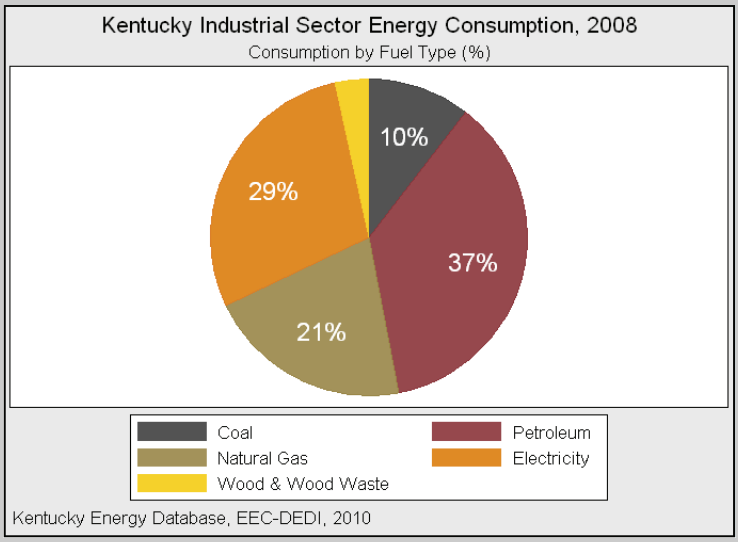


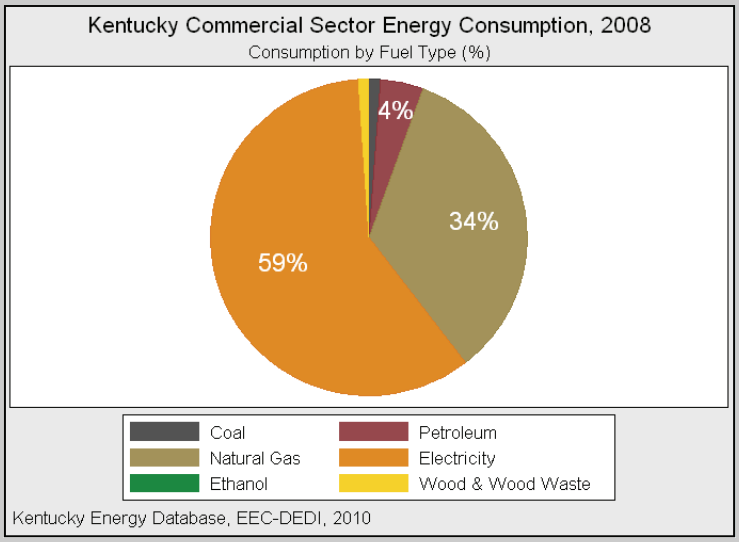


In 2008, the Commonwealth of Kentucky consumed 1,982,844 Billion BTU of energy, which reflected a 2.14% decline from 2007. This decline is mostly attributed to a decline in consumption of transportation fuels. The industrial sector accounted for 45% of total energy consumption, followed by the transportation sector (23%), residential sector (19%), and commercial sector (13%).

Coal remained Kentucky's primary energy source, providing 51% of the Commonwealth's energy requirements. Of the coal consumed, 95% was used to produce Electricity. Petroleum products, utilized mainly for transportation, were the second largest source of energy consumption (34%). The remainder of energy consumption was supplied by natural gas (12%), and renewable energy sources (3%).

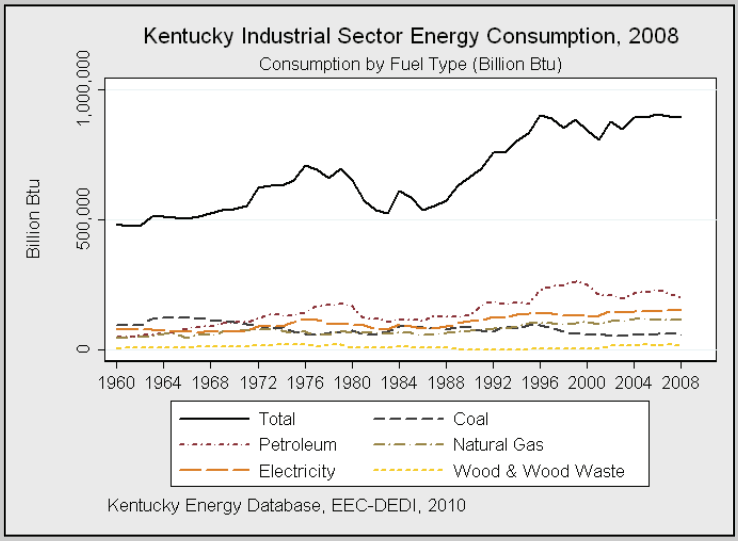
Kentucky Energy Use by Sector

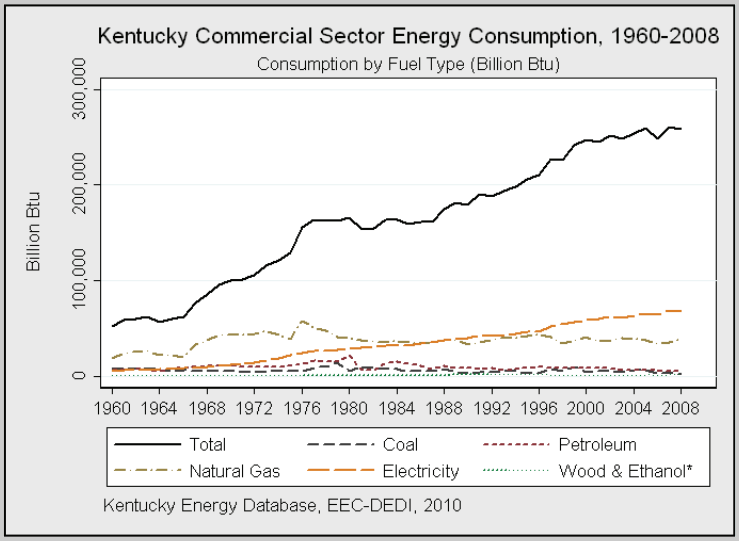




Fuel Type	Billion BTU	Percentage
Total	549,173	100%
Petroleum	200,664	37%
Electricity	157,627	29%
Natural Gas	114,471	21%
Coal	57,605	10%
Wood & Wood Waste	18,770	3%

Fuel Type	Billion BTU	Percentage
Total	113,093	100%
Electricity	67,110	59%
Natural Gas	38,450	34%
Petroleum	4,953	4%
Coal	1,341	~1%
Wood & Wood Waste	1,239	~1%

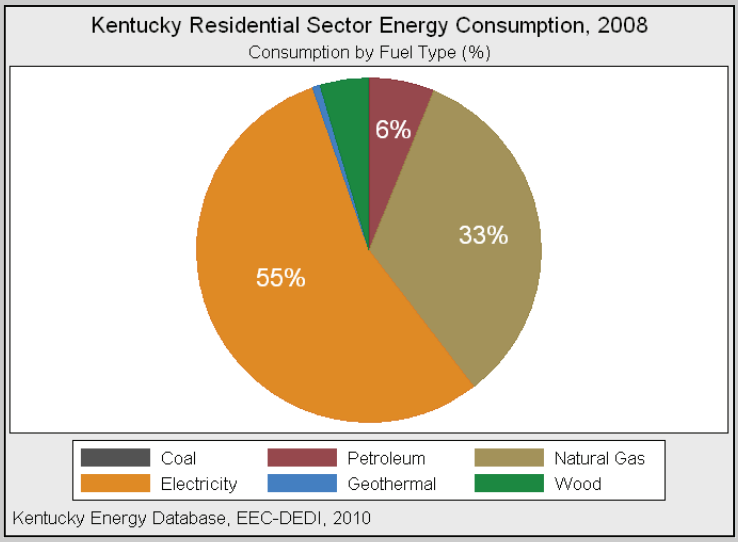


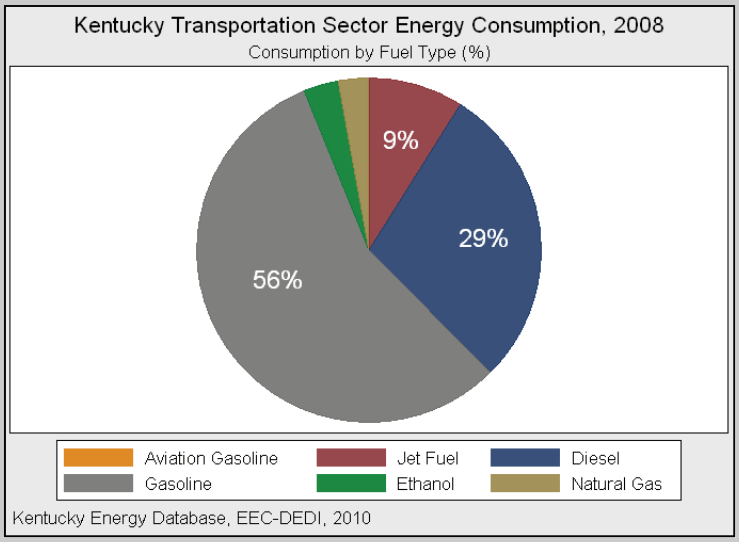


The **Industrial Sector** consists of all facilities and equipment used to produce, process, and assemble goods. Major components of the industrial sector include manufacturing, agriculture, mining, and construction operations. In 2008, Kentucky industries consumed 549,173 Billion BTU of energy, with petroleum products (37%), electricity (29%), and natural gas (21%) being the largest fuel sources for this energy consumption. Overall, total energy consumption in the industrial sector declined by 3% compared to the previous year of 2007.

The **Commercial Sector** consists of service-providing businesses, governments, public institutions, as well as religious and social groups. For 2008, non-industrial businesses in Kentucky consumed 113,093 Billion BTU of energy, with electricity accounting for 59% of this energy consumption. Natural gas was the next largest component of commercial sector energy consumption, representing 34% of total consumption. Overall, energy consumption for this sector increased only a small amount (0.36%) from the previous year of 2007.

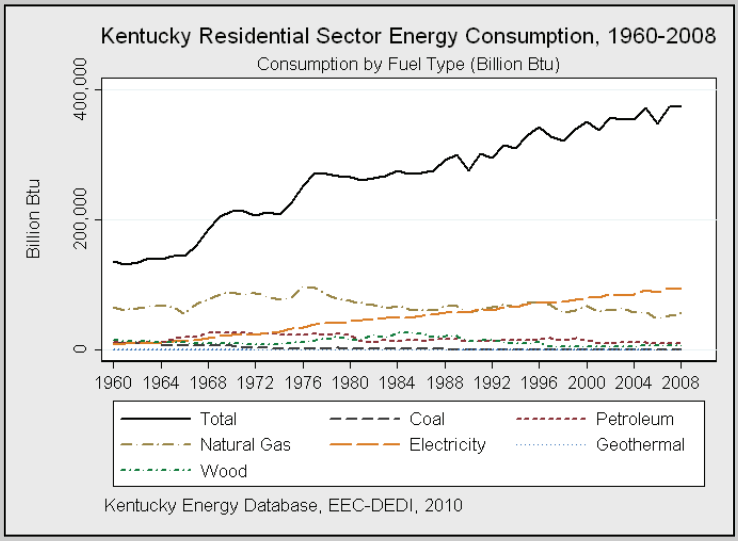
Kentucky Energy Use by Sector

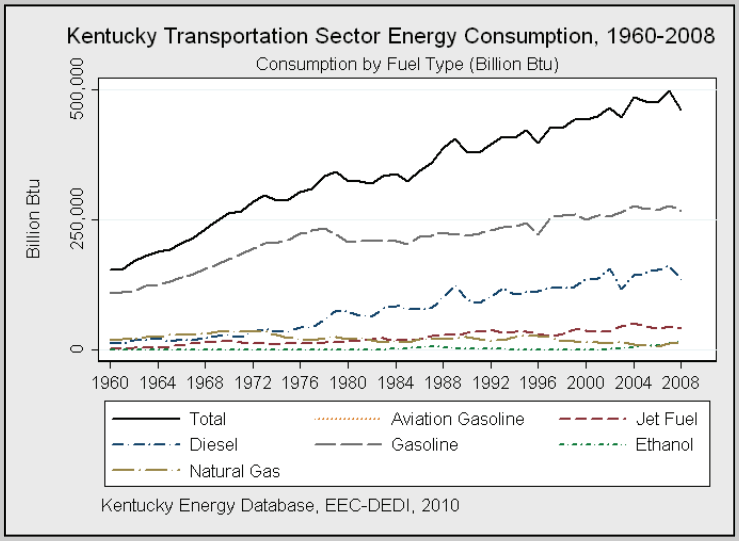




Fuel Type	Billion BTU	Percentage
Total	170,754	100%
Electricity	94,114	55%
Natural Gas	57,012	33%
Petroleum	10,414	6%
Wood & Geothermal	9,065	5%
Coal	149	<1%

Fuel Type	Billion BTU	Percentage
Total	472,968	100%
Gasoline	266,656	56%
Diesel	135,328	29%
Jet Fuel	42,101	9%
Ethanol	15,456	3%
Natural Gas	13,427	2%

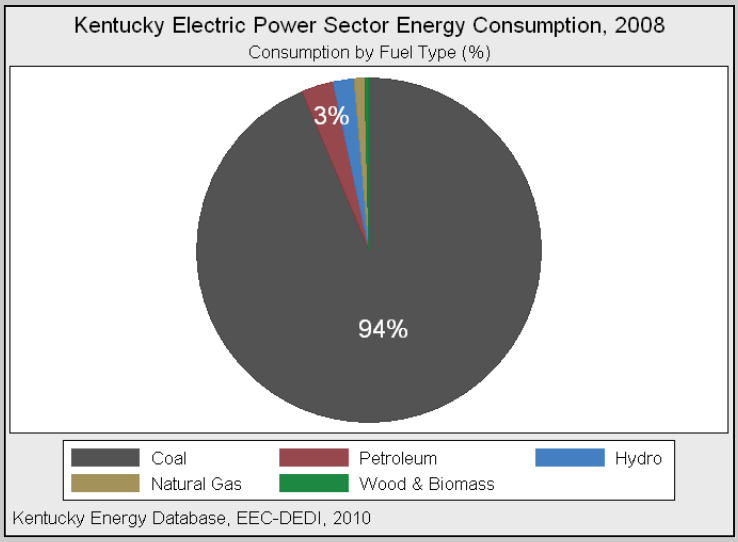


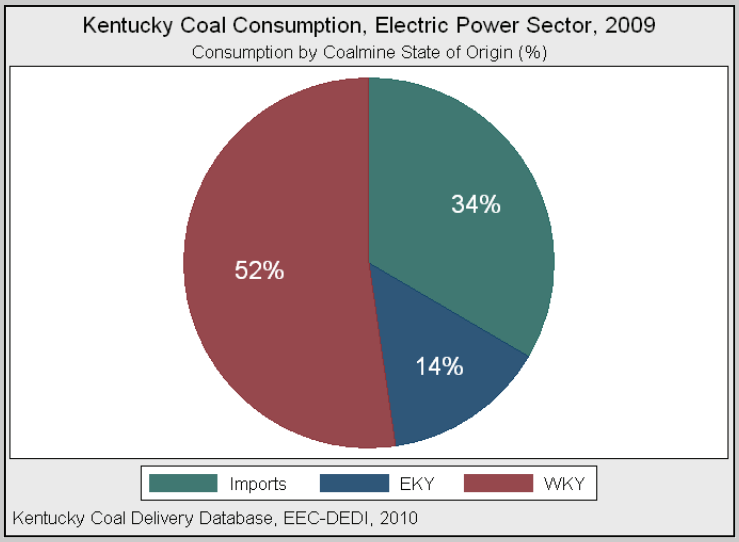


The **Residential Sector** consists of buildings and living quarters for private households. In 2008, private residences in Kentucky consumed 170,754 Billion BTU of energy. The vast majority of this energy consumption was divided between electricity (55%) and natural gas (33%), and relates to the energy demands of home heating and air conditioning. Overall, total energy consumption in the Residential Sector in 2008 increased by 2.3% compared to 2007.

The **Transportation Sector** consists of all vehicles whose primary purpose is the movement of people and/or goods from one location to another. This sector includes automobiles, trucks, buses, motorcycles, trains, subways, commodity pipelines, aircraft, ships, barges, and other vessels. In 2008, the transportation sector in Kentucky consumed 472,968 Billion BTU of energy. Gasoline comprised the largest portion of energy consumption in the transportation sector with 56% followed by diesel with 29% of total energy consumption. Overall, energy consumption for the transportation sector in Kentucky fell by 7.4% compared with the previous year of 2007.

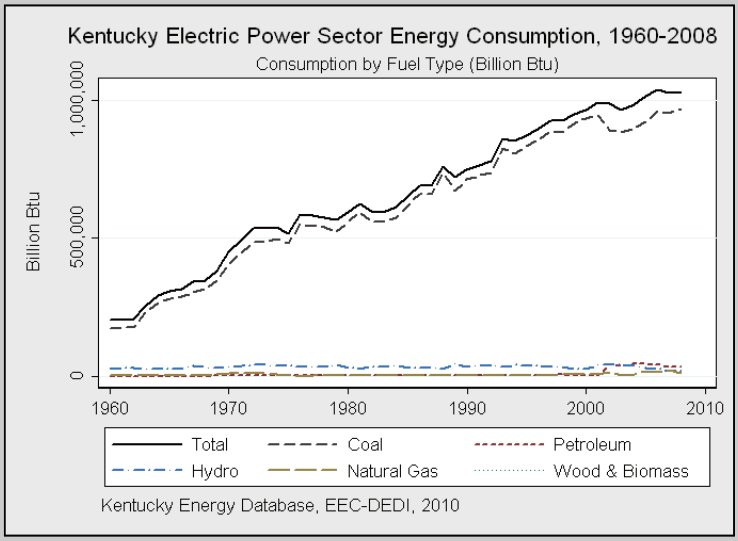
Kentucky Energy Use by Sector

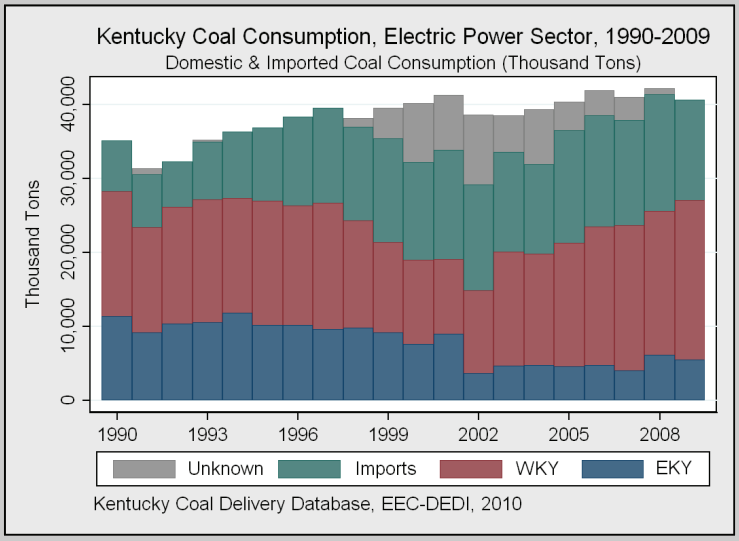




Fuel Type	Billion BTU	Percentage
Total	1,030,185	100%
Coal	965,876	94%
Petroluem	34,469	3%
Hydro	18,895	2%
Natural Gas	9,284	1%
Wood & Biomass	1,661	<1%

Coal Mine State	Thousand Tons	Percentage
Total	40,672	100%
Western Kentucky	21,271	52%
Imports	13,600	34%
Eastern Kentucky	5,801	14%

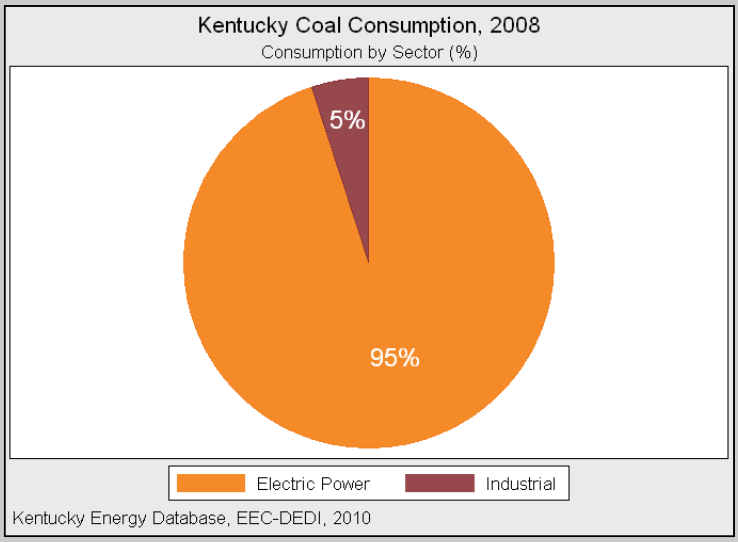


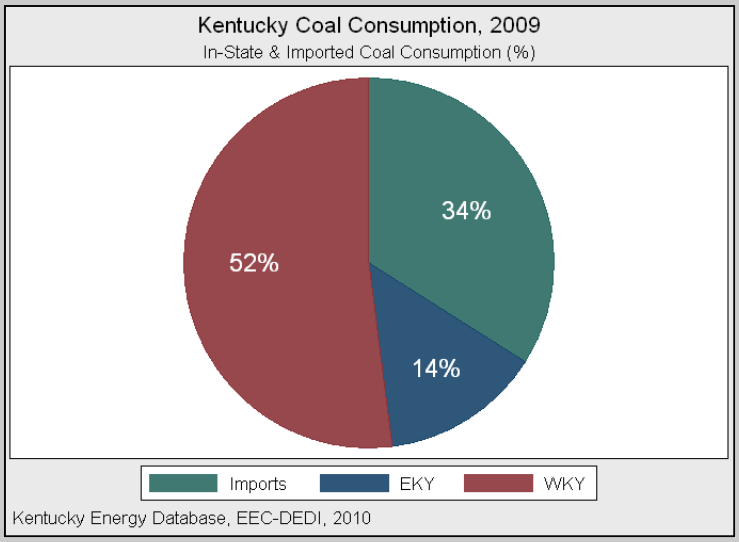


The **Electric Power Sector** consists of facilities whose primary function is the generation of electricity or combined-heat-and-power for the purpose of public sales. Utilities and independent power producers are included in the electric power sector. In 2008, the electric power sector utilized 1,030,185 Billion BTU of energy in the generation of electricity. The vast majority of this energy (94%) was derived through the combustion of coal. Petroleum was the second largest energy source for generation, accounting for 3% of energy requirements. The remaining energy needs of the electric power sector were satisfied by hydro power (2%) , natural gas (1%), and wood products and biomass (<1%) in 2008.

Additionally, accounting for approximately 95% of total coal consumption in Kentucky, the electric power sector received 40,672,130 tons of coal in 2009. This delivery amount represents a 1.75% decline from electric power sector coal deliveries in 2008. Of the coal delivered in 2009 to electric generating plants in Kentucky, 52% originated in Western Kentucky, 14% originated in Eastern Kentucky, and 34% was imported from out-of-state.

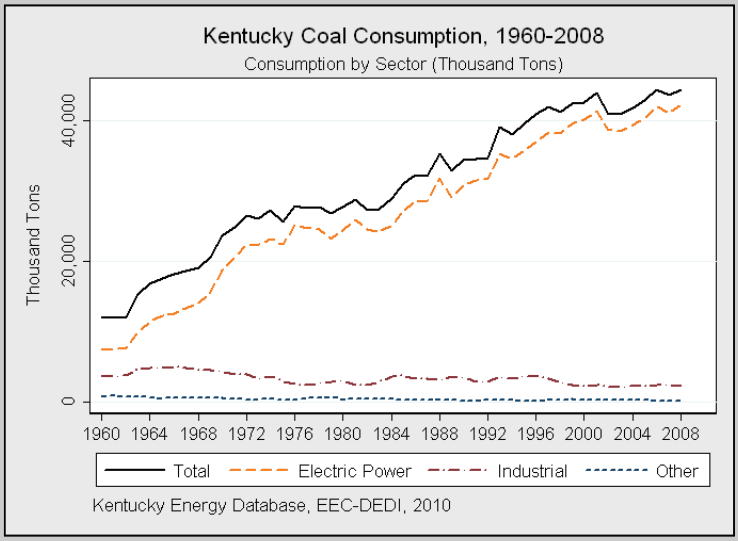
Kentucky Coal Consumption

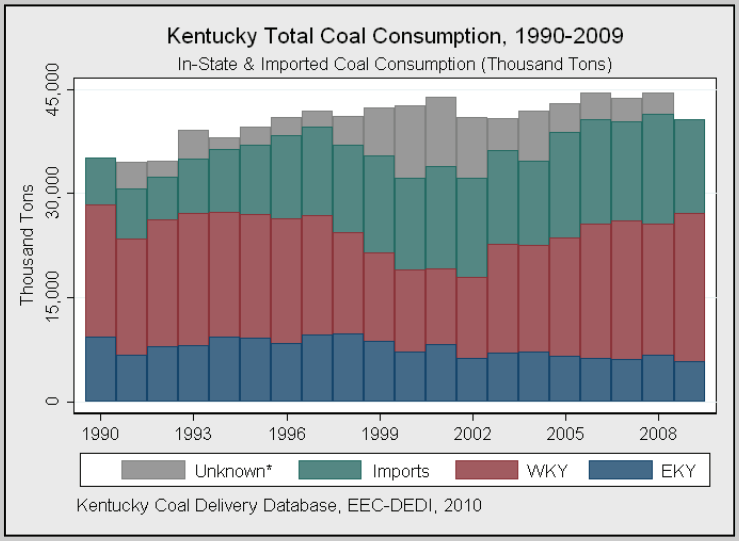




Sector	Thousand Tons	Percentage
Total	44.457	100%
Electric Power	42,191	95%
Industrial	2,212	5%

Origin of Coal	Thousand Tons	Percentage
Total	40,672	100%
Western Kentucky	21,271	52%
Imports	13,600	34%
Eastern Kentucky	5,801	14%



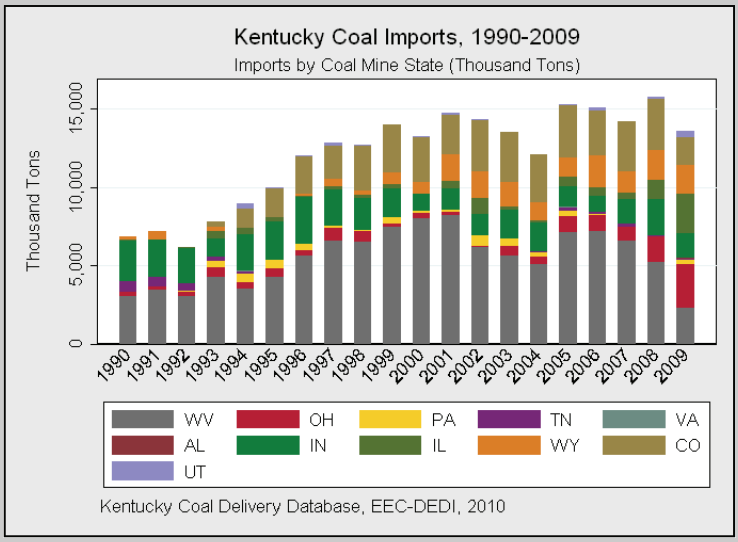


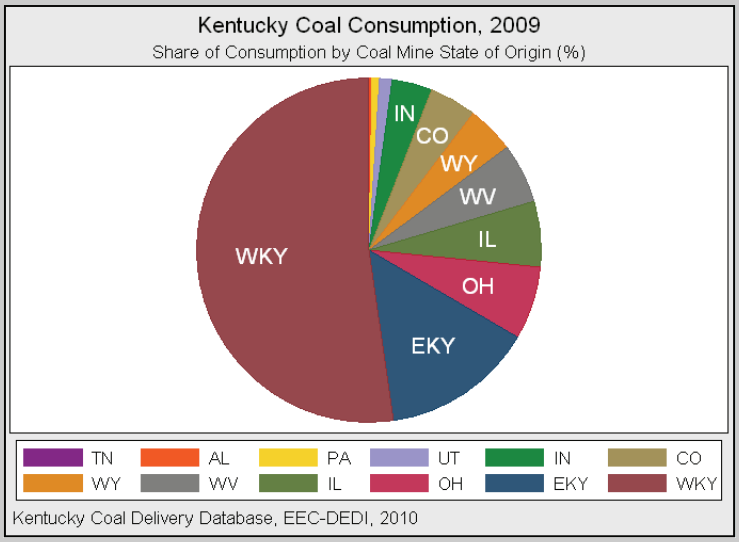
Kentucky consumed 44,457,200 tons of coal in 2008, which represented a 1.8% increase in total coal consumption from 2007. The electric power sector consumed the super majority of this amount, accounting for 95% of total coal consumption in 2008. The industrial sector accounted for the remaining 5% of coal consumption, with the commercial and residential sectors consuming negligible amounts of coal.

In 2009, the Commonwealth of Kentucky consumed 40,672,000 tons of coal.* This amount reflected a 1.75% decline in total coal consumption, compared with 2008. Western Kentucky supplied the majority (52%) of coal consumed in Kentucky in 2009, followed by imported coal (34%) from ten different states, and Eastern Kentucky coal (14%).

*Total coal consumption numbers for 2009 are likely to be revised, following updated federal reporting which reflects steam coal and metallurgical coal usage.

Kentucky Coal Imports

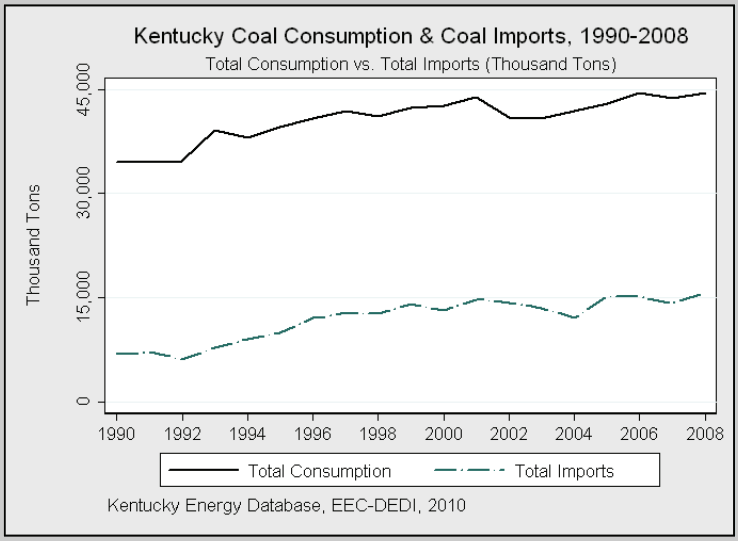




Origin of Coal	Thousand Tons	Percentage
Total	40,672	100%
Total Imports	13,600	34%

Exporting States	No. of States	Year
Total	10	2009

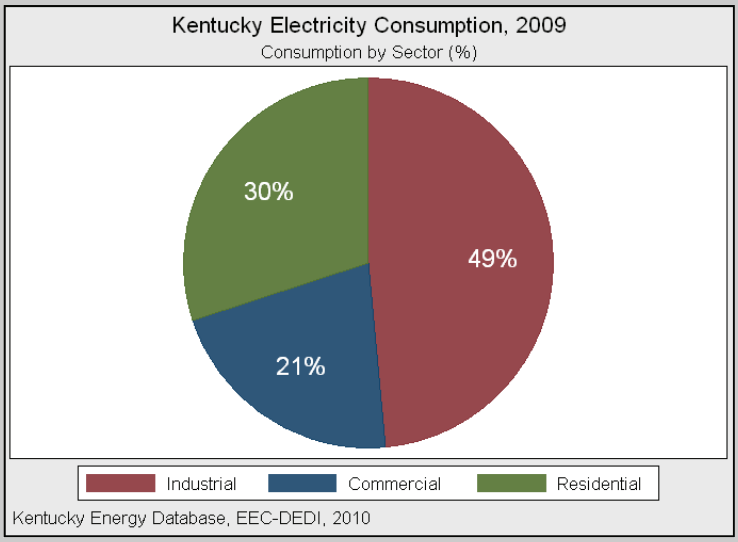
Origin of Coal	Thousand Tons	Percentage
Total	40,672	100%
Western Kentucky	21,271	52%
Eastern Kentucky	5,801	14%
Ohio	2,801	7%
Illinois	2,511	6%
West Virginia	2,288	6%
Wyoming	1,812	4%
Colorado	1,760	4%
Indiana	1,565	4%
Utah	460	1%
Pennsylvania	267	<1%
Alabama	83	<1%
Tennessee	53	<1%

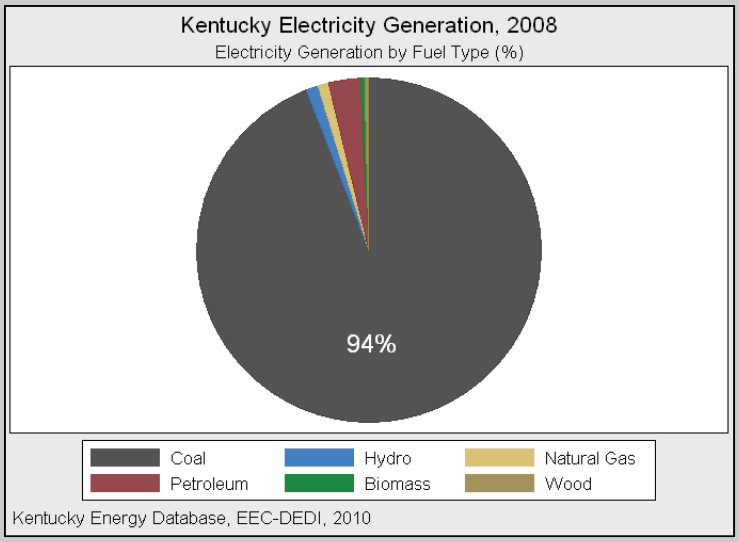


The Commonwealth of Kentucky imported 13,600,000 tons of coal in 2009. Originating in ten different states, this amount represented a 14% decline in coal imports from 2008. As a portion of statewide coal deliveries, imported coal represented 34% of all coal delivered in Kentucky in 2009.

The market variables influencing the importation of coal into Kentucky focus primarily on price, heat content of a particular coal, and the sulfur content of a particular coal. For electrical power generation, electric utilities and electric power producers in Kentucky must balance concern for these variables when purchasing coal. As a result, electric utilities, municipalities, and power producers elect to blend coal from in-state and out-of-state sources so as to maintain a diversified fuel resource. Since 1990, electric generation in Kentucky has increasingly utilized higher sulfur coal (Western Kentucky, Illinois, Indiana) which can be attributed to the installation of sulfur dioxide scrubbers on coal-fired generators in the State. Additionally, the relatively low price of coal from the Western States has also increased imports.

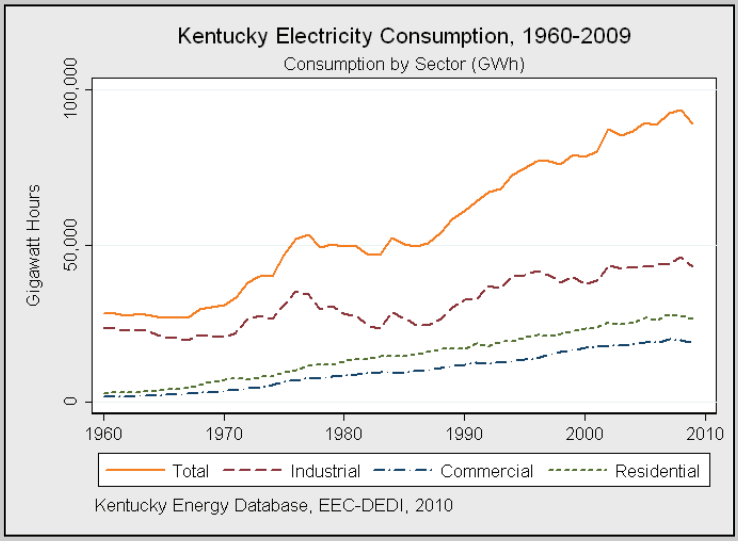
Kentucky Electricity Consumption

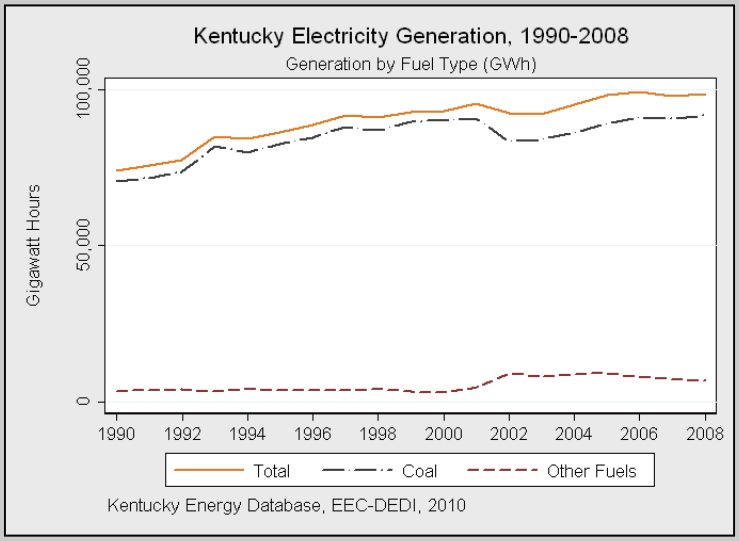




Sector	Gigawatt Hours	Percentage
Total	88,796	100%
Industrial	43,577	49%
Residential	26,525	30%
Commercial	18,694	21%

Fuel Type	Gigawatt Hours	Percentage
Total	97,553	100%
Coal	91,621	94%
Petroleum	2,874	3%
Hydro	1,917	2%
Natural Gas	983	1%
Wood & Biomass	919	<1%



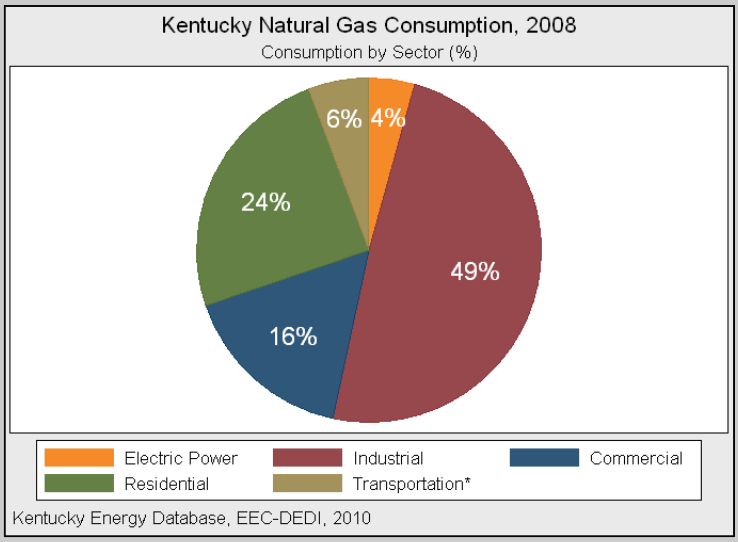


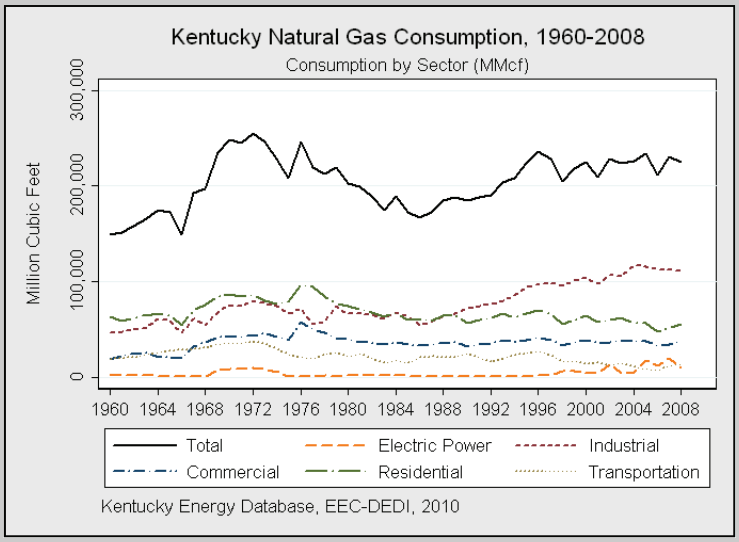
Total Electricity Consumption in Kentucky in 2009 fell by 5% to 88,796 Gigawatt hours from 2008. The decrease in electricity consumption was likely caused by the combination of increased energy efficiency programs and the downturn in the economy.

The industrial sector remained the largest consumer of electricity, accounting for 49% of total consumption in 2008. The residential and commercial sectors consumed 30% and 21% of statewide electricity, respectively.

Of the electricity generated in 2008, 94% was derived from the combustion of coal. Petroleum, hydroelectric power, natural gas, wood products, and biomass supplied the remaining 6% of electricity generation.

Kentucky Natural Gas Consumption





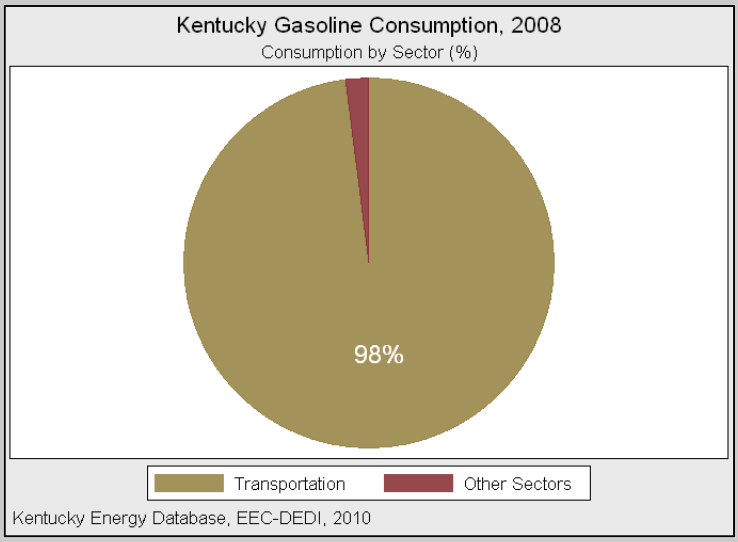
Sector	Million Cubic Feet	Percentage
Total	225,299	100%
Industrial	110,553	49%
Residential	55,060	24%
Commercial	37,134	16%
Transportation*	12,968	6%
Electric Power	9,584	4%

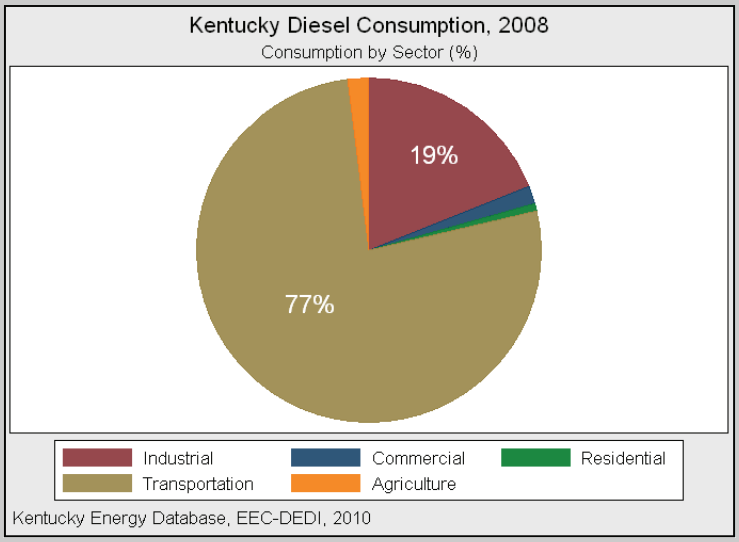
*Natural Gas consumption by the Transportation Sector is the summation of vehicle fuel usage and natural gas utilized in the movement of natural gas resources through transmission and distribution pipelines. In Kentucky in 2008, direct vehicle fuel usage of natural gas was approximately 10 MMcf.

In 2008, the Commonwealth of Kentucky consumed 225,299 million cubic feet of natural gas, representing a 2% decline in state-wide consumption compared with 2007. The industrial sector was by far the largest consumer of natural gas, accounting for 49% of total consumption. The residential sector was the next largest consumer of natural gas with 24% of consumption, followed by the commercial sector with 16% of consumption. The transportation sector represented 6% of consumption, with the electric power sector representing the remaining 4% of consumption.

In the Commercial and Residential sectors natural gas is combusted to generate heat. In the Industrial sector, however, natural gas is used as a process feed stock in addition to its combustion use.

Kentucky Liquid Fuel Consumption

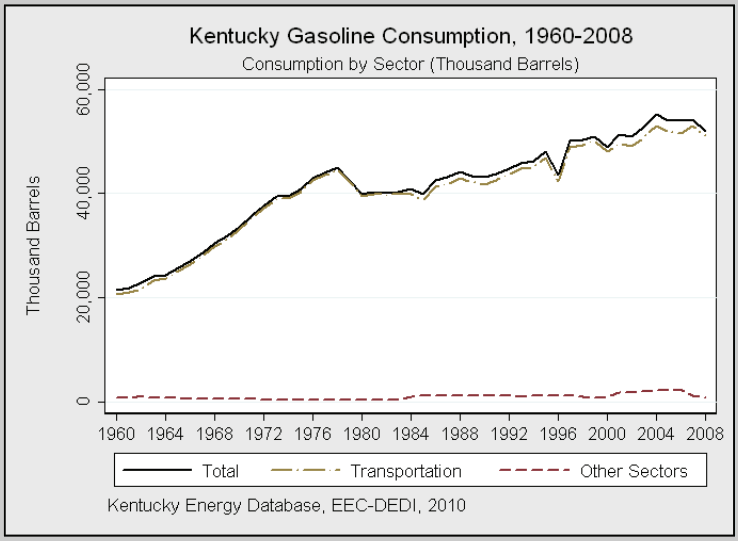


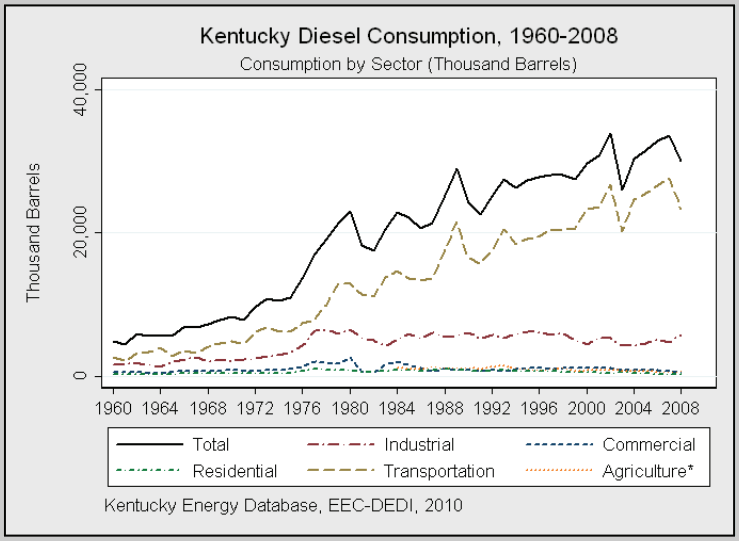


Sector	Thousand Barrels	Percentage
Total	51,934	100%
Transportation	51,103	98%
Other Sectors	831	2%

Year	Price/Gallon ($US)	Fuel Type
2008	3.27	Regular

Sector	Thousand Barrels	Percentage
Total	30,299	100%
Transportation	23,233	77%
Industrial	5,734	19%
Agriculture	603	2%
Commercial	498	~1%
Residential	231	<1%

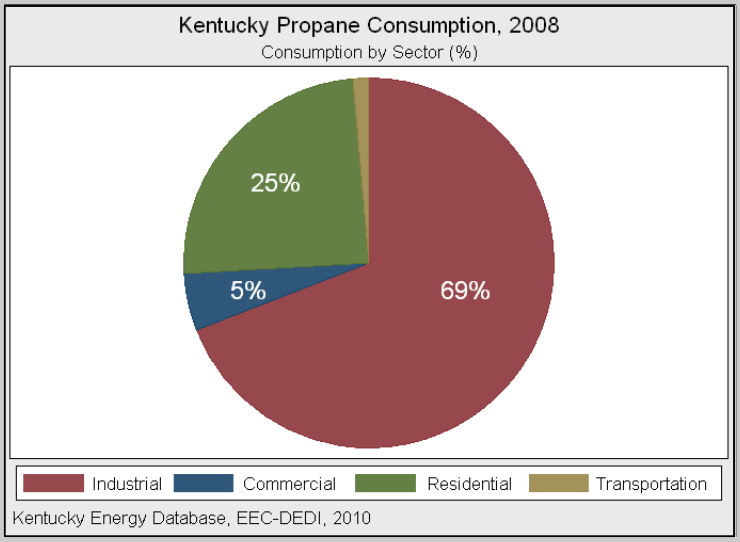


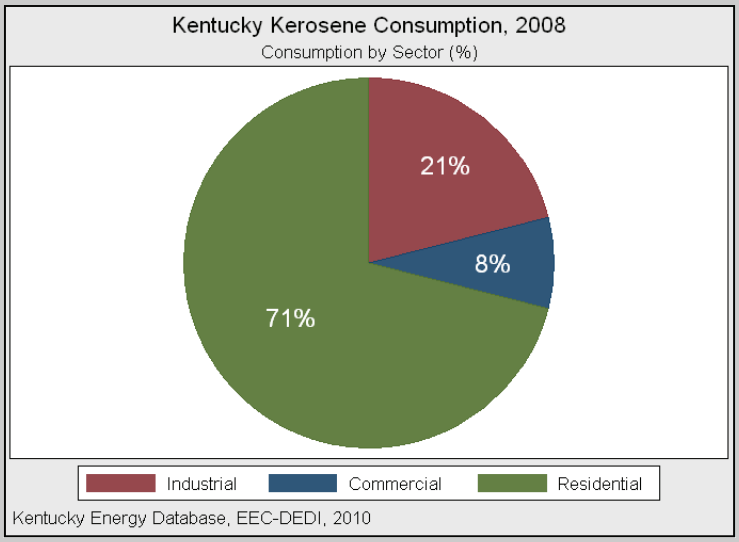


Gasoline is a liquid fuel produced through the distillation of petroleum (crude oil). Gasoline is predominantly used for transportation involving cars and light trucks. In 2008, the Commonwealth of Kentucky consumed 51,934,110 barrels of gasoline (2,181,232,620 gallons), with almost 99% of this amount related to the transportation sector. Compared with 2007, total gasoline consumption in Kentucky fell by 4% in 2008. This decrease in consumption is in part explained by the high price of gasoline at the pump during the period 2007-2008.

Diesel is a liquid fuel derived from petroleum, predominantly used for transportation. Diesel is normally used for heavy duty work such as trucking, shipping, and rail operations. The Commonwealth of Kentucky consumed 30,298,750 barrels of diesel (1,272,547,500 gallons) in 2008, representing a 10.41% decline in overall consumption compared with 2007. The Transportation Sector accounted for 77% of this consumption, followed by the Industrial Sector with 19% of consumption. The Commercial, Residential, and Agricultural Sectors made up the remaining 4% of statewide diesel consumption in 2008.

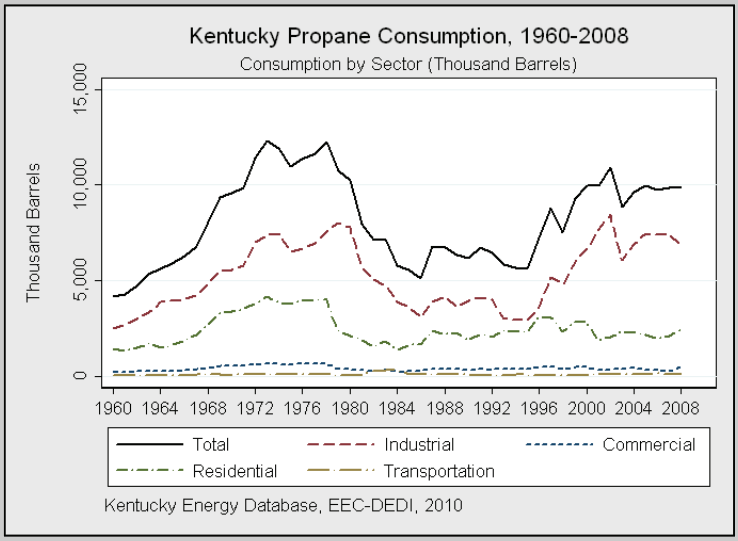
Kentucky Liquid Fuel Consumption

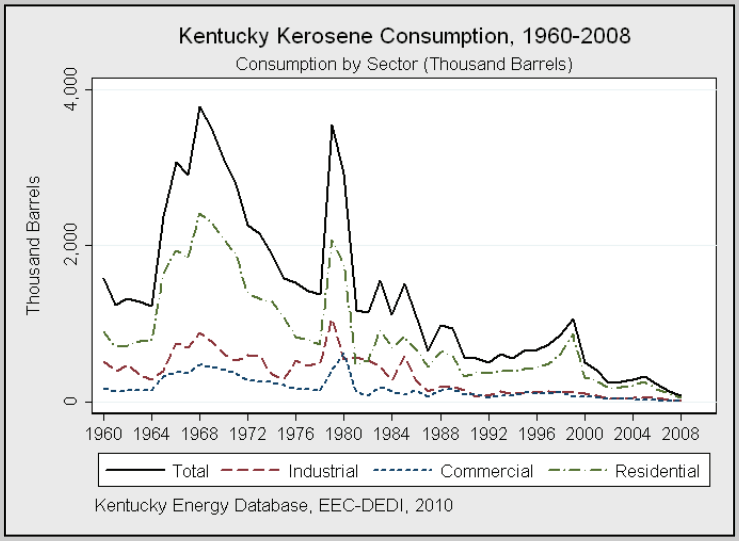




Sector	Thousand Barrels	Percentage
Total	9,898	100%
Industrial	6,835	69%
Residential	2,429	25%
Commercial	498	5%
Transportation	136	1%

Sector	Thousand Barrels	Percentage
Total	80	100%
Residential	57	71%
Industrial	17	21%
Commercial	6	8%

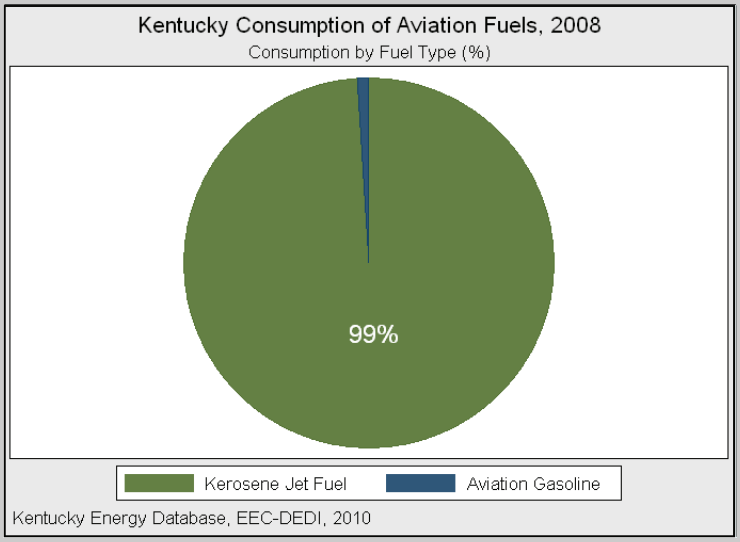




Propane, a by-product of natural gas processing or petroleum refinement, is a gas that is typically compressed into a transportable liquid. The liquefied version of propane is utilized for numerous residential, commercial, and industrial purposes. In 2008, the Commonwealth of Kentucky consumed nearly 9,899,000 barrels of propane, with the industrial sector accounting for 69% of all propane consumption. The residential sector in Kentucky was the next largest consumer of propane with 25% of all propane consumption.

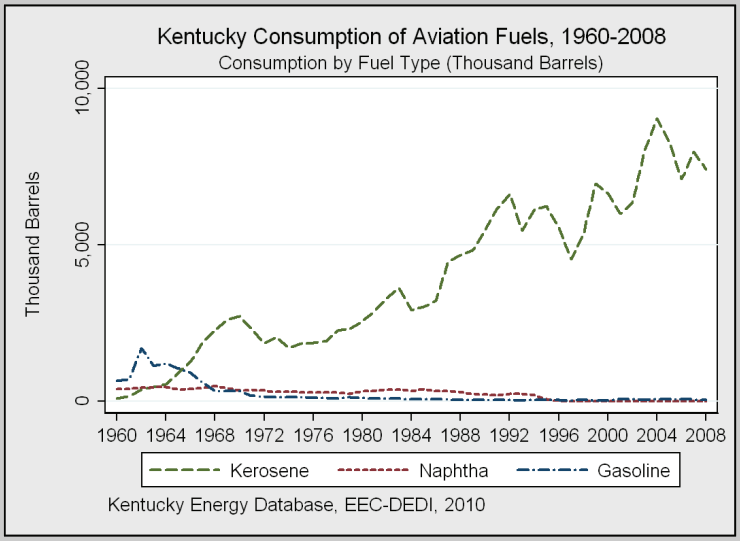
Kerosene is a liquid fuel which is derived from petroleum distillation processes. Typical Kerosene usage involves interior heating, industrial processes, and some commercial applications. In 2008, the residential sector accounted for 71% of all kerosene consumption in the state, with the industrial sector consuming 21% and the commercial sector the remaining 7% of kerosene in the same year. Overall, the Commonwealth of Kentucky consumed approximately 80,000 barrels of kerosene in 2008, representing a 39.73% decline in total consumption compared with 2007.

Kentucky Liquid Fuel Consumption



Aviation Fuels are highly refined liquid products derived from petroleum. Since 1965, the vast majority of Aviation Fuel consumed in the Commonwealth of Kentucky has been Kerosene-type Jet Fuel. Also called "Jet A" or "Jet A-1" fuel for jet engines and turboprops, kerosene-type jet fuel comprised over 99% of aviation fuel consumption (some 7,425,000 barrels) in Kentucky for the year 2008. Traditional Aviation Gasoline, which is used for piston driven engines, is primarily used for non-commercial aviation and some helicopters, but Aviation gasoline constituted less than 1% of aviation fuel consumption for the year 2008. There was no measured consumption of Naphtha-type Jet Fuel in Kentucky in 2008.

Sector	Thousand Barrels	Percentage
Total	7,473	100%
Kerosene Jet Fuel	7,425	99%
Aviation Gasoline	48	<1%
Naphtha Jet Fuel	0	0%



Energy Production

Description:

Energy production is the process of mining, collecting, or cultivating an energy resource that can be harnessed or converted into a more useful form of energy such as heat, steam, locomotion, or electricity. Energy production is based on naturally occurring or man-made resources such as coal, natural gas, crude oil, and renewable sources (hydroelectric power, biomass, etc.). Consequently, it is of great interest to measure and understand the reality and magnitude of energy production within the Commonwealth, as this dynamic powerfully influences both the energy security and economic security of Kentucky.

Accounting:

For the purposes of standardized measurement and accounting, energy production within the Commonwealth is quantified by converting all supplies of energy into a British Thermal Unit (BTU) value. Though more widely used measurements may be included to reflect production of a particular energy resource, this conversion is necessary to form a balanced comparison of production across energy supplies. Subsequently, a general understanding of the significance of a specific energy resource and its related production can be developed.

Summary:

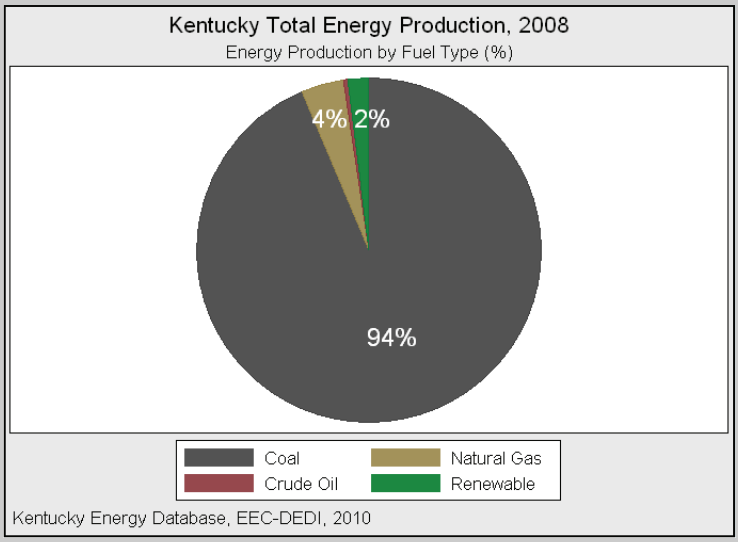
In 2008, the Commonwealth of Kentucky produced 3,119,573 Billion BTU of energy. Compared with an energy consumption total of 1,982,844 Billion BTU for the same year, this production total made Kentucky a net exporter of energy supplies. The super majority of energy exports from the Commonwealth were related to the export and sale of coal produced in Kentucky. Overall, total energy production in the State increased by 2.59%, compared with 2007. This increase in production was led by enhanced production of Kentucky's coal and natural gas resources.

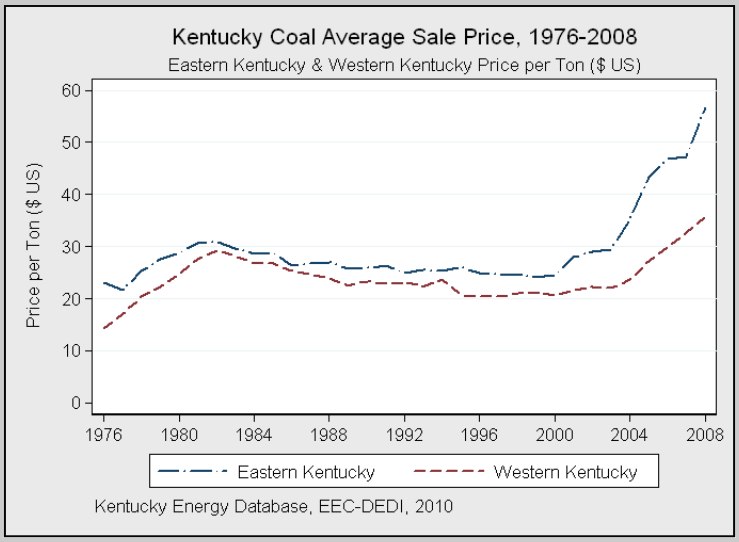
In an aggregate comparison of energy production, coal by far remained the Commonwealth's primary source of energy production. Ranking third nationally, Kentucky produced 120,810,617 tons of coal in 2008, of which 79% was exported to 23 different states.* This amount equated to 2,927,900 Billion BTU, or approximately 94% of total energy production in the Commonwealth. The supremacy of coal and energy production in Kentucky for 2008 follows long standing historical trends, and is unlikely to change in the near term.

Other forms of energy production within Kentucky in 2008 included the extraction of crude oil and natural gas, as well as the collection and/or cultivation of renewable energy resources. The production of these resources comprised the remaining 6% of total energy production in the State. Natural gas production was the leader of this group, accounting for 121,462 Billion BTU, or approximately 4% of Kentucky's total energy production. Renewable resources, such as hydroelectric power, wood products, ethanol, and geothermal sources, constituted nearly 2% of statewide energy production. Crude oil production, which has remained effectively stable at around 2.5 million barrels a year, generated 6 Billion BTU of energy in 2008, or less than 1% of Kentucky's total energy production.

*Coal production data for 2009 is also available and included in this document, though not available for a BTU comparison across fuel types. In 2009, the Commonwealth of Kentucky produced 107,338,000 tons of coal, of which between 70-75% was exported 20 different states.

Kentucky Total Energy Production

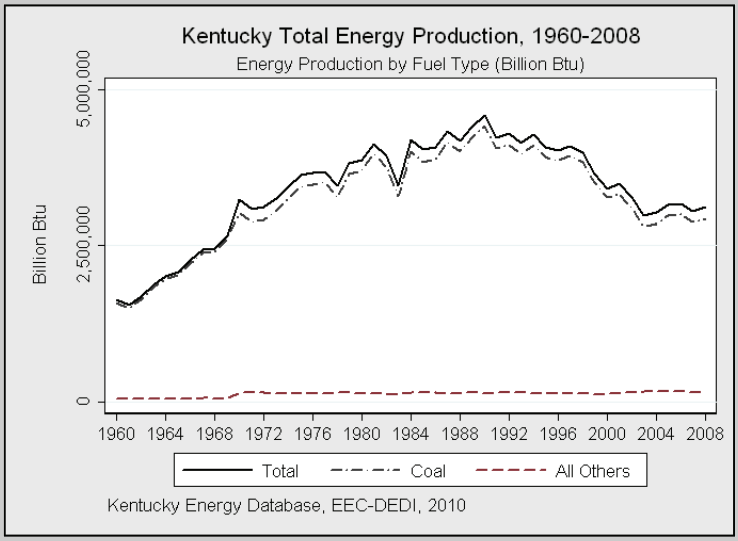


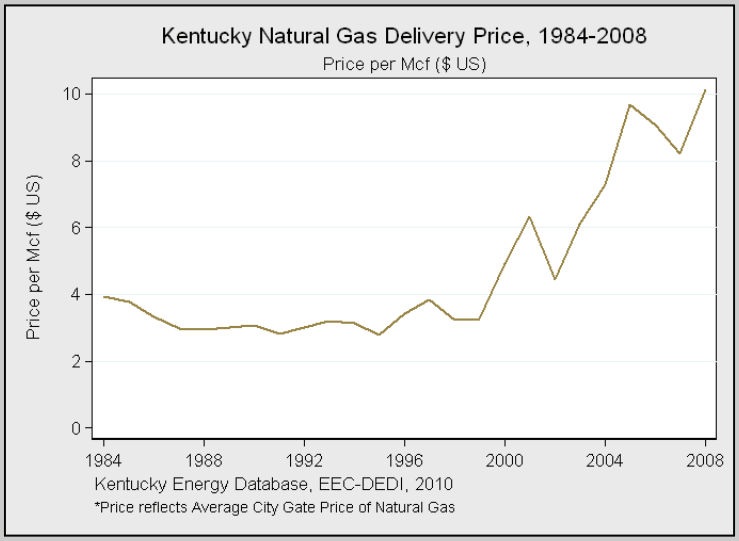


Fuel Type	Billion BTU	Percentage
Total	3,119,573	100%
Coal	2,927,900	94%
Natural Gas	121,462	4%
Renewable	54,870	2%
Crude Oil	6	<1%
Losses in Production*	15,335	<1%

Commodity	Average Sale Price	Metric
EKY Coal	$56.63	($US)/Ton
WKY Coal	$35.53	($US)/Ton

Commodity	Delivery Price	Metric
Natural Gas	$10.14	($US)/Mcf

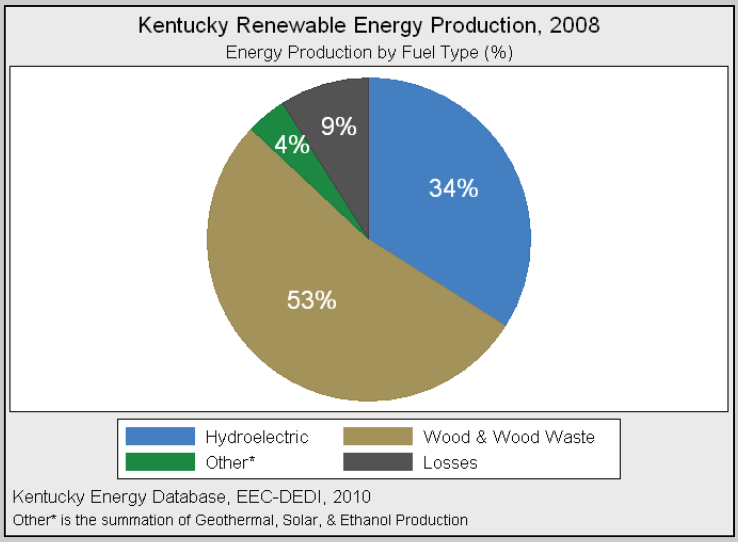


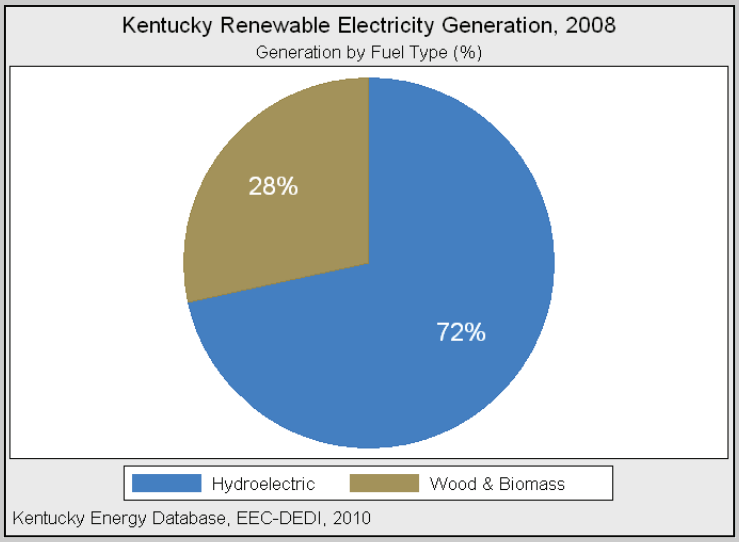


As the third largest coal producer in the nation, the vast majority of energy production in Kentucky is related to the extraction of coal. In 2008, the Commonwealth of Kentucky produced 3,119,573 Billion BTU of energy. This amount represented a 2.59% increase in total energy production compared with 2007. Of this amount, coal accounted for 94% of all energy production in Kentucky in 2008. Natural gas and renewable energy resources comprised the remaining 5% of total energy production in the Commonwealth, with crude oil production contributing to less than 1% of total energy production.

*Losses in Production are noted so as to permit summation of sources to achieve Total Energy Production of 3,119,573 BBTU. Losses in Production function as an accounting measure, and relate to the removal of liquid constituents in primary natural gas sources and the projected energy requirements necessary to produce ethanol or other biomass products.

Kentucky Renewable Energy Production



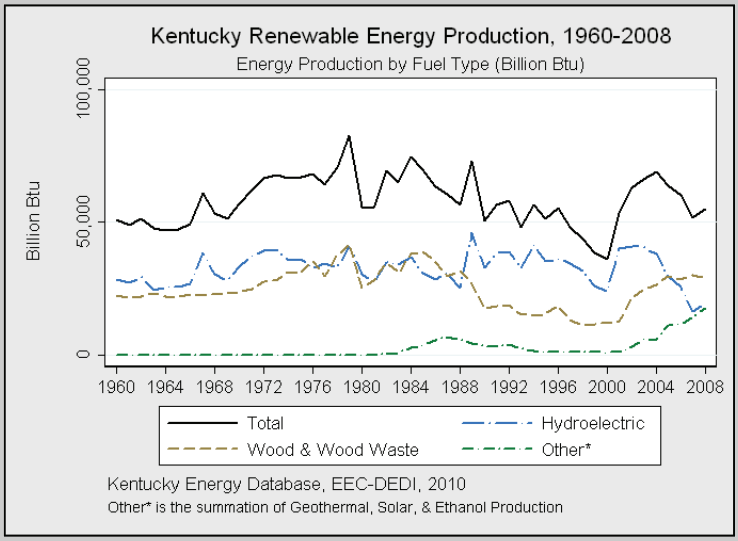


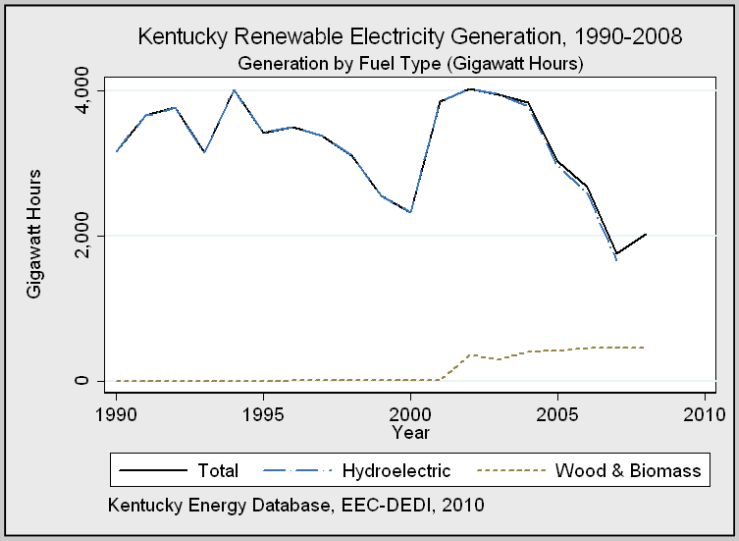
Fuel Type	Billion BTU	Percentage
Total	54,870	100%
Wood & Wood Waste	29,074	53%
Hydroelectric*	18,895	34%
Other	1,937	4%
Losses in Production	4,964	9%

Please review previous page for explanation of "Losses in Production"

Fuel Type	Gigawatt Hours	Percentage
Total	2,377	100%
Hydroelectric*	1,917	81%
Wood & Biomass	460	19%

*Hydroelectric generation is directly accounted through Gigawatt Hour consumption, whereas hydroelectric production (Billion BTU) is a calculated fossil fuel displacement conversion. This conversion represents the amount of fossil fuel energy required to generate an equal amount of electricity.

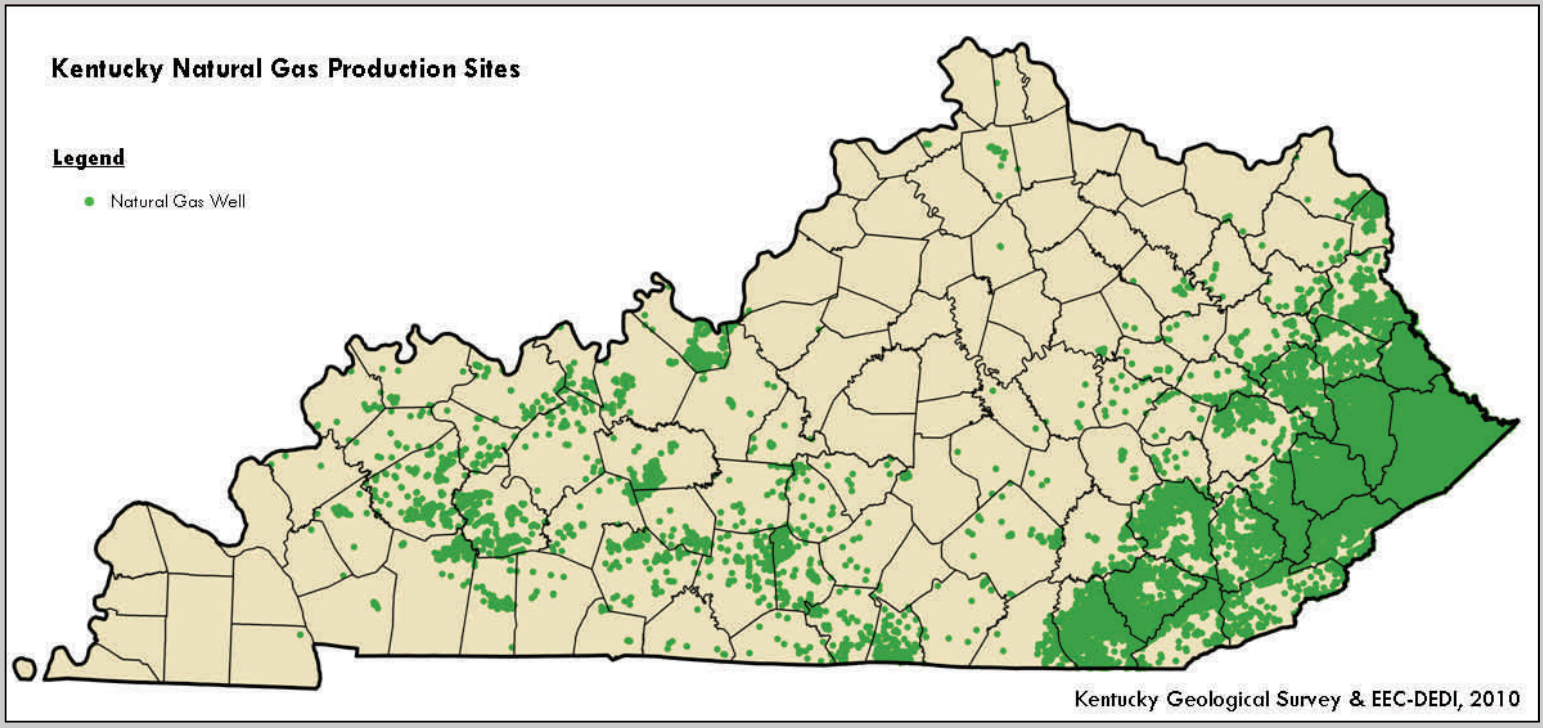


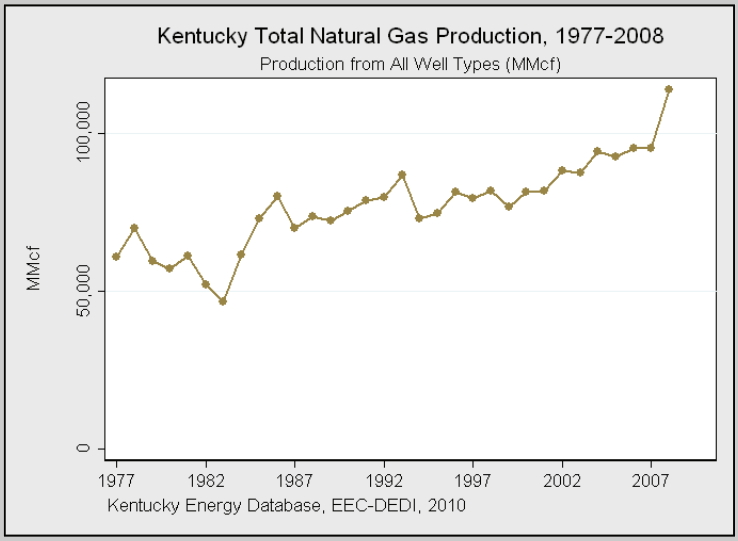


The Commonwealth of Kentucky produced 54,870 Billion BTU of energy from renewable sources in 2008. This amount reflected a 6.1% increase in Renewable Energy Production compared with 2007. Of available renewable energy resources in the Commonwealth, hydroelectric power and wood products were the largest contributors to renewable energy production. In 2008, hydroelectric facilities produced 34% of renewable energy in Kentucky, while wood and wood waste resources accounted for 53% of renewable energy production.

In Kentucky, electricity generation from renewable energy sources primarily involves hydroelectric power and biomass resources. The amount of electricity that is generated from hydroelectric dams in Kentucky fluctuates annually due to varying levels of precipitation and temperature. Hydroelectric generation was particularly low (1,917 GWh) in 2008 due to repair work being conducted by the U.S. Army Corps of Engineers at Lake Cumberland's Wolf Creek Dam, which accounts for one-third of the total hydroelectric generation capacity in the State. Biomass resources contributed another 460 GWh to total electricity generation for the year.

Kentucky Natural Gas Production





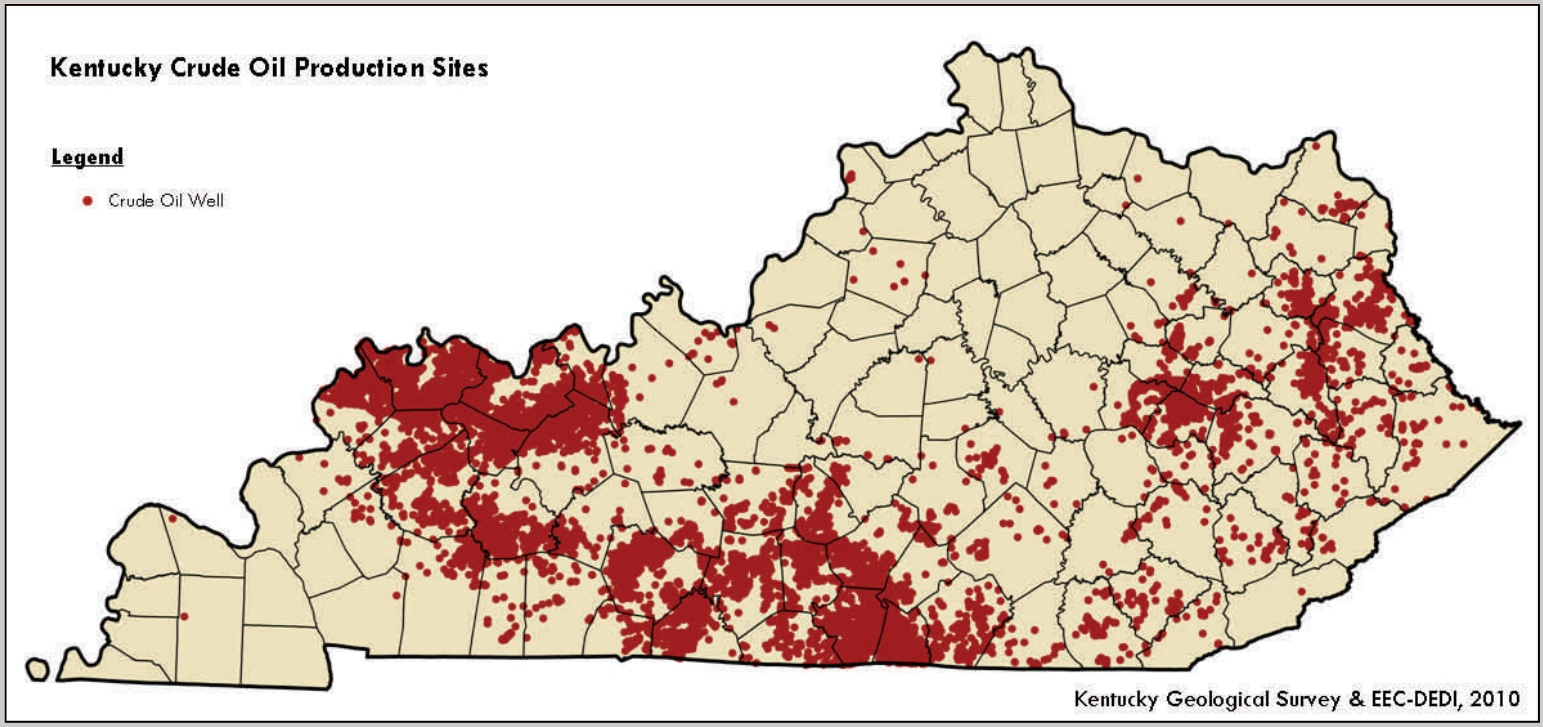
Production	Million Cubic Feet	Rank
U.S.A	25,754,348	1
Kentucky	114,116	17

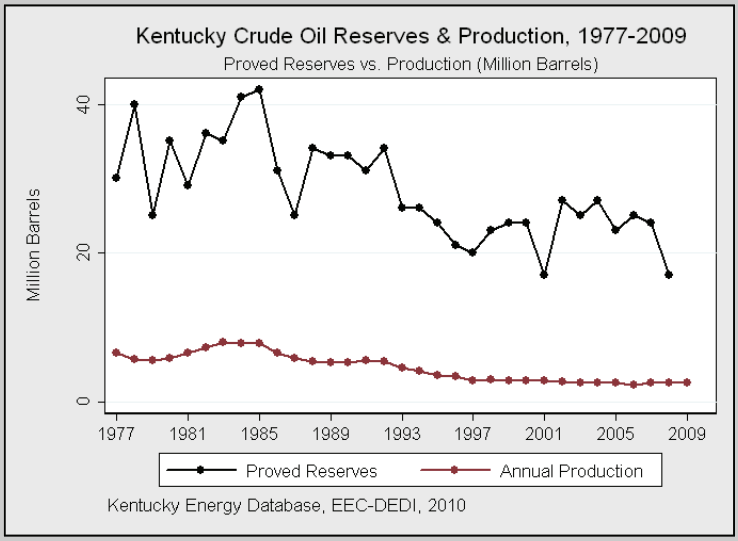
Reserves	Billion Cubic Feet	Percentage
U.S.A	244,656	100%
Kentucky	2,714	1.1%

The Commonwealth of Kentucky produced 114,116 Million cubic feet of natural gas in 2008. This amount represented a 19.57% increase in total natural gas production compared with 2007. As reflected in the map of Kentucky Natural Gas Production, the preponderance of natural gas is located and extracted in Eastern Kentucky. Additionally, statewide production is expected to increase in the near term due to improved horizontal drilling methods and market conditions favorable to new exploration.

*Kentucky natural gas map data and production data supplied courtesy of the Kentucky Geological Survey.

Kentucky Crude Oil Production





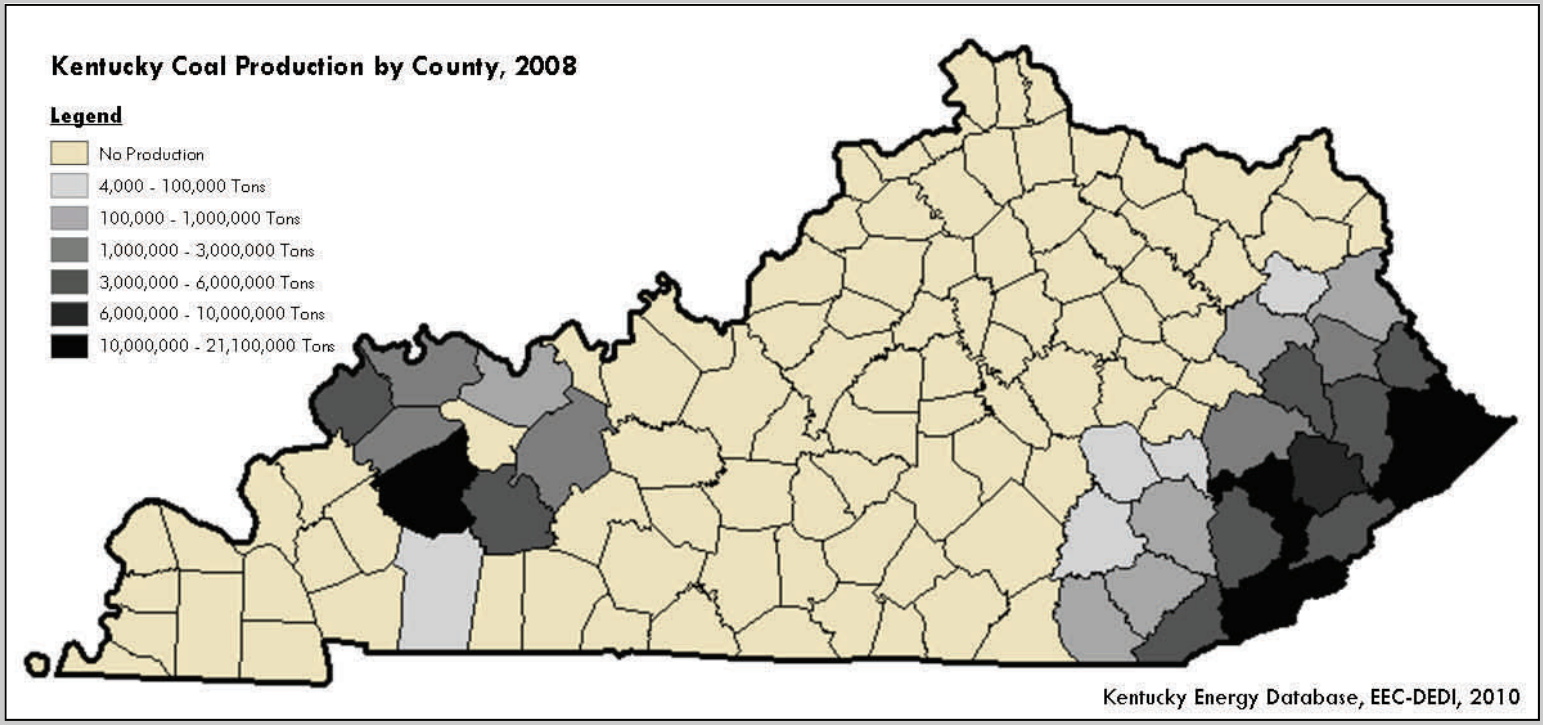
Production	Million Barrels	Rank
U.S.A	1,957	1
Kentucky	2.6	20

Reserves	Million Barrels	Percentage
U.S.A	19,121	100%
Kentucky	17	<0.1%

The Commonwealth of Kentucky produced 2,552,400 barrels of crude oil in 2009. This amount represented a 2.4% decline in total crude oil production in the State, compared with 2008. Annual crude oil production in Kentucky has remained relatively stable, between 2.5 and 2.9 million barrels, since the year 2000.

*Kentucky crude oil map data and production data supplied courtesy of the Kentucky Geological Survey.

Kentucky Coal Production



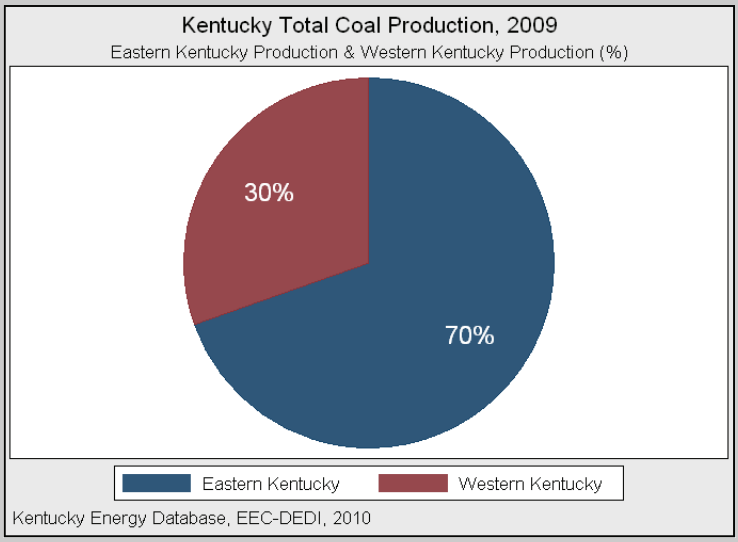
County	Production (Tons)	Percentage
Total (2008)*	120,810,617	100%
Pike	21,158,960	18%
Perry	17,132,272	14%
Hopkins	14,300,000	12%
Harlan	10,900,000	9%
Knott	7,535,976	6%
Floyd	5,878,220	5%
Letcher	5,756,674	5%
Martin	5,692,560	5%
Union	4,883,647	4%
Leslie	4,620,225	4%
Muhlenberg	4,483,088	4%
Magoffin	3,427,333	3%
Bell	3,360,367	3%
Henderson	2,820,269	2%

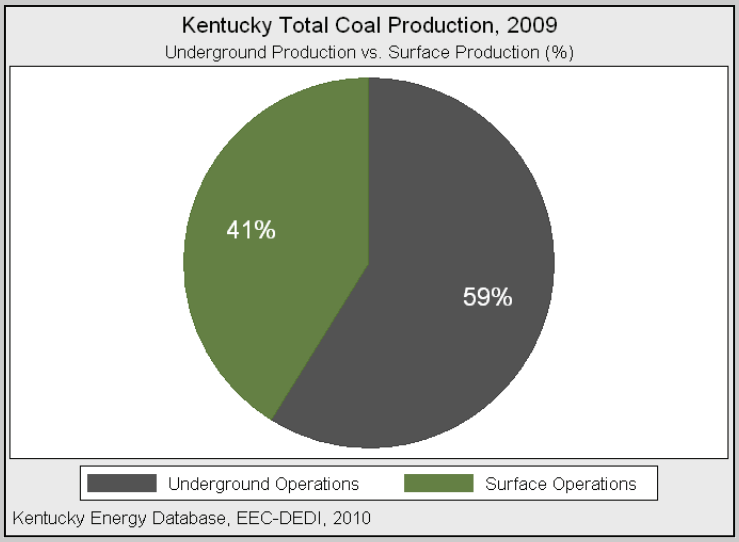
County	Production (Tons)	Percentage
Breathitt	2,021,162	2%
Webster	1,990,271	2%
Ohio	1,391,055	1%
Johnson	1,028,393	1%
Lawrence	623,159	1%
Knox	465,263	<1%
Whitley	370,874	<1%
Daviess	342,100	<1%
Clay	245,738	<1%
Morgan	204,532	<1%
Owsley	56,552	<1%
Jackson	45,142	<1%
Elliot	37,630	<1%
Laurel	34,952	<1%
Christian	4,203	<1%

Of the 120 counties of the Commonwealth of Kentucky, 29 counties reported coal production in 2008. Coal production was dispersed between the Central Appalachian Basin of Eastern Kentucky and the Illinois Basin of Western Kentucky, and totaled 120,810,617 tons. The majority of this production was connected to the counties of Eastern Kentucky. Additionally, eight of the ten highest producing counties in 2008 were located in Eastern Kentucky.

*County-level production totals for 2009 were not available at the time of release for this document.

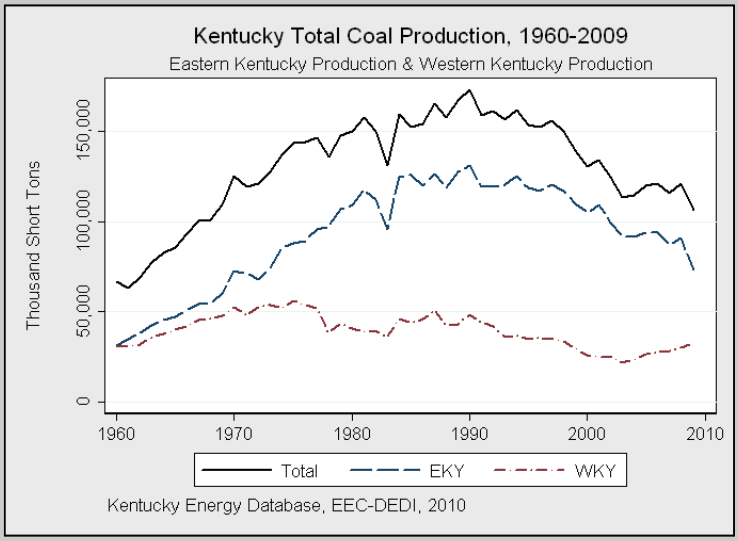
Kentucky Coal Production

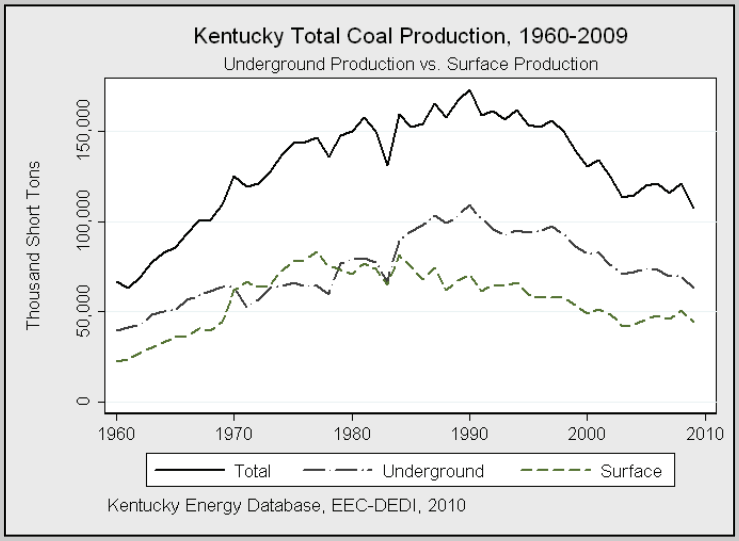




Region	Thousand Tons	Percentage
Total	107,338	100%
Eastern Kentucky	74,719	70%
Western Kentucky	32,619	30%

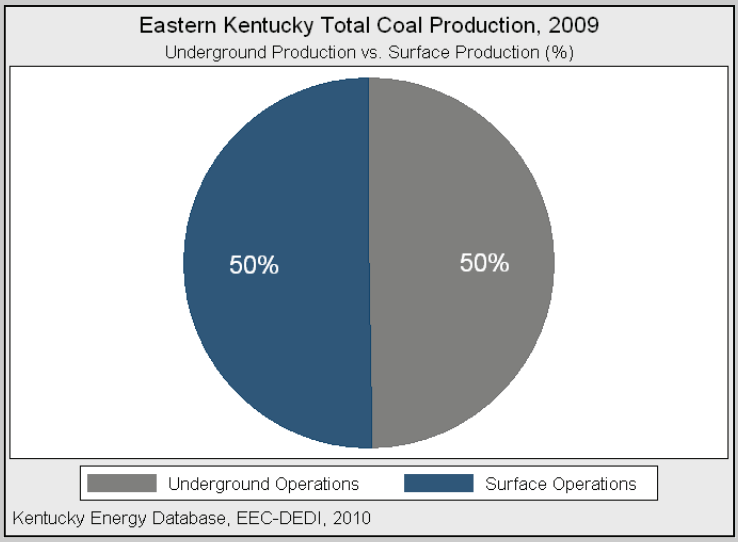
Mine Type	Thousand Tons	Percentage
Total	107,338	100%
Underground	63,152	59%
Surface	44,186	41%

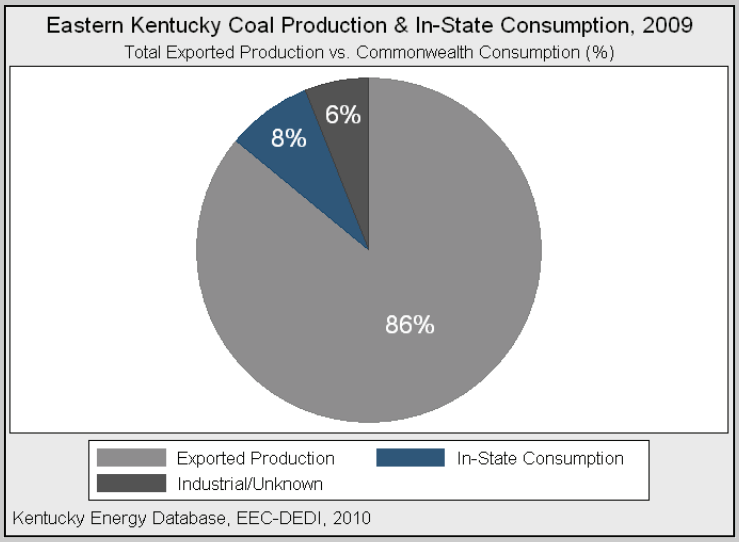




Kentucky Coal Production declined by 11.13% in 2009 to 107,338,000 tons. The majority of this coal was extracted through underground operations (59%), followed by surface operations (41%). The Eastern Kentucky coalfield produced the vast majority of this coal (70%), totaling 74,719,000 tons in 2009. Conversely, the Western Kentucky coalfield accounted for 30% of total production, reaching 32,619,000 tons in 2009.

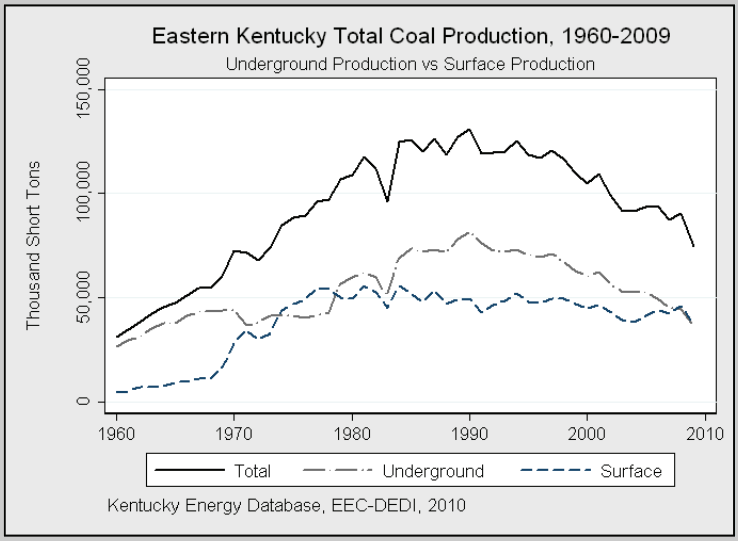
Eastern Kentucky Coal Production

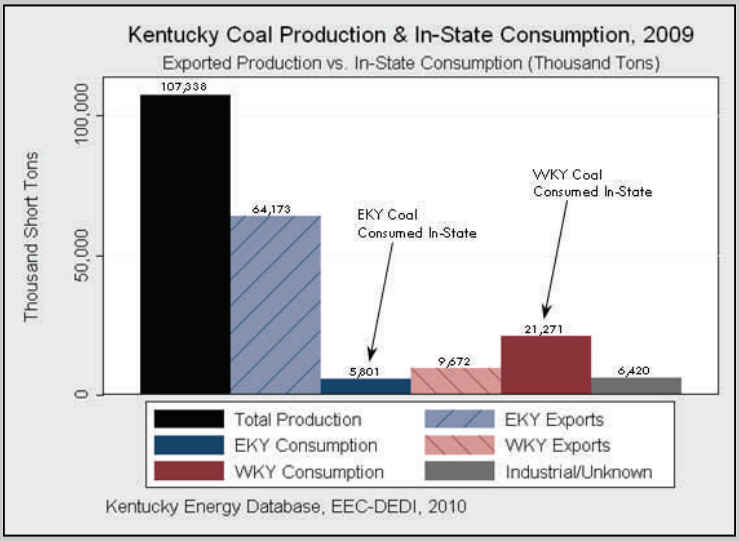




Mine Type	Thousand Tons	Percentage
Total	74,719	100%
Surface	37,549	50%
Underground	37,170	50%

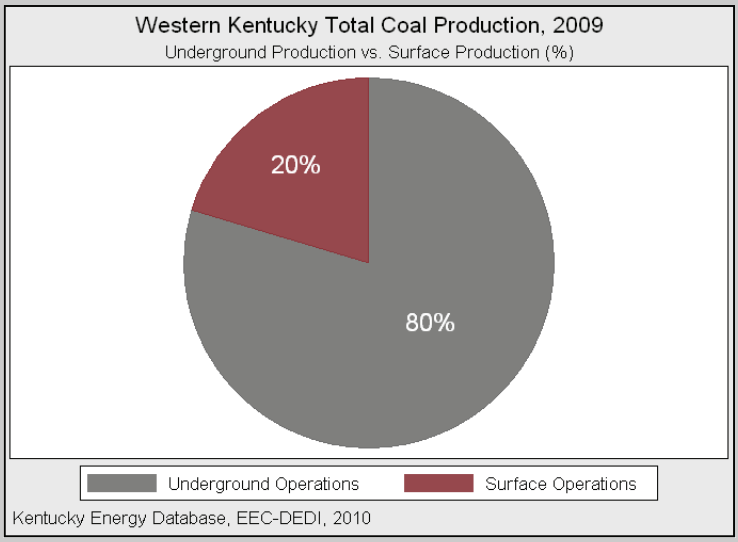
Production	Thousand Tons	Percentage
Total	74,719	100%
Exported Production	64,173	86%
In-State Consumption	5,801	8%
Industrial/Unknown	4,746	6%

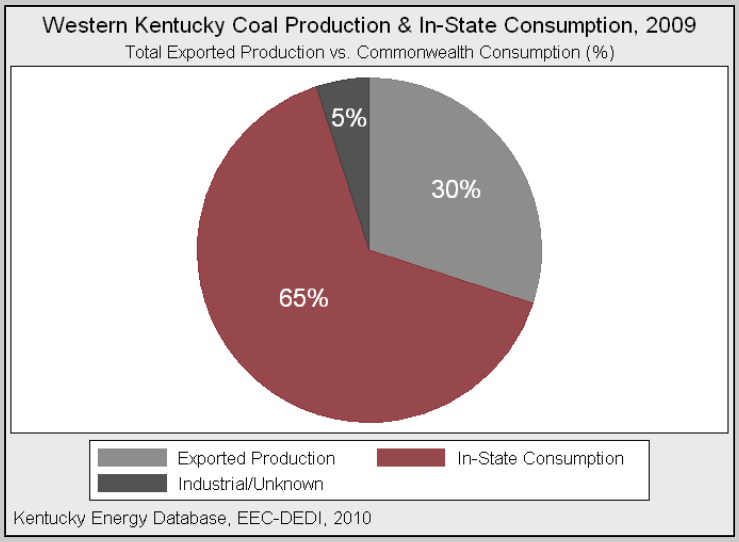




The **Appalachian Basin** of Eastern Kentucky produced 74,719,000 tons of coal in 2009. This amount represented a 17.54% decline in coal production in the Eastern Kentucky region, compared with 2008. Of the coal mined in Eastern Kentucky in 2009, production was evenly split between surface operations (50%) and underground operations (50%). Following the mining process, 86% of Eastern Kentucky coal was exported to one of 18 different States in 2009. Eight percent of Eastern Kentucky coal production was shipped and consumed within the Commonwealth of Kentucky in 2009. The destination of the remaining 6% of Eastern Kentucky coal production is unknown, but is likely linked to industrial coal deliveries and usage.

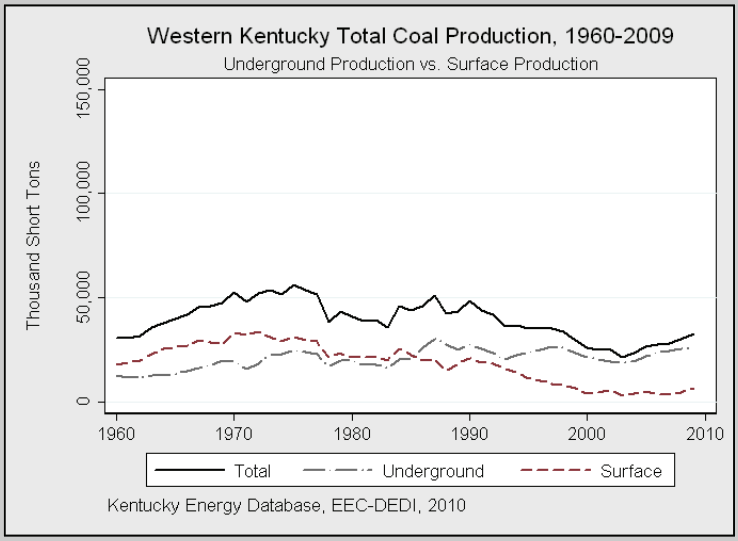
Western Kentucky Coal Production

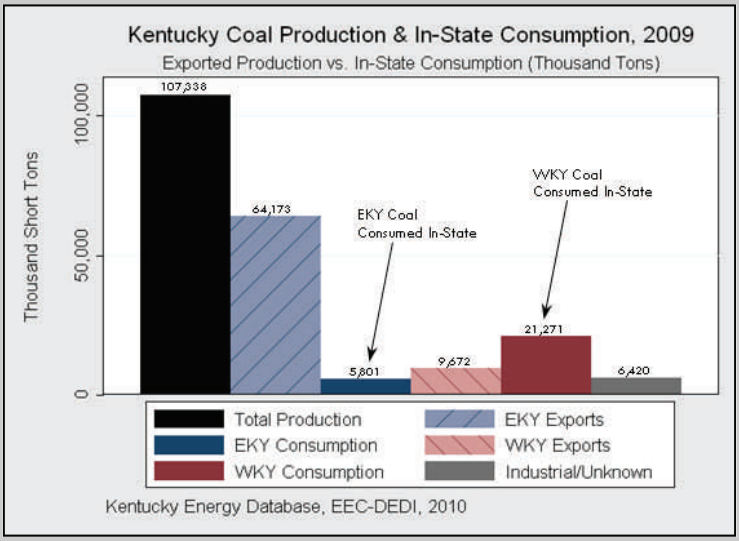




Mine Type	Thousand Tons	Percentage
Total	32,619	100%
Underground	25,982	80%
Surface	6,637	20%

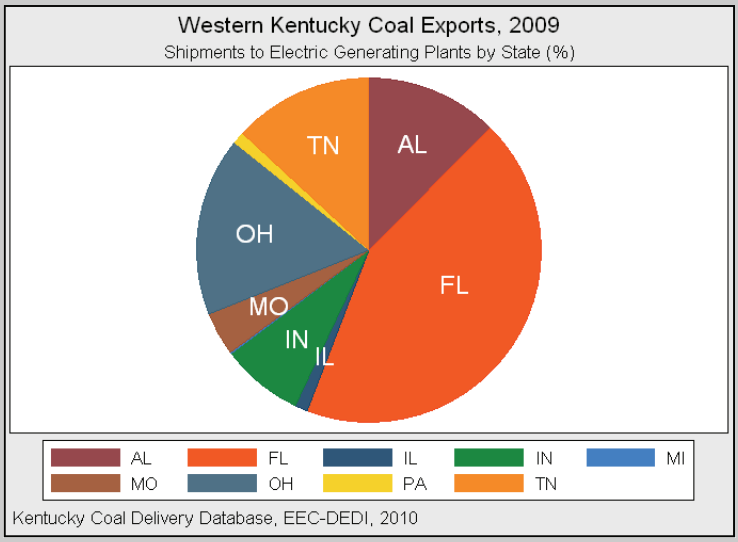
Production	Thousand Tons	Percentage
Total	32,619	100%
In-State Consumption	21,271	65%
Exported Production	9,672	30%
Industrial/Unknown	1,674	5%

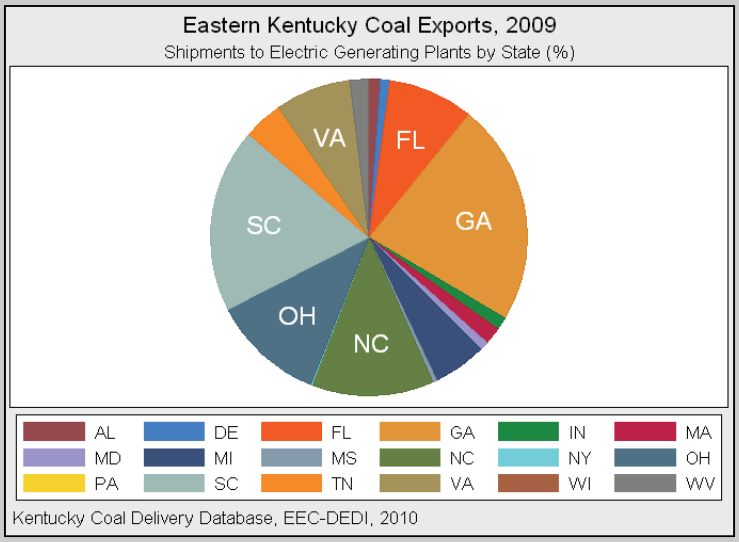




The **Illinois Basin** of Western Kentucky produced 32,619,000 tons of coal in 2009. This amount represented a 8.12% increase in coal production in the Western Kentucky region, compared with 2008. Of the coal mined in Western Kentucky in 2009, underground operations comprised 80% of production and surface operations accounted for the remaining 20% of production. Following the mining process, 30% of Western Kentucky coal was exported to one of 9 different States in 2009. Inversely, sixty-five percent of Western Kentucky coal production was shipped and consumed within the Commonwealth of Kentucky in 2009. The destination of the remaining 5% of Western Kentucky coal production is unknown, but is likely linked to industrial coal deliveries and usage.

Kentucky Coal Exports





Importing State	Thousand Tons	Percentage
Total	9,674	100%
Florida	4,205	43%
Ohio	1,626	17%
Tennessee	1,268	13%
Alabama	1,199	12%
Indiana	744	8%
Missouri	394	4%
Illinois	115	1%
Pennsylvania	111	1%
Michigan	12	<1%

Coal Field	Thousand Tons	Percentage
Total Exports	73,847	100%
Eastern Kentucky	64,173	87%
Western Kentucky	9,674	13%

Importing States	Western Kentucky	Eastern Kentucky
Total	9	17

Importing State	Thousand Tons	Percentage
Total	64,173	100%
Georgia	14,546	23%
South Carolina	12,045	19%
North Carolina	8,037	13%
Ohio	7,348	11%
Florida	5,607	9%
Virginia	4,990	8%
Michigan	3,508	5%
Tennessee	2,611	4%
West Virginia	1,206	2%
Massachusetts	1,099	2%
Indiana	848	1%
Alabama	773	1%
Maryland	619	<1%
Delaware	582	<1%
Mississippi	289	<1%
Pennsylvania	36	<1%
New York	29	<1%

In 2009, coal mined from the Illinois Basin in **Western Kentucky** was exported to 9 different States. The total amount of coal exported domestically from Western Kentucky reached some 9,674,000 tons, and represented a 18.37% decline in exports from this region compared with the previous year of 2008. The States importing the largest amounts of Western Kentucky Coal in 2009 were Florida (43%), Ohio (17%), Tennessee (13%), and Alabama (12%).

In 2009, coal mined from the Appalachian Basin in **Eastern Kentucky** was exported to 18 different States. The total amount of coal exported domestically from Eastern Kentucky reached some 64,173,000 tons, and represented a 12.24% decline in exports from this region compared with the previous year of 2008. The States importing the largest amounts of Eastern Kentucky Coal in 2009 were Georgia (23%), South Carolina (19%), North Carolina (13%), and Ohio (11%).

Overall, total coal exports for the Commonwealth of Kentucky reached 73,847,000 tons in 2009. This coal was shipped to 20 different states, and reflected a 12.84% decline in domestic coal exports from the previous year of 2008.

Electricity Service, Rates, & Generation

Retail Service

Electricity in Kentucky is provided to customers by utility companies that are regulated by the Kentucky Public Service Commission (PSC), municipally owned utilities, and by the Tennessee Valley Authority (TVA) and its distributors. Each electric supplier has the exclusive right to serve the customers within its territory. (See maps on following pages.)

Electric suppliers that are regulated by the PSC fall into two categories: Investor Owned Utilities and Rural Electric Cooperative Companies (RECCs). There are four investor-owned companies in Kentucky: Duke Kentucky, Kentucky Power Company (aka. AEP), Kentucky Utilities, and LG&E. Each of these companies generates the power to meet its respective customers' electricity demands. There are 19 rural electric cooperatives that are regulated by the PSC. Sixteen of these jointly own and purchase power from East Kentucky Power Cooperative. The remaining three jointly own and purchase power from Big Rivers Electric Corporation. A "distribution" cooperative typically receives power from its respective "generation and transmission" cooperative at a substation in the distributor's service territory.

There are five Rural Electric Cooperative Companies (RECCs) and ten municipal companies that secure all of their electricity from the TVA. These RECCs and municipalities then resell and distribute electricity to customers within their service territories. Separately, the TVA also serves several large industrial customers directly.

Additionally, there are eighteen municipal electric suppliers that do not receive electricity from the TVA. These municipalities either self-generate electricity - by owning and/or operating generating facilities - or purchase power from various sources. In the case of purchased power, a municipality may negotiate a guaranteed delivery of electricity from an investor owned utility or independent power producer, or purchase electricity on the market for distribution within its service area.

Electricity Rates

Retail electricity rates are set by either the PSC, the owner or board governing a municipal utility, or the TVA.* Rates are generally established to cover the operating expenses and the capital costs of the utilities. Operating expenses typically include personnel costs, fuel costs, generation costs, and maintenance costs. Capital costs typically include the cost to construct facilities, environmental equipment, transmission lines, the outstanding interest on debt, and a scheduled return on equity. The particular authority that sets a rate is to ensure that these costs are fair, just, and reasonable.

Electricity Generation

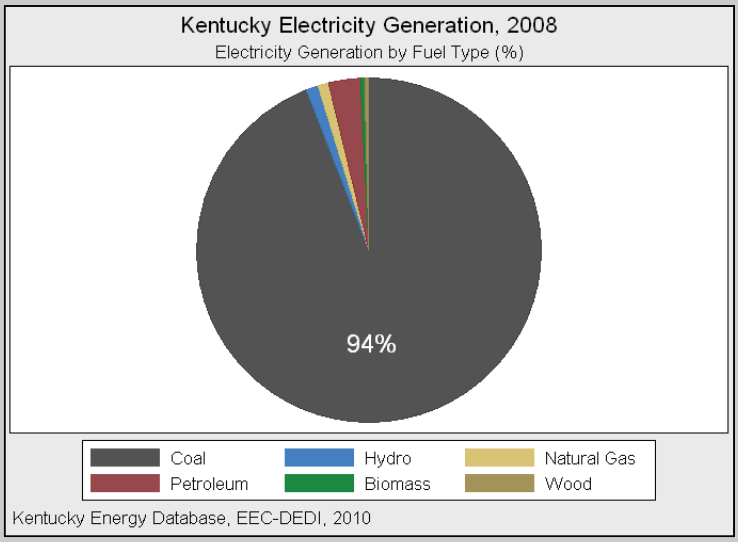
There is approximately 19.9 Gigawatts of electric generating capacity in Kentucky. (**Capacity** is the maximum amount of electricity that can be produced at one moment in time.) 14.3 Gigawatts (72%) of the capacity is coal fired, 4.7 Gigawatts (24%) is gas or petroleum fired, 0.8 GW (4%) is hydro power, and .06 GW (>1%) is other renewable generation capacity.

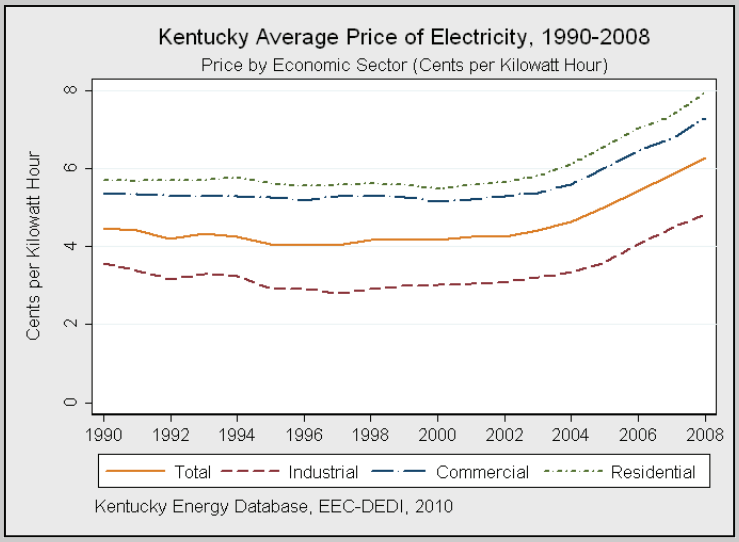
In 2008 there were 97,533 Gigawatt-hours of electricity produced in Kentucky. Ninety-four percent of this generation was produced by coal combustion, 4% was from gas or petroleum, 2% from hydroelectric generation, and less than 1% from other renewable sources.

The variation between the percentage of capacity and electricity produced by the various energy sources is created because some types of generating plants operate more hours during the year than others. Coal plants are "base load" units which typically run 24 hours per day, 365 days per year. The natural gas and petroleum units in Kentucky only run when the demand for electricity is very high, and function to rapidly increase or decrease electricity production to match "peak" demand. Existing hydroelectric facilities and other renewable generating units operate whenever their specific resource is available (which can be intermittent).

*The TVA sets the wholesale rate for electricity supplied to its distributors, and approves the distributors' retail rate.

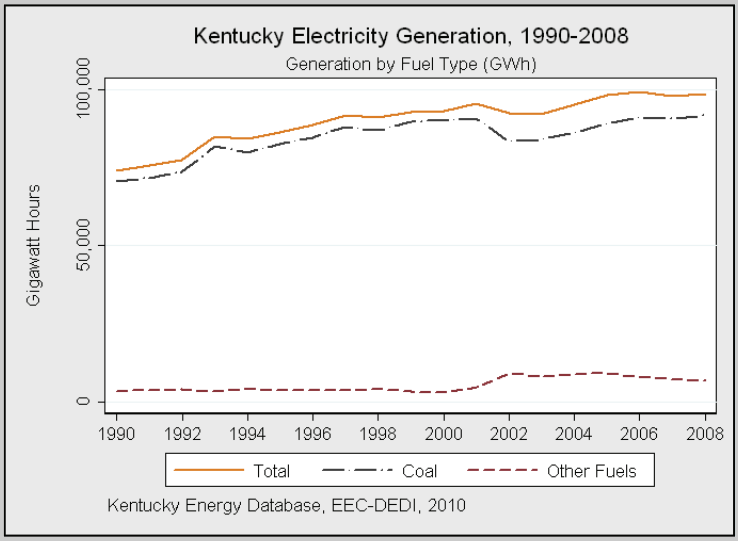
Kentucky Electricity Generation





Fuel Type	Gigawatt Hours	Percentage
Total	97,553	100%
Coal	91,621	94%
Petroleum	2,874	3%
Hydro	1,917	2%
Natural Gas	983	1%
Wood & Biomass	919	<1%

Sector	Rate/kWh	Since 1990
Average	$0.0626	+40%
Residential	$0.0794	+40%
Commercial	$0.0729	+36%
Industrial	$0.0482	+35%

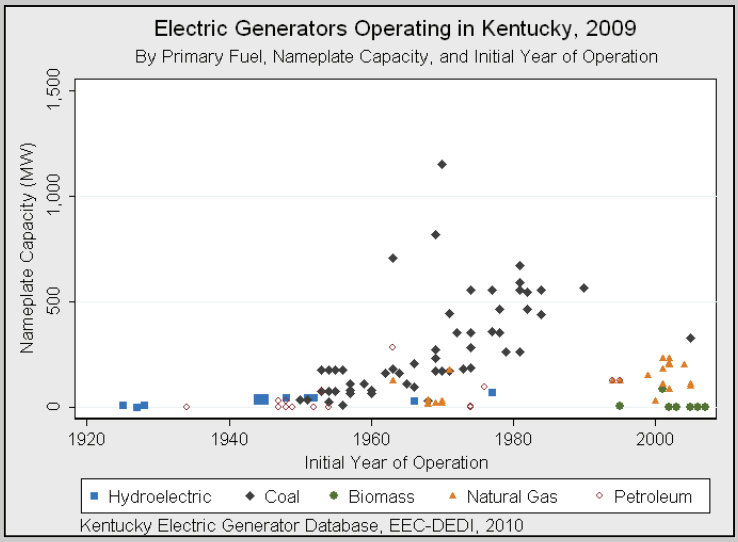


Electricity rates in Kentucky are billed in terms of cents per kilowatt hour of electricity consumed. Due to the nature of the different economic sectors, as well as the arrangements established between utilities and economic sectors, the price of electricity is not uniform across the economy of the Commonwealth. As a result, each economic sector in Kentucky receives a different billing rate for consumption of electricity.

In 2008, the average rate of electricity across economic sectors in Kentucky was $0.0626 per kilowatt hour. The residential sector paid the highest rate at $0.0794 per kilowatt hour, followed by the commercial sector at $0.0729 per kilowatt hour. The industrial sector faced a much lower electricity rate, paying on average $0.0482 per kilowatt hour of consumption.

The electric power sector in the Commonwealth of Kentucky generated 97,553 Gigawatt hours of electricity in 2008. The supermajority (94%) of this electricity generation was fueled by the combustion of coal, and represented a 3.37% increase in total generation compared with 2007. Petroleum was the next largest fuel source for electricity production, accounting for 3% of generation. Hydroelectric power, natural gas, wood products, and biomass comprised the remaining 3% of electricity generation in 2008.

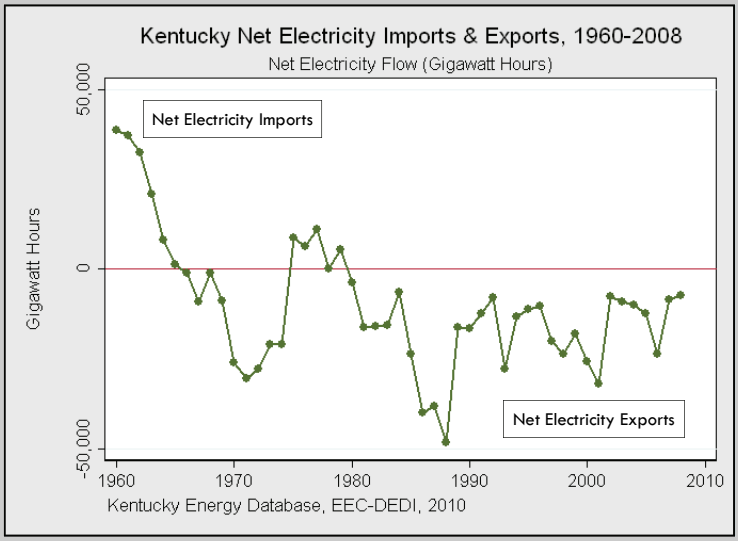
Kentucky Electricity Generation



Electric generating units in Kentucky range in age from 85 years to less than one year old.* The oldest generating units in the State are hydroelectric turbines, whereas newer generating units are typically fueled by natural gas or biomass. Overall, the vast majority of Kentucky's electricity is provided by its coal-fired generator fleet, which represents 52% of the State's generating capacity. This low proportion of generating capacity to actual, total generation by Kentucky's coal generator fleet is explained by the fact that many generating facilities (typically natural gas or petroleum) function only to meet peak electricity demand. In times of normal electricity demand these "peaking" units remain idle. Consequently, substantial generating capacity is little used during the year, and normal electricity demand is predominantly met by coal fired generation.

Average Unit Age	Average Unit Size	Primary Fuel
40 Years	151 MW	Coal

Generation Type	Gigawatt Hours	% of Generation
Electricity Export	7,314	7%

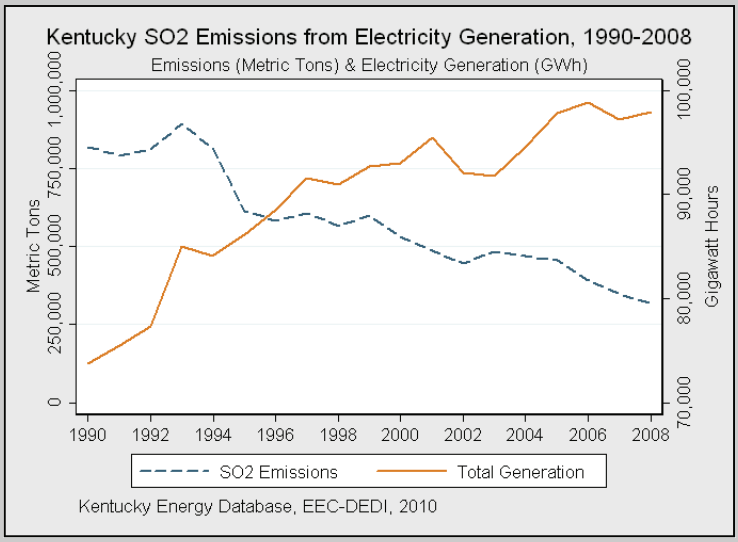


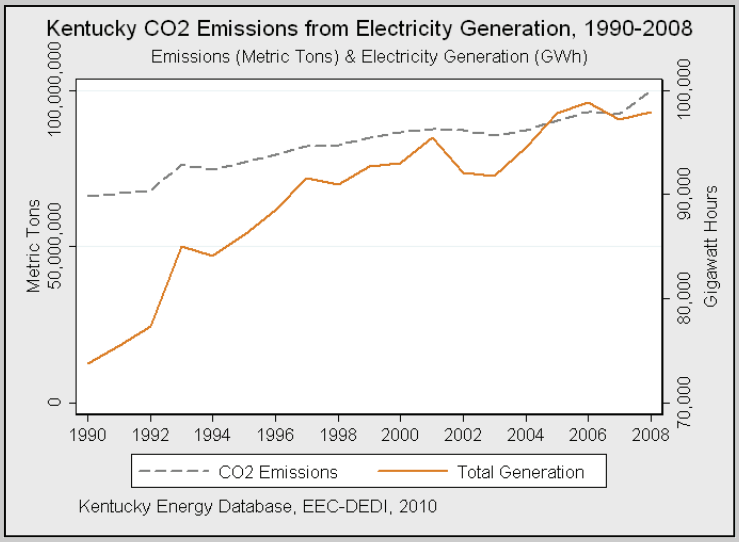
Since 1980, the Commonwealth of Kentucky has been a net exporter of electricity. In 2008, utilities and electric generators based in Kentucky exported 7,314 Gigawatt hours of electricity to consumers out-of-state. This amount represented over 7% of total electricity generation, and a 14.52% decrease in electricity exports compared with the previous year of 2007.

Kentucky's utilities generally maintain enough generating capacity to supply their customers with electricity plus a "reserve margin" of approximately 12 – 20%. When economic conditions warrant, Kentucky's utilities will contract to buy electricity from others or sell the extra electricity that they are able to generate. In addition to utilities, independent power producers also have generators in Kentucky and can sell power to utilities in-state or to customers out of state.

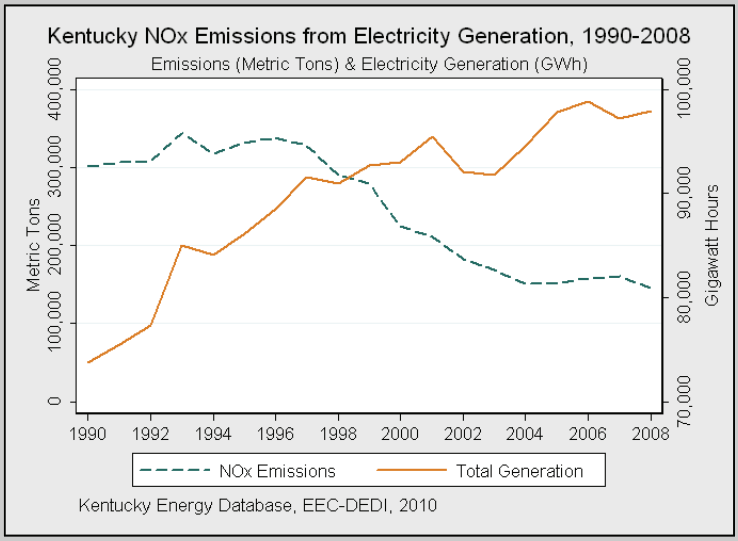
*NOTE: Electric Generator scatter plot data is approximate. Additionally, units with the same online year and nameplate capacity are layered.

Kentucky Electric Power Emissions





Emission	Metric Tons	Since 1990*
Carbon Dioxide	99,908,690	52%
Sulfur Dioxide	316,710	-61%
Nitrogen Oxides	145,815	-52%



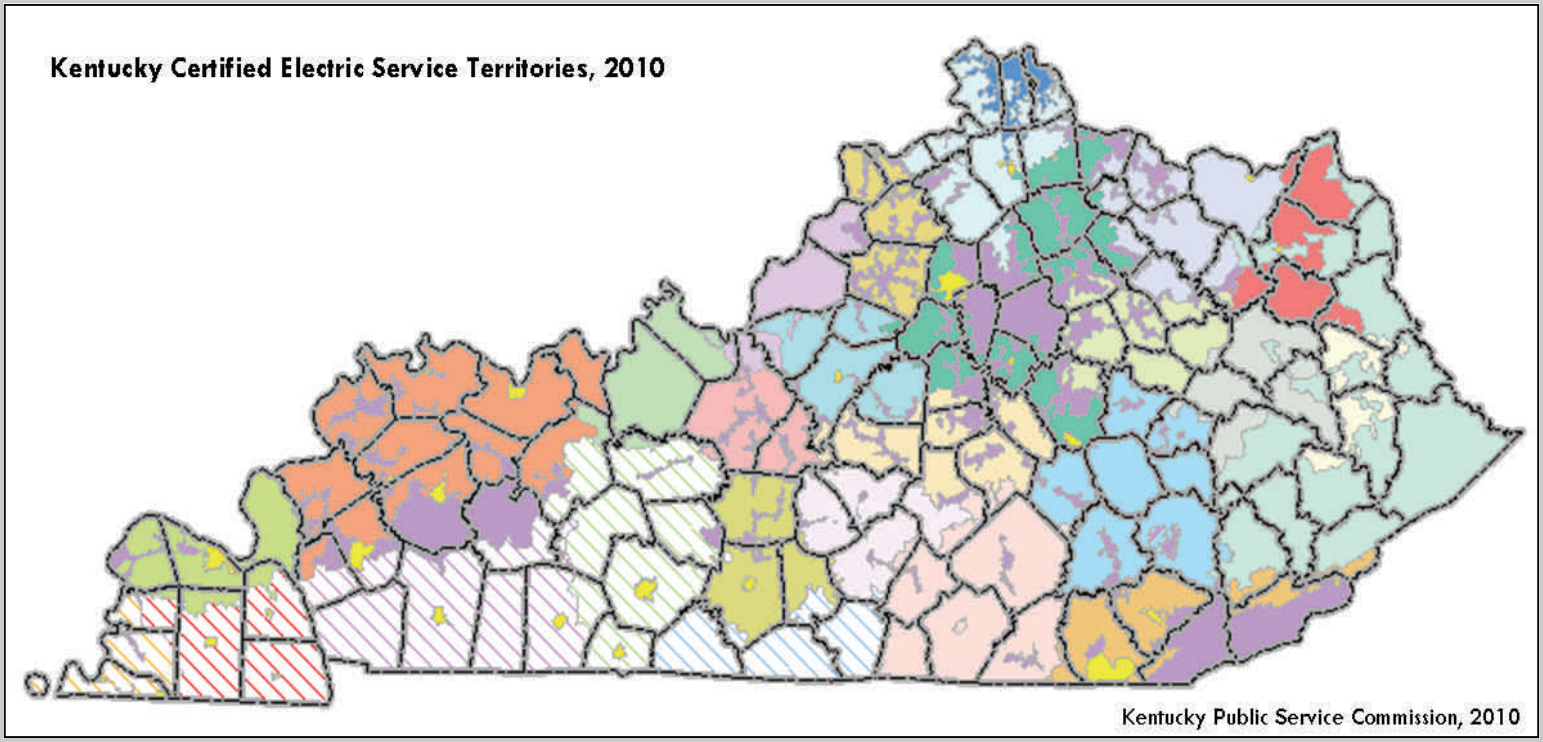
Sulfur Dioxide is a highly reactive gas and major pollutant that is monitored and regulated at the State and Federal level. In 2008, the Commonwealth of Kentucky emitted 316,710 metric tons of sulfur dioxide, representing a 9% decrease from 2007. Overall, the Commonwealth of Kentucky has reduced aggregate sulfur dioxide emissions by 61.31% since 1990.

Nitrogen Oxides are a group of highly reactive gasses which are monitored and regulated at the State and Federal level. In 2008, the Commonwealth of Kentucky emitted 145,815 metric tons of nitrogen oxides, representing a 9.33% decrease from 2007. Overall, the Commonwealth of Kentucky has reduced the aggregate emission of nitrogen oxides by 51.55% since 1990.

Carbon Dioxide emissions from fossil fuel power plants have been monitored over time at the State and Federal level. In 2008, the Commonwealth of Kentucky emitted 99,908,690 metric tons of carbon dioxide. This amount represented a 8.22% increase in electric power carbon dioxide emissions in the State, compared with 2007. Overall, the Commonwealth of Kentucky has increased aggregate carbon dioxide emissions by 51.53% since 1990.

* The last major amendments to the **Clean Air Act** were implemented in 1990. These amendments focused on National Ambient Air Quality Standards and the mechanisms which would ensure attainment and compliance. Sulfur Dioxide and Nitrogen Oxides emissions from electric generating plants were subsequently regulated and targeted for mandated reduction. The dual display of electricity generation and regulated emissions indicates that over time, though electricity demand and production have increased, the release of targeted pollutants has actually decreased.

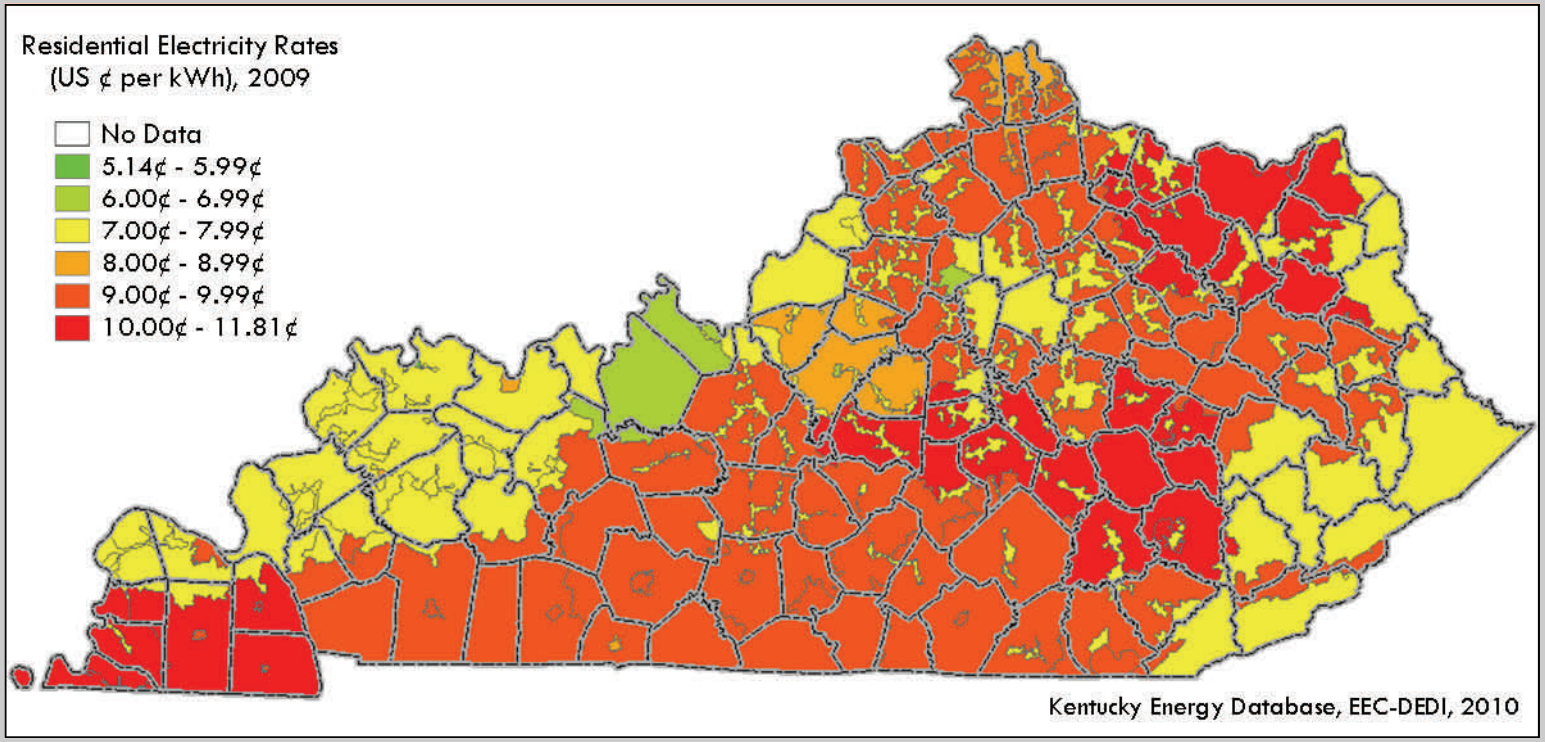
Kentucky Electric Service Areas



All Municipal Utilities		Kentucky Utilities	
Big Sandy RECC		Licking Valley RECC	
Blue Grass ECC		Louisville Gas & Electric	
Clark ECC		Meade County RECC	
Cumberland Valley RECC		Nolin RECC	
Duke Energy Kentucky		Owen ECC	
Farmers RECC		Pennyrile RECC	
Fleming-Mason ECC		Salt River ECC	
Grayson RECC		Shelby ECC	
Hickman-Fulton Counties RECC		South Kentucky RECC	
Inter County ECC		Taylor County RECC	
Jackson ECC		Tri-County Electric Member Corporation	
Jackson Purchase Energy Corporation		Warren RECC	
Kenergy Corporation		West Kentucky RECC	
Kentucky Power			

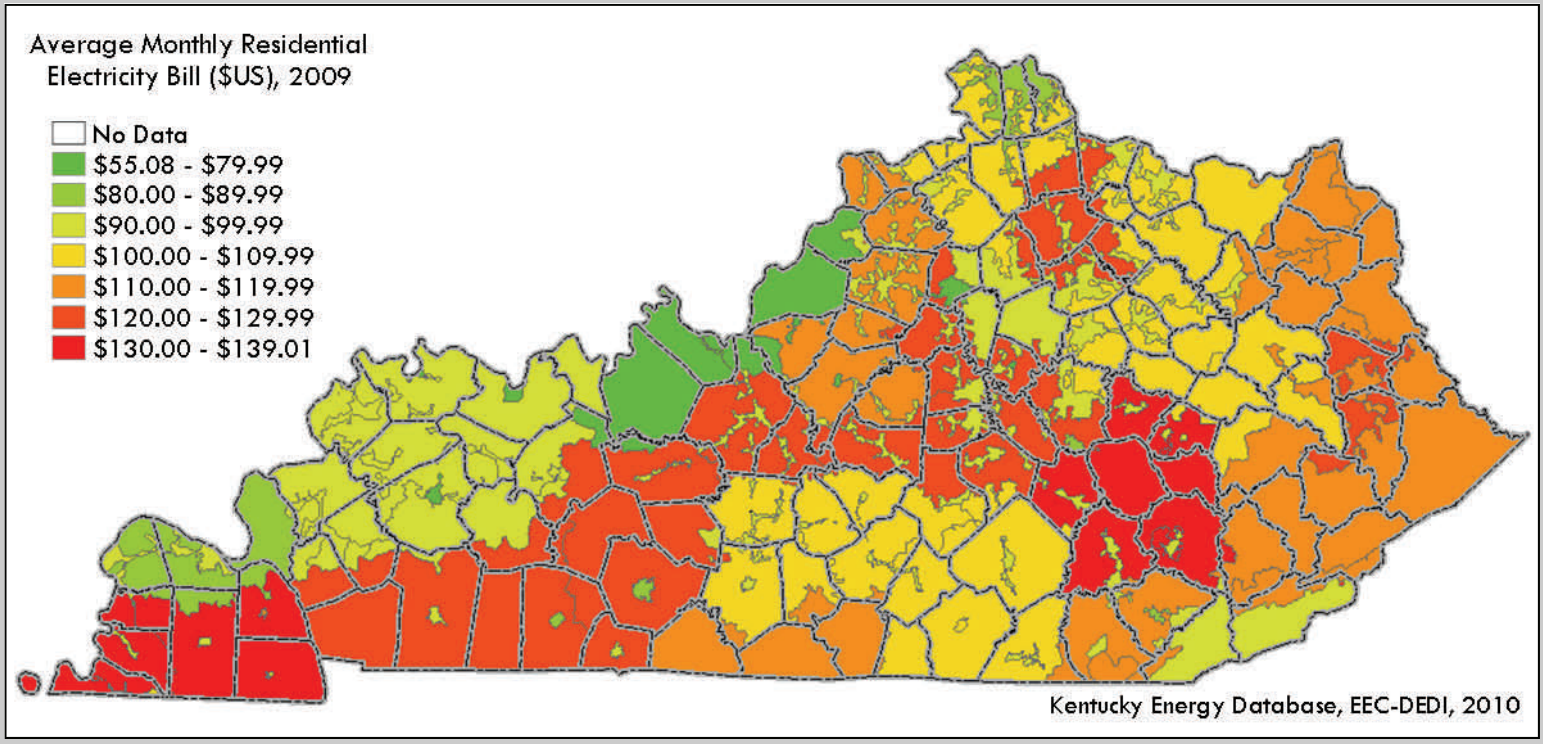
The Commonwealth of Kentucky is divided into certified electric service territories as determined by the Kentucky Public Service Commission (K.R.S. 278.016). Within these certified electric service areas, electricity service and delivery is restricted to one electricity provider per service area. Providers of electricity in Kentucky are either Investor-Owned Utilities (IOU), Municipal-Owned Utilities (MOU), or Rural Electric Cooperative Corporations (RECC).

Residential Electricity Rates, 2009



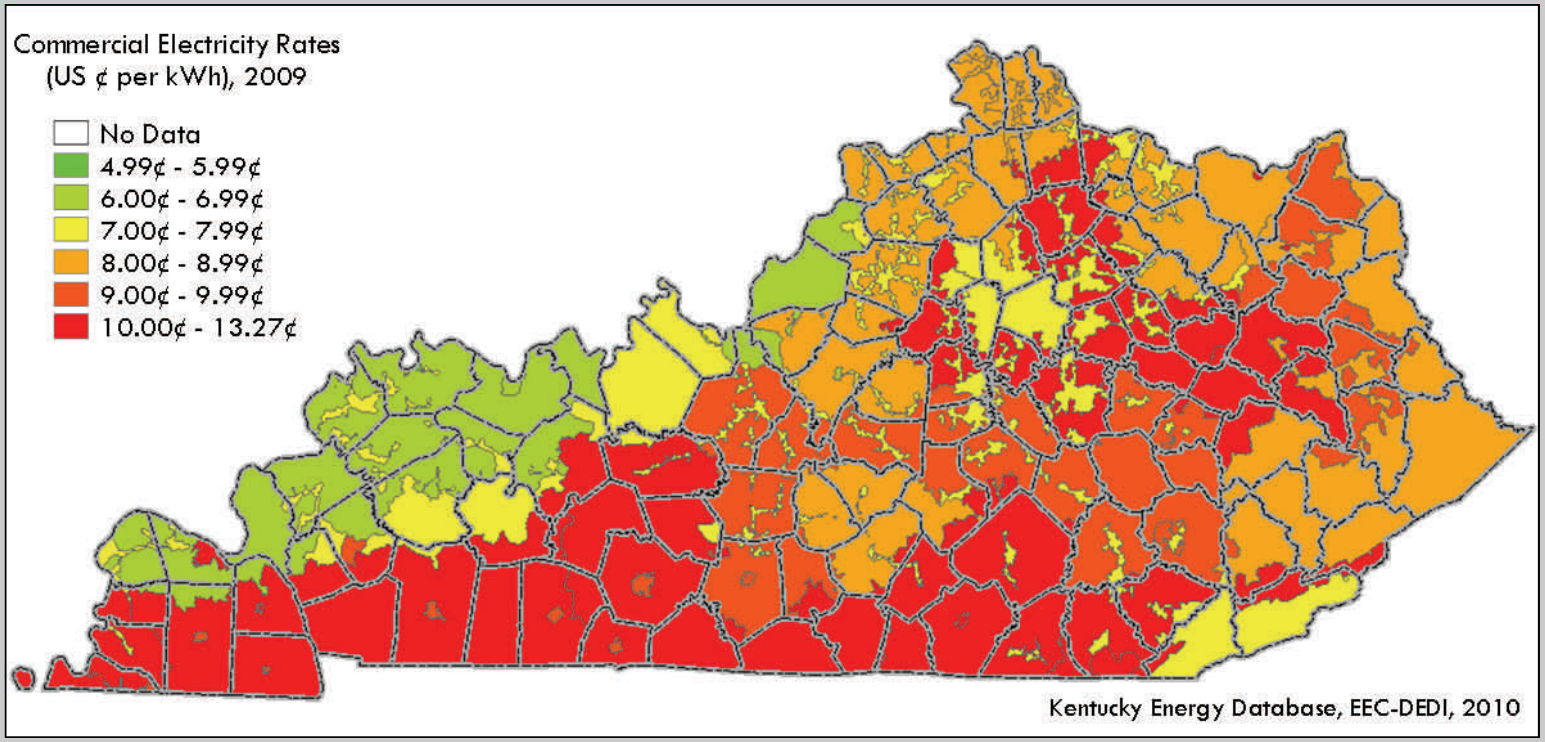
Henderson City Utility Commission	5.14¢	South Kentucky RECC	9.32¢
City of Paris	6.39¢	City of Russellville	9.38¢
City of Nicholasville	6.43¢	Farmers RECC	9.41¢
City of Frankfort	6.45¢	City of Glasgow	9.49¢
City of Bardstown	6.89¢	Nolin RECC	9.50¢
Meade County RECC	6.99¢	City of Paducah	9.52¢
Jackson Purchase Energy Corporation	7.03¢	Tri-County Electric Member Corporation	9.54¢
Kenergy Corporation	7.07¢	Clark ECC	9.58¢
City of Benham	7.15¢	Warren RECC	9.58¢
City of Berea Municipal Utilities	7.20¢	City of Jellico	9.64¢
City of Bardwell	7.26¢	City of Murray	9.65¢
Kentucky Utilities	7.31¢	Big Sandy RECC	9.72¢
Barbourville Utility Commission	7.48¢	Licking Valley RECC	9.81¢
Louisville Gas & Electric	7.58¢	Blue Grass ECC	9.82¢
City of Falmouth	7.75¢	Pennyrile RECC	9.85¢
Madisonville Municipal Utilities	7.81¢	City of Mayfield Plant Board	9.90¢
Kentucky Power Co	7.93¢	City of Princeton	9.92¢
Williamstown Utility Commission	8.10¢	Owen ECC	9.94¢
Corbin City Utilities Commission	8.15¢	City of Olive Hill	10.13¢
City of Owensboro	8.46¢	Fleming-Mason ECC	10.15¢
Duke Energy Kentucky	8.74¢	City of Fulton	10.20¢
City of Providence	8.76¢	City of Benton	10.39¢
City of Franklin	8.79¢	Inter County ECC	10.39¢
Salt River ECC	8.81¢	Jackson ECC	10.45¢
City of Bowling Green	9.08¢	City of Vanceburg	10.52¢
City of Hopkinsville	9.08¢	Grayson RECC	11.02¢
Taylor County RECC	9.16¢	City of Hickman	11.04¢
Shelby ECC	9.22¢	West Kentucky RECC	11.17¢
Cumberland Valley RECC	9.26¢	Hickman-Fulton Counties RECC	11.81¢

Residential Electricity Bill, 2009



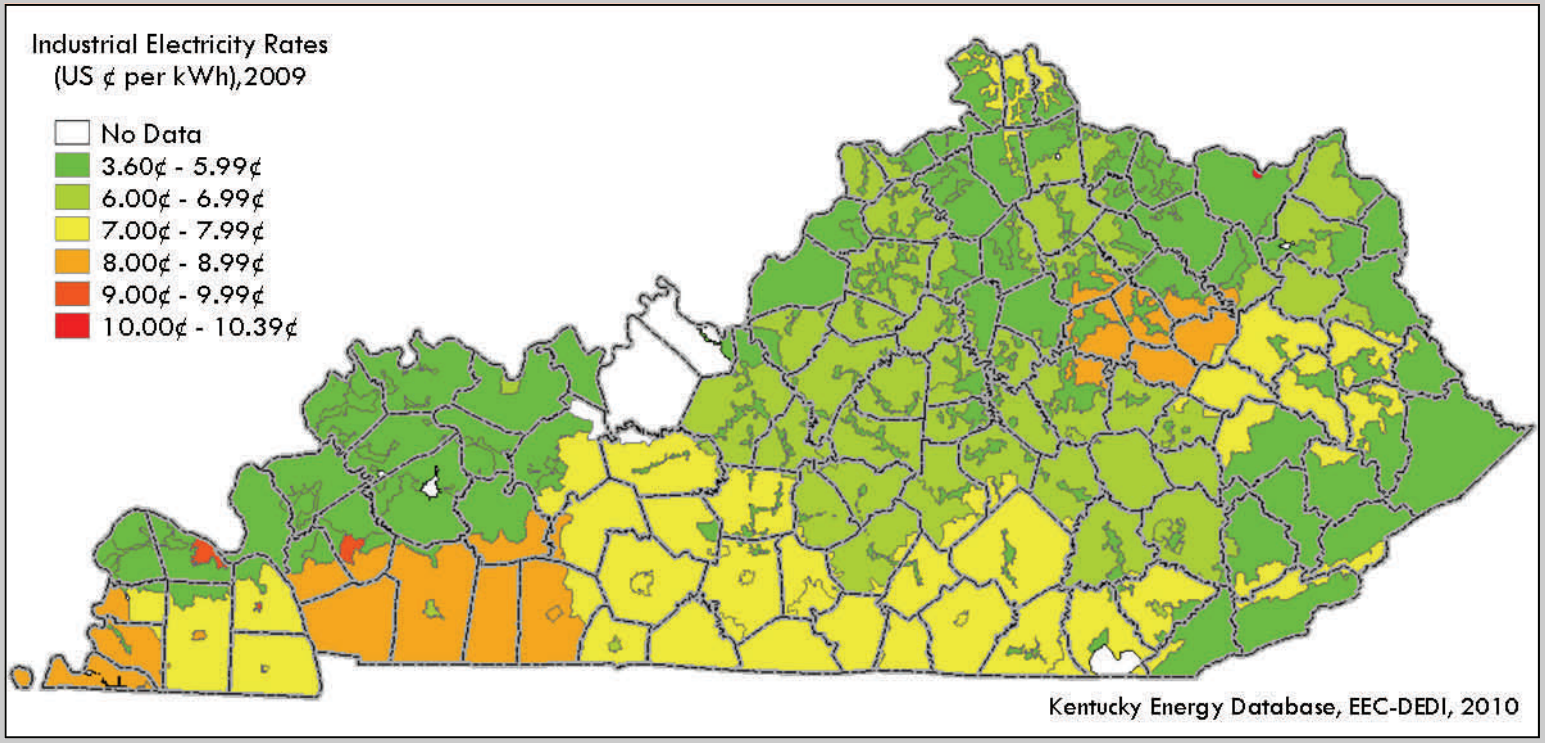
City of Bardwell	$55.08	South Kentucky Rural Electric Coop Corp	$101.18
Henderson City Utility Comm	$56.97	City of Fulton	$102.35
City of Falmouth	$57.69	Taylor County Rural E C C	$104.80
City of Paris	$65.14	Clark Energy Coop Inc	$105.63
Frankfort City of	$70.33	Fleming-Mason Energy Coop Inc	$106.18
City of Owensboro	$71.98	Farmers Rural Electric Coop Corp	$106.19
City of Nicholasville	$73.47	Williamstown Utility Comm	$107.28
Madisonville Municipal Utils	$73.63	Owen Electric Coop Inc	$108.66
Meade County Rural E C C	$74.40	City of Jellico	$109.51
Louisville Gas & Electric Co	$75.06	City of Hickman	$110.65
City of Bardstown	$78.46	Cumberland Valley Rural E C C	$111.46
City of Berea Municipal Utilities	$79.92	Kentucky Power Co	$111.60
Corbin City Utilities Comm	$81.31	Salt River Electric Coop Corp	$112.98
Barbourville Utility Comm	$83.46	Olive Hill City of	$114.03
City of Bowling Green	$84.04	City of Vanceburg	$115.02
Duke Energy Kentucky, Inc.	$85.42	City of Benton	$115.22
Jackson Purchase Energy Corporation	$87.34	Tri-County Elec Member Corp	$116.75
Russellville City of	$88.37	Shelby Energy Co-op, Inc	$117.90
Kentucky Utilities Co	$89.41	Grayson Rural Electric Coop Corp	$118.04
City of Princeton	$89.72	Nolin Rural Electric Coop Corp	$120.07
City of Providence	$90.91	Inter County Energy Coop Corp	$120.17
City of Murray	$91.77	Big Sandy Rural Elec Coop Corp	$121.88
City of Mayfield Plant Board	$92.27	Blue Grass Energy Coop Corp	$122.84
City of Franklin	$92.97	Pennyrile Rural Electric Coop	$124.96
Kenergy Corp	$92.98	City of Benham	$125.57
City of Hopkinsville	$95.78	Warren Rural Elec Coop Corp	$127.04
City of Glasgow	$97.79	Jackson Energy Coop Corp	$129.16
City of Paducah	$98.40	West Kentucky Rural E C C	$134.12
Licking Valley Rural E C C	$101.18	Hickman-Fulton Counties RECC	$139.01

Commercial Electricity Rates, 2009



Henderson City Utility Commission	4.99¢	Nolin RECC	9.25¢
Jackson Purchase Energy Corporation	6.08¢	City of Franklin	9.32¢
City of Bardstown	6.08¢	City of Fulton	9.38¢
City of Paris	6.35¢	Jackson ECC	9.48¢
Madisonville Municipal Utilities	6.47¢	City of Mayfield Plant Board	9.53¢
Louisville Gas & Electric	6.75¢	Grayson RECC	9.54¢
City of Owensboro	6.79¢	City of Glasgow	9.60¢
Kenergy Corporation	6.82¢	City of Hopkinsville	9.67¢
City of Nicholasville	7.02¢	City of Russellville	9.74¢
Kentucky Utilities	7.02¢	City of Murray	9.81¢
City of Frankfort	7.12¢	City of Princeton	9.89¢
City of Berea Municipal Utilities	7.15¢	Inter County ECC	9.99¢
Meade County RECC	7.16¢	City of Benton	10.02¢
Barbourville Utility Commission	7.28¢	Blue Grass ECC	10.13¢
City of Benham	7.29¢	Williamstown Utility Commission	10.21¢
City of Bardwell	7.63¢	Cumberland Valley RECC	10.23¢
Corbin City Utilities Commission	7.79¢	Clark ECC	10.24¢
City of Providence	7.91¢	City of Vanceburg	10.39¢
Duke Energy Kentucky	8.09¢	Licking Valley RECC	10.39¢
Kentucky Power	8.16¢	Tri-County Electric Member Corporation	10.40¢
Taylor County RECC	8.40¢	Warren RECC	10.74¢
City of Falmouth	8.47¢	South Kentucky RECC	10.83¢
Shelby ECC	8.49¢	Pennyrile RECC	10.98¢
Fleming-Mason ECC	8.65¢	City of Paducah	11.12¢
Salt River ECC	8.69¢	City of Olive Hill	11.19¢
Owen ECC	8.73¢	City of Jellico	11.54¢
Big Sandy RECC	9.07¢	Hickman-Fulton Counties RECC	12.78¢
City of Bowling Green	9.09¢	West Kentucky RECC	12.81¢
Farmers RECC	9.13¢	City of Hickman	13.27¢

Industrial Electricity Rates, 2009



Kenergy Corporation	3.60¢	Shelby ECC	6.72¢
City of Benham	3.75¢	City of Franklin	6.84¢
City of Bardstown	4.03¢	Jackson ECC	6.86¢
Corbin City Utilities Commission	4.14¢	Duke Energy Kentucky	7.15¢
Tennessee Valley Authority	4.30¢	City of Murray	7.21¢
Owen ECC	4.59¢	City of Glasgow	7.24¢
Henderson City Utility Commission	4.81¢	West Kentucky RECC	7.32¢
Jackson Purchase Energy Corporation	5.09¢	Farmers RECC	7.42¢
Louisville Gas & Electric	5.14¢	Tri-County Electric Member Corporation	7.47¢
City of Nicholasville	5.29¢	City of Bowling Green	7.57¢
Kentucky Power	5.57¢	Cumberland Valley RECC	7.65¢
Kentucky Utilities	5.59¢	South Kentucky RECC	7.75¢
City of Frankfort	5.65¢	Big Sandy RECC	7.76¢
Fleming-Mason ECC	5.87¢	Warren RECC	7.83¢
Barbourville Utility Commission	6.02¢	Licking Valley RECC	7.85¢
City of Paris	6.04¢	Pennyrile RECC	8.01¢
Nolin RECC	6.13¢	City of Russellville	8.11¢
City of Owensboro	6.28¢	City of Fulton	8.48¢
Grayson RECC	6.32¢	Hickman-Fulton Counties RECC	8.52¢
Taylor County RECC	6.43¢	Clark ECC	8.66¢
Blue Grass ECC	6.44¢	City of Mayfield Plant Board	8.72¢
Inter County ECC	6.59¢	City of Princeton	9.24¢
City of Hopkinsville	6.64¢	City of Paducah	9.42¢
City of Berea Municipal Utilities	6.65¢	City of Benton	9.49¢
Salt River ECC	6.69¢	City of Vanceburg	10.39¢
Williamstown Utility Commission	6.71¢		

Acknowledgements

The Kentucky Department for Energy Development and Independence (DEDI) would like to extend a special thanks to the following agencies and organizations for their contributions to this project:

The Kentucky Geological Survey (KGS)
The Kentucky Public Service Commission (PSC)
The University of Kentucky Department of Statistics

Basic Methodology

Purpose:

In December 2009, Kentucky Energy and Environment Cabinet Secretary Len Peters directed the Department for Energy Development and Independence (DEDI) to construct a comprehensive database concerning energy, environmental, and economic statistics for the purposes of quantitative analysis and policy interpretation. The outcome of this effort is the Kentucky Energy Database, a summary time series data set encapsulating energy related statistics for the Commonwealth of Kentucky for the period 1950 to 2010. An outgrowth of this undertaking is the *Kentucky Energy Profile 2010*, which utilizes the summary statistics of the Kentucky Energy Database to provide an annual snapshot of energy consumption and production within Kentucky. The *Kentucky Energy Profile 2010* exists for the following three purposes:

1. To support the Commonwealth Energy Assurance Plan that identifies potential threats to energy systems in the Commonwealth, and facilitates the restoration of energy supplies in the event of an emergency.
2. To serve as an impartial repository of energy statistics for the general public, researchers, and policy makers.
3. To provide an understanding of the dynamics of energy consumption and production within the Commonwealth.

Construction:

The foundation of the *Kentucky Energy Profile 2010*, the Kentucky Energy Database, consists of one summary time series data set and four supporting multidimensional panel data sets, each with a different unit of observation. The majority of the variables located in this database were acquired from publically available resources, primarily the Department of Energy State Energy Data System (SEDS). This data system is produced and maintained by the U.S. Energy Information Administration (EIA).

However, the SEDS database does not contain many critical variables - particularly economic, socioeconomic, and environmental - required for a holistic analysis of energy systems. Accordingly, the Kentucky Energy Database was supplemented with data sets from the following United States Government agencies: Federal Energy Regulatory Commission (FERC), National Renewable Energy Laboratory (NREL), Bureau of Economic Analysis, National Oceanic Atmospheric Administration (NOAA), U.S. Census Bureau, U.S. Census of Manufacturers, Environmental Protection Agency (EPA), Mine Safety and Health Administration (MSHA), Bureau of Labor Statistics (BLS).

Following the construction of the Kentucky Energy Database, DEDI analysts were able to conduct specified research involving economic and energy related issues of the Commonwealth. The collation of data provided a platform on which summary statistics and time series analyses could be easily generated to answer questions of interest. Such information could then be transformed into accessible tables and graphics for general representation and distribution.

Production:

Incorporating the capabilities of the Kentucky Energy Database, DEDI analysts were able to produce an energy profile for the Commonwealth, which became the *Kentucky Energy Profile 2010*. This document intends to function as a comprehensive assessment of energy consumption and production within the State by supplying detailed summary statistics and identifying time series trends. The data and topics included within the document are represented through quantitative tables, analytic graphics and maps, as well as textual analysis.

For a more detailed explanation of methodology involving the construction of the Kentucky Energy Database, and the capabilities with which the *Kentucky Energy Profile 2010* was designed, please examine the "Kentucky Energy Database Methodology" available in conjunction with this document. A file can be downloaded and viewed in PDF format, and is co-located with the *Kentucky Energy Profile 2010*.

Kentucky Energy Profile Glossary

Aviation Gasoline: A complex mixture of relatively volatile hydrocarbons with or without small quantities of additives, blended to form a fuel suitable for use in aviation reciprocating engines.

Biomass: Organic non-fossil material of biological origin constituting a renewable energy source.

British Thermal Unit (BTU): The quantity of heat required to raise the temperature of 1 pound of liquid water by 1 degree Fahrenheit at the temperature at which water has its greatest density (approximately 39 degrees Fahrenheit).

Central Appalachian Basin: The Central Appalachian Coal Basin is the middle basin of three basins that comprise the Appalachian Coal Region of the eastern United States. It includes parts of Kentucky, Tennessee, Virginia, and West Virginia.(G)

Coal: a naturally occurring, combustible, sedimentary rock containing at least 50% by weight organic matter, a solid "fossil" fuel.(G)

Coal Export: A quantity of coal shipped, delivered, and combusted within a State different from the coal mine State of origin.(D)

Coal Field: A geographic region characterized by coal resources.(G)

Coal Import: A quantity of coal delivered and combusted within a State, but not originating from a coal mine within the same State.(D)

Commercial Sector: An energy-consuming sector that consists of service-providing facilities and equipment of businesses; Federal, State, and local governments; and other private and public organizations, such as religious, social, or fraternal groups.

Diesel: A fuel composed of distillates obtained in petroleum refining operation, or blends of such distillates with residual oil used in motor vehicles.

Electric Power Sector: An energy-consuming sector that consists of electricity only and combined heat and power (CHP) plants whose primary business is to sell electricity, or electricity and heat, to the public--i.e., North American Industry Classification System 22 plants.

Electric Service Area: The geographic served exclusively by one retail electricity provider.(D)

Electricity Distribution: The delivery of electrical energy to a customer's home or business through low-voltage lines (typically at 69kV or less).(D)

Electricity Generation: The conversion of energy resources into electric power.

Electricity Rate: The average amount of money charged for each unit of electrical energy (kWh) distributed to a customer.(D)

Electricity Transmission: The movement or transfer of electric energy at high voltage over an interconnected group of lines and associated equipment between points of supply and points at which it is transformed for delivery to consumers or is delivered to other electric systems.

Energy Consumption: The processes of converting energy supplies into useful forms such as heat, steam, electricity, and motion.(D)

Energy Production: The processes of extraction, collection, or utilization of energy resources for the purpose of creating accessible energy supplies (i.e. - available for sale and distribution).(D)

Ethanol: A clear, colorless, flammable alcohol. Ethanol is typically produced biologically from biomass feedstocks such as agricultural crops and cellulosic residues from agricultural crops or wood.

Gasoline: A complex mixture of relatively volatile hydrocarbons with or without small quantities of additives, blended to form a fuel suitable for use in spark-ignition engines.

Geothermal Energy: Hot water or steam extracted from Geothermal reservoirs in the earth's crust. Also, a subterranean energy source utilized by residential heat pumps and air conditioning units.

Kentucky Energy Profile Glossary

Gigawatt (GW): A measure of electrical power. Specifically, one billion watts or one thousand megawatts.

Gigawatt Hour (GWh): A measure of electrical energy defined as a unit of work, measured as 1 Gigawatt (1,000,000,000 watts) of power expended for 1 hour.

Hydroelectric Energy: The use of flowing water to produce electrical energy.

Illinois Basin: The coal producing areas of Western Kentucky, Southern Illinois, and Southwest Indiana.(G)

Industrial Sector: An energy-consuming sector that consists of all facilities and equipment used for producing, processing, or assembling goods. The industrial sector encompasses the following types of activity manufacturing (NAICS codes 31-33); agriculture, forestry, fishing and hunting (NAICS code 11); mining, including oil and gas extraction (NAICS code 21); and construction (NAICS code 23).

Jet Fuel: A refined petroleum product used in jet aircraft engines. It includes kerosene-type Jet Fuel and naphtha-type Jet Fuel.

Kerosene: A light petroleum distillate that is used in space heaters, cook stoves, and water heaters and is suitable for use as a light source when burned in wick-fed lamps.

Kilowatt (kW): A measure of electrical power. Specifically, one thousand watts.

Kilowatt Hour (kWh): A measure of electrical energy defined as a unit of work, measured as 1 Kilowatt (1,000 watts) of power expended for 1 hour.

Megawatt (MW): A measure of electrical power. Specifically, one million watts.

Megawatt Hour (MWh): A measure of electrical energy defined as a unit of work, measured as 1 Megawatt (1,000,000 watts) of power expended for 1 hour.

Metallurgical Coal: Coking coal and pulverized coal consumed in making steel.

Natural Gas: A naturally occurring combustible mixture of light hydrocarbon (primarily methane) and inorganic gases that often occurs in porous and permeable sedimentary rocks, a gaseous "fossil" fuel.(G)

Natural Gas Liquids: Propane and butanes, which are dissolved in natural gas at reservoir pressure but condense into liquids at normal atmospheric pressure. Also called condensates, these liquids are removed from initial natural gas production and refined into a variety of additional energy products.(D)

Net Energy Consumption: The measurement of the total British Thermal Unit (BTU) value of energy resources utilized or combusted, subtracting the quantity of energy lost in the conversion of a primary energy source into a secondary, useful energy source.(D)

Petroleum: A mixture of hydrocarbons that exists in liquid phase in natural underground reservoirs and remains liquid at atmospheric pressure after passing through surface separating facilities.

Primary Energy: Energy in the form that it is first accounted for in a statistical energy balance, before any transformation to secondary or tertiary forms of energy.

Propane: A normally gaseous straight-chain hydrocarbon, that is extracted from natural gas or refinery gas streams.

Regulated Emissions: Relating to Sulfur Dioxide (SO_2), Nitrogen Oxides (NO_x), and other particulates, the release of these constituents by electric generating units are restricted by provisions of the Clean Air Act amendments of 1990. Federal and State regulatory agencies are required to monitor the production and movement of these emissions, and ensure their mandated control and reduction.(D)

Renewable Energy: There is no formal, universally accepted definition for this term. Typical usage may define renewable energy as: Energy resources that are naturally replenishing but flow-limited. Such resources are virtually inexhaustible in duration but limited in the amount of energy that is available per unit of time.

Kentucky Energy Profile Glossary

Residential Sector: An energy-consuming sector that consists of living quarters for private households. Common uses of energy associated with this sector include space heating, water heating, air conditioning, lighting, refrigeration, cooking, and running a variety of other appliances.

Steam Coal: Coal used in boilers to generate steam for the purpose of electricity generation or heat and power distribution.

Surface Coal Mine Operation: A coal mine operation that produces coal through extraction processes removing surface layers of soil, rock, and coal deposits.(D)

Total Energy Consumption: The measurement of the total British Thermal Unit (BTU) value of primary energy resources utilized or combusted.(D)

Transportation Sector: An energy-consuming sector that consists of all vehicles whose primary purpose is transporting people and/or goods from one physical location to another.

Underground Coal Mine Operation: A coal mine operation that produces coal through solely subterranean extraction processes.(D)

Volt (V): A measure of electrical potential or electromotive force.

Watt (W): The unit of electrical power equal to one ampere under a pressure of one volt. A Watt is equal to 1/746 horse power.

Wood & Wood Waste: Wood and wood products, possibly including scrubs, branches, sawdust, etc., bought or gathered, and used by direct combustion.

*** All definitions are cited from the Energy Information Administration (E.I.A) Glossary unless otherwise noted.

(D) - Kentucky Department for Energy Development and Independence (DEDI)

(G) - Kentucky Geological Survey (KGS)