

# Kentucky Energy Profile

6th Edition • 2017



Kentucky Energy and Environment Cabinet

Department for Energy Development and Independence

[energy.ky.gov](http://energy.ky.gov)

# Executive Summary

The Commonwealth of Kentucky remains a leader in energy production and consumption. The Kentucky Energy and Environment Cabinet (EEC) offers the Kentucky Energy Profile 2017 to serve as an impartial point of reference for the general public and as a foundation for discussing Kentucky's energy future.

In 2016, after more than two centuries of commercial mining operations, Kentucky's domestic supply of coal remains the Commonwealth's primary source of energy and an important component of the Commonwealth's economy. Coal accounts for 83 percent of Kentucky's own electricity portfolio, see [page 14](#), and 47 percent of our total energy consumption, see [page 35](#). Although coal is Kentucky's primary energy source, the Commonwealth also produces small amounts of oil, see [page 53](#), and enough natural gas to meet our home heating and industrial requirements, see [page 57](#). Kentucky also has limited, but growing, renewable energy resources and opportunities, as shown on [pages 58-65](#). For more detailed information on coal production in Kentucky, please see our sister publication [Kentucky Coal Facts](#).

Kentucky's low energy costs stimulate economic growth by lowering the costs of doing business in Kentucky. Kentucky maintained the sixth-lowest industrial electricity price in the United States in 2016 and the lowest east of the Mississippi River, see [pages 9-10](#). In 2016, 37 percent of the energy and electricity consumed in Kentucky went to manufacturing, see [page 14](#), which remains Kentucky's largest source of revenue and a leading source of employment, see [page 5](#). In addition to large flagship manufacturers, such as General Electric, Toyota, and Ford, who have located in Kentucky—in part due to the low energy costs and central location—Kentucky is also home to particularly energy-intensive manufacturing processes including; iron and steel mills, paper mills, chemical production, and glass manufacturing. Furthermore, Kentucky is a transportation and logistics hub for companies like UPS and DHL, which consume large amounts of transportation fuels to ship manufactured goods around the United States and the world. For more information on the importance of low energy costs for economic growth, please read our associated [white paper](#).

While our abundant supply of coal has enabled Kentucky to maintain one of the lowest electricity prices in the United States, see [pages 8-9](#), electricity prices do vary across the Commonwealth and between utilities. Prices have also trended upward in recent years. In real terms, average electricity prices in Kentucky have risen by 10 percent in the past 5 years and 30 percent in the past ten years. The residential sector has experienced the largest change in prices (a 50 percent rise in real prices) since the year 2000. For more information on electricity prices in Kentucky see [pages 10-11](#).

Electricity in Kentucky is supplied by 160 individual electricity generating units at 46 power plants across the state, as shown on [pages 18-19](#). Our power plants average 38 years of age, with our oldest hydroelectric station being built in 1925 and newest natural gas combined cycle (NGCC) units coming online in 2015 and 2016. Electricity is sold by six major electric utilities and dozens of smaller municipalities, as shown on the maps on [pages 16-17](#). We have profiled each major electric utility on [pages 22-23](#), and profiled each power plant on [pages 68-107](#). Kentucky's power plants have reduced emissions of pollutants such as sulfur dioxide and nitrogen oxides by more than 70 percent since 1995, as shown on [page 21](#) and is shown on the profile for each utility and power plant.

We hope that you will find this report informative and useful. We welcome your questions and feedback. Please direct all inquiries to Greg Bone (Greg.Bone@ky.gov) or by telephone at 502-782-7246. This publication received no funding beyond staff time, and—as a cost-saving measure—will not be printed with public funds. All of the data in this report are public information aggregated from a variety of state and federal government agencies.

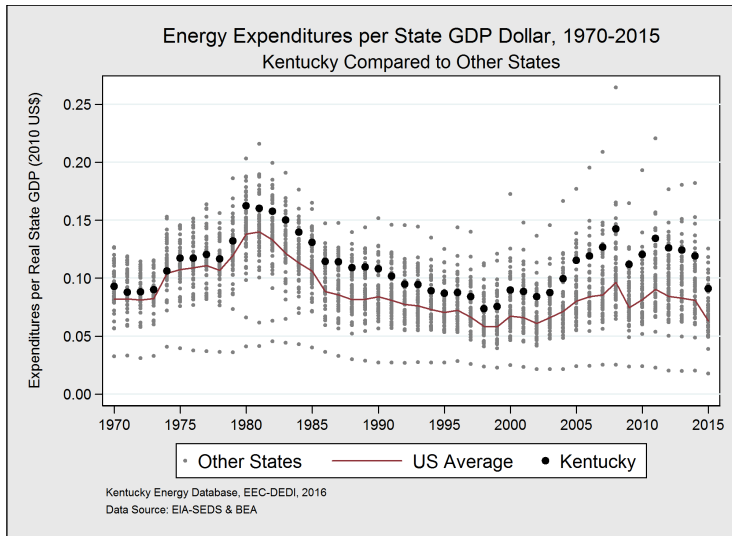
## Cover Photos

*Front Top Left:* H.L. Spurlock Generating Station. Owned and operated by Eastern Kentucky Power Cooperative. *Photo courtesy of Tim Webb.* *Front Top Right:* Mother Ann Lee Hydroelectric Station at Lock and Dam 7 on the Kentucky River. *Photo taken by EEC staff.* *Bottom:* 10 MW Solar Array at E.W. Brown Generating Station. *Photo courtesy of LG&E-KU.* *Back Cover:* H.L. Spurlock Generating Station. *Photo courtesy of Eastern Kentucky Power Cooperative.*

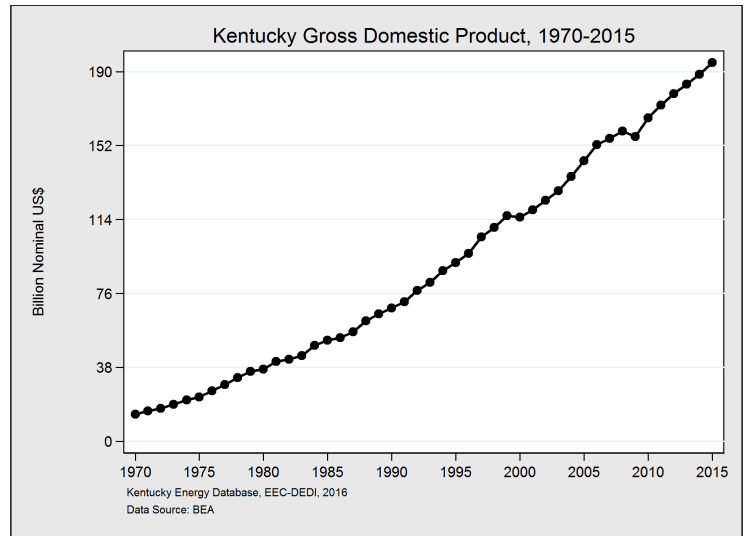
# Table of Contents

<b>Executive Summary .....</b>	<b>2</b>
<b>General Statistics and Economy Overview.....</b>	<b>4</b>
<b>Kentucky Energy Commodity Prices and Expenditures .....</b>	<b>6</b>
<b>Kentucky Electricity.....</b>	<b>8</b>
Average Price of Electricity by State.....	9
Kentucky Electricity Prices .....	10
Kentucky Electric Service Areas.....	12
Kentucky Balancing Authority Areas .....	13
Kentucky Electricity Generation.....	14
Electricity Utilities in Kentucky Profiles .....	20
<b>Kentucky Energy Production.....</b>	<b>34</b>
<b>Kentucky Energy Consumption .....</b>	<b>35</b>
Kentucky Commercial Energy Consumption .....	38
Kentucky Industrial Energy Consumption .....	40
Kentucky Residential Energy Consumption.....	42
Kentucky Transportation Energy Consumption .....	44
<b>Kentucky Coal Production, Consumption and Distribution* .....</b>	<b>46</b>
<b>Kentucky Crude Oil Production and Consumption .....</b>	<b>53</b>
<b>Kentucky Natural Gas Production and Consumption .....</b>	<b>57</b>
<b>Kentucky Renewable Energy.....</b>	<b>58</b>
Kentucky Biomass.....	60
Kentucky Wind Power Potential .....	62
Kentucky Hydroelectricity.....	64
Kentucky Distributed Renewable Energy .....	66
Kentucky Solar Power Projects.....	67
<b>Kentucky Demand Side Management Programs .....</b>	<b>68</b>
<b>Kentucky Coal-fired Power Plant Profiles.....</b>	<b>70</b>
<b>Acknowledgements.....</b>	<b>111</b>

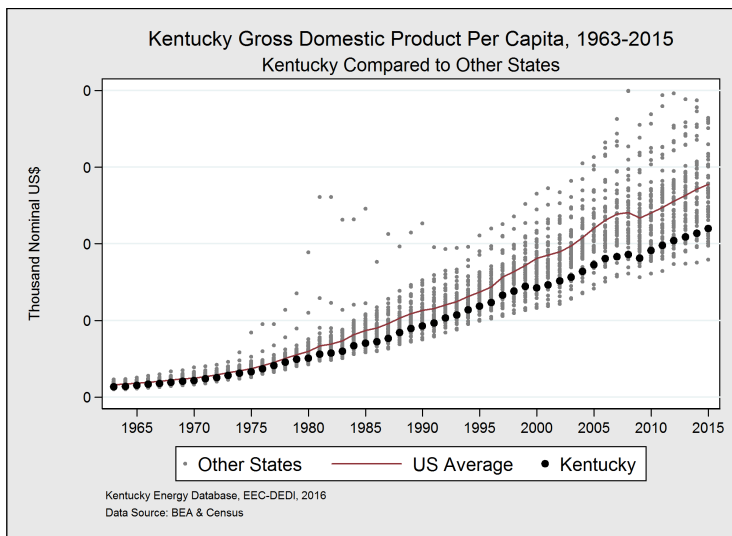
# General Statistics



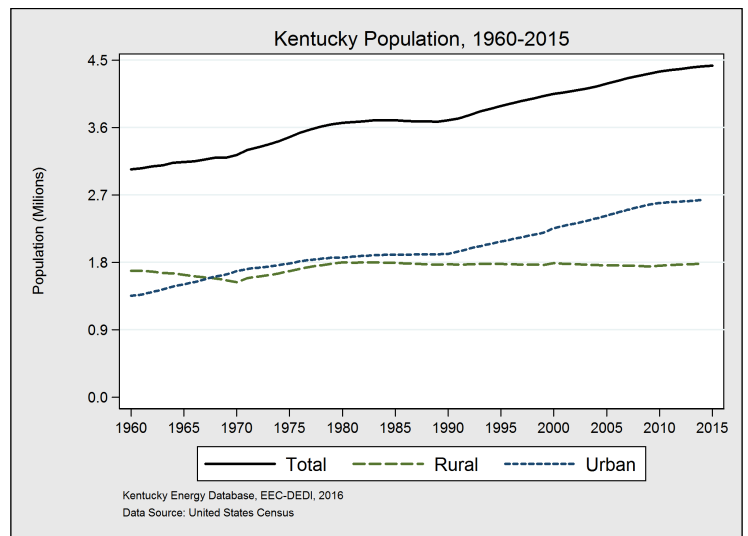
In 2015, on average \$0.09 was spent in Kentucky on energy to produce one dollar of state Gross Domestic Product (GDP). Kentucky ranked twelfth in energy intensity of GDP in 2015, and decreased its intensity by twenty four percent from 2014. Kentucky is home to large, energy-intensive, manufacturing operations, which cause Kentucky's electricity intensity to be higher than other states.



In 2015, the Gross Domestic Product of Kentucky was \$195 billion, an increase of 3.2 percent from 2014, or \$5 billion. Kentucky has the 28th largest GDP in the United States. Since 1970, the inflation adjusted GDP of Kentucky has had a average compound annual growth rate of 1.8 percent.



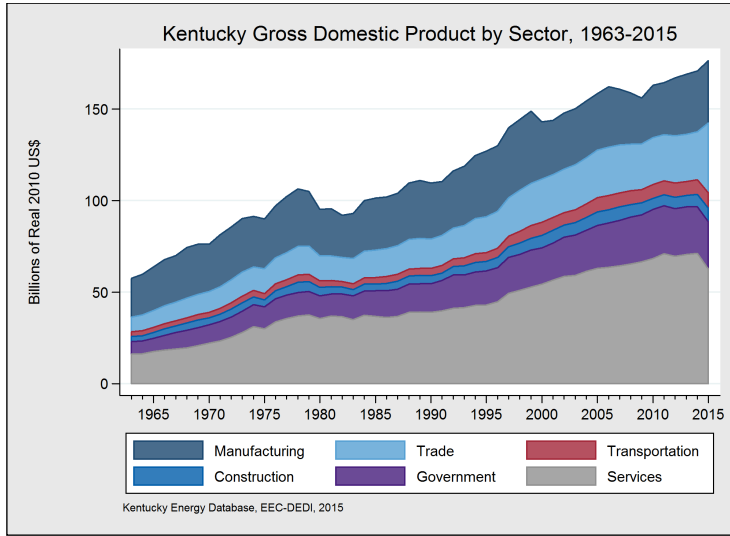
In 2015, Kentucky's GDP per capita was \$43,986, an increase of 2.9 percent from 2014. Kentucky ranked 43rd in the nation in terms of GDP per capita and below the national average of \$55,998 in 2015.



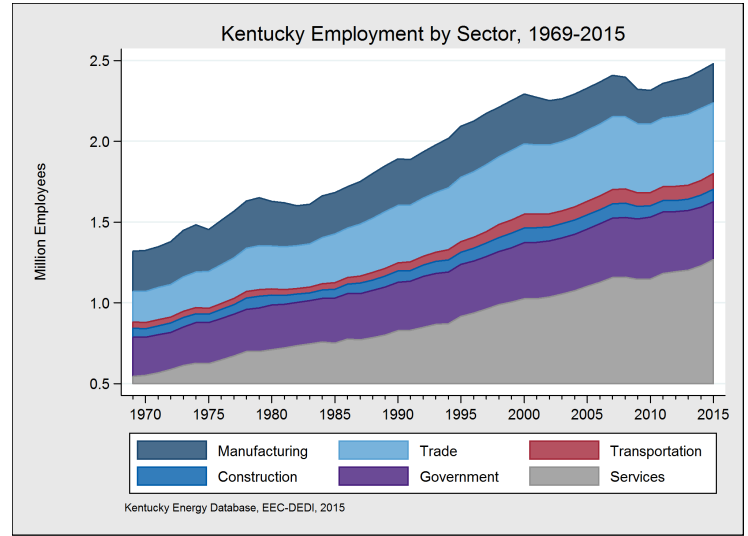
In 2015, Kentucky's population was approximately 4.4 million people, an increase of 12 thousand people, or 0.28 percent since 2014. From 1960 to 2015, Kentucky's urban population has doubled while its rural population increased by 5.8 percent.



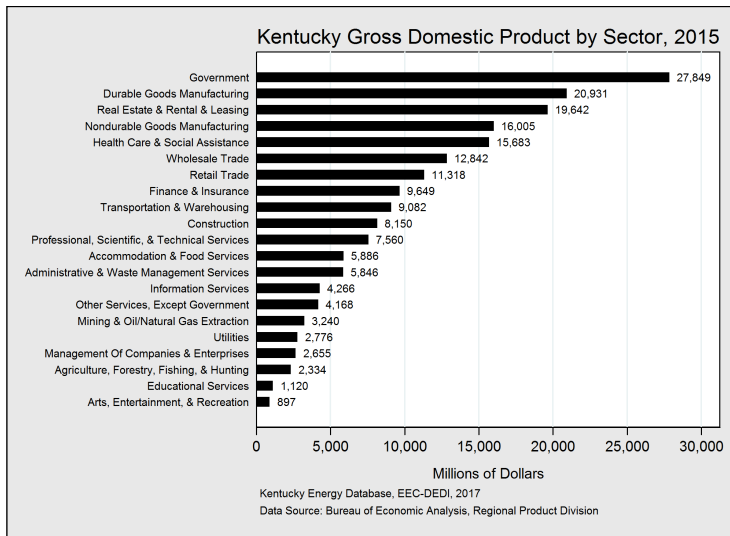
# Kentucky's Economy



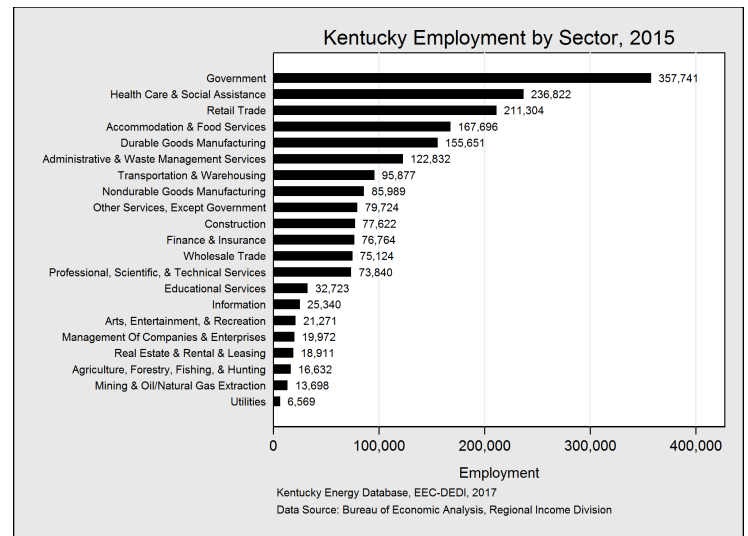
GDP from most sectors has risen gradually in the last 50 years, with output from the service sector rising the most. Manufacturing GDP has been relatively more volatile than that from other sectors, with peaks of output in 1999 and 2006 followed by significant decreases thereafter. After adjusting for inflation, manufacturing output in 2015 grew 2 percent from the previous year.



With the exception of manufacturing, employment in all sectors of the Kentucky economy remained stable until 2008, when most sectors experienced decreases in employment. Manufacturing employment, at 241 thousand, grew by 2.8 percent from the year prior.

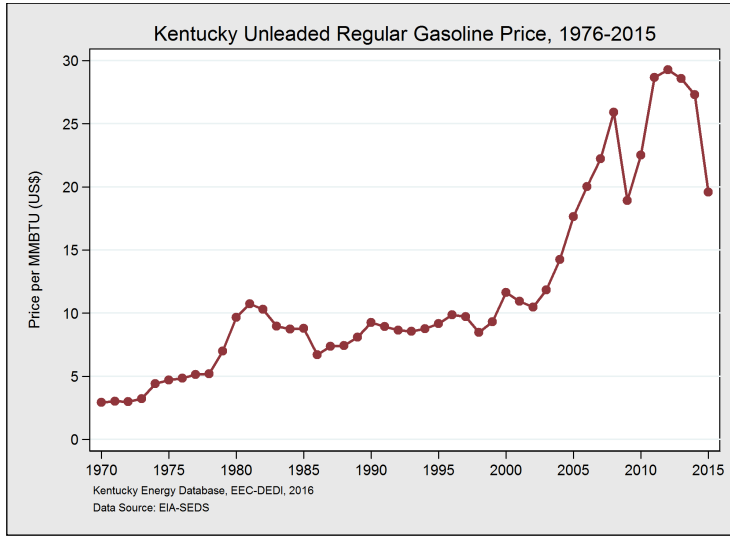


Government has the largest portion of state GDP with 15 percent, followed by durable goods manufacturing with approximately 10.8 percent of total. Nondurable goods manufacturing contributes 8.2 percent.



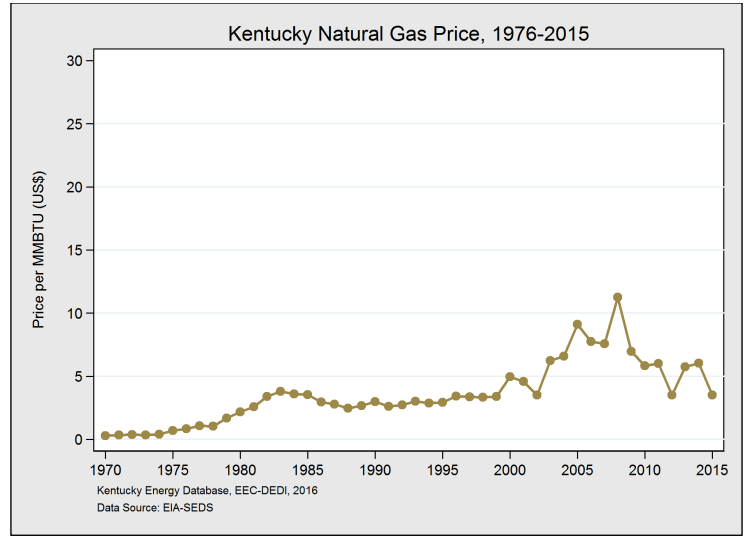
In 2015, the public sector was the single largest employer in the Commonwealth. Government employment was approximately 14.4 percent of total employment; healthcare was 9.5 percent, and retail trade 8.5 percent. Employment is defined as the average number of full-time and part-time jobs where wages or salaries are paid.

# Kentucky Commodity Prices



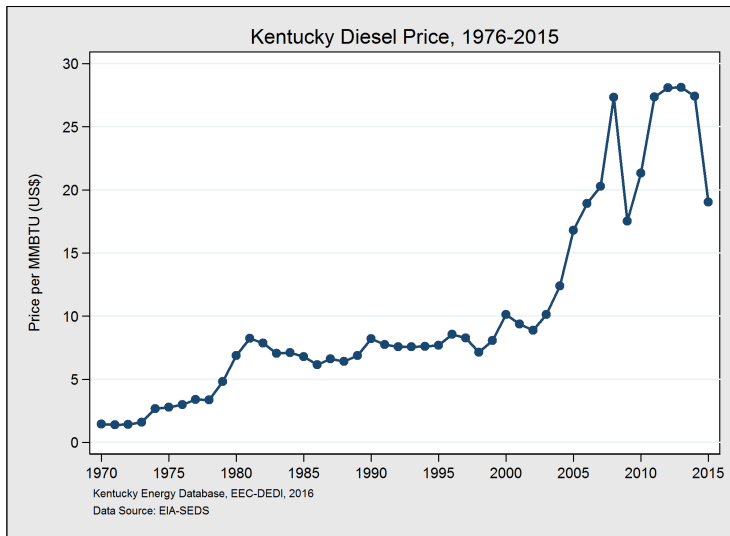
Fuel Type	U.S.\$/MMBtu	% Change
Gasoline	19.59	-28.2

The average price of gasoline in Kentucky in 2015 was \$2.52 per gallon, a 28 percent decrease in the price of gasoline compared with 2014.



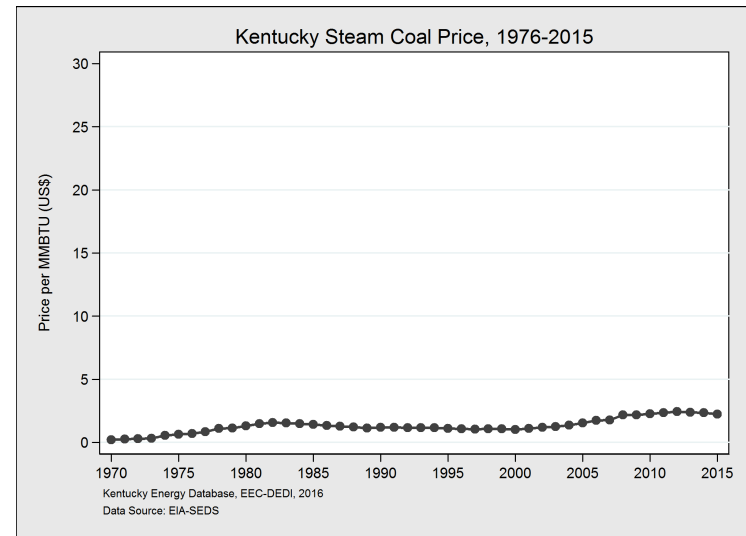
Fuel Type	U.S.\$/MMBtu	% Change
Natural Gas	3.52	-41.5

The average citygate price of natural gas in Kentucky in 2015 was 3.52 per million Btus, a 41.5 percent decrease in the price of natural gas compared with 2014.



Fuel Type	U.S.\$/MMBtu	% Change
Diesel	19.02	-30.6

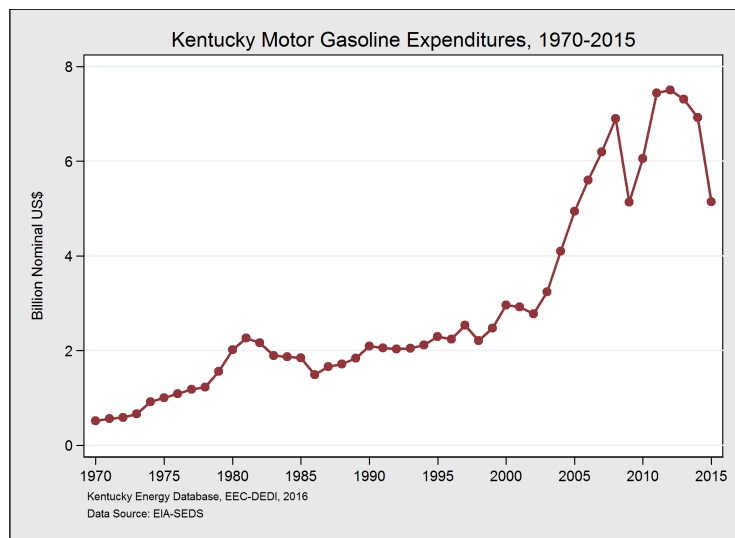
The average retail price of diesel in Kentucky in 2015 was \$19.02 per million Btus, a 30. percent decrease in the price of diesel compared with 2014.



Fuel Type	U.S.\$/MMBtu	% Change
Coal	2.22	-4.7

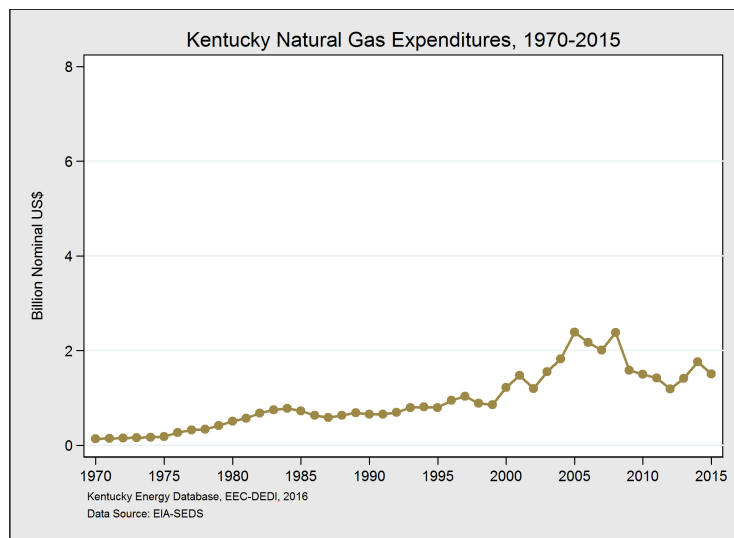
The average price of steam coal in Kentucky in 2015 was \$2.22 per million Btus, a 4.7 percent decrease in the price of steam coal compared with 2014.

# Kentucky Commodity Expenditures



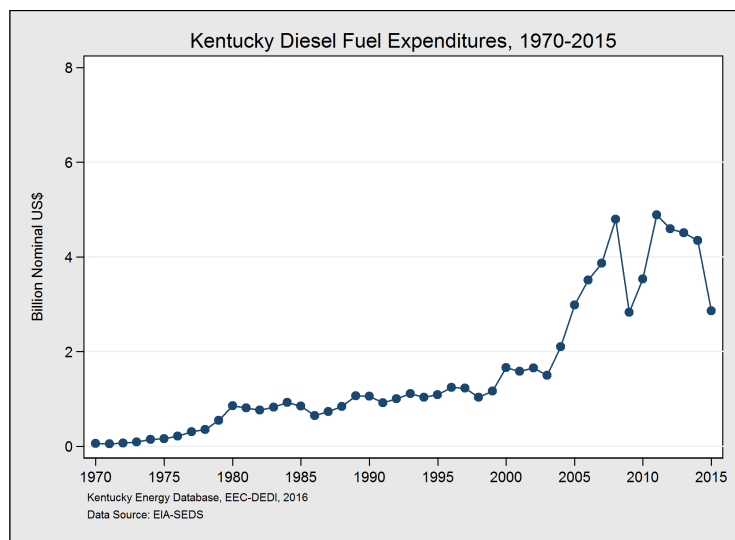
Fuel Type	Million U.S.\$	% of Total
Gasoline	5,144	29%

Gasoline expenditures in Kentucky were approximately \$5.1 billion in 2015; a twenty five percent decrease in gasoline expenditures compared with 2014, and accounted for 29 percent of energy expenditures in the state.



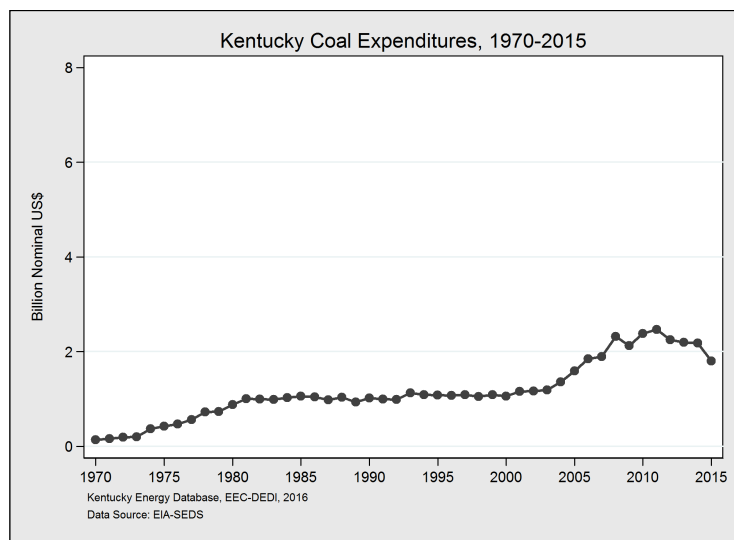
Fuel Type	Million U.S.\$	% of Total
Natural Gas	1,507	8%

Total natural gas expenditures in Kentucky were approximately \$1.5 billion in 2015; a 14 percent decrease in natural gas expenditures compared with 2014, and accounted for 8 percent of energy expenditures in the state.



Fuel Type	Million U.S.\$	% of Total
Diesel	2,861	16%

Approximately \$2.8 billion was spent on diesel in Kentucky in 2015, a thirty four percent decrease in diesel expenditures compared with 2014, and accounted for 16 percent of energy expenditures in the state.



Fuel Type	Million U.S.\$	% of Total
Coal	1,804	10%

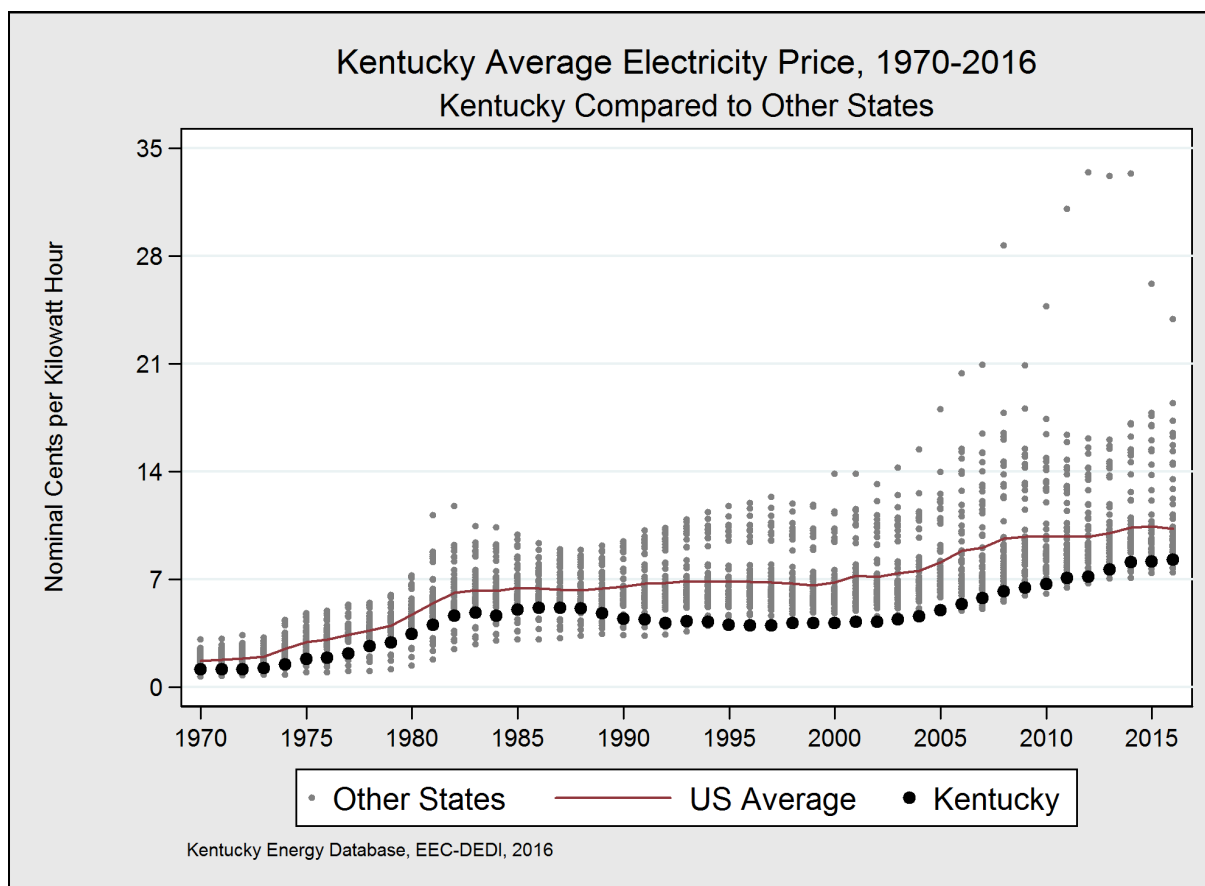
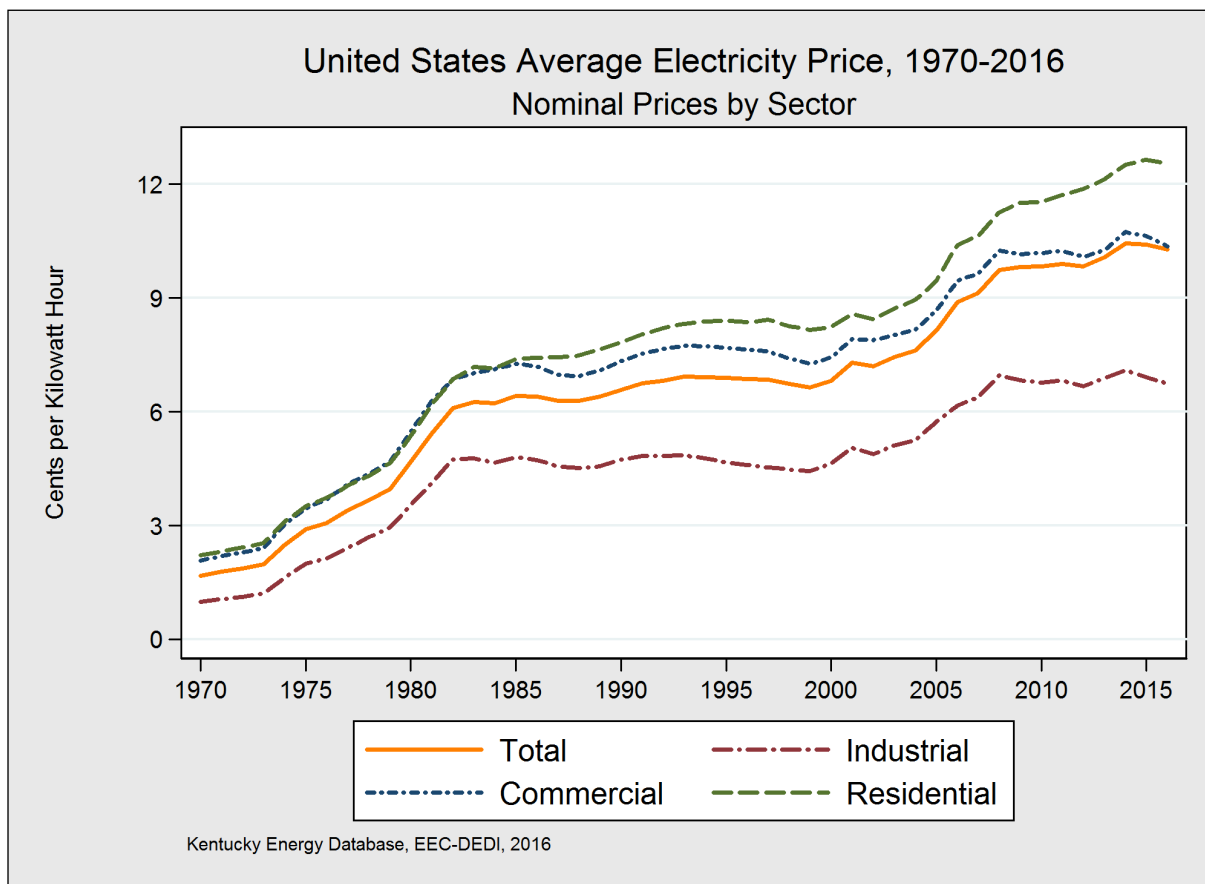
Coal expenditures in Kentucky were approximately \$1.8 billion in 2015. Spending on coal decreased by seventeen percent from 2014 and accounted for 10 percent of energy expenditures in the state.

# Average Price of Electricity by State

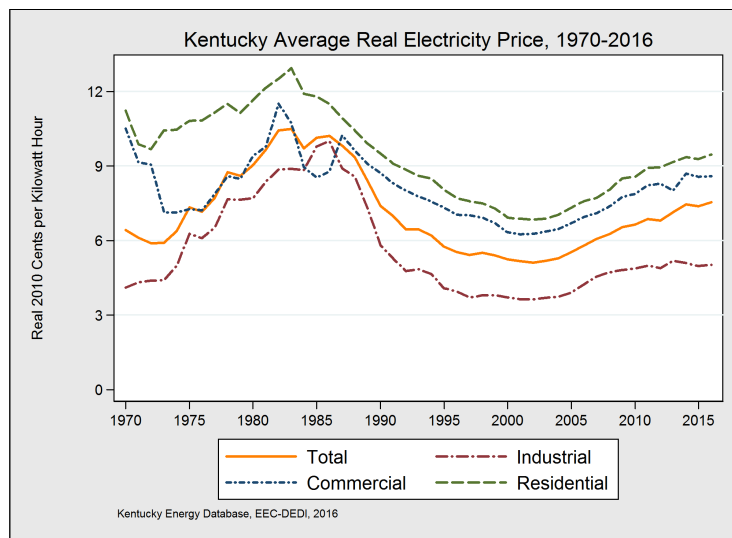
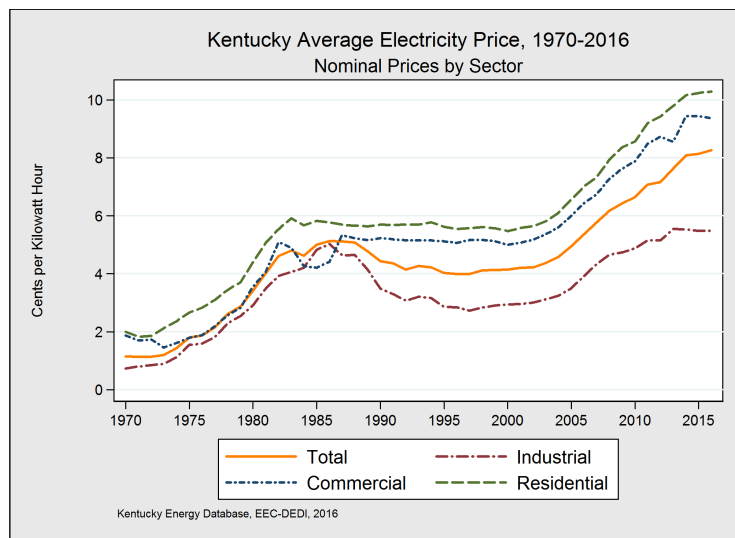
Rank	State	Primary Generation Source	2016 Industrial Price (Cents/kWh)	2016 Total Price (Cents/kWh)	Inflation Adjusted 1 Year Change	Inflation Adjusted 5 Year Change
1	Louisiana	Natural Gas	5.03	7.41	-3.7%	-6.1%
2	Washington	Hydroelectric	4.53	7.70	+3.4%	+8.3%
3	Oklahoma	Natural Gas	4.85	7.72	-2.6%	-6.6%
4	Arkansas	Natural Gas	5.93	8.05	-2.2%	+5.2%
5	Idaho	Hydroelectric	6.58	8.13	-0.7%	+18.9%
6	Wyoming	Coal	6.92	8.19	+2.6%	+20.7%
7	Kentucky	Coal	5.49	8.26	+2.2%	+10.0%
8	Texas	Natural Gas	5.22	8.28	-4.8%	-11.4%
9	Nevada	Natural Gas	5.86	8.40	-12.9%	-11.2%
10	Mississippi	Natural Gas	5.91	8.72	-9.2%	-3.4%
11	Iowa	Coal	6.14	8.74	+2.0%	+8.5%
12	Utah	Coal	6.31	8.77	+0.8%	+16.9%
13	Montana	Coal	4.97	8.89	-0.8%	+3.1%
14	West Virginia	Coal	6.57	8.89	+9.0%	+7.9%
15	Oregon	Hydroelectric	6.16	8.90	+0.4%	+4.5%
16	North Dakota	Coal	8.22	9.05	+2.2%	+15.5%
17	Nebraska	Coal	7.64	9.09	-0.4%	+8.5%
18	Indiana	Coal	7.02	9.14	+3.6%	+9.3%
19	Virginia	Natural Gas	6.67	9.16	-2.2%	-2.3%
20	New Mexico	Coal	5.73	9.17	-1.8%	-2.8%
21	Illinois	Nuclear	6.37	9.17	-6.3%	+1.0%
22	North Carolina	Nuclear	6.23	9.25	-1.9%	+0.8%
23	Tennessee	Coal	5.82	9.26	-1.7%	-5.2%
24	Georgia	Natural Gas	5.64	9.46	-1.9%	-7.8%
25	Missouri	Natural Gas	6.81	9.53	+1.0%	+7.2%
26	Alabama	Natural Gas	6.08	9.59	+2.2%	+3.0%
27	South Carolina	Nuclear	6.00	9.64	+0.7%	+3.0%
28	Ohio	Coal	6.78	9.74	-2.2%	+2.6%
29	Colorado	Coal	7.13	9.76	-0.9%	-1.0%
30	South Dakota	Hydroelectric	7.55	9.79	+4.7%	+15.0%
31	Minnesota	Coal	7.27	10.02	+2.9%	+10.3%
32	Florida	Natural Gas	7.81	10.13	-5.3%	-9.8%
33	Pennsylvania	Nuclear	6.92	10.26	-2.0%	-6.4%
	United States	Natural Gas	6.75	10.28	+3.3%	+12.2%
34	Arizona	Natural Gas	6.07	10.40	-1.8%	-0.2%
35	Kansas	Coal	7.40	10.40	+2.6%	+10.9%
36	Wisconsin	Coal	7.74	10.92	-0.7%	+1.8%
37	Delaware	Natural Gas	7.98	11.15	-0.8%	-7.4%
38	Michigan	Coal	7.04	11.16	+2.2%	+1.9%
	District of Columbia	Natural Gas	8.96	11.87	-2.1%	-12.4%
39	Maryland	Natural Gas	7.84	12.21	+0.1%	-3.3%
40	Maine	Natural Gas	9.03	12.84	-1.5%	-3.6%
41	New Jersey	Natural Gas	10.14	13.49	-4.3%	-11.2%
42	Vermont	Natural Gas	10.06	14.41	-0.1%	-1.3%
43	New York	Natural Gas	6.04	14.53	-5.8%	-14.1%
44	California	Natural Gas	12.07	15.31	-2.5%	+10.8%
45	New Hampshire	Nuclear	12.35	15.68	-2.6%	+0.5%
46	Rhode Island	Natural Gas	13.54	16.24	-5.1%	+17.7%
47	Massachusetts	Natural Gas	13.11	16.47	-2.8%	+10.2%
48	Connecticut	Natural Gas	13.02	17.27	-3.1%	+0.0%
49	Alaska	Natural Gas	15.56	18.40	+2.7%	+10.0%
50	Hawaii	Petroleum	20.70	23.87	-9.3%	-27.4%



# Average Price of Electricity by State



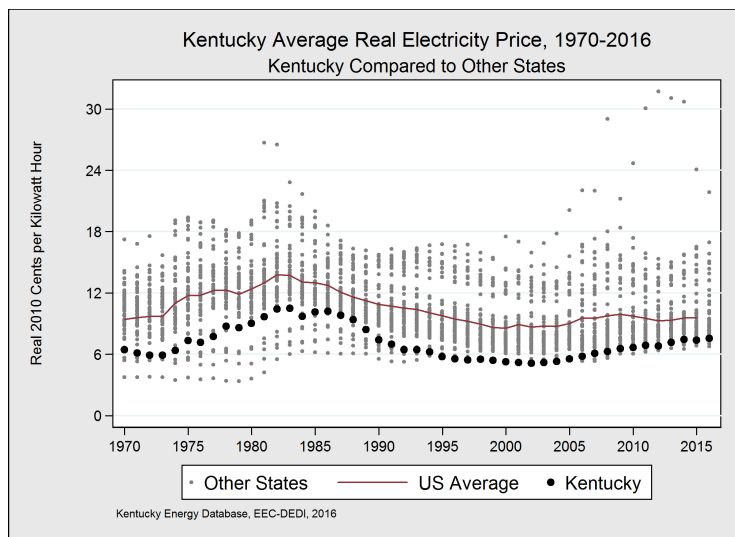
# Kentucky Electricity Prices



Sector	Nominal Cents/kWh	Since 2000
<b>Average</b>	8.26¢	+97%
<b>Residential</b>	10.29¢	+88%
<b>Commercial</b>	9.37¢	+83%
<b>Industrial</b>	5.49¢	+83%

Sector	Real* Cents/kWh	Since 2000
<b>Average</b>	7.55¢	+43%
<b>Residential</b>	9.46¢	+50%
<b>Commercial</b>	8.59¢	+36%
<b>Industrial</b>	5.02¢	+35%

\*Real 2010 \$US



In 2016, the average price of electricity across economic sectors in Kentucky was 8.26¢ per kilowatt-hour. This average price ranked Kentucky electricity prices the seventh lowest in the country. The residential sector paid the highest price for electricity at 10.29¢ per kilowatt-hour, followed by the commercial sector at 9.37¢ per-kilowatt hour, and the industrial sector at 5.49¢ per kilowatt-hour, the sixth lowest in the country. Since 1970, the average price of electricity in Kentucky has been among the lowest in the United States and well below the national average.

After, adjusting for inflation, the trends of electricity prices in Kentucky between 1970 and 2016 are notably different from the adjacent, nominal graphic. In inflation-adjusted dollars, the price of electricity in Kentucky actually decreased from 1980 through 2002. However, the real price of electricity in Kentucky in inflation-adjusted dollars has been increasing since 2002. This period of 14 consecutive years of real price increases is contrary to the trend of the 20 years between 1982 and 2002. A major factor driving real electricity prices in Kentucky up since 2002 has been the rising price of steam coal used by electric utilities.

Retail electricity rates are set by either the PSC, the owner or board governing a municipal utility, or TVA. Rates are generally established to cover the operating expenses and the capital costs of the utilities to maintain generation infrastructure and supply electricity. Operating expenses typically include personnel costs, fuel costs, generation costs, and maintenance costs. Capital costs typically include the costs to construct facilities, environmental equipment, and transmission lines, service the outstanding interest on debt, and earn a scheduled return on equity.

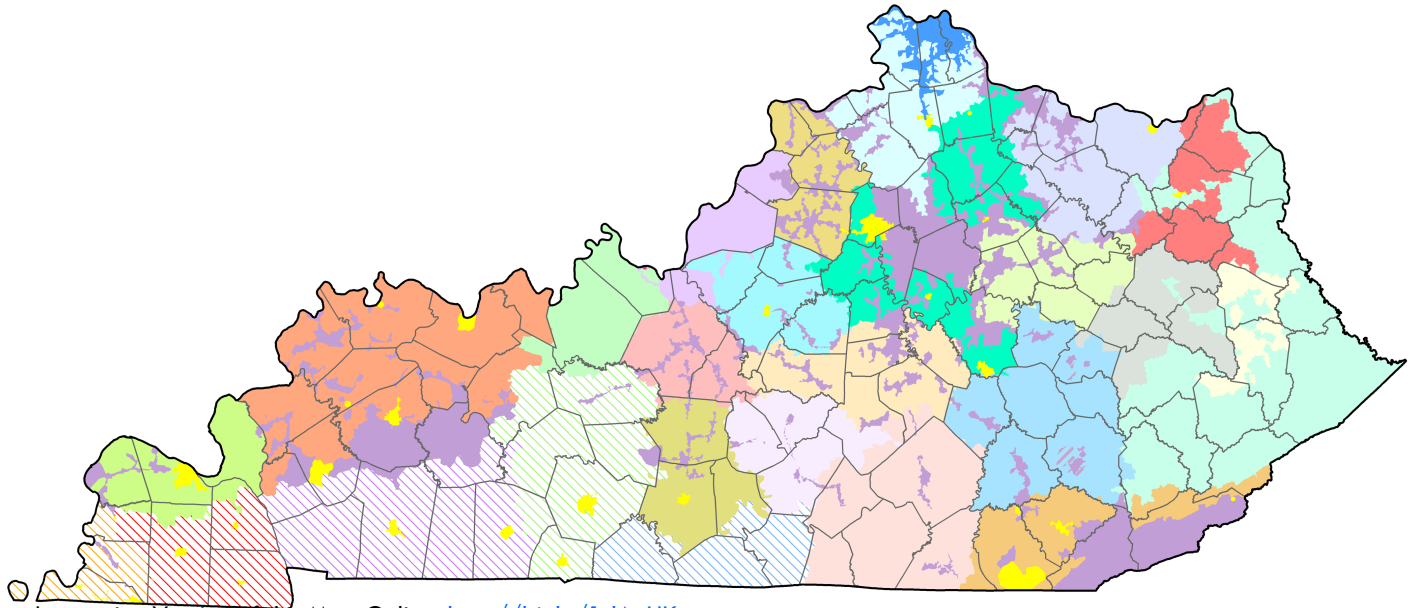
# Kentucky Utility Prices

Utility*	Average	Commercial	Industrial	Residential	Residential Bill
Barbourville	8.66¢	9.33¢	7.71¢	9.58¢	\$95.69
Bardstown	7.65¢	7.59¢	7.30¢	8.49¢	\$93.57
Benton	10.85¢	11.17¢	8.11¢	11.77¢	\$132.31
Berea	8.23¢	8.65¢	7.07¢	8.92¢	\$96.63
Big Sandy	10.62¢	10.40¢	7.44¢	10.95¢	\$128.99
Blue Grass Energy	9.36¢	9.83¢	5.96¢	10.72¢	\$131.06
Bowling Green	9.27¢	9.47¢	6.03¢	10.34¢	\$97.86
Clark Energy	10.93¢	10.90¢	8.39¢	11.02¢	\$119.77
Cumberland Valley	9.62¢	11.02¢	7.85¢	10.12¢	\$117.31
Duke Energy	7.90¢	7.70¢	6.61¢	8.86¢	\$87.49
Farmers	9.42¢	8.89¢	7.41¢	10.36¢	\$114.74
Fleming-Mason	7.31¢	8.64¢	5.35¢	10.56¢	\$111.78
Frankfort	8.35¢	9.18¢	7.65¢	9.19¢	\$98.25
Franklin	8.54¢	10.97¢	6.40¢	10.67¢	\$115.81
Fulton	9.94¢	10.85¢	7.74¢	11.41¢	\$114.59
Glasgow	9.74¢	10.39¢	6.52¢	11.71¢	\$114.77
Grayson	12.05¢	11.40¢	6.30¢	13.28¢	\$132.63
Henderson	6.59¢	7.59¢	5.69¢	7.96¢	\$82.25
Hickman	13.67¢	15.26¢	-	12.44¢	\$121.00
Hopkinsville	9.25¢	10.71¢	5.48¢	10.52¢	\$108.36
Inter County Energy	10.22¢	8.86¢	7.33¢	10.87¢	\$128.01
Jackson Energy	11.32¢	10.60¢	6.99¢	11.91¢	\$141.86
Jackson Purchase Energy	10.31¢	9.97¢	10.37¢	10.48¢	\$129.85
Jellico	10.68¢	12.34¢	-	10.33¢	\$114.04
Kenergy	4.78¢	11.34¢	3.73¢	10.78¢	\$138.19
Kentucky Power	9.77¢	11.95¢	6.65¢	11.94¢	\$154.58
Kentucky Utilities	8.34¢	9.35¢	6.13¢	9.87¢	\$116.71
Licking Valley	10.83¢	10.73¢	8.24¢	11.05¢	\$108.34
Louisville Gas & Electric Co	9.11¢	9.28¢	6.69¢	10.41¢	\$102.59
Madisonville	8.89¢	8.46¢	-	10.13¢	\$90.36
Mayfield	10.83¢	10.65¢	8.67¢	11.64¢	\$108.04
Meade County	10.99¢	12.09¢	-	10.70¢	\$115.10
Nicholasville	8.01¢	8.84¢	7.32¢	8.47¢	\$91.35
Nolin	8.90¢	9.35¢	5.51¢	10.02¢	\$123.43
Owensboro	11.83¢	10.12¢	11.10¢	14.14¢	\$117.03
Paducah	13.88¢	13.81¢	9.49¢	14.41¢	\$131.80
Princeton	12.86¢	14.24¢	12.55¢	12.90¢	\$118.71
Russellville	9.17¢	10.85¢	6.89¢	10.35¢	\$97.58
Salt River	8.71¢	9.02¢	6.57¢	9.26¢	\$119.05
Shelby Energy	8.82¢	8.81¢	6.49¢	10.57¢	\$133.21
South Kentucky	9.88¢	12.27¢	8.03¢	10.56¢	\$111.11
Taylor County	8.6¢	8.95¢	4.80¢	9.72¢	\$103.12
West Kentucky	11.64¢	13.44¢	6.39¢	11.85¢	\$143.52

\*Data from EIA-861 Early

# Kentucky Electric Service Areas

## Kentucky Electricity Service Areas, 2015



Explore Interactive Version of this Map Online: <http://bit.ly/1rIAoHK>

Kentucky Energy Database, EEC-DEDI, 2015

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 (KRS 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 Utilities, Electric Cooperative Corporations (ECC), or Rural Electric Cooperative Corporations (RECC). Municipal Utilities and TVA Distributors are not subject to Kentucky Public Service Commission regulation.

\*Investor-Owned Utilities

†EKPC Owner-Member Cooperative

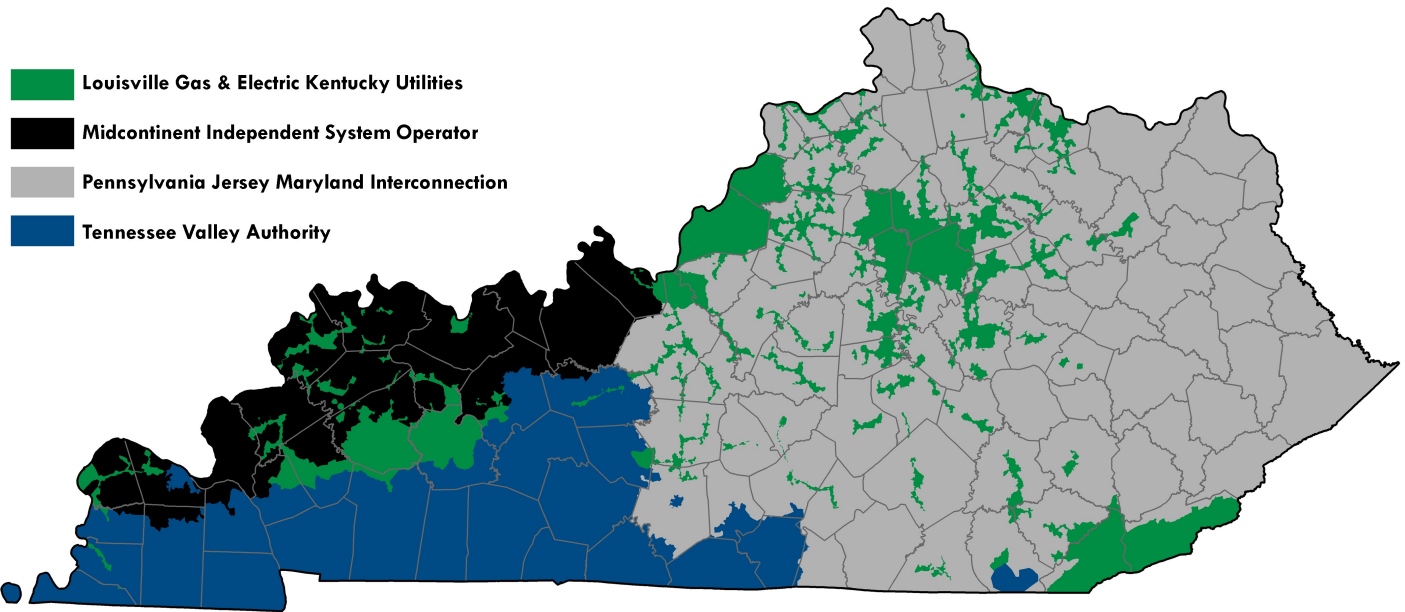
‡BREC Member Cooperative

§TVA Distributor



# Kentucky Balancing Authority Areas

## Kentucky Balancing Authority Areas, 2015



Kentucky Energy Database, EEC-DEDI, 2015

### Retail Service:

Electricity in Kentucky is provided to customers by one of the following types of entities that have the exclusive right to serve the customers within its territory:

- Retail electric suppliers that are regulated by the Kentucky Public Service Commission (PSC), which include:
  1. Investor-Owned Utilities (IOUs)
  2. Rural Electric Cooperative Companies (RECCs)
- Municipal Utilities
- The Tennessee Valley Authority (TVA) and its associated distributors within the state

Electric suppliers fall into two categories: IOUs and RECCs. There are four investor-owned companies in Kentucky: Duke Energy Kentucky, Kentucky Power Company (aka. American Electric Power), Kentucky Utilities (KU), and Louisville Gas and Electric (LG&E). Each of these companies generates or purchases the power required to meet its respective customers' electricity demands. RECCs are owned by their individual ratepayers and are non-profit entities that reinvest profits into energy infrastructure or return profits to ratepayers.

There are 19 RECCs that are regulated by the PSC. Sixteen of these jointly own and purchase power from East Kentucky Power Cooperative (EKPC) and the remaining three jointly own and purchase power from Big Rivers Electric Corporation (BREC). A distribution cooperative typically receives power from its respective generation and transmission cooperative at a substation in the distributor's service territory.

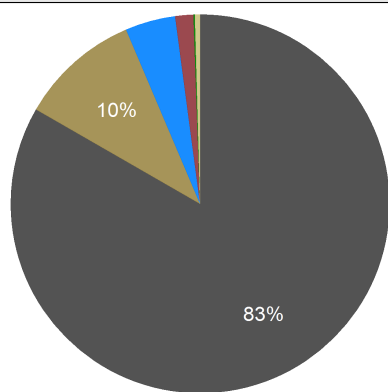
Eighteen municipal electric suppliers purchase power from various sources or self-generate electricity by owning and/or operating generating facilities. In the case of purchased power, a municipality may negotiate a guaranteed delivery of electricity from an investor owned utility or independent power producer, or purchase electricity on the market for distribution within its service area.

Five RECCs and ten municipal utilities purchase electricity from TVA. These RECCs and municipalities then resell and distribute electricity to customers within their service territories. TVA also directly serves several large industrial customers within Kentucky.

\*The Tennessee Valley Authority sets the wholesale rate for electricity supplied to its distributors, and approves the distributors' retail rate.

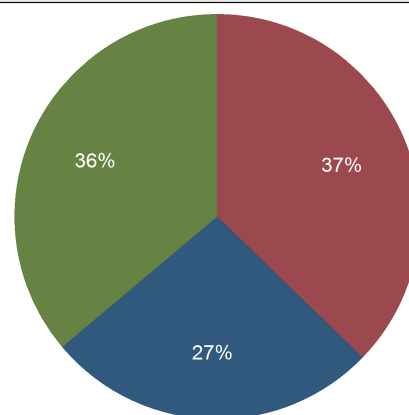
# Kentucky Electricity

Kentucky Electricity Generation by Fuel, 2016



Kentucky Energy Database, EEC-DEDI, 2016

Kentucky Electricity Consumption by Sector, 2016

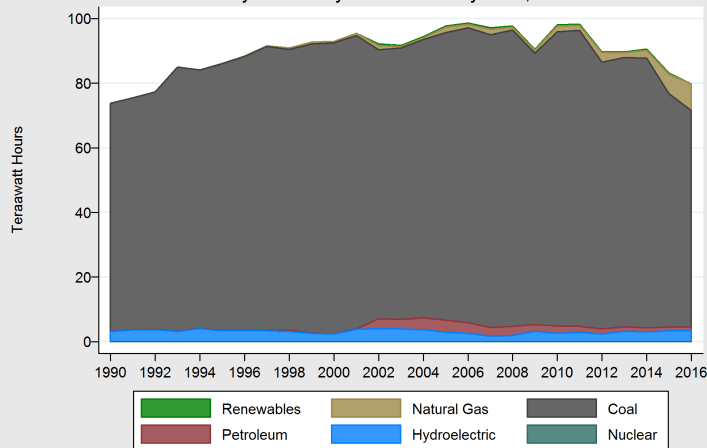


Kentucky Energy Database, EEC-DEDI, 2016

Fuel Type	Gigawatt Hours	1 Year Change
Total	80,344	-3.5%
Coal	66,889	-7.4%
Hydro	3,450	+0.8%
Natural Gas	8,255	+38%
Petroleum	1,236	+13%
Wood & Biomass	357	+4%

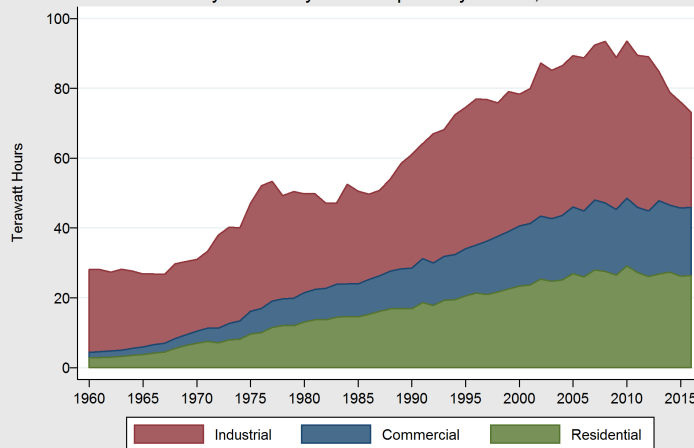
Sector	Gigawatt Hours	1 Year Change
Total*	73,153	-3.8%
Industrial	27,267	-10%
Residential	26,425	+0.9%
Commercial	19,460	-0.6%

Kentucky Electricity Generation by Fuel, 1990-2016



Kentucky Energy Database, EEC-DEDI, 2016

Kentucky Electricity Consumption by Sector, 1960-2016



Kentucky Energy Database, EEC-DEDI, 2016

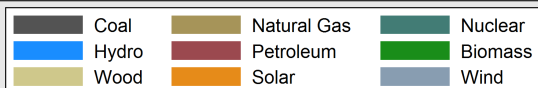
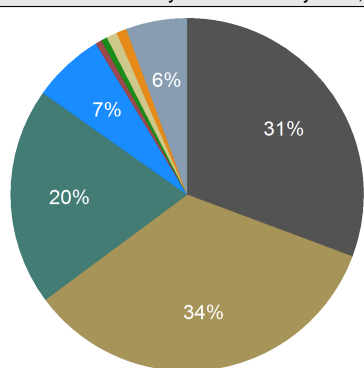
Of the electricity generated in Kentucky in 2016, 83 percent was derived through the combustion of coal. Coal-fired electricity generation decreased substantially. Natural gas facilities were the second-largest source of electricity. Hydroelectric power decreased slightly and produced the third most of all fuels. Due to plentiful coal resources and low costs, Kentucky has consistently used coal to meet the vast majority of electricity demand within the state.

*\*The difference between generation and consumption are exports and transmission losses.*

Electricity consumption in Kentucky during 2016 totaled 73 terawatt-hours, a decrease of 3.8 percent compared with 2015. The industrial sector remained the largest consumer of electricity in Kentucky, representing 37 percent of total electricity consumption while the national average was 25 percent in 2016. The residential sector was the second-largest consumer of electricity with 36 percent of consumption, followed by the commercial sector with 27 percent.

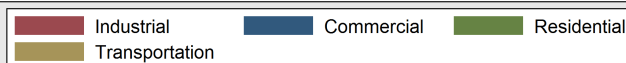
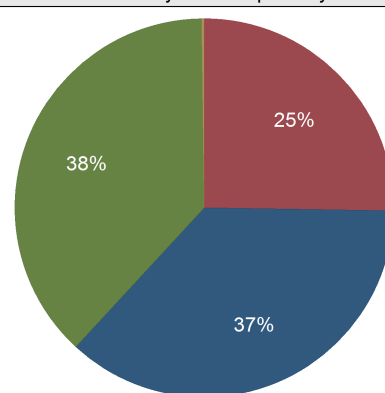
# United States Electricity

United States Electricity Generation by Fuel, 2016



Kentucky Energy Database, EEC-DEDI, 2016

United States Electricity Consumption by Sector, 2016

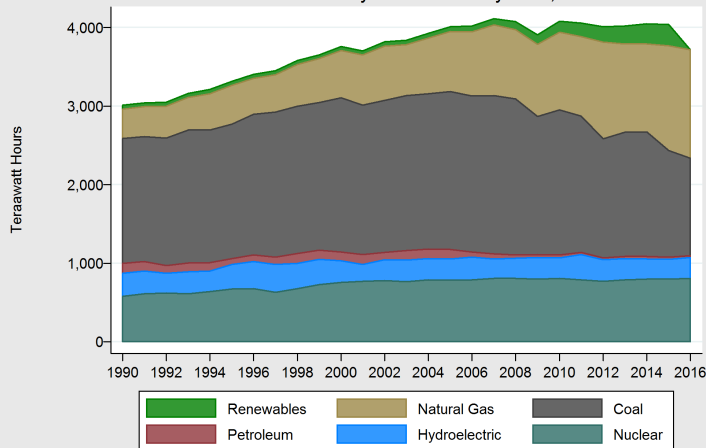


Kentucky Energy Database, EEC-DEDI, 2016

Fuel Type	Gigawatt Hours	1 Year Change
Total	4,078,670	-0.2%
Coal	1,240,089	-8.5%
Natural Gas	1,380,293	+3.4%
Nuclear	805,327	+1.0%
Hydro	265,829	+5.8%
Wind	226,484	+18%

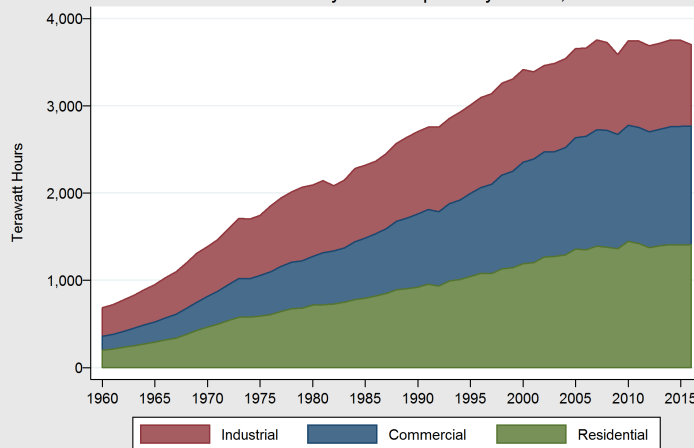
Sector	Gigawatt Hours	1 Year Change
Total	3,710,778	-1.3%
Residential	1,407,394	+0.2%
Commercial	1,359,616	-0.08%
Industrial	936,268	-5.1%

United States Electricity Generation by Fuel, 1990-2016



Kentucky Energy Database, EEC-DEDI, 2016

United States Electricity Consumption by Sector, 1960-2016

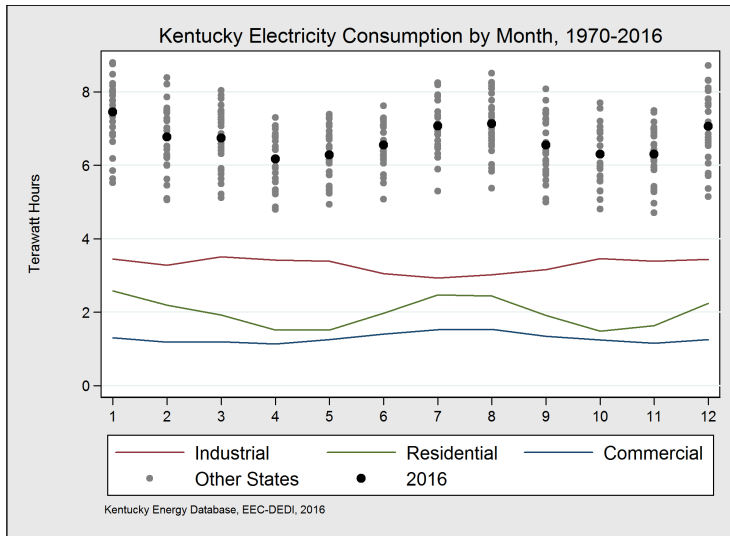


Kentucky Energy Database, EEC-DEDI, 2016

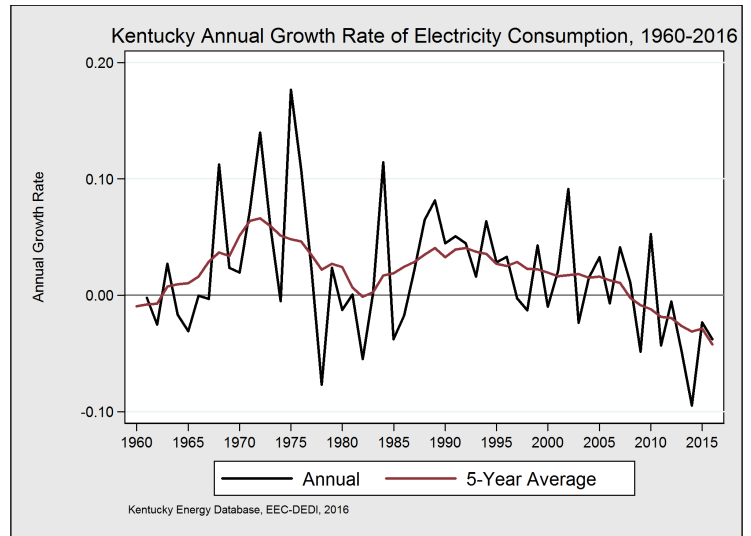
The United States generated more than four petawatt-hours in 2016, a decrease of 0.2 percent. Electricity generation from natural gas became the largest source of electricity at 34 percent of total, and increased by 3.4 percent compared to 2015. Wind electricity generated six percent of total electricity requirements. Nuclear and hydroelectricity generation have remained relatively constant for decades, supplying 20 and seven percent respectively.

Total electricity consumption decreased by 1.3 percent in 2016 to four petawatt-hours. In contrast to Kentucky's manufacturing-intensive industrial electricity load, nationally, residential consumers are the largest share of electricity demand, 38 percent in 2016. Residential, which is highly responsive to changes in weather, grew by 0.2 percent in 2016. Industrial demand fell 5 percent to 936 terawatt-hours.

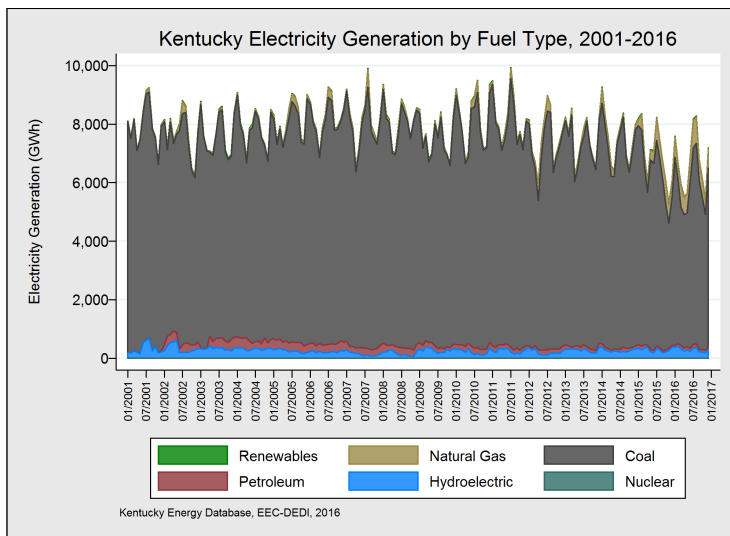
# Kentucky Monthly Electricity



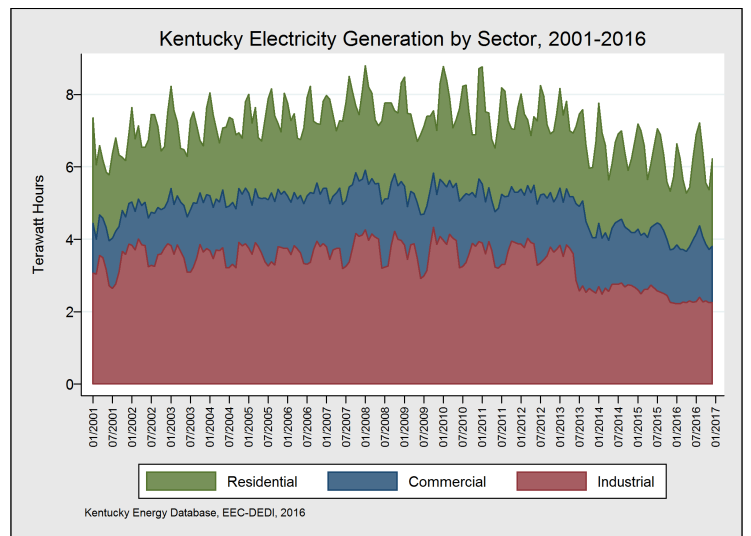
Seasonal fluctuations in Kentucky's electricity consumption are largely the result of the residential sector, which utilizes electricity for air conditioning in the summer and heating in the winter. On average, the highest demand for electricity in Kentucky occurs in summer and winter. Kentucky experienced lower than average electricity demand throughout 2016.



Kentucky electricity demand grew rapidly in the late 1960s to the early 1970s and again from the late 1980s to the early 1990s, but has decreased overall since 2008.



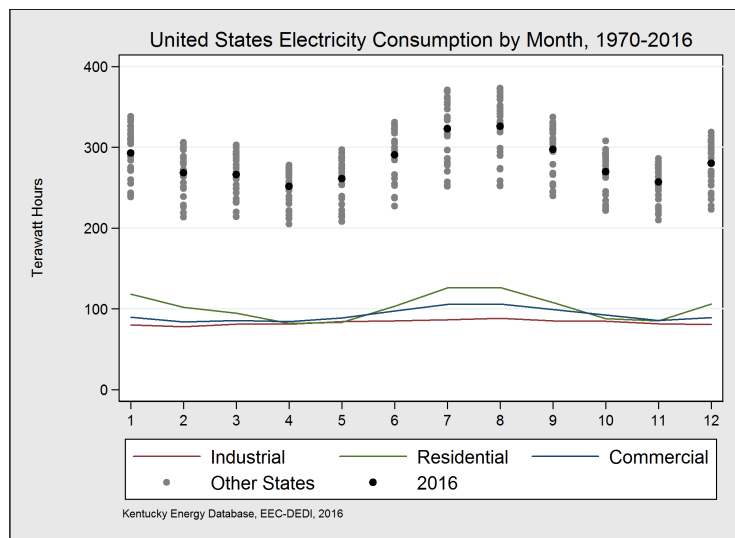
Coal-fired generation supplies the vast majority of electricity in Kentucky throughout the year, with hydroelectric generation fluctuating along with seasonal river flows and natural gas utilized during time of peak demand, mostly during hot summer and cold winter days. During the spring and fall, electricity demand is lower, and some coal plants go offline for maintenance.



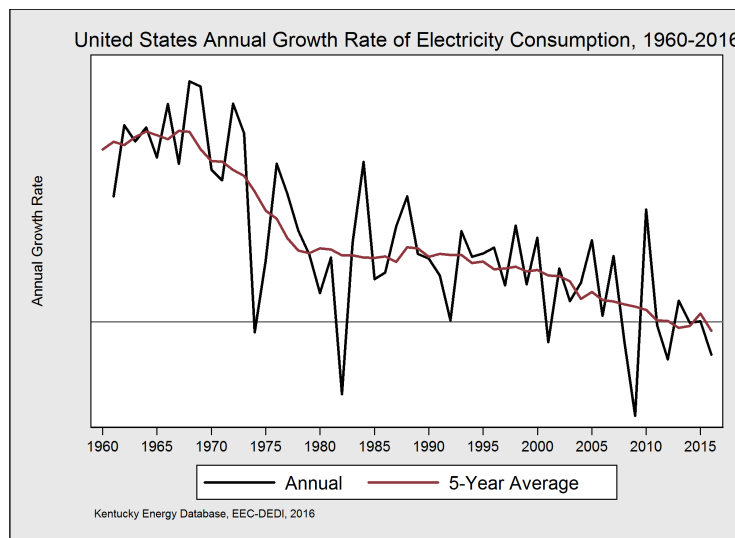
Commercial and industrial electricity demand in Kentucky tends to vary little relative to the residential sector. Industrial electricity demand had decreased between June and August, when the United States Enrichment Corporation in Paducah—approximately 15 percent of Kentucky's total electricity demand—would shut down for annual maintenance. However, since the facility's closure in May, 2013 industrial sales have remained steady.



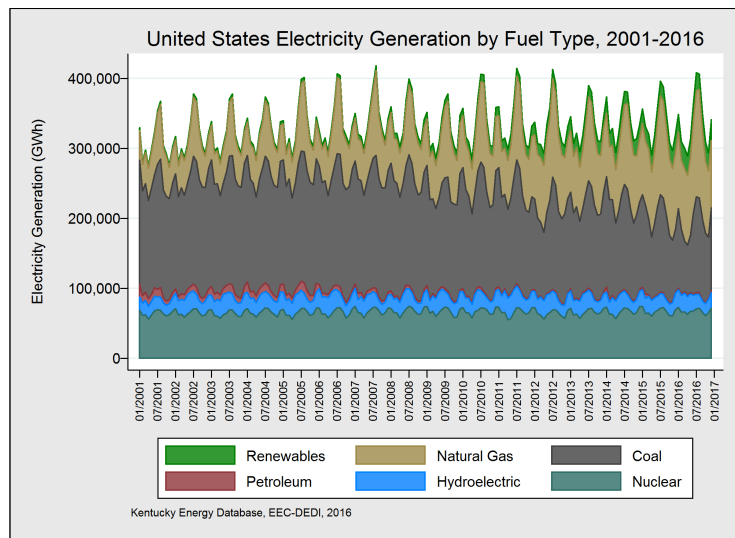
# United States Monthly Electricity



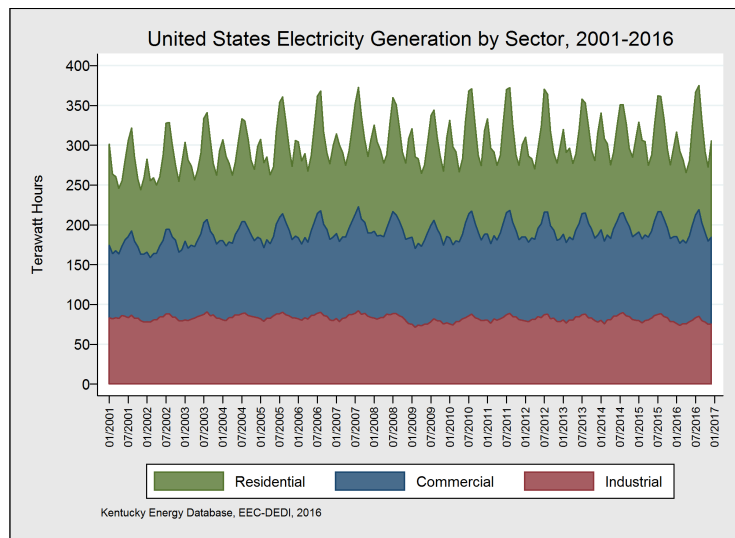
Electricity demand in the United States is approximately the same across all sectors during spring and fall, but demand for heating and air conditioning increases residential and commercial electricity demand in the summer and winter. In contrast, industrial demand is fairly constant throughout the year. The United States consumed less electricity than average in 2016, with a warmer winter decreasing consumption relative to other years.



Although, electricity demand has grown in the United States for decades, the rate at which electricity demand has grown has decreased over time—from an average of seven percent in the 1960s to less than one percent over the last 10 years. Since 2005, many states have experienced no growth or even decreases in electricity consumption.



Nuclear generation is relatively constant with the exception of regular shutdowns for maintenance, but renewable generation facilities depend on the presence of their respective resources. Coal and natural gas tend to make up the difference between electricity demand and electricity generated by renewables, nuclear, and hydroelectric generation. The United States has natural gas simple cycle turbines as well as combined cycle units, which are flexible and can be quickly ramped up during periods of peak electricity demand.



United States electricity demand is highest during the hotter summer, though there is a smaller increase in demand during colder winter months. Whereas summer heat can only be met with air conditioning, winter heating requirements can be remedied with a variety of non-electric fuels such as natural gas, wood, propane, and diesel fuel. Industrial demand varies somewhat, with increases in the summer months.

# Kentucky Generation Infrastructure

## Electricity Generating Capacity

Capacity is the maximum amount of electricity that can be produced at any one moment in time and is measured in watts, or joules per second. Kentucky has 46 power plants that operate 156 individual electricity generating units. There are approximately 20 gigawatts of electric generation capacity in Kentucky.

## Generation

Of the electricity generated in Kentucky in 2016, 83 percent was derived through the combustion of coal. The amount of coal-based electricity generation decreased in 2016. Natural gas facilities were the second-largest source of electricity. Due to the presence of coal resources, and the low price of coal, Kentucky has consistently used coal to meet the vast majority of electricity demand within the Commonwealth.

## Capacity Factor

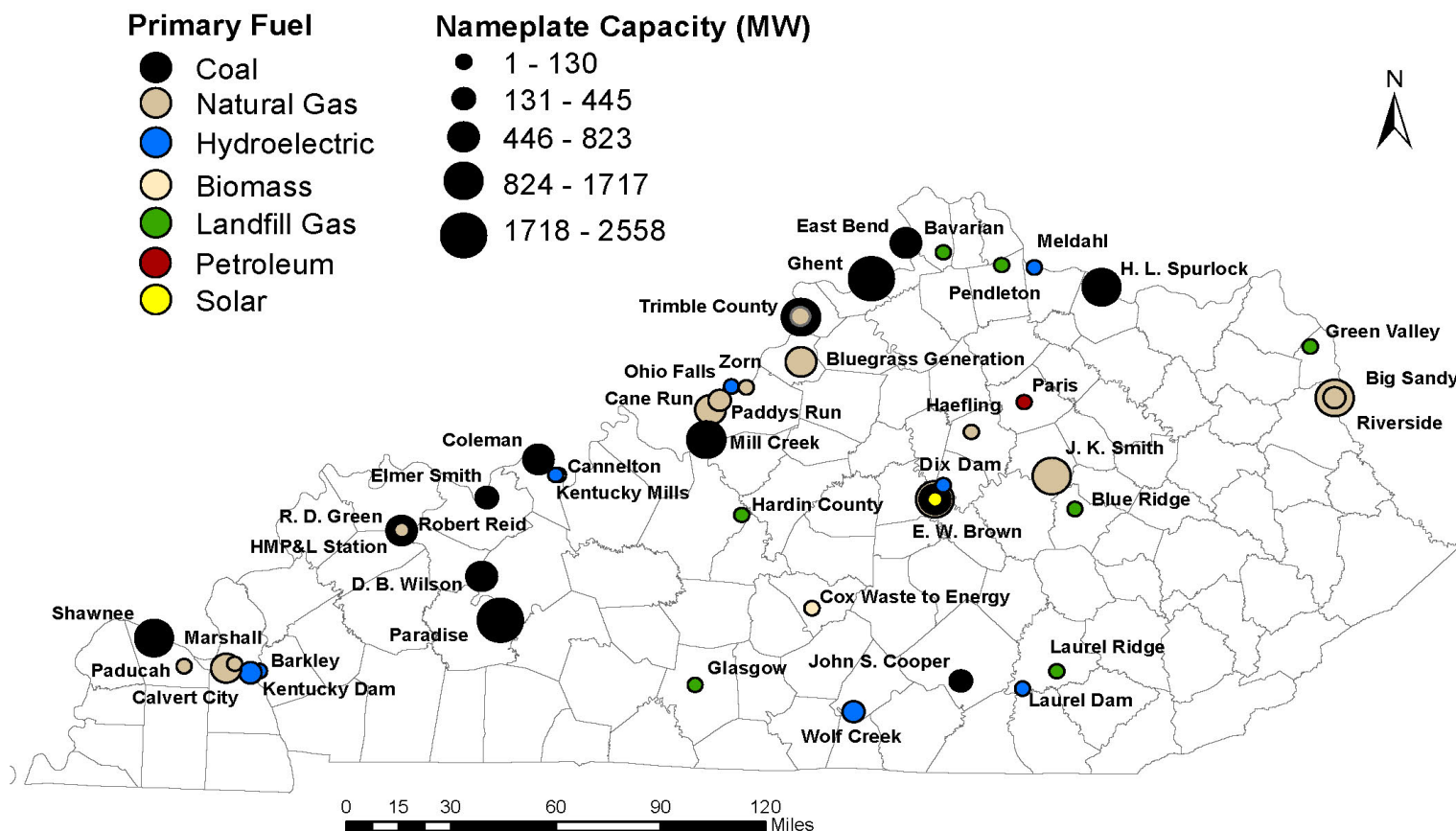
The capacity factor of a generating unit is a ratio of actual power output from a unit versus the maximum possible output from a unit over a period of time. To calculate the maximum possible output of a unit, the rated nameplate capacity (MW) is multiplied by time (typically, hours per year). The actual output (MWh) is then divided by the maximum possible output (MWh) to determine the capacity factor of the unit.

Many variable factors influence the actual capacity factor of a given generating unit including operational costs, operational design, age of a unit, emissions of criteria pollutants, electricity demand fluctuations, and the particular generation and environmental plans of individual power producers.

Number	Name	Initial Year of Operation	Owner
1	Dix Dam	1925	LG&E and KU
2	Mother Ann Lee	1927	Lock 7 Partners
3	Ohio Falls	1927	LG&E and KU
4	Wolf Creek	1928	U.S. Army CoE
5	Kentucky Dam	1948	TVA
6	Paris	1952	Paris
7	Shawnee	1953	TVA
8	Cane Run	1954	LG&E and KU
9	E. W. Brown	1955	LG&E and KU
10	Big Sandy	1963	Kentucky Power
11	Paradise	1963	TVA
12	Elmer Smith	1964	Owensboro
13	John S. Cooper	1965	EKPC
14	Robert Reid	1966	Big Rivers
15	Barkley	1966	U.S. Army CoE
16	Kenneth Coleman	1969	Big Rivers
17	Haefling	1970	LG&E and KU
18	Mill Creek	1972	LG&E and KU
19	Ghent	1973	LG&E and KU
20	HMP&L Station 2	1973	Henderson
21	Laurel	1977	U.S. Army CoE
22	H. L. Spurlock	1977	EKPC
23	R. D. Green	1979	Big Rivers

Number	Name	Initial Year of Operation	Owner
24	East Bend	1981	Duke Energy
25	D. B. Wilson	1984	Big Rivers
26	Trimble County	1990	LG&E and KU
27	E. W. Brown	1995	LG&E and KU
28	J. K. Smith	1995	EKPC
29	Cox Interior	1995	Cox Interior
30	Calvert City	1999	DTE Energy
31	Bluegrass	2000	EKPC
32	Riverside Gen.	2001	Riverside Gen.
33	Domtar Corp.	2001	Domtar Corp.
34	Trimble County	2002	LG&E and KU
35	Marshall	2002	TVA
36	Bavarian	2003	EKPC
37	Green Valley	2003	EKPC
38	Laurel Ridge	2003	EKPC
39	Hardin County	2006	EKPC
40	Pendleton County	2007	EKPC
41	Paducah Power	2010	Paducah Power
42	Blue Ridge	2012	North Am. Biofuels
43	Glasgow LFGTE	2015	EKPC
44	E. W. Brown	2016	LG&E and KU
45	Cannelton	2016	AMP - Ohio
46	Meldahl	2016	City of Hamilton

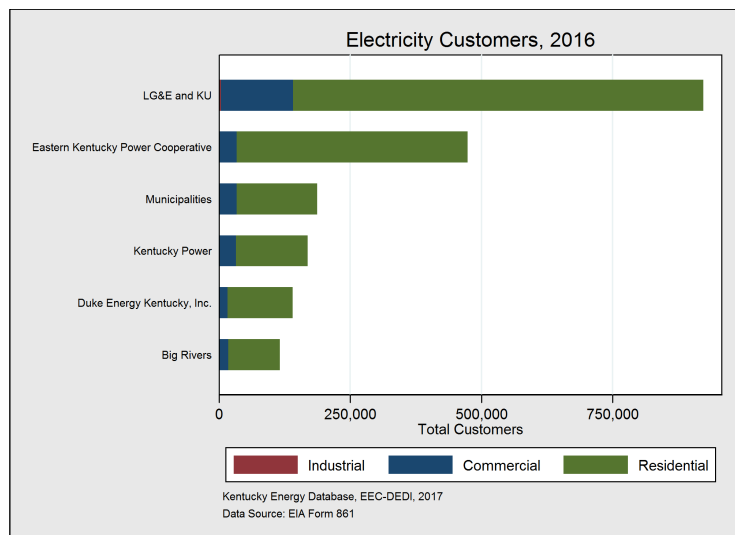
# Power Plants in Kentucky



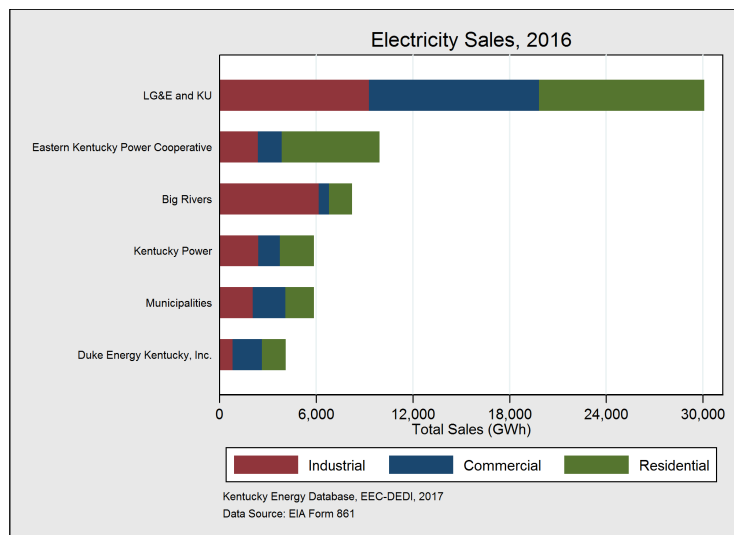
Primary Fuel	Unit Count	Average Age	Average Capacity (MW)	Total Capacity
All Active Units	156	38	128	20,512
Coal	42	46	324	13,616
Natural Gas	50	29	116	5,821
Hydro	39	58	26	944
Biomass	24	12	5	109
Solar	1	1	10	10

Coal-fired, hydroelectric, and biomass-fired generators provide all of the baseload electricity in Kentucky because of their low operating costs. The coal fleet consists of large generators that were constructed between the mid-1950s and 2010. Most of these plants have been retrofitted with environmental controls to meet air quality emissions standards but many may need further upgrades as the standards have become more stringent. Peaking power—the additional electricity needed for short periods of high demand—is generated by natural gas and petroleum. Utilities typically satisfy these short periods of high demand (peaks) with simple cycle natural gas or petroleum generators because they are relatively cheap to build, and can rapidly power up and power down to balance electricity demand. However, peaking units are costlier to operate than baseload generators due to their designs, and are not optimized for baseload generation.

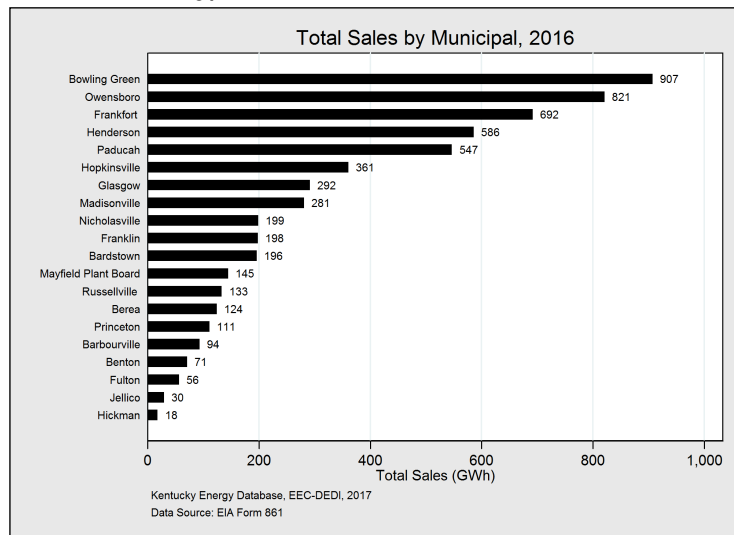
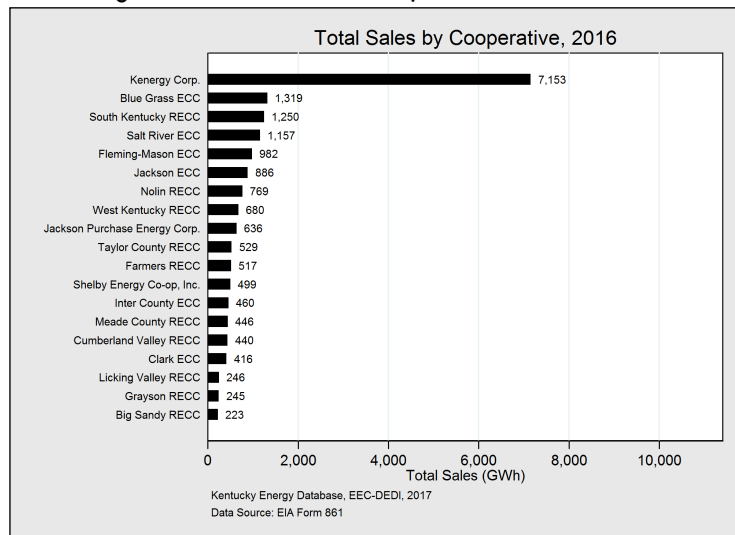
# Electricity Utilities in Kentucky



Entity	Consumers	Percentage
<b>Total</b>	<b>2,152,888</b>	<b>100%</b>
LG&E and KU	923,587	43%
EKPC	473,904	22%
Municipalities	186,571	9%
TVA	144,109	7%
Kentucky Power	168,848	8%
Duke Energy	140,014	7%
Big Rivers	115,855	5%



Entity	Sales (GWh)	Percentage
<b>Total</b>	<b>71,288</b>	<b>100%</b>
LG&E and KU	30,093	42%
EKPC	9,937	14%
Big Rivers	8,236	12%
TVA	7,065	10%
Municipalities	5,995	8%
Kentucky Power	5,863	8%
Duke Energy	4,099	6%

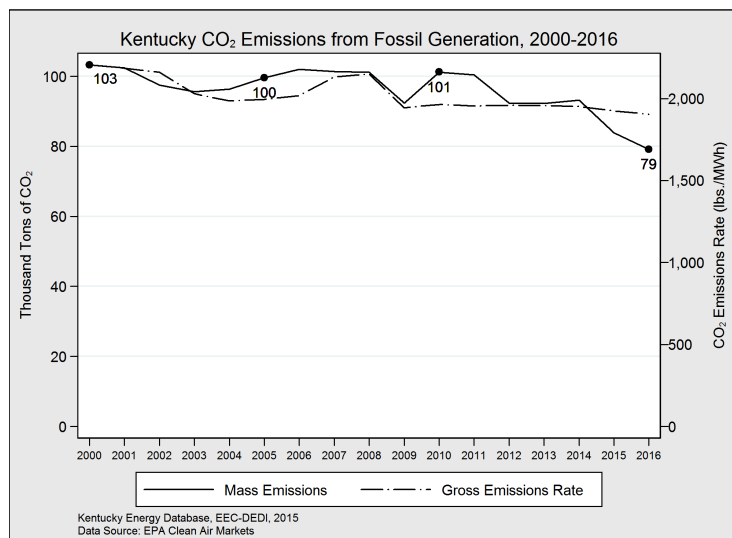
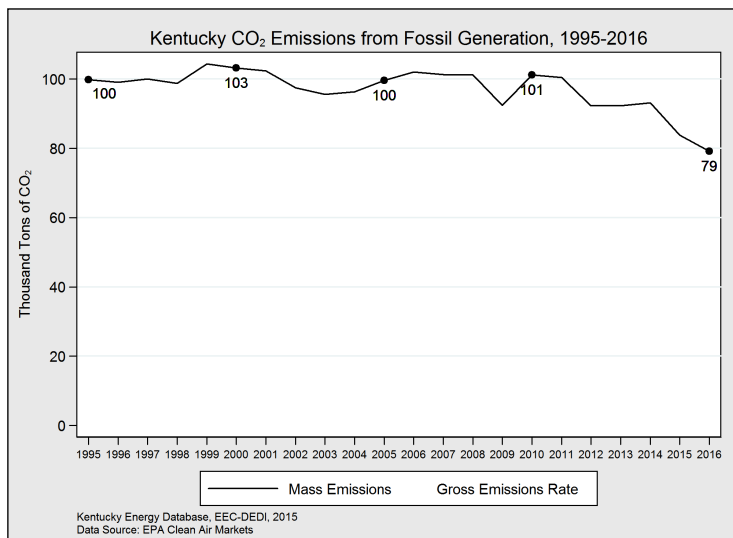


Utilities in Kentucky sold 71 TWh to 2.1 million consumers in 2016. Households accounted for 87 percent of consumers, but were 36 percent of consumption. The 7,725 industrial firms are less than one percent of total customers, but used 38 percent of all electricity consumed in Kentucky in 2016. LG&E and KU sell to 43 percent of consumers in the Commonwealth, while East Kentucky Power Cooperative sells to 22 percent, and the rest 35 percent.

All of the sales from the Big Rivers Electric Corporation, and East Kentucky Power Cooperative and the majority from the Tennessee Valley Authority are to RECCs and municipalities. Together, cooperatives consume more than all investor-owned corporations except LG&E and KU. Kenergy Corporation, a cooperative, sells 10 percent of Kentucky's total—more electricity than Kentucky Power, all municipalities, the Tennessee Valley Authority, and Duke Energy.

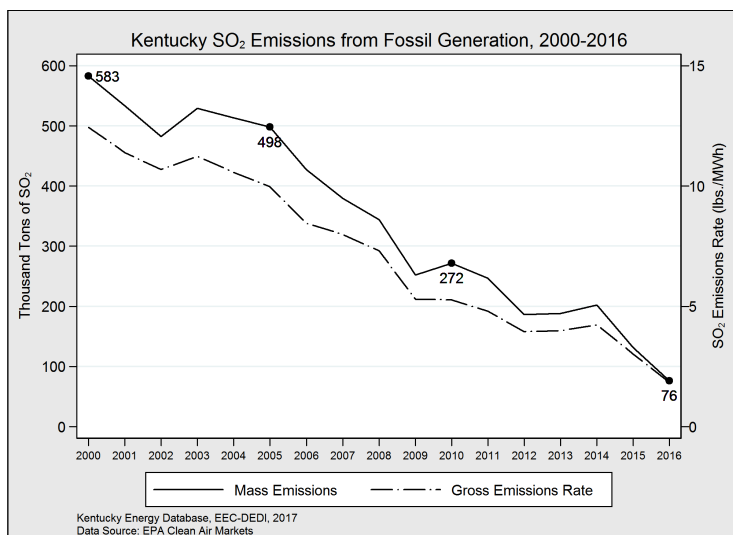


# Kentucky Electric Power Emissions

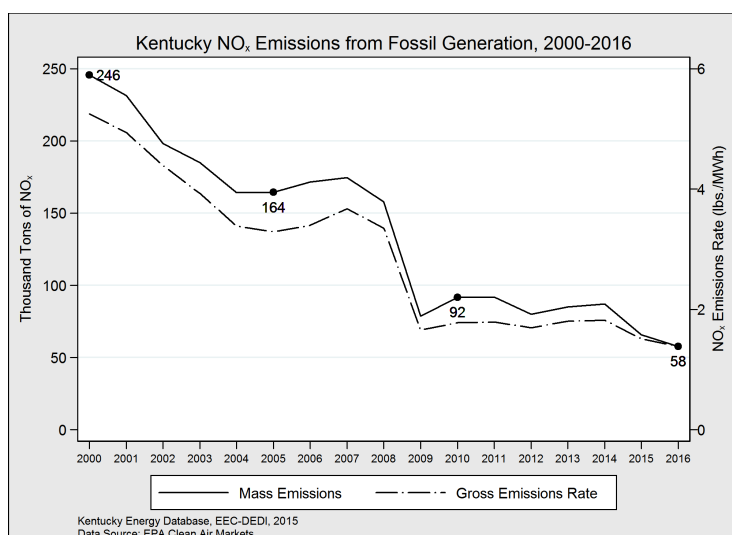


Emission	Tons	Since 1995
Carbon Dioxide	79,172,720	-20.7%
Sulfur Dioxide	76,421	-88.7%
Nitrogen Oxides	57,658	-76.5%

In 2016, power plants in Kentucky emitted 79.1 million tons of carbon dioxide, a decrease of 6 percent compared with 2015. In terms of emissions rate, power plants emit almost 20 percent less carbon dioxide as they did in 1995.

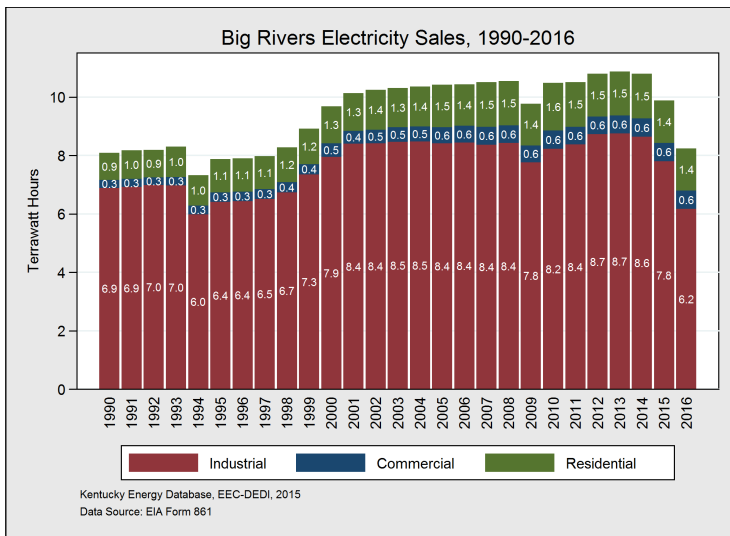
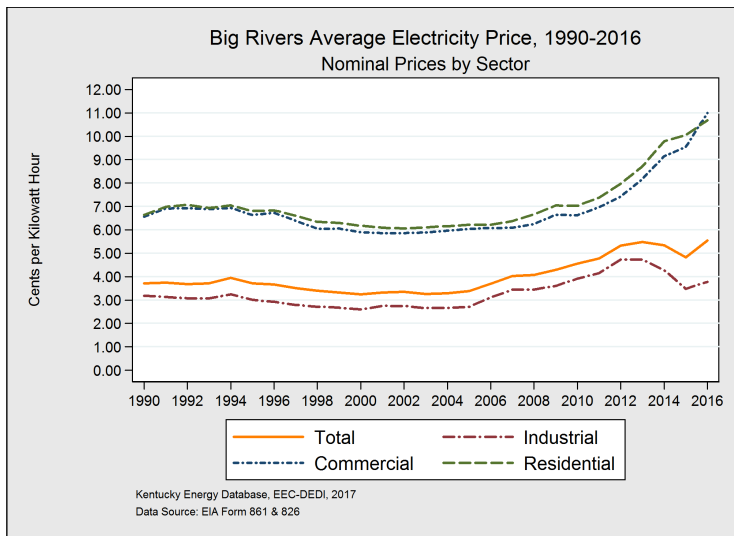


Sulfur dioxide (SO<sub>2</sub>) is a highly reactive gas and major pollutant that is monitored and regulated by the state and federal government due to its connection to acid rain, incidence of asthma, and other respiratory problems. In 2016, the electric power sector of Kentucky emitted 76,421 tons of sulfur dioxide, a 88.7 percent decrease from 1995 and a 42 percent decrease from 2015.



Nitrogen oxides (NO<sub>x</sub>) are a group of highly reactive regulated pollutants: Nitric Oxide (NO), Nitrogen Dioxide (NO<sub>2</sub>), and Nitrous oxide (N<sub>2</sub>O). Nitrogen oxide, which is displayed here, has been shown to cause acid rain and exacerbate respiratory disease, while nitrous oxide, or laughing gas, is a greenhouse gas 312 times more potent than carbon dioxide. In 2016, the electric power sector of Kentucky emitted 57,658 tons of nitrogen oxides, a decrease of 84.2 percent from 1995 and a decrease of 12.3 percent from 2015.

# Big Rivers

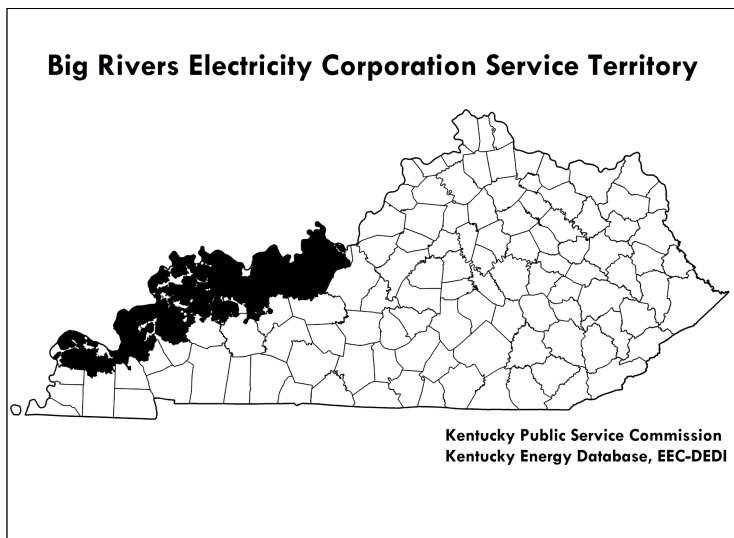


Sector	Price (Cents/kWh)	Since 2010*
Total†	5.53	+11%
Commercial	11.00	+52%
Residential	10.67	+39%
Industrial	3.78	-12%

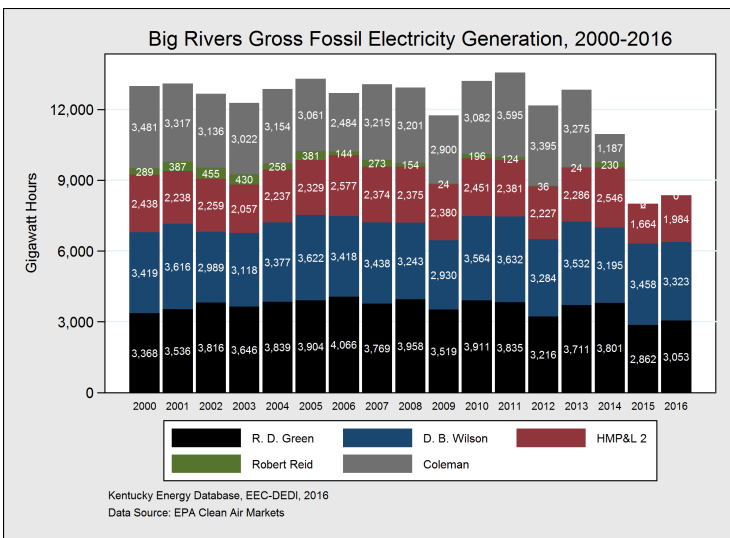
\*Change in real 2010 U.S.\$

Sector	Sales (GWh)	Percentage
Total†	8,236	100%
Industrial	6,165	75%
Residential	1,436	17%
Commercial	635	8%

†Includes direct sales and sales to rural electric cooperatives



Big Rivers Electric Corporation generates and sells electricity in northwestern Kentucky. Total electricity prices in 2016 were 5.53 cents per kWh and have increased by eleven percent since 2010 in inflation-adjusted dollars. Big Rivers serves three RECCs: Kenergy Corporation, Meade County RECC, and Jackson Purchase Energy Corporation. Big Rivers operates five coal-fired generating stations.

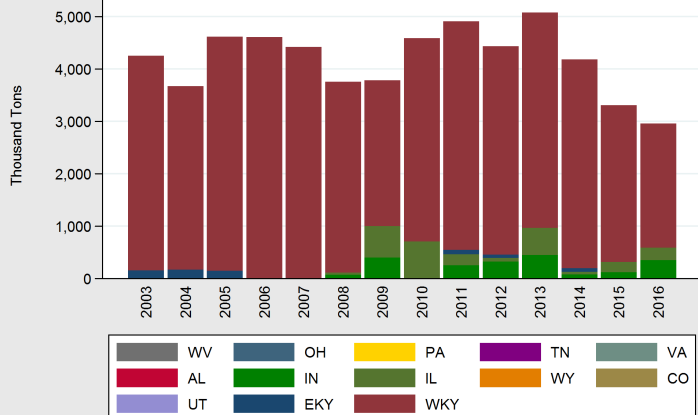


Electricity Generation	2016	Since 2000
Gigawatt Hours	8,359	-35.7%

Big Rivers generated 8.3 TWh and sold 8.2 TWh of electricity in 2016. Big Rivers has sold the bulk of its electricity load to industrial firms.

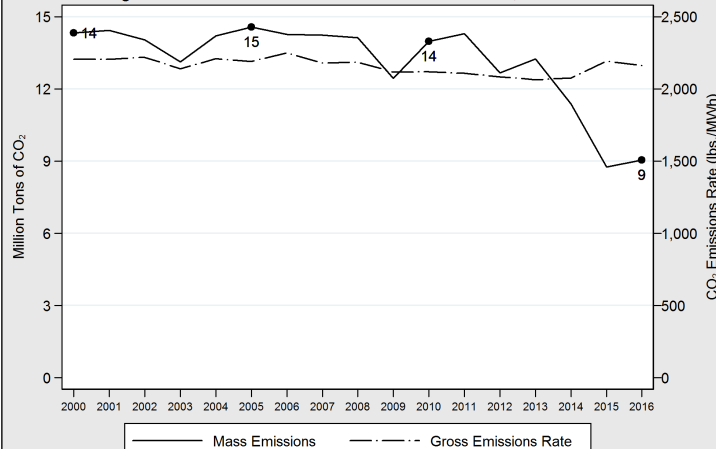
# Big Rivers

Big Rivers Coal Consumption by Origin, 2003-2016



Kentucky Energy Database, EEC-DEDI, 2016  
Data Source: FERC-423 & EIA-923

Big Rivers CO<sub>2</sub> Emissions from Fossil Generation, 2000-2016



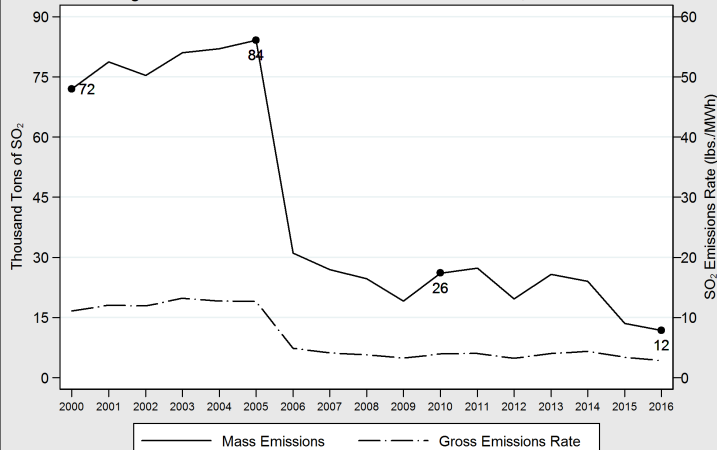
Kentucky Energy Database, EEC-DEDI, 2016  
Data Source: EPA Clean Air Markets

State	2016 Tons	Percentage
<b>Total</b>	<b>2,742,996</b>	<b>100%</b>
Western Kentucky	2,368,998	86%
Indiana	350,001	13%
Illinois	23,997	1%

Carbon Dioxide	2016	Since 2000
Emissions (Tonnage)	9,036,609	-37.0%
Rate (lbs./MWh)	2,161	-2.0%

Big Rivers Electric Corporation emitted 9 million tons of CO<sub>2</sub> in 2016, a decrease of 37 percent since 2000. The rate of CO<sub>2</sub> emissions has decreased by 2 percent during that period.

Big Rivers SO<sub>2</sub> Emissions from Fossil Generation, 2000-2016

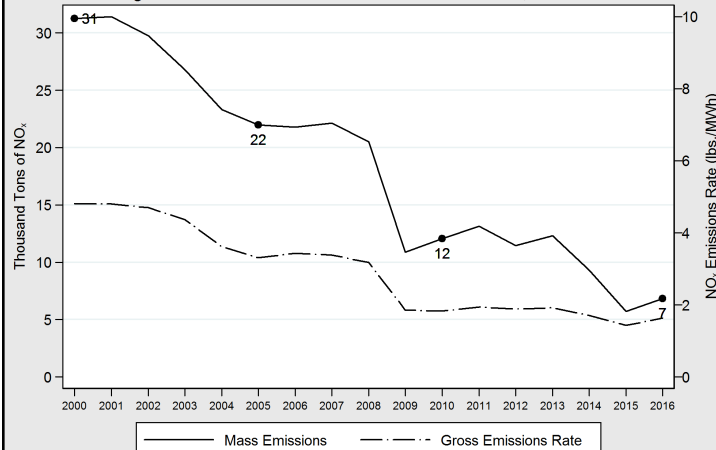


Kentucky Energy Database, EEC-DEDI, 2016  
Data Source: EPA Clean Air Markets

Sulfur Dioxide	2016	Since 2000
Emissions (Tonnage)	11,810	-83.6%
Rate (lbs./MWh)	2.82	-74.6%

Big Rivers Electric Corporation emitted 11 thousand tons of SO<sub>2</sub> in 2016, a decrease of 83 percent since 2000. The rate of SO<sub>2</sub> emissions decreased by 74 percent during that period.

Big Rivers NO<sub>x</sub> Emissions from Fossil Generation, 2000-2016



Kentucky Energy Database, EEC-DEDI, 2016  
Data Source: EPA Clean Air Markets

Nitrogen Dioxide	2016	Since 2000
Emissions (Tonnage)	6,830	-78.2%
Rate (lbs./MWh)	1.63	-66%

Big Rivers Electric Corporation emitted 6.8 thousand tons of NO<sub>x</sub> in 2016, a reduction of 78 percent since 2000. The rate of NO<sub>x</sub> emissions decreased by 66 percent during that period.

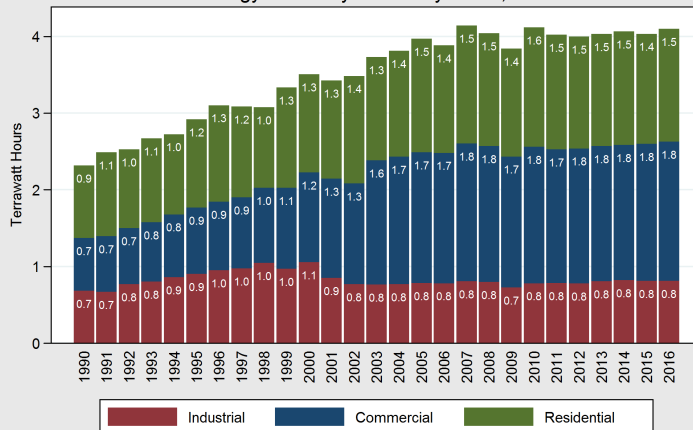
# Duke Energy Kentucky

Duke Energy Kentucky Average Electricity Price, Inc., 1990-2016  
Nominal Prices by Sector



Kentucky Energy Database, EEC-DEDI, 2017  
Data Source: EIA Form 861 & 826

Duke Energy Kentucky Electricity Sales, 1990-2016



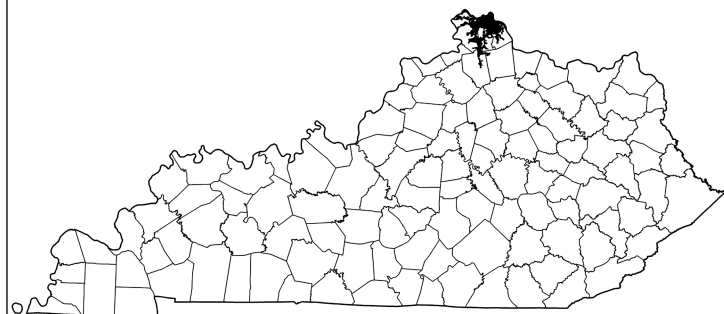
Kentucky Energy Database, EEC-DEDI, 2015  
Data Source: EIA Form 861

Sector	Price (Cents/kWh)	Since 2010*
Total†	7.89	-5%
Residential	8.85	-2%
Commercial	7.69	-6%
Industrial	6.61	-8%

\*Change in real 2010 U.S.\$

Sector	Sales (GWh)	Percentage
Total†	4,099	100%
Commercial	1,811	44%
Residential	1,473	36%
Industrial	815	20%

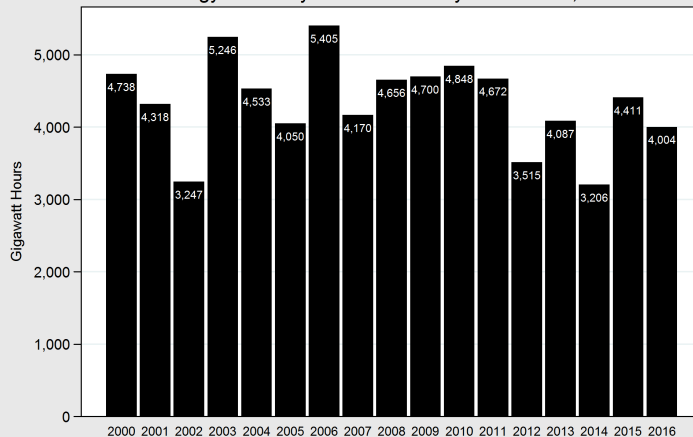
## Duke Energy Kentucky Service Territory



Kentucky Public Service Commission  
Kentucky Energy Database, EEC-DEDI

Duke Energy Kentucky generates and sells electricity in northern Kentucky and is owned and operated by Duke Energy. Total electricity prices in 2016 were 7.9 cents per kWh and have decreased by 5 percent since 2010 in inflation-adjusted dollars. Duke Energy owns and operates the East Bend coal-fired power plant in Boone County. Duke Energy also sells electricity throughout North and South Carolina, Indiana, and southwest Ohio.

Duke Energy Kentucky Gross Electricity Generation, 2000-2016



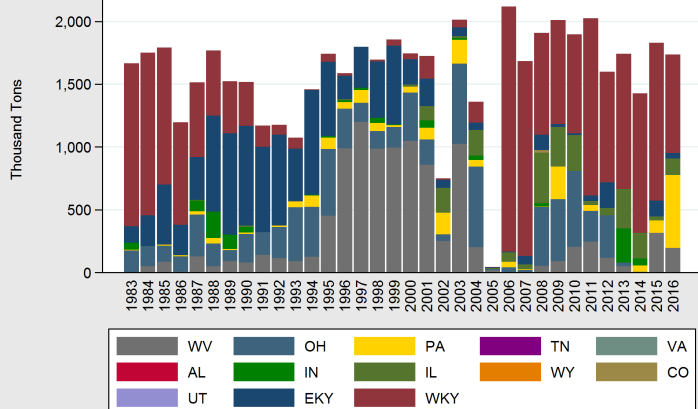
Kentucky Energy Database, EEC-DEDI, 2016  
Data Source: EPA Clean Air Markets

Electricity Generation	2016	Since 2000
Gigawatt Hours	4,004	-2.0%

Duke Energy Kentucky generated 4 TWh of electricity in 2016, a decrease of 9 percent from 2015, when it generated 4.4 TWh. Duke sold almost 4.1 TWh of electricity in 2016.

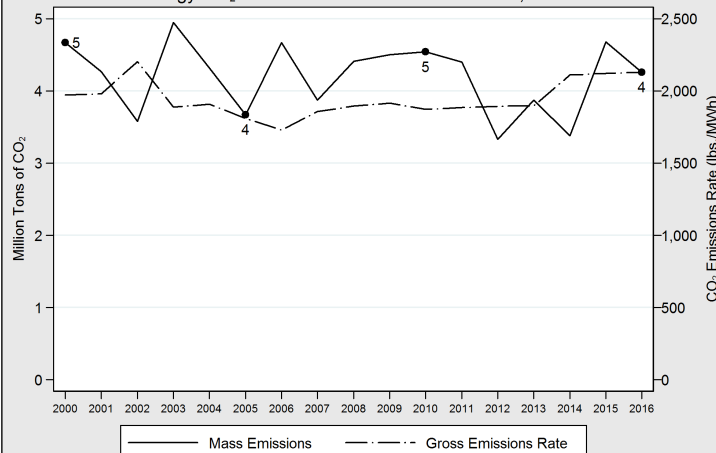
# Duke Energy Kentucky

Duke Energy Kentucky Coal Consumption by Origin, 1983-2016



Kentucky Energy Database, EEC-DEDI, 2016  
Data Source: FERC-423 & EIA-923

Duke Energy CO<sub>2</sub> Emissions from Fossil Generation, 2000-2016



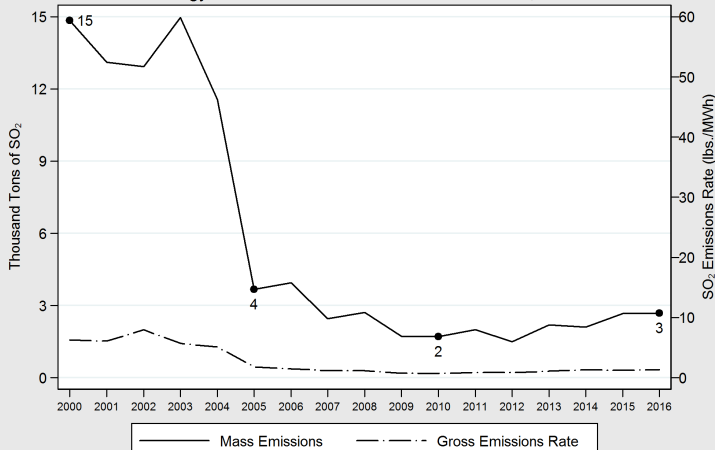
Kentucky Energy Database, EEC-DEDI, 2016  
Data Source: EPA Clean Air Markets

State	2016 Tons	Percentage
<b>Total</b>	<b>1,517,512</b>	<b>100%</b>
Western Kentucky	785,597	52%
Illinois	133,579	9%
Pennsylvania	578,729	38%
West Virginia	19,607	1%

Carbon Dioxide	2016	Since 2000
Emissions (Tonnage)	4,261,735	-8.7%
Rate (lbs./MWh)	2,128	+8.0%

Duke Energy Kentucky emitted 4.3 million tons of CO<sub>2</sub> in 2016, a decrease of 8.7 percent since 2000. The rate of CO<sub>2</sub> emissions has increased by 8 percent during that period, and had the highest rate of CO<sub>2</sub> emissions in 2016.

Duke Energy SO<sub>2</sub> Emissions from Fossil Generation, 2000-2016

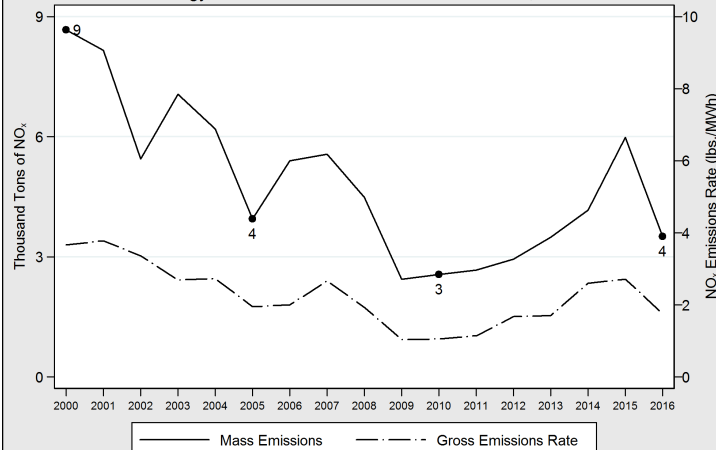


Kentucky Energy Database, EEC-DEDI, 2016  
Data Source: EPA Clean Air Markets

Sulfur Dioxide	2016	Since 2000
Emissions (Tonnage)	2,680	-82.0%
Rate (lbs./MWh)	1.34	-79.0%

Duke Energy Kentucky emitted 2,680 tons of SO<sub>2</sub> in 2016, a decrease of 82 percent since 2000. The rate of SO<sub>2</sub> emissions reduced by 79 percent during that period and the utility's rate of SO<sub>2</sub> emissions is the lowest in Kentucky.

Duke Energy NO<sub>x</sub> Emissions from Fossil Generation, 2000-2016

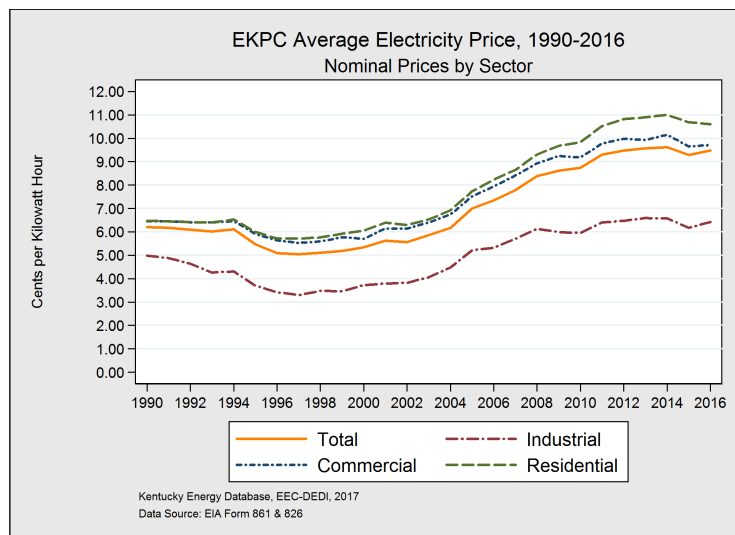


Kentucky Energy Database, EEC-DEDI, 2016  
Data Source: EPA Clean Air Markets

Nitrogen Dioxide	2016	Since 2000
Emissions (Tonnage)	3,511	-60.0%
Rate (lbs./MWh)	1.75	-52.2%

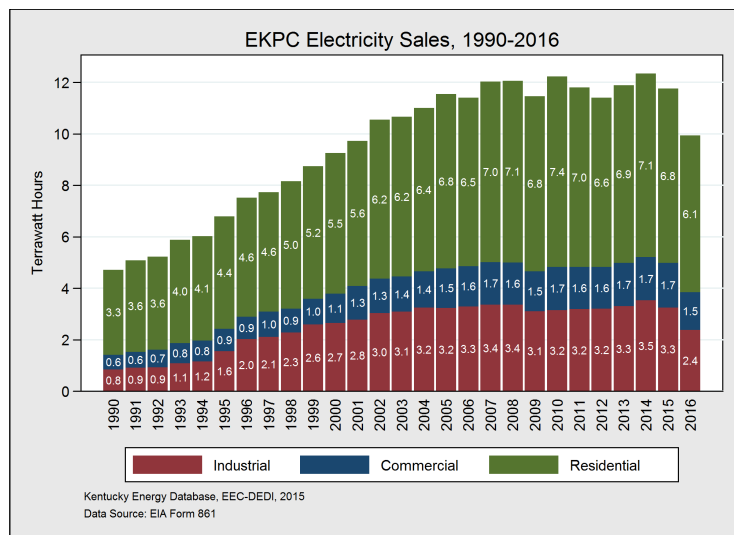
Duke Energy Kentucky emitted four thousand tons of NO<sub>x</sub> in 2016, a reduction of 60 percent since 2000. The rate of NO<sub>x</sub> emissions decreased by 52 percent during that period, but was the most intensive electricity utility in terms of nitrogen dioxide in the Commonwealth.

# East Kentucky Power Cooperative



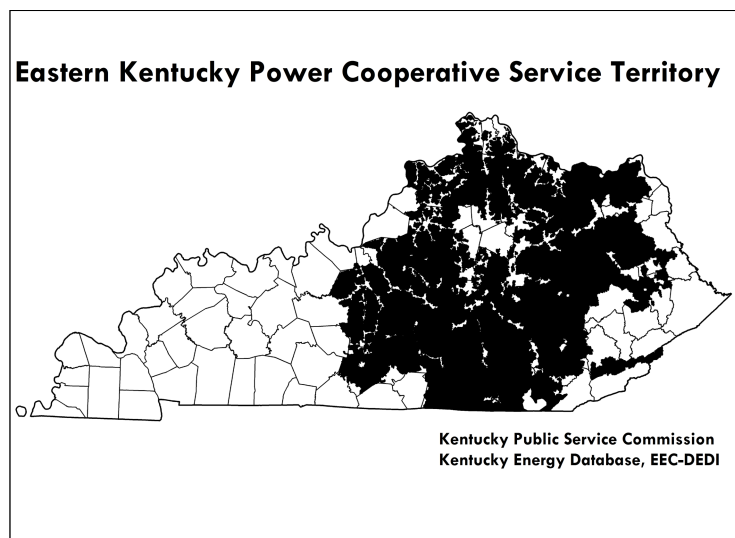
Sector	Price (Cents/kWh)	Since 2010*
Total	9.46	-0.8%
Residential	10.60	-1%
Commercial	9.71	-3%
Industrial	6.42	-1%

\*Change in real 2010 U.S.\$

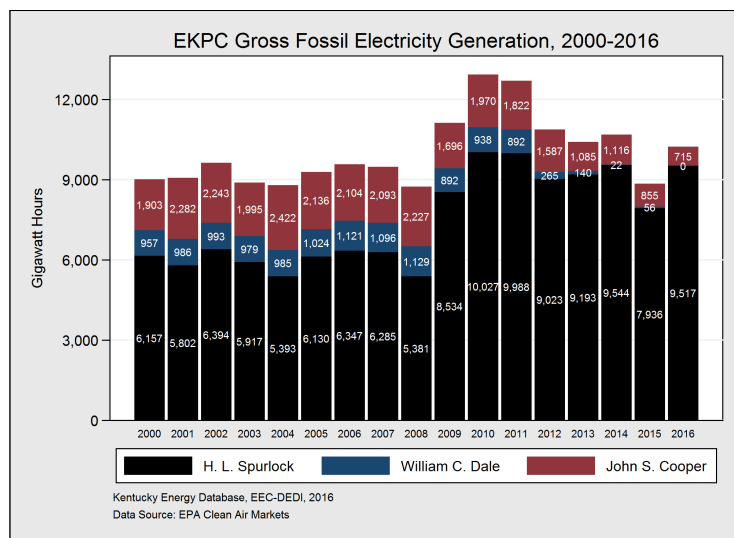


Sector	Sales (GWh)	Percentage
Total	9,936	100%
Residential	6,086	61%
Industrial	2,386	24%
Commercial	1,464	15%

†Includes direct sales and sales to rural electric cooperatives



East Kentucky Power Cooperative serves central and eastern Kentucky where 16 RECCs jointly own and purchase electricity from EKPC. Total electricity prices in 2016 were 9.46 cents per kWh and have decreased by one percent since 2010 in inflation-adjusted dollars. EKPC owns and operates two coal-fired power plants, two natural gas electricity generating stations, and six landfill gas generating stations.



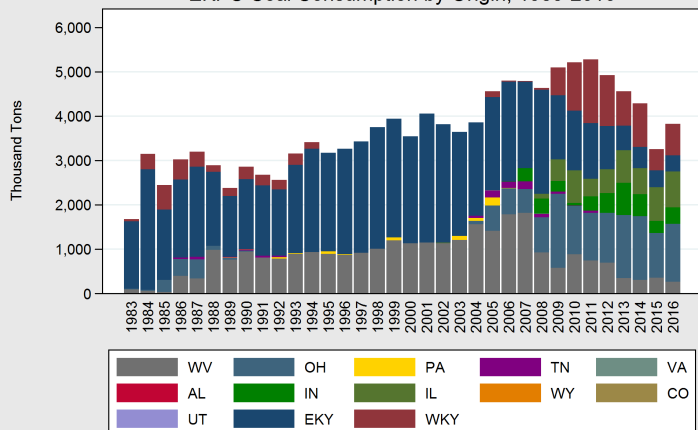
Electricity Generation	2016	Since 2000
Gigawatt Hours	10,232	+15.7%

East Kentucky Power Cooperative generated 10 TWh and sold 9.9 TWh of electricity in 2016. Eastern Kentucky Power Cooperative sold 9.9 TWh of electricity in 2016.



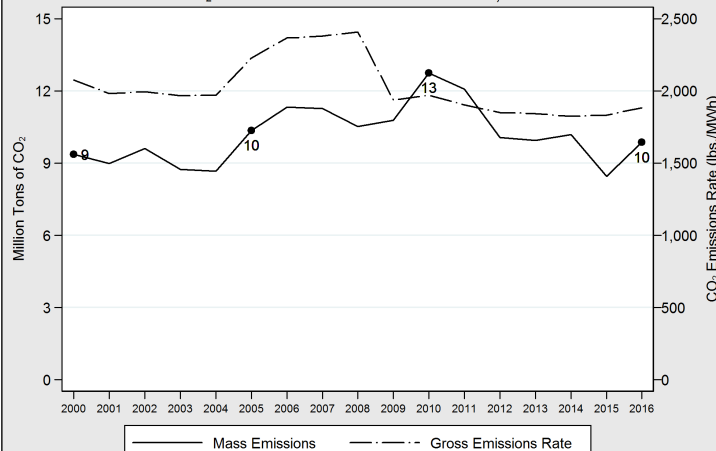
# East Kentucky Power Cooperative

EKPC Coal Consumption by Origin, 1983-2016



Kentucky Energy Database, EEC-DEDI, 2016  
Data Source: FERC-423 & EIA-923

EKPC CO<sub>2</sub> Emissions from Fossil Generation, 2000-2016



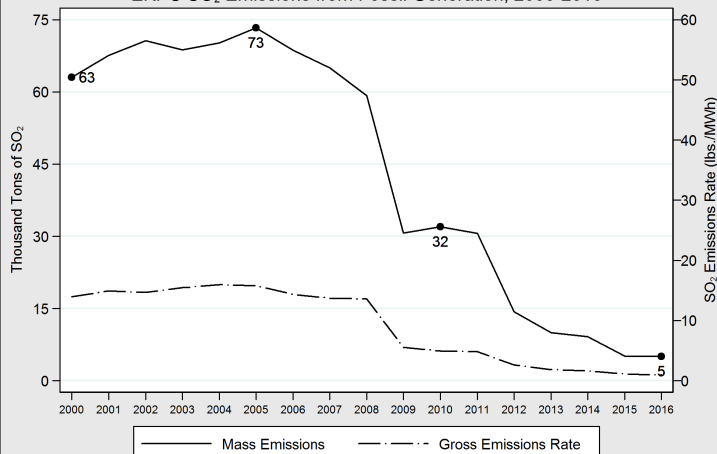
Kentucky Energy Database, EEC-DEDI, 2016  
Data Source: EPA Clean Air Markets

State	2016 Tons	Percentage
Total	3,821,065	100%
Ohio	1,303,640	34%
Western Kentucky	707,438	19%
Illinois	808,124	21%
Indiana	375,799	10%
Eastern Kentucky	362,293	9%
West Virginia	263,771	7%

Carbon Dioxide	2016	Since 2000
Emissions (Tonnage)	9,855,985	+5.3%
Rate (lbs./MWh)	1,884	-9.3%

East Kentucky Power Cooperative emitted almost 10 million tons of CO<sub>2</sub> in 2016, an increase of five percent since 2000. The rate of CO<sub>2</sub> emissions has decreased by 9.3 percent during that period.

EKPC SO<sub>2</sub> Emissions from Fossil Generation, 2000-2016

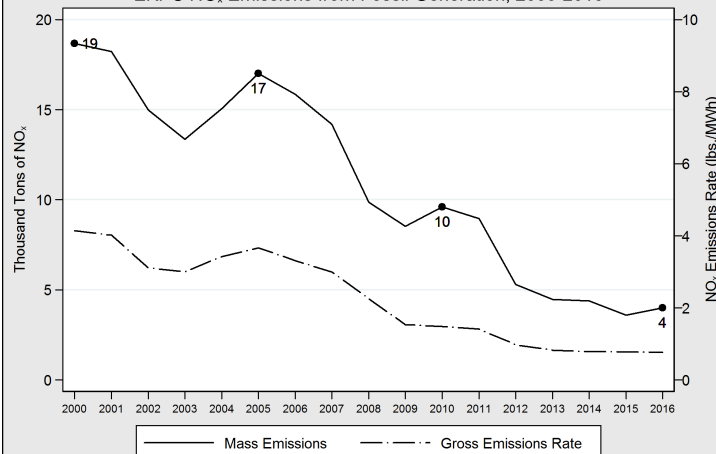


Kentucky Energy Database, EEC-DEDI, 2016  
Data Source: EPA Clean Air Markets

Sulfur Dioxide	2016	Since 2000
Emissions (Tonnage)	5,024	-92.0%
Rate (lbs./MWh)	0.96	-93.7%

East Kentucky Power Cooperative emitted 5,024 tons of SO<sub>2</sub> in 2016, a decrease of 92 percent since 2000. The rate of SO<sub>2</sub> emissions reduced by 93 percent during that period.

EKPC NO<sub>x</sub> Emissions from Fossil Generation, 2000-2016

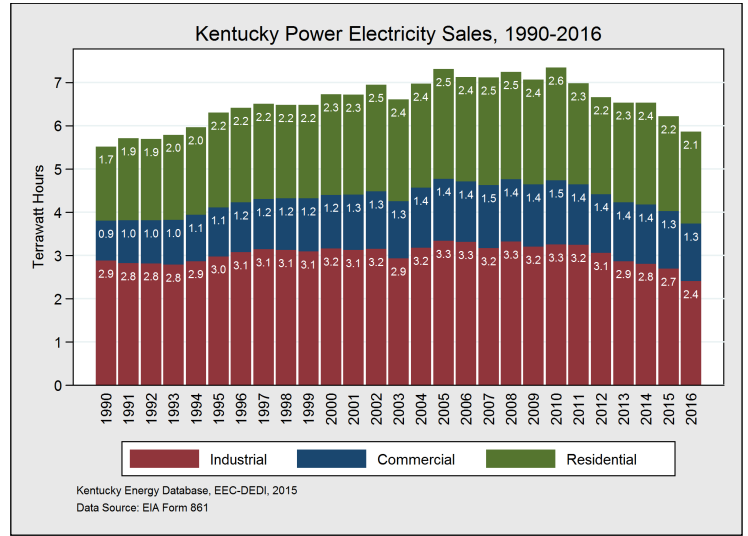
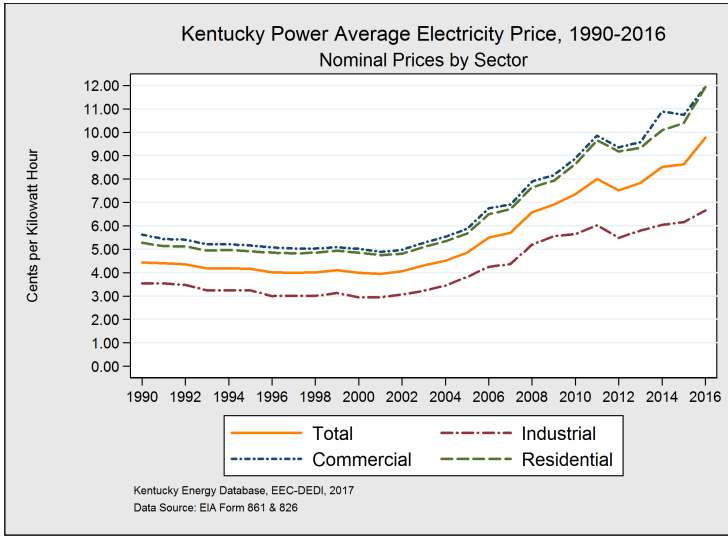


Kentucky Energy Database, EEC-DEDI, 2016  
Data Source: EPA Clean Air Markets

Nitrogen Dioxide	2016	Since 2000
Emissions (Tonnage)	4,006	-78.6%
Rate (lbs./MWh)	0.76	-81.6%

East Kentucky Power Cooperative emitted four thousand tons of NO<sub>x</sub> in 2016, a reduction of 78 percent since 2000. The rate of NO<sub>x</sub> emissions decreased by 81 percent during that period and is the lowest in Kentucky.

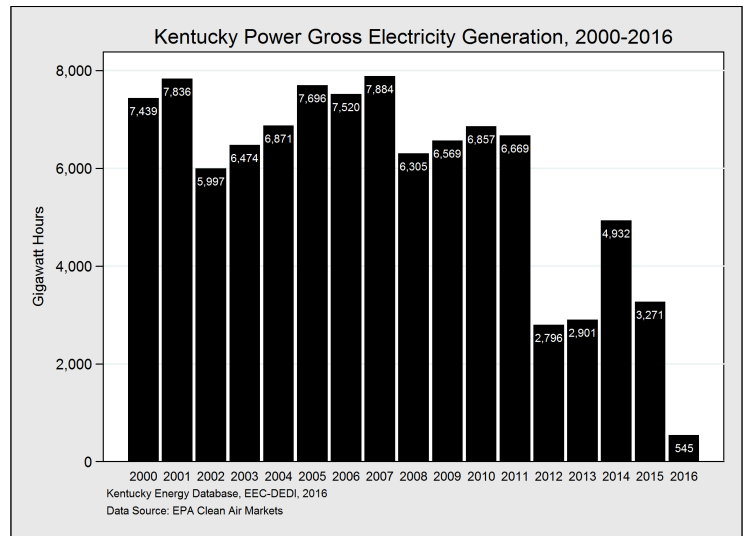
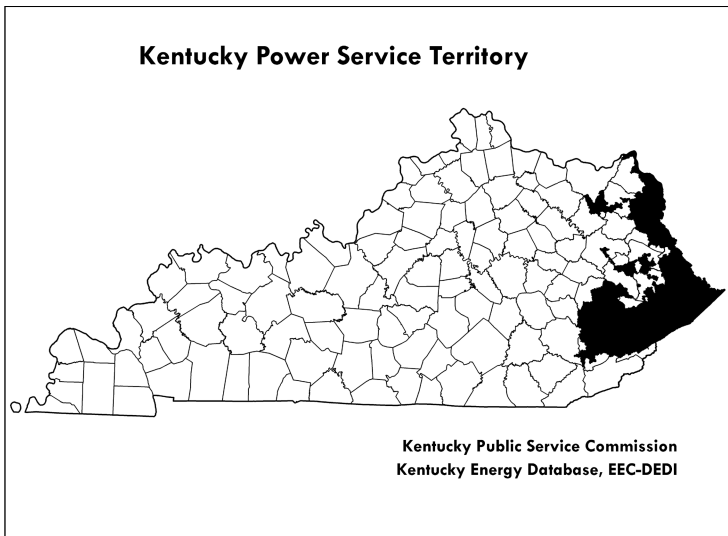
# Kentucky Power



Sector	Price (Cents/kWh)	Since 2010*
Total	9.77	+33%
Commercial	11.95	+35%
Residential	11.94	+38%
Industrial	6.65	+18%

\*Change in real 2010 U.S.\$

Sector	Sales (GWh)	Percentage
Total†	5,863	100%
Industrial	2,408	41%
Residential	2,128	36%
Commercial	1,327	23%

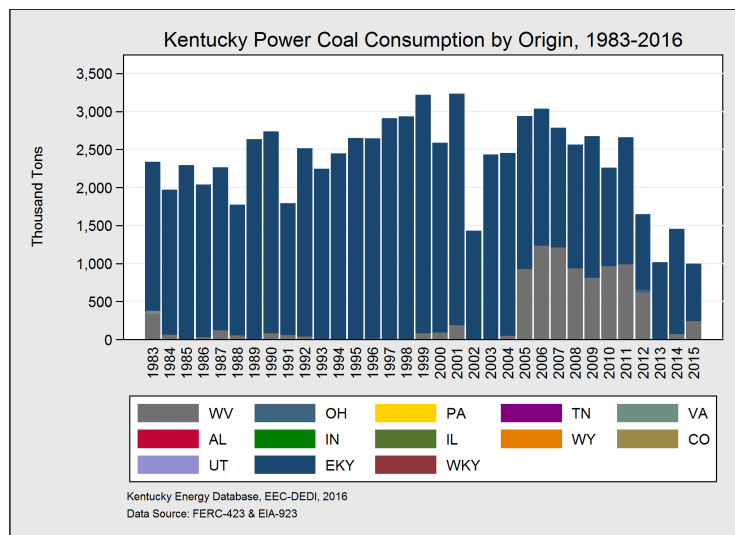


Kentucky Power, a subsidiary of American Electric Power, generates and distributes electricity in eastern Kentucky. Total electricity prices in 2016 were 9.7 cents per kWh and have increased by 33 percent since 2010 in inflation-adjusted dollars. Kentucky Power operates the Big Sandy power plant in Louisa Kentucky.

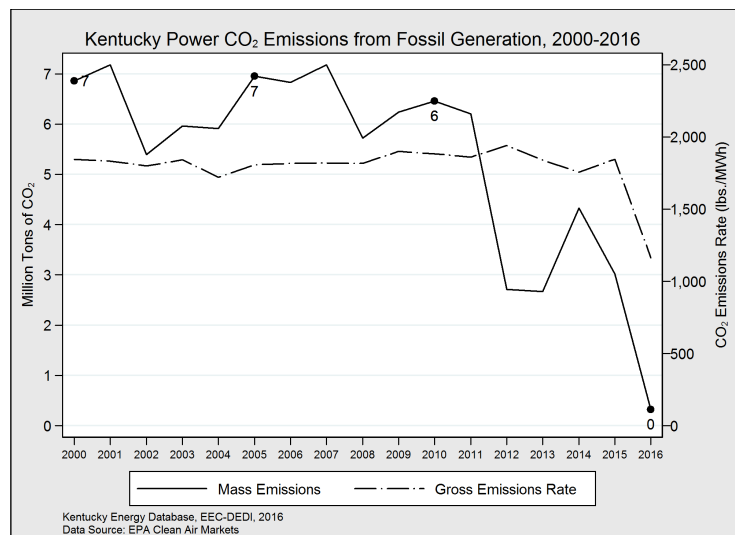
Electricity Generation	2016	Since 2000
Gigawatt Hours	545	-93.0%

Kentucky Power generated almost 545 GWh and sold 5.8 TWh of electricity in 2016. Since 2000 generation has decreased by 93 percent and decreased by 83 percent since 2015.

# Kentucky Power

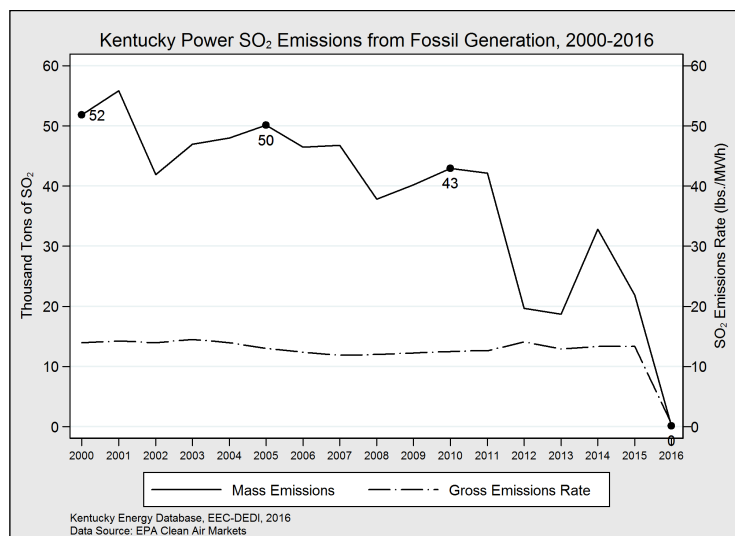


Unit 2 was retired in May of 2015, while unit 1 was converted to natural gas. Over its lifetime, Big Sandy's coal-fired units generated 98.6 TWh for the Commonwealth.



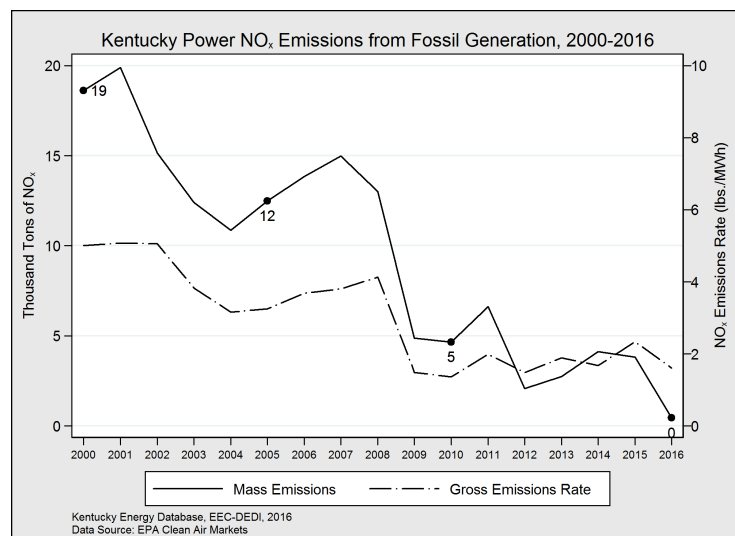
Carbon Dioxide	2016	Since 2000
Emissions (Tonnage)	317,238	-95.4%
Rate (lbs./MWh)	1,163	-36.9%

Kentucky Power emitted 317 thousand tons of CO<sub>2</sub> in 2016, a decrease of 95.4 percent since 2000. The rate of CO<sub>2</sub> emissions decreased by 36.9 percent.



Sulfur Dioxide	2016	Since 2000
Emissions (Tonnage)	137	-99.7%
Rate (lbs./MWh)	0.5	-96.4%

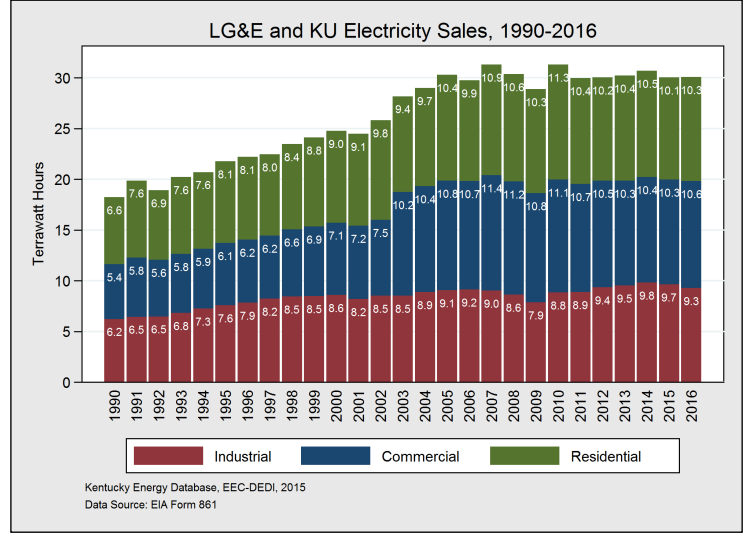
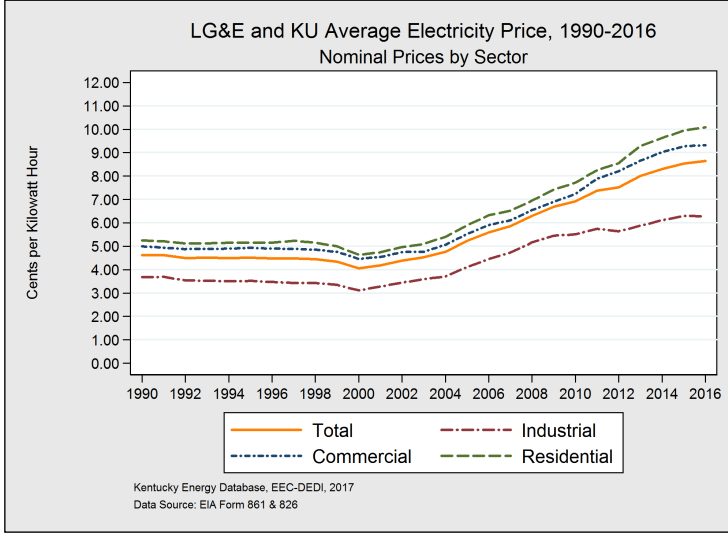
Kentucky Power emitted 137 tons of SO<sub>2</sub> in 2016, a decrease of 99.7 percent since 2000. The rate of SO<sub>2</sub> emissions reduced by 96 percent during that period.



Nitrogen Dioxide	2016	Since 2000
Emissions (Tonnage)	438	-97.6%
Rate (lbs./MWh)	1.60	-68.0%

Kentucky Power emitted 438 tons of NO<sub>x</sub> in 2016, a reduction of 97 percent since 2000. The rate of NO<sub>x</sub> emissions decreased by two-thirds during that period.

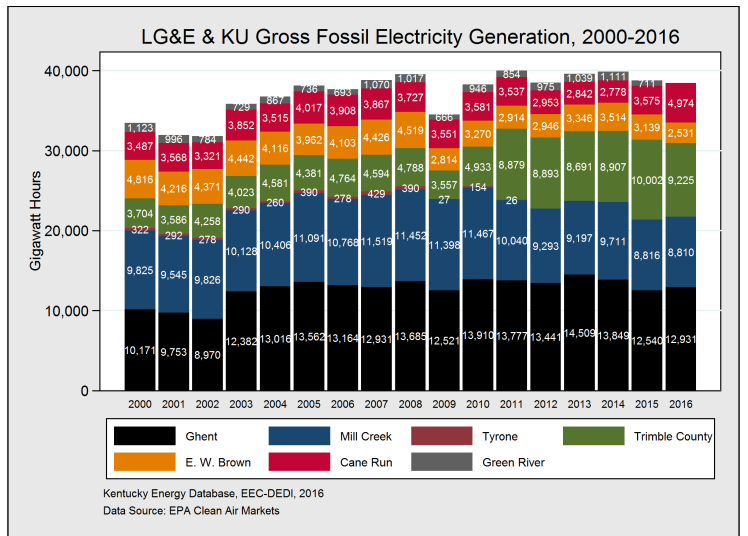
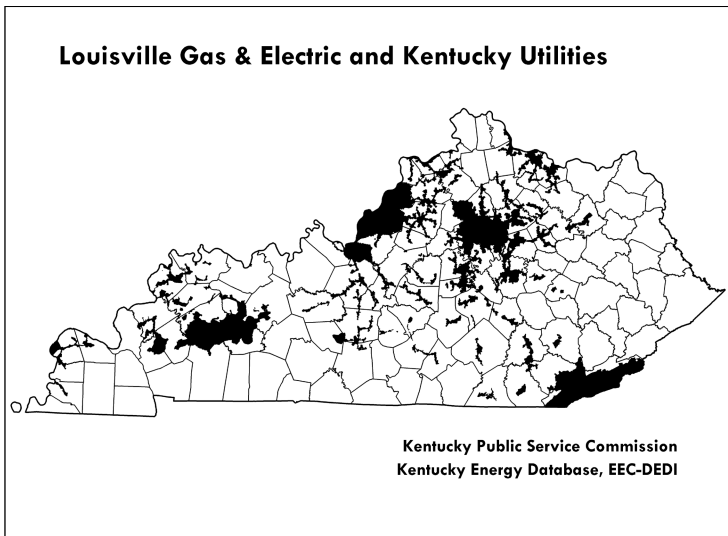
# LG&E and KU



Sector	Price (Cents/kWh)	Since 2010*
Total	8.65	+14%
Residential	10.09	+20%
Commercial	9.32	+18%
Industrial	6.29	+4%

\*Change in real 2010 U.S.\$

Sector	Sales (GWh)	Percentage
Total	30,093	100%
Residential	10,263	34%
Commercial	10,555	35%
Industrial	9,275	31%

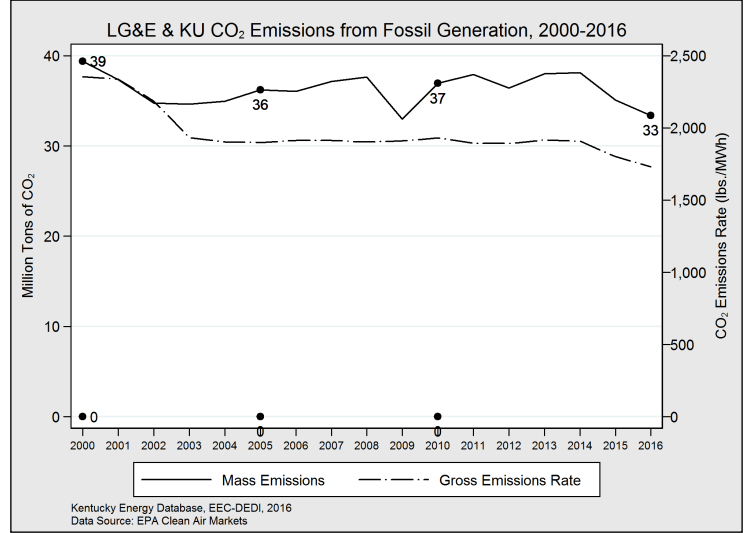
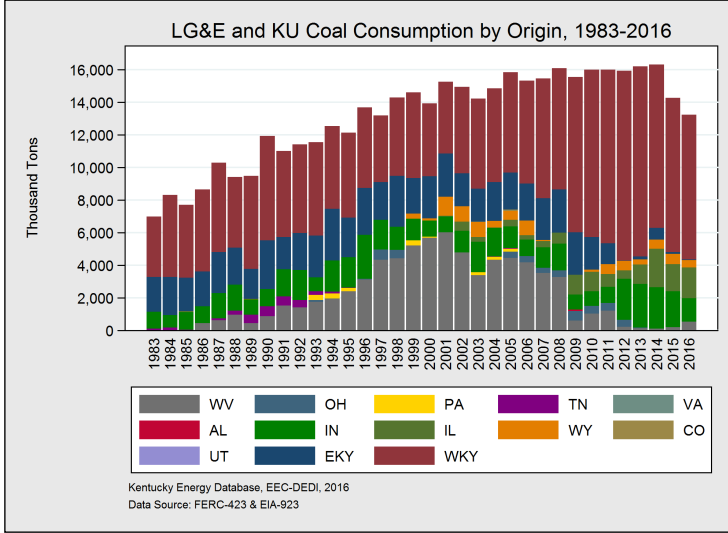


LG&E and KU is the single largest utility by sales in Kentucky and sells electricity throughout the state, primarily in densely populated areas. Total electricity prices in 2016 were 8.65 cents per kWh and have increased by 14 percent since 2010 in inflation-adjusted dollars. LG&E and KU operate numerous electricity generation facilities throughout the state including seven coal-fired power plants, two hydroelectric dams, four natural gas facilities and one solar facility.

Electricity Generation	2016	Since 2000
Gigawatt Hours	38,468	-0.8%

LG&E and KU generated greater than 38 TWh and sold 30 TWh of electricity in 2016. Since 2015, generation has decreased by less than one percent.

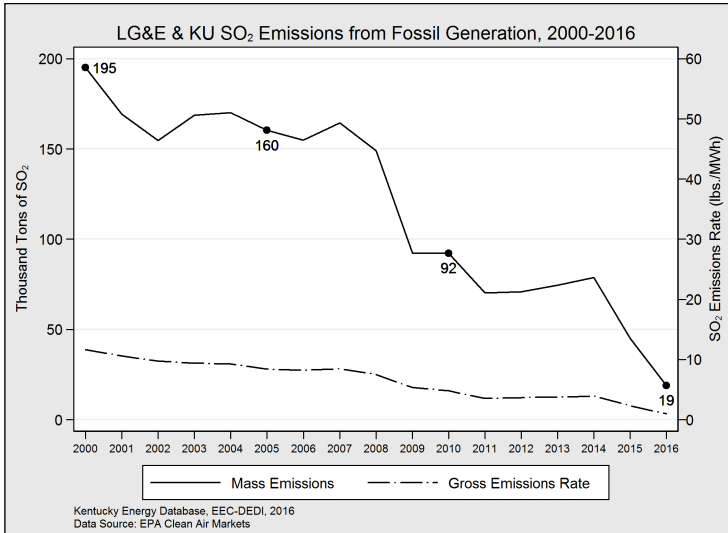
# LG&E and KU



State	2016 Tons	Percentage
<b>Total</b>	<b>13,240,265</b>	<b>100%</b>
Western Kentucky	8,884,686	67%
Indiana	1,443,788	11%
Illinois	1,873,120	14%
Wyoming	456,180	3%
Eastern Kentucky	39,634	1%
West Virginia	542,857	4%

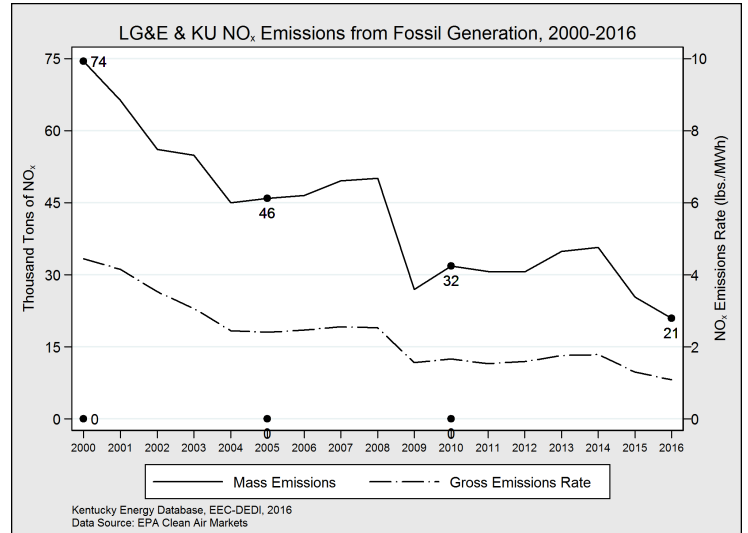
Carbon Dioxide	2016	Since 2000
Emissions (Tonnage)	33,373,948	-15.3%
Rate (lbs./MWh)	1,730	-27.0%

LG&E and KU emitted 33 million tons of CO<sub>2</sub> in 2016, a decrease of 15.3 percent since 2000. The rate of CO<sub>2</sub> emissions has decreased by almost 27 percent during that period.



Sulfur Dioxide	2016	Since 2000
Emissions (Tonnage)	18,965	-90.0%
Rate (lbs./MWh)	0.98	-92.0%

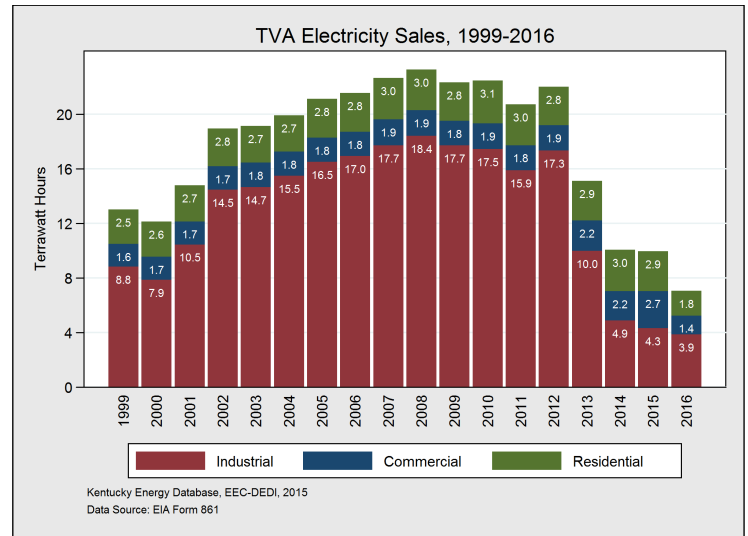
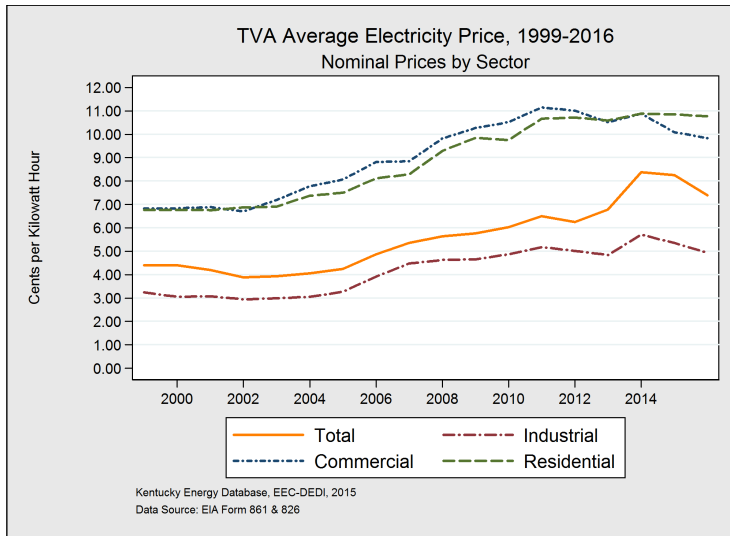
LG&E and KU emitted 19 thousand tons of SO<sub>2</sub> in 2016, a decrease of 90 percent since 2000. The rate of SO<sub>2</sub> emissions reduced by 92 percent during that period.



Nitrogen Dioxide	2016	Since 2000
Emissions (Tonnage)	20,942	-71.0%
Rate (lbs./MWh)	1.08	-75.7%

LG&E and KU emitted 21 thousand tons of NO<sub>x</sub> in 2016, a reduction of 71 percent since 2000. The rate of NO<sub>x</sub> emissions decreased by 76 percent during that period.

# Tennessee Valley Authority

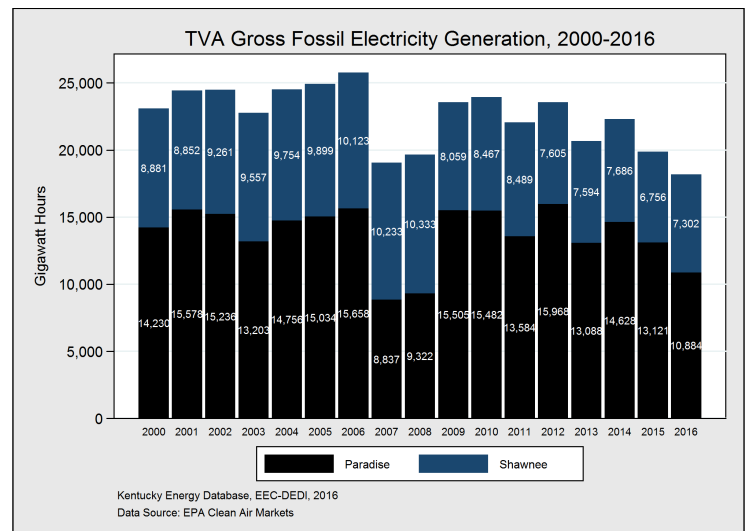
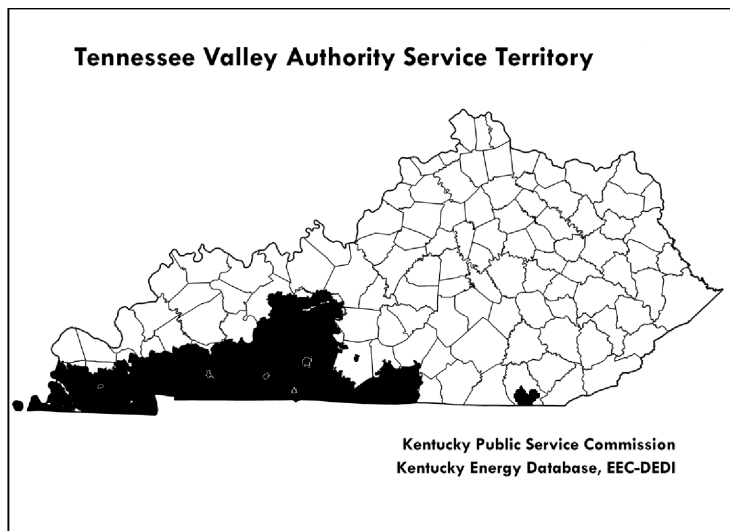


Sector	Price (Cents/kWh)	Since 2010*
Total†	7.38	+22%
Residential	10.77	+15%
Commercial	9.83	+4%
Industrial	4.94	+17%

\*Change in real 2010 U.S.\$

Sector	Sales (GWh)	Percentage
Total†	7,065	100%
Industrial	3,879	55%
Residential	1,809	26%
Commercial	1,377	19%

†Includes direct sales and sales to rural electric cooperatives



The Tennessee Valley Authority generates and sells electricity to five RECCs, 10 municipalities, and several industrial consumers in southwest Kentucky. Total electricity prices in 2017 were 7.38 cents per kWh and have increased by 22 percent since 2010 in inflation-adjusted dollars. In Kentucky, TVA operates the Marshall Combustion Turbine Plant near Calvert City as well as the coal-fired power plants of Paradise and Shawnee. Paradise units 1 and 2 were retired in spring of 2017.

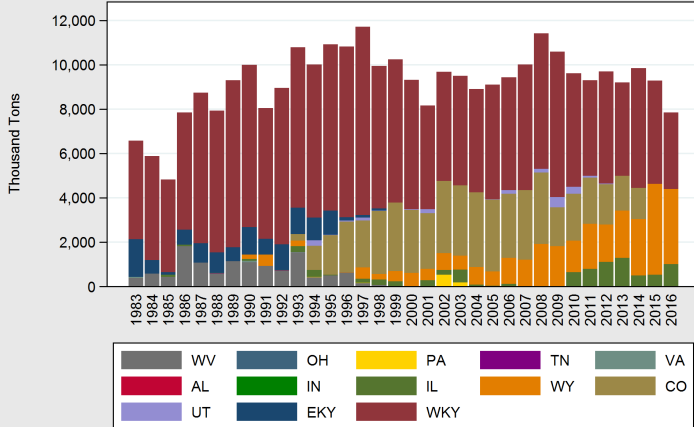
Electricity Generation	2016	Since 2000
Gigawatt Hours	18,186	-21.3%

TVA generated 18 TWh and sold 7 TWh of electricity in 2016. Since 2015, generation has decreased by 7.3 percent and sales have decreased by 33 percent. TVA directly sells electricity to a number of industrial manufacturers and five RECCs. The 10 municipalities TVA supplies are not shown in the figures above.



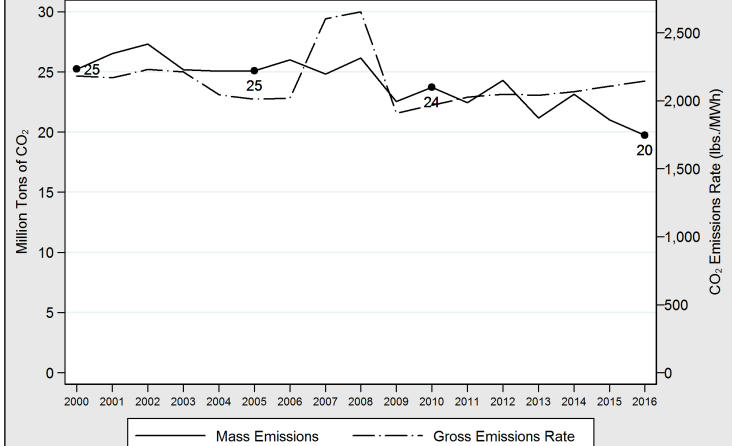
# Tennessee Valley Authority

TVA Coal Consumption by Origin, 1983-2016



Kentucky Energy Database, EEC-DEDI, 2016  
Data Source: FERC-423 & EIA-923

TVA CO<sub>2</sub> Emissions from Fossil Generation, 2000-2016



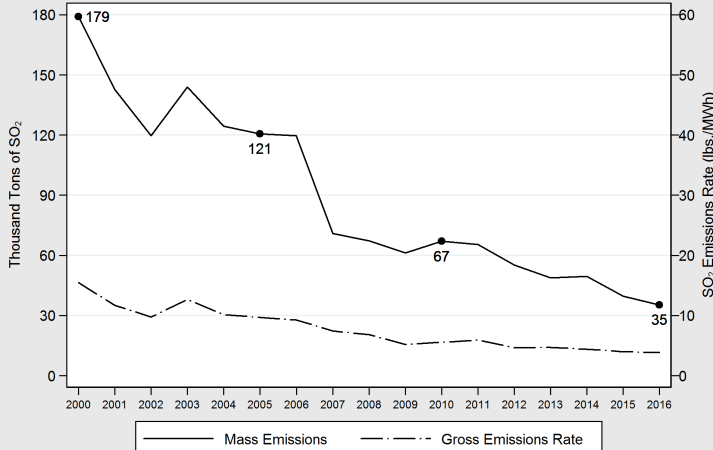
Kentucky Energy Database, EEC-DEDI, 2016  
Data Source: EPA Clean Air Markets

State	2016 Tons	Percentage
Total	7,843,981	100%
Western Kentucky	3,454,091	44%
Wyoming	3,379,434	43%
Illinois	1,010,456	13%

Carbon Dioxide	2016	Since 2000
Emissions (Tonnage)	19,737,708	-21.8%
Rate (lbs./MWh)	2,146	-1.7%

The Tennessee Valley Authority emitted nearly 20 million tons of CO<sub>2</sub> in Kentucky in 2016, a decrease of 21.8 percent since 2000. The rate of CO<sub>2</sub> emissions has decreased by 1.7 percent during that period.

TVA SO<sub>2</sub> Emissions from Fossil Generation, 2000-2016

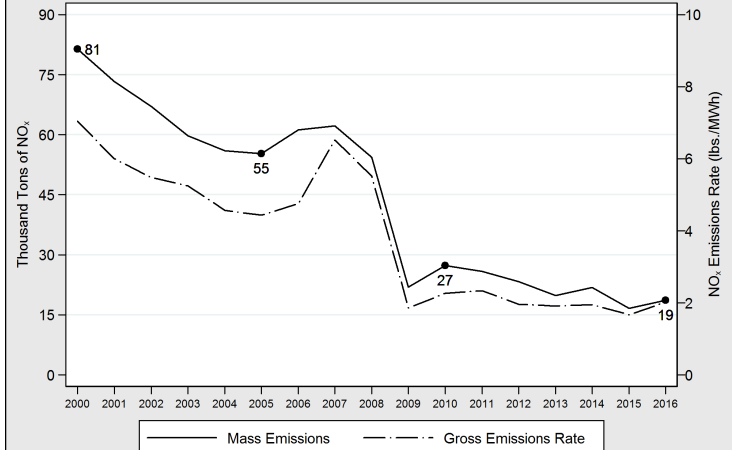


Kentucky Energy Database, EEC-DEDI, 2016  
Data Source: EPA Clean Air Markets

Sulfur Dioxide	2016	Since 2000
Emissions (Tonnage)	35,348	-80.3%
Rate (lbs./MWh)	3.84	-75.2%

The Tennessee Valley Authority emitted 35 thousand tons of SO<sub>2</sub> in 2016, a decrease of 80 percent since 2000. The rate of SO<sub>2</sub> emissions reduced by 75 percent during that period.

TVA NO<sub>x</sub> Emissions from Fossil Generation, 2000-2016



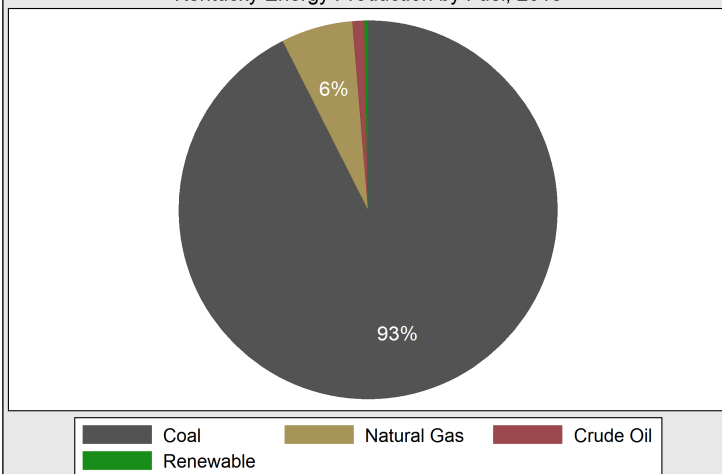
Kentucky Energy Database, EEC-DEDI, 2016  
Data Source: EPA Clean Air Markets

Nitrogen Dioxide	2016	Since 2000
Emissions (Tonnage)	18,617	-73.2%
Rate (lbs./MWh)	2.024	-77.1%

The Tennessee Valley Authority emitted 19 thousand tons of NO<sub>x</sub> in 2016, a reduction of 73 percent since 2000. The rate of NO<sub>x</sub> emissions decreased by 77 percent during that period.

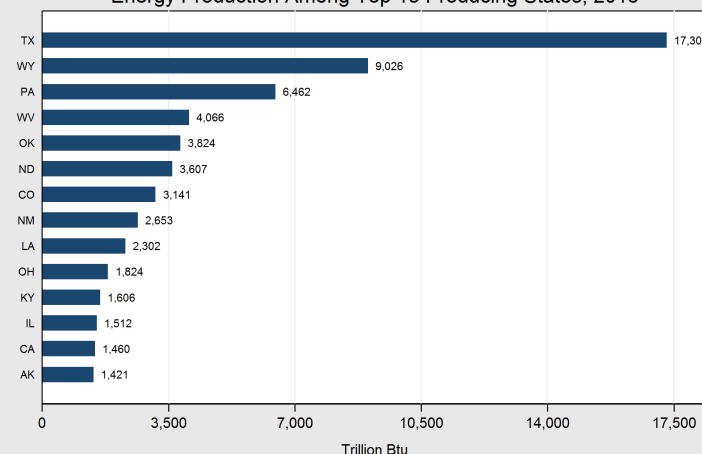
# Kentucky Energy Production

Kentucky Energy Production by Fuel, 2015



Kentucky Energy Database, EEC-DEDI, 2016

Energy Production Among Top 15 Producing States, 2015



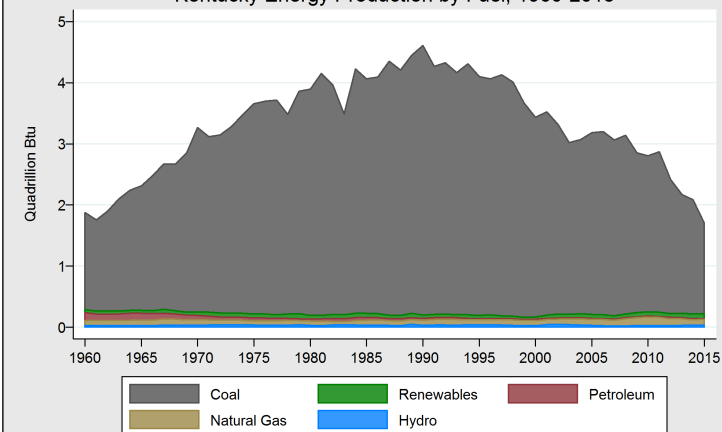
Kentucky Energy Database, EEC-DEDI, 2016

Fuel Type	Billion Btu	1 Year Change
Total	1,674,175	-21.9%
Coal	1,486,019	-20.5%
Natural Gas	98,132	+7.9%
Renewable	73,424	-2.5%
Crude Oil	16,600	-15.2%

State	Quadrillion Btu	Rank
Texas	17,301	1st
Kentucky	1,606	11th

Kentucky was the 11th largest producer of energy in 2015. As recently as 2009, Kentucky ranked 4th among all states; however, the increased adoption of horizontal hydraulic fracturing has increased production in other states and the decline of coal mining has decreased production in Kentucky.

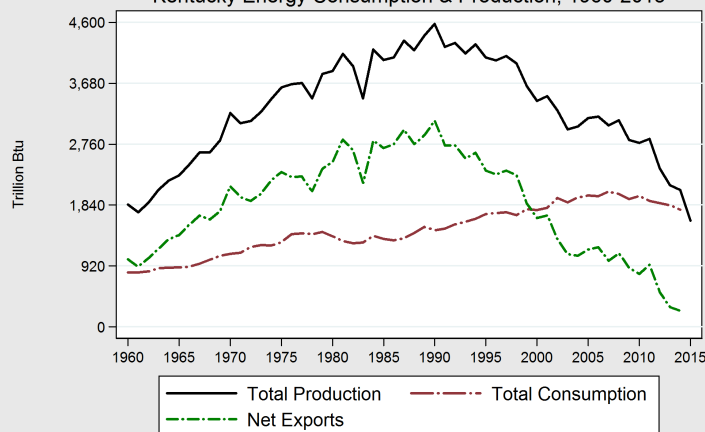
Kentucky Energy Production by Fuel, 1960-2015



Kentucky Energy Database, EEC-DEDI, 2016  
Data Source: EIA-SEDS

Kentucky produced 1.67 quadrillion Btu of energy in 2015. Despite declining production since 1990, coal supplies the vast majority of energy production in Kentucky at 1.48 quadrillion Btu, or 88 percent of all energy produced. Natural gas, renewable resources, and crude oil—despite significant growth in recent years—combined only account for 12 percent of energy production.

Kentucky Energy Consumption & Production, 1960-2015

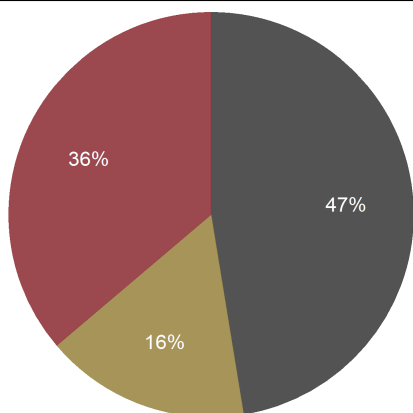


Kentucky Energy Database, EEC-DEDI, 2016  
Data Source: EIA-SEDS

Due to abundant coal resources, Kentucky has historically been a net exporter of energy. The trend in coal production in Kentucky has always driven the trend in overall energy production. However, with decreasing coal production and stable demand, Kentucky's net exports of energy have declined since 1990.

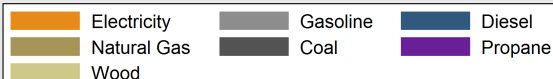
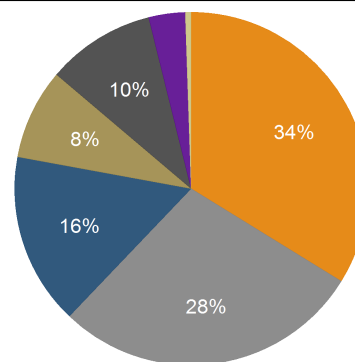
# Kentucky Energy Consumption

Kentucky Energy Consumption by Fuel, 2015



Kentucky Energy Database, EEC-DEDI, 2016

Kentucky Energy Expenditures by Fuel, 2015



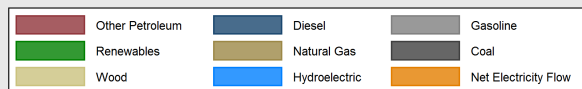
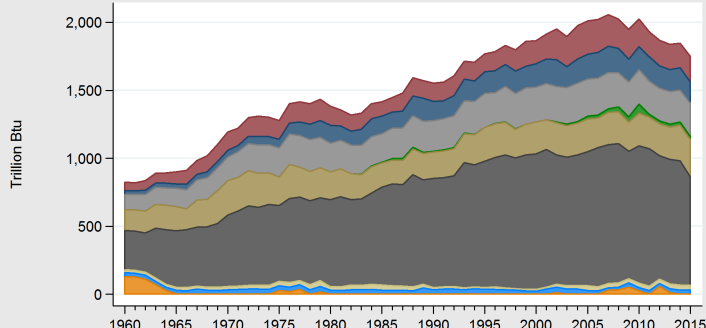
Kentucky Energy Database, EEC-DEDI, 2016

Fuel Type	Billion Btu	1 Year Change
Total	1,766,848	-5.2%
Coal	796,484	-12.8%
Petroleum	607,832	+1.8%
Natural Gas	274,749	+4.7%
Renewables	87,783	-2.8%

Fuel Type*	Million (\$ US)	1 Year Change
Total	17,725	-21.0%
Electricity	6,189	-3.7%
Gasoline	5,144	-25.7%
Diesel	2,861	-34.2%
Coal	1,804	-17.2%
Natural Gas	1,507	-14.4%

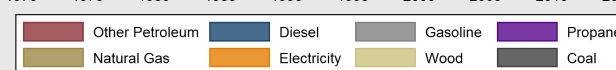
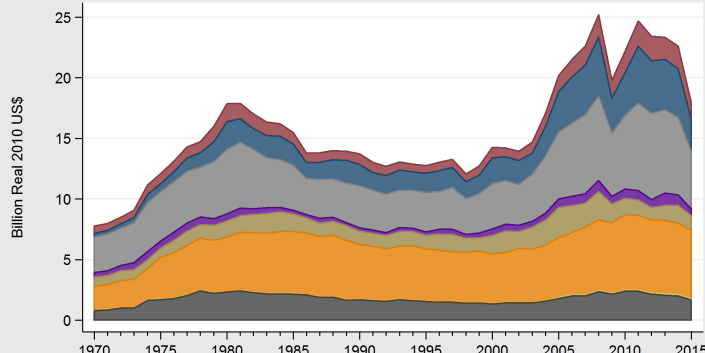
\*Only top five sources listed

Kentucky Energy Consumption by Fuel, 1960-2015



Kentucky Energy Database, EEC-DEDI, 2015  
Data Source: EIA-SEDS

Kentucky Energy Expenditures by Fuel, 1970-2015



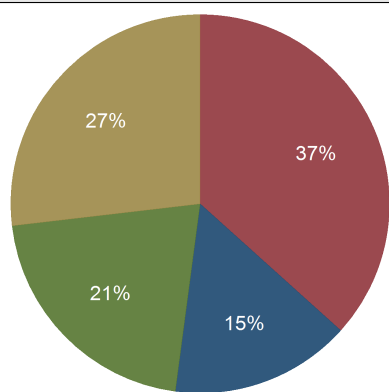
Kentucky Energy Database, EEC-DEDI, 2015  
Data Source: EIA-SEDS

During 2015, Kentucky consumed 1.76 quadrillion Btu of energy, a decrease of 5.2 percent compared with 2014. The combustion of coal for electricity remained Kentucky's primary energy source, providing 45 percent of the state's energy requirements. Petroleum products were the second largest source of energy at 34 percent. The remainder of energy consumption was supplied by natural gas, at 15 percent, and renewable energy sources at five percent.

More than \$17.7 billion was spent on energy in Kentucky in 2015, a significant decrease in energy expenditures compared with 2014. During the year, gasoline was 29 percent of energy expenditures and electricity was 35 percent. Diesel fuel accounted for 16 percent of energy expenditures. Coal and natural gas consumption, other than electricity, together accounted for approximately 19 percent of energy expenditures.

# Kentucky Energy Consumption

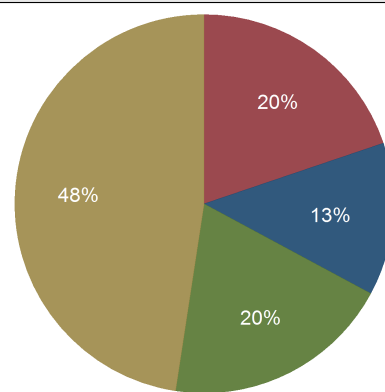
Kentucky Energy Consumption by Sector, 2015



Industrial Commercial  
Residential Transportation

Kentucky Energy Database, EEC-DEDI, 2016

Kentucky Energy Expenditures by Sector, 2015



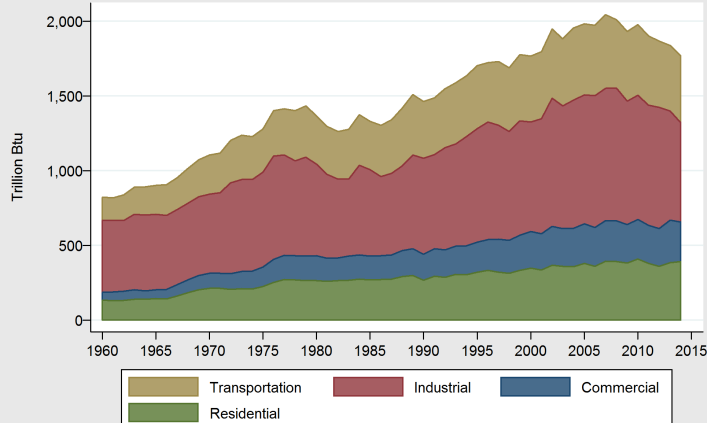
Industrial Commercial  
Residential Transportation

Kentucky Energy Database, EEC-DEDI, 2016

Sector	Billion Btu	1 Year Change
Total	1,725,476	-2.6%
Industrial	632,988	-4.6%
Transportation	463,210	+2.8%
Residential	363,335	-7.7%
Commercial	265,942	+0.7%

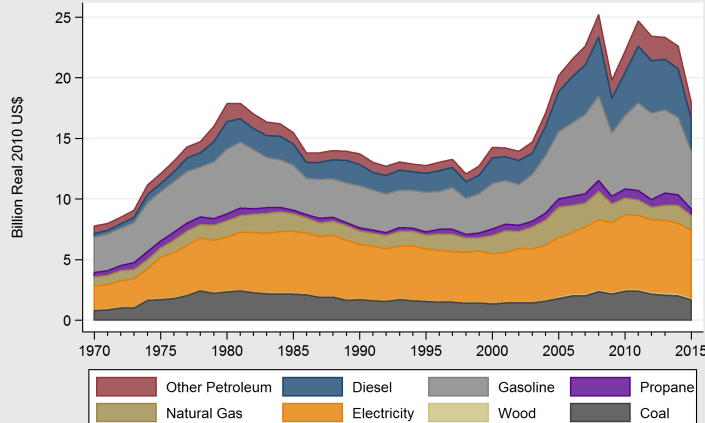
Sector	Million Dollars	1 Year Change
Total	17,725	-21.0%
Transportation	8,433	-28.6%
Industrial	3,508	-22.9%
Residential	3,465	-8.3%
Commercial	2,319	+1.3%

Kentucky Energy Consumption by Sector, 1960-2015



Kentucky Energy Database, EEC-DEDI, 2016  
Data Source: EIA-SEDS

Kentucky Energy Expenditures by Fuel, 1970-2015



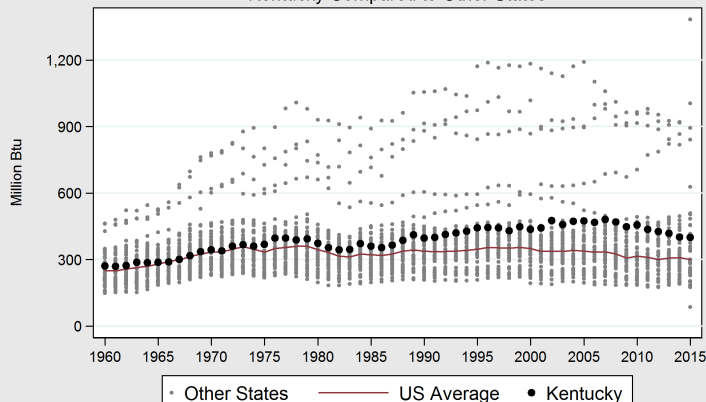
Kentucky Energy Database, EEC-DEDI, 2015  
Data Source: EIA-SEDS

During 2015, manufacturing operations in Kentucky consumed 37 percent of all energy consumed within the Commonwealth. Kentucky's industrial energy use was proportionally larger than the national average of 32 percent in 2015, because Kentucky's low cost have attracted energy-intensive manufacturers. After manufacturing, transportation was the second largest use of energy, with 27 percent of total energy demand, followed by residential energy use at 21 percent. The commercial sector accounted for 15 percent of energy consumption.

Despite being the second-largest consumer of energy in 2015, the Kentucky transportation energy use was the majority of energy expenditures in the state during the year, due the higher cost of petroleum products. A total of \$8.4 billion was spent in 2015 on transportation fuels—primarily on gasoline and diesel. Manufacturers spent \$3.5 billion on various energy commodities, while the residential and commercial sectors spent \$3.5 billion and \$2.3 billion, respectively.

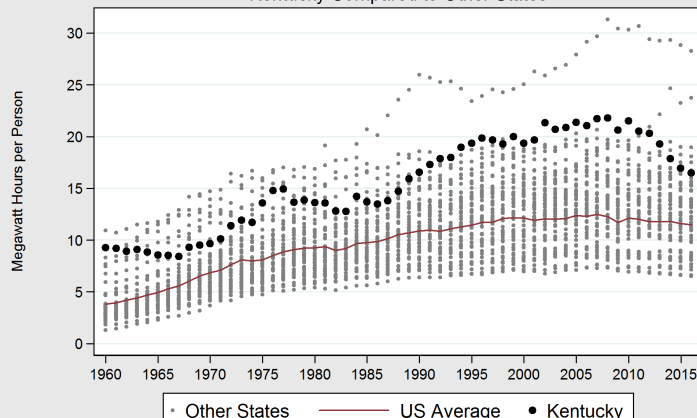
# Kentucky Energy Intensity

Kentucky Annual Energy Consumption per Capita, 1960-2015  
Kentucky Compared to Other States



Kentucky Energy Database, EEC-DEDI, 2016  
Data Source: EIA-SEDS & Census

Electricity Consumption Per Capita, 1960-2016  
Kentucky Compared to Other States



Kentucky Energy Database, EEC-DEDI, 2016

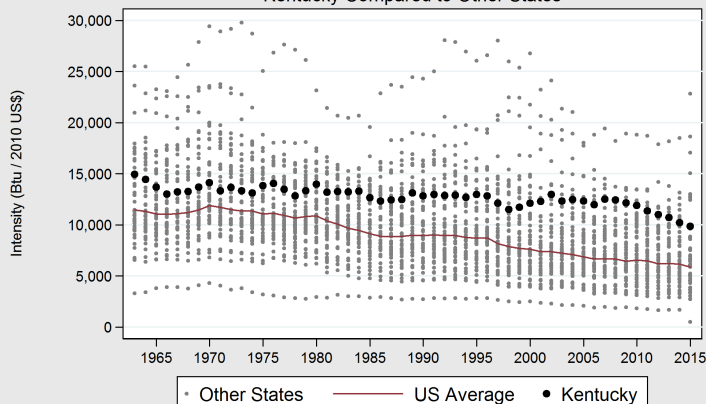
State	MMBtu per Capita	Rank
Wyoming	1383	1st
Kentucky	399	14th
U.S. Average	300	-
California	174	50th

Kentucky total energy consumption per capita decreased by 0.5 percent compared in 2015, which is 14th highest of all states.

State	MWh per Capita	Rank
Wyoming	28.3	1st
Kentucky	16.5	7th
U.S. Average	11.5	-
California	6.5	50th

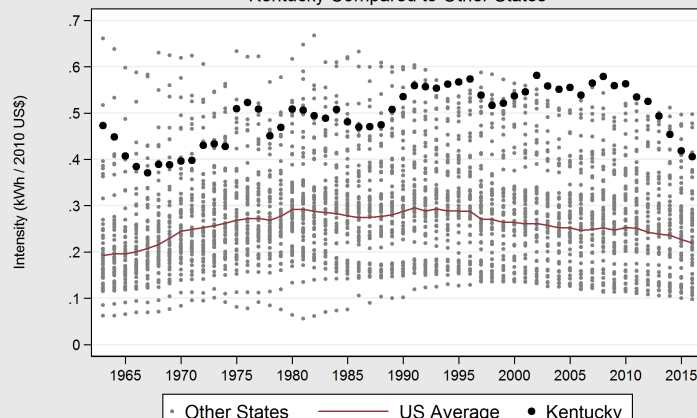
In 2016, Kentucky ranked 7th in terms of total electricity consumption per capita. Total electricity consumption per capita decreased by 2.7 percent compared with 2015.

Energy Consumption per State GDP Dollar, 1963-2015  
Kentucky Compared to Other States



Kentucky Energy Database, EEC-DEDI, 2016  
Data Source: EIA-SEDS & BEA

Electricity Consumption per State GDP Dollar, 1963-2016  
Kentucky Compared to Other States



Kentucky Energy Database, EEC-DEDI, 2016

State	Btu/\$U.S. GDP	Rank
Wyoming	22,813	1st
Kentucky	9,865	9th
U.S. Average	5,880	-
Maine	2,733	50th

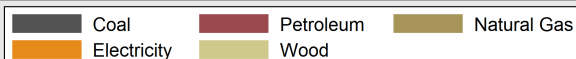
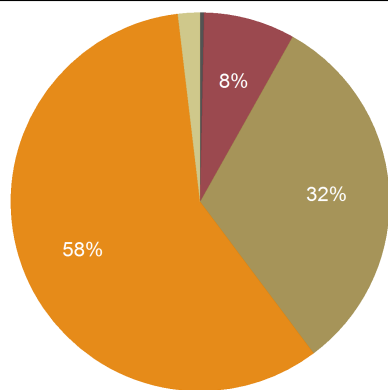
Kentucky ranked 9th in terms of total energy consumption per dollar of state GDP in 2015. Total energy intensity decreased by 3.2 percent compared with 2014.

State	kWh/\$U.S. GDP	Rank
Mississippi	0.50	1st
Kentucky	0.41	8th
U.S. Average	0.22	-
California	0.11	50th

In 2016, Kentucky had the 8th most electricity-intensive economy in the United States, and total electricity intensity decreased by 3.1 percent compared with 2015.

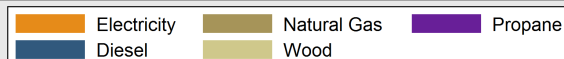
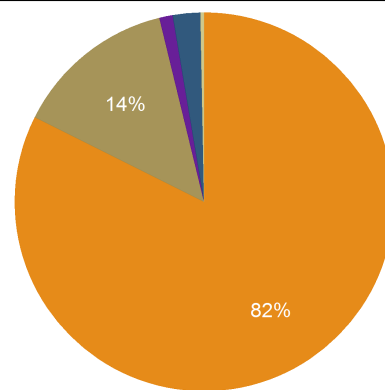
# Commercial Energy Consumption

Kentucky Commercial Energy Consumption by Fuel, 2015



Kentucky Energy Database, EEC-DEDI, 2016

Kentucky Commercial Energy Expenditures by Fuel, 2015

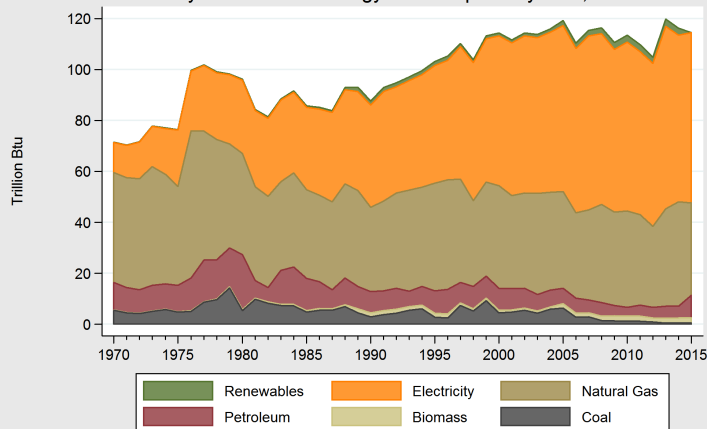


Kentucky Energy Database, EEC-DEDI, 2016

Fuel Type	Billion Btu	1 Year Change
Total Net	114,517	-2.8%
Electricity	66,838	+2.3%
Natural Gas	36,234	-11.7%
Petroleum	8,912	+92.7%
Wood	2,142	+9.2%
Coal	391	-20.0%

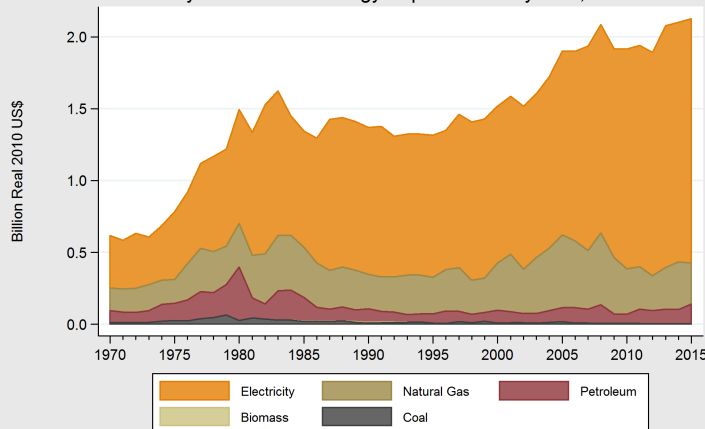
Fuel Type	Million Dollars	1 Year Change
Total	2,244	-1.6%
Electricity	1,848	+2.3%
Natural Gas	310	-14.0%
Petroleum	152	+40.7%
Diesel	53	-6.2%
Propane	26	-18.8%

Kentucky Commercial Energy Consumption by Fuel, 1970-2015



Kentucky Energy Database, EEC-DEDI, 2017  
Data Source: EIA-SEDS

Kentucky Commercial Energy Expenditures by Fuel, 1970-2015



Kentucky Energy Database, EEC-DEDI, 2017  
Data Source: EIA-SEDS

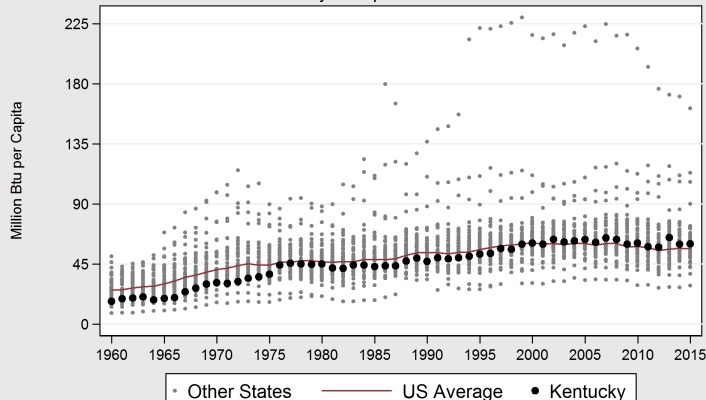
In 2015, non-manufacturing businesses in Kentucky consumed 114,517 billion Btu of energy, a 2.8 percent increase in net commercial energy consumption compared with 2014. Electricity constituted 58 percent of commercial energy consumption, followed by natural gas at 32 percent. Other commodities such as petroleum products, wood, coal, and ethanol accounted for approximately 10 percent of commercial energy consumption in 2015. The commercial sector, which includes service industries, primarily uses natural gas for heating during the winter and cooking.

In 2015, non-manufacturing businesses in Kentucky spent more than \$2.2 billion on energy consumption—a 1.6 percent decrease in commercial energy expenditures compared with 2014. Electricity was the largest energy expenditure, at 81 percent. Natural gas was 14 percent of commercial energy expenditures. The increase in energy expenditures by the commercial sector is more a reflection of increased utilization because the price for energy decreased in 2013.



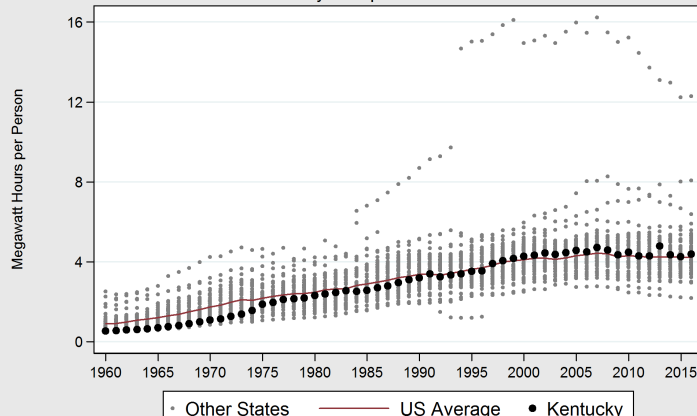
# Commercial Energy Intensity

Annual Commercial Energy Consumption Per Capita, 1960-2015  
Kentucky Compared to Other States



Kentucky Energy Database, EEC-DEDI, 2016  
Data Source: EIA-SEDS & Census

Commercial Electricity Consumption Per Capita, 1960-2016  
Kentucky Compared to Other States



Kentucky Energy Database, EEC-DEDI, 2016

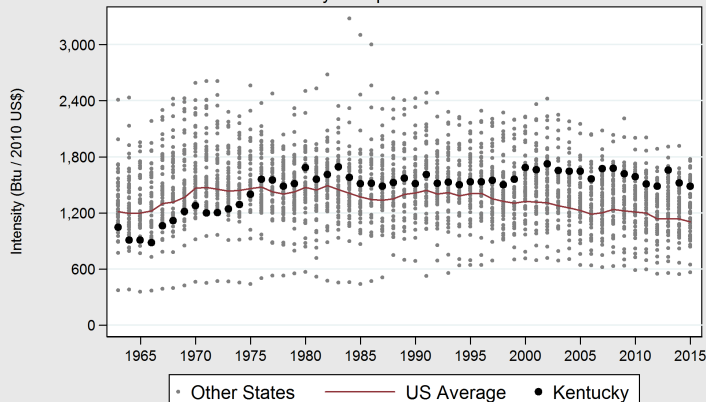
State	MMBtu per Capita	Rank
North Dakota	113	1st
Kentucky	60	23rd
U.S. Average	56	-
Hawaii	29	50th

Kentucky commercial energy consumption per capita increased by 0.4 percent compared with 2014, and ranks 23rd of all states.

State	MWh per Capita	Rank
North Dakota	8.1	1st
Kentucky	4.4	22nd
U.S. Average	4.4	-
Hawaii	2.2	50th

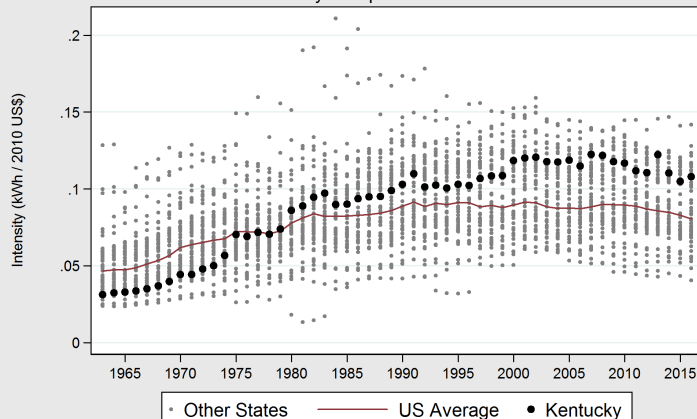
Kentucky ranked 22nd in terms of commercial electricity consumption per capita in 2016, an increase of 3.1 percent compared with 2015.

Commercial Energy Consumption per State GDP Dollar, 1963-2015  
Kentucky Compared to Other States



Kentucky Energy Database, EEC-DEDI, 2016  
Data Source: EIA-SEDS & BEA

Commercial Electricity Consumption per State GDP Dollar, 1963-2016  
Kentucky Compared to Other States



Kentucky Energy Database, EEC-DEDI, 2016

State	Btu/\$U.S. GDP	Rank
Montana	1,774	1st
Kentucky	1,484	12th
U.S. Average	1,103	-
Hawaii	562	50th

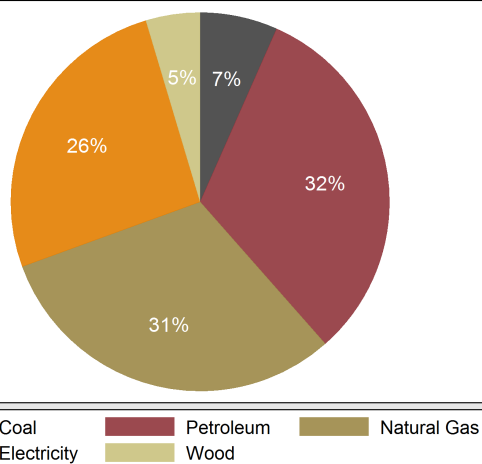
Kentucky ranked 12th highest in terms of commercial energy consumption per dollar of state GDP in 2015. Commercial energy intensity increased by 2.3 percent compared with 2014.

State	kWh/\$U.S. GDP	Rank
Mississippi	0.14	1st
Kentucky	0.11	16th
U.S. Average	0.08	-
Hawaii	0.04	50th

In 2016, Kentucky ranked 16th in terms of commercial electricity use per dollar of state GDP. Commercial electricity intensity increased by 2.8 percent compared with 2015.

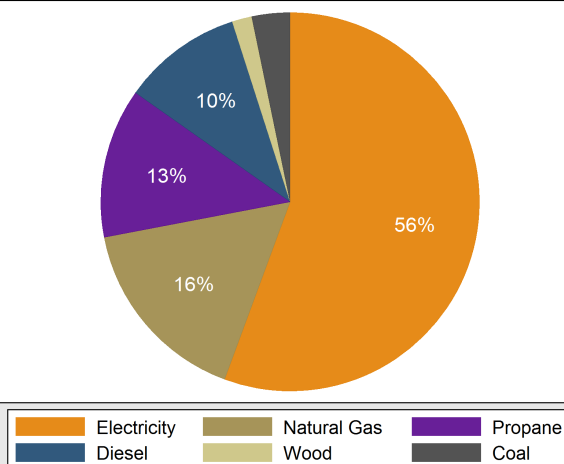
# Industrial Energy Consumption

Kentucky Industrial Energy Consumption by Fuel, 2015



Kentucky Energy Database, EEC-DEDI, 2016

Kentucky Industrial Energy Expenditures by Fuel, 2015

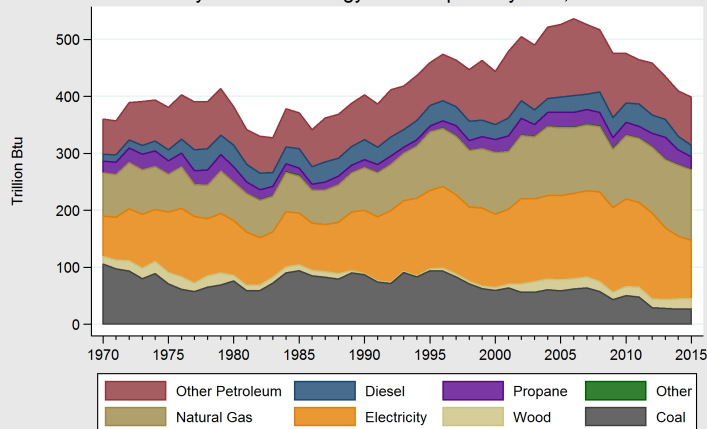


Kentucky Energy Database, EEC-DEDI, 2016

Fuel Type	Billion Btu	1 Year Change
Total Net	398,390	-2.73%
Petroleum	127,124	-2.02%
Electricity	103,320	-6.20%
Natural Gas	123,276	-1.33%
Coal	26,230	-0.92%
Wood	18,440	+0.95%

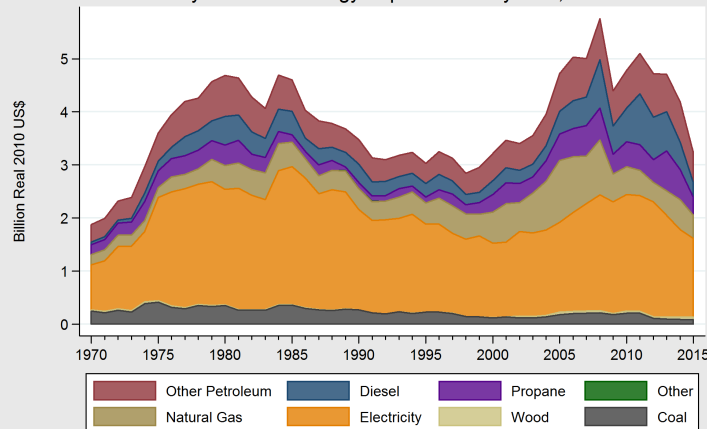
Fuel Type	Million Dollars	1 Year Change
Total	2,894	-22%
Electricity	1,660	-9%
Diesel	297	-47%
Propane	370	-40%
Natural Gas	473	-24%
Coal	94	-4%

Kentucky Industrial Energy Consumption by Fuel, 1970-2015



Kentucky Energy Database, EEC-DEDI, 2017  
Data Source: EIA-SEDS

Kentucky Industrial Energy Expenditures by Fuel, 1970-2015



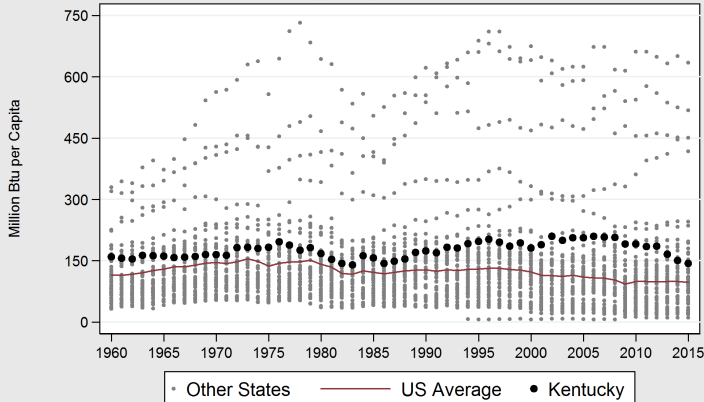
Kentucky Energy Database, EEC-DEDI, 2017  
Data Source: EIA-SEDS

Kentucky-based manufacturing operations and farms consumed 398 trillion Btu of energy in 2015, a decrease of 2.7 percent from 2014. Petroleum was the largest component of industrial energy use in 2015, or 32 percent of total industrial energy consumption. Electricity and natural gas accounted for 26 percent and 31 percent of industrial energy consumption, respectively.

Kentucky spent almost \$2.9 billion to fuel factories and farms within the Commonwealth, which was a 22 percent decrease in industrial energy spending compared with 2014. Electricity was the largest expenditure—57 percent of industrial energy spending. Diesel and propane accounted for 10 percent and 13 percent of industrial expenditures, respectively. Natural gas, coal, wood, and ethanol accounted for the remainder of industrial energy expenditures in 2015.

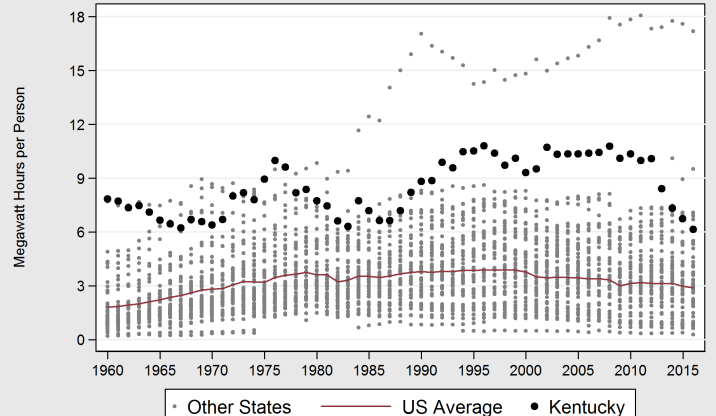
# Industrial Energy Intensity

Annual Industrial Energy Consumption Per Capita, 1960-2015  
Kentucky Compared to Other States



Kentucky Energy Database, EEC-DEDI, 2016  
Data Source: EIA-SEDS & Census

Industrial Electricity Consumption Per Capita, 1960-2016  
Kentucky Compared to Other States



Kentucky Energy Database, EEC-DEDI, 2016

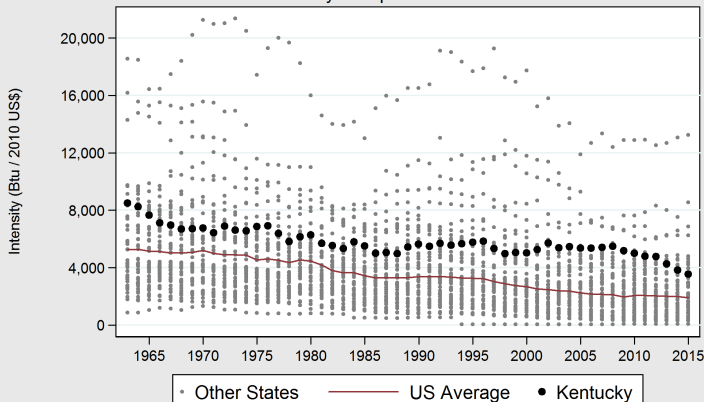
State	MMBtu per Capita	Rank
Louisiana	634	1st
Kentucky	143	13th
U.S. Average	98	-
Maryland	18	50th

Kentucky industrial energy consumption per capita decreased by 4.8 percent in 2015, but remains above average due to energy-intensive manufacturing.

State	MWh per Capita	Rank
Wyoming	17.2	1st
Kentucky	6.2	8th
U.S. Average	2.9	-
Maryland	0.6	50th

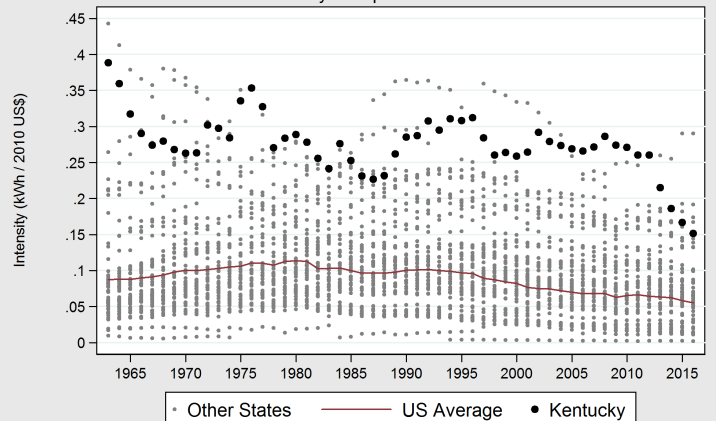
Industrial electricity consumption per capita decreased by 9 percent in 2016, but remains above average due to the presence of energy-intensive manufacturing.

Industrial Energy Consumption per State GDP Dollar, 1963-2015  
Kentucky Compared to Other States



Kentucky Energy Database, EEC-DEDI, 2016  
Data Source: EIA-SEDS & BEA

Industrial Electricity Consumption per State GDP Dollar, 1963-2016  
Kentucky Compared to Other States



Kentucky Energy Database, EEC-DEDI, 2016

State	Btu/\$U.S. GDP	Rank
Louisiana	13,238	1st
Kentucky	3,534	13th
U.S. Average	1,913	-
New York	296	50th

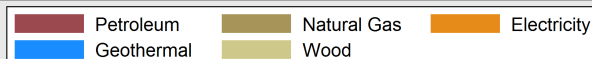
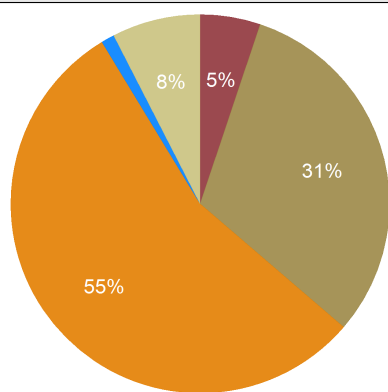
Kentucky industrial energy intensity decreased by 7.4 percent compared with 2014, and is decreasing significantly faster than the national average.

State	kWh/\$U.S. GDP	Rank
Wyoming	0.29	1st
Kentucky	0.15	7th
U.S. Average	0.06	-
Maryland	0.01	50th

In 2016, Kentucky was 7th in terms of industrial electricity use per dollar of GDP, but decreased by 9 percent compared with 2016.

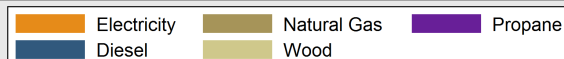
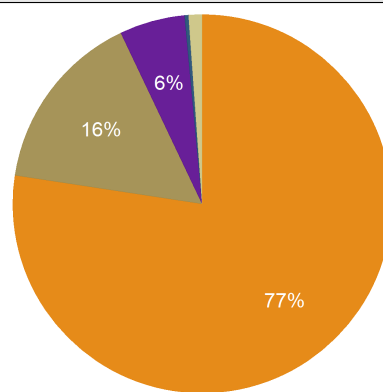
# Residential Energy Consumption

Kentucky Residential Energy Consumption by Fuel, 2015



Kentucky Energy Database, EEC-DEDI, 2016

Kentucky Residential Energy Expenditures by Fuel, 2015

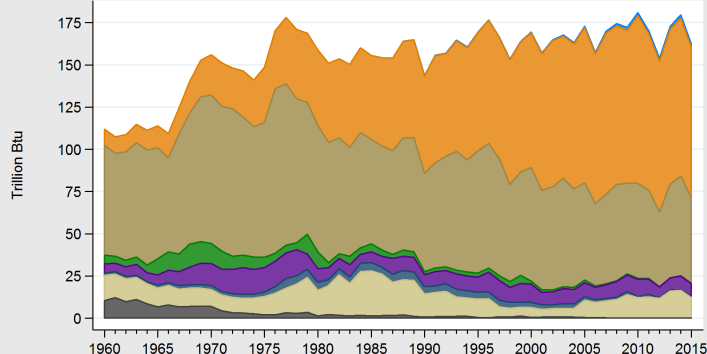


Kentucky Energy Database, EEC-DEDI, 2016

Fuel Type	Billion Btu	1 Year Change
Total Net	162,249	-10%
Electricity	89,286	-4%
Natural Gas	50,541	-14%
Wood	12,234	-26%
Petroleum	8,328	-5%
Geothermal	1,860	+0%

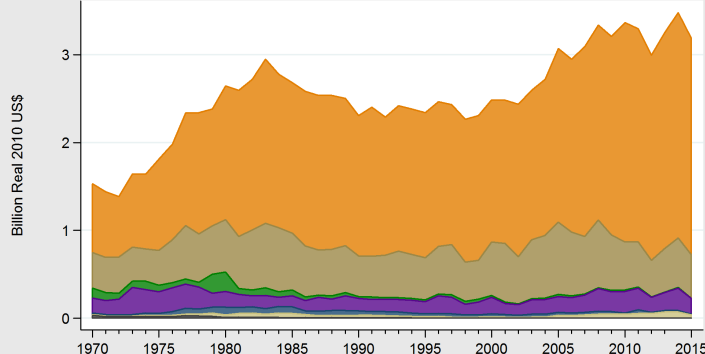
Fuel Type	Million Dollars	1 Year Change
Total	3,453	-8%
Electricity	2,680	-4%
Natural Gas	537	-12%
Liquid Propane Gas	193	-31%
Wood	40	-49%
Kerosene	3	-70%

Kentucky Residential Energy Consumption by Fuel, 1960-2015



Kentucky Energy Database, EEC-DEDI, 2015  
Data Source: EIA-SEDS

Kentucky Residential Energy Expenditures by Fuel, 1970-2015



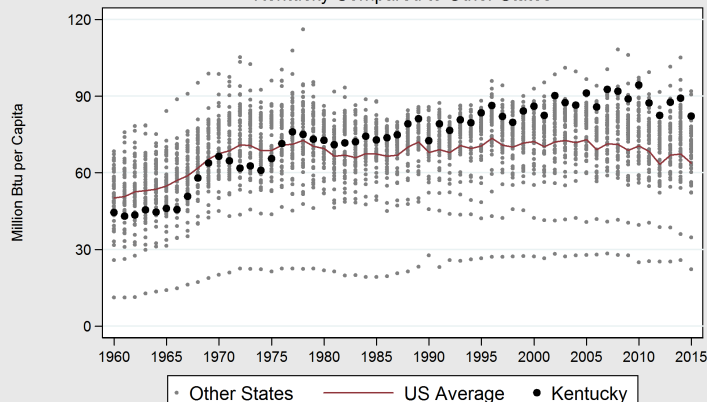
Kentucky Energy Database, EEC-DEDI, 2015  
Data Source: EIA-SEDS

Households in Kentucky consumed 162 trillion Btu of energy in 2015, a 10 percent decrease in net residential energy consumption compared with 2014. The largest portion of energy used in the residential sector—55 percent—was through electricity and the second largest was natural gas. Over time, electricity has increased its share of domestic energy consumption while natural gas, primarily used for home heating, has decreased. Residential energy use has remained relatively stagnant since the late 1970s despite population having grown by approximately 24 percent.

Kentucky households spent nearly \$3.4 billion on energy commodities and energy consumption in 2015, a 8 percent decrease in residential energy expenditures compared with 2014. Electricity expenditures comprised 78 percent of spending, which totaled \$2.6 billion during the year. Expenditures on all residential energy sources decreased in 2015.

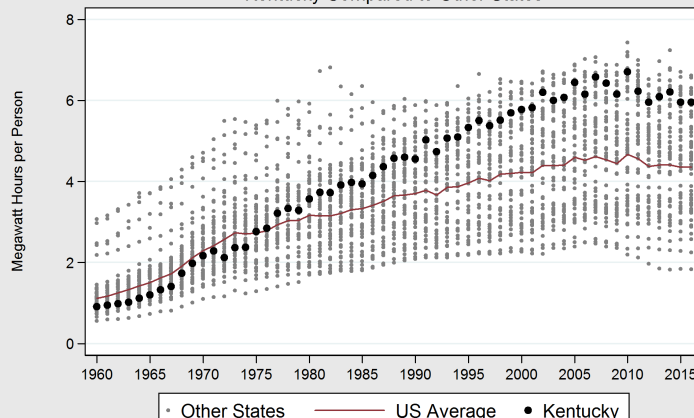
# Residential Energy Intensity

Annual Residential Energy Consumption Per Capita, 1960-2015  
Kentucky Compared to Other States



Kentucky Energy Database, EEC-DEDI, 2016  
Data Source: EIA-SEDS & Census

Residential Electricity Consumption Per Capita, 1960-2016  
Kentucky Compared to Other States



Kentucky Energy Database, EEC-DEDI, 2016

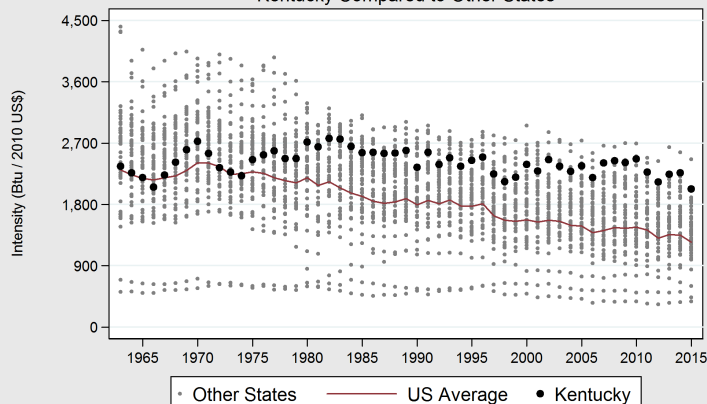
State	MMBtu per Capita	Rank
North Dakota	91	1st
Kentucky	82	4th
U.S. Average	63	-
Hawaii	22	50th

Kentucky residential energy consumption per capita decreased in 2015 by 7.9 percent, and is 4th highest of all states.

State	MWh per Capita	Rank
Alabama	6.6	1st
Kentucky	6.2	9th
U.S. Average	4.4	-
Hawaii	1.8	50th

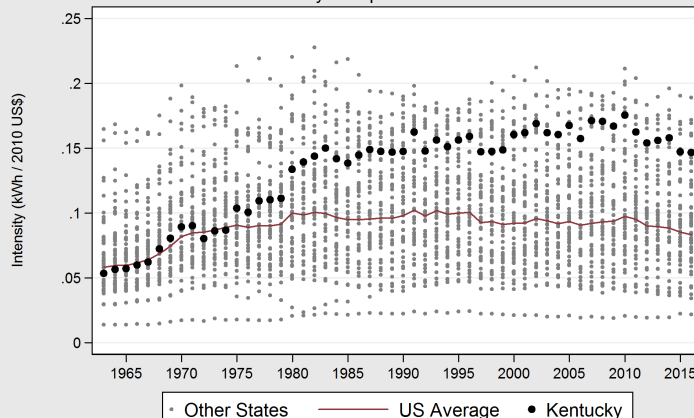
In 2016, Kentucky ranked 9th nationally in terms of residential electricity use per capita, an increase of .06 percent compared with 2015.

Residential Energy Consumption per State GDP Dollar, 1963-2015  
Kentucky Compared to Other States



Kentucky Energy Database, EEC-DEDI, 2016  
Data Source: EIA-SEDS & BEA

Residential Electricity Consumption per State GDP Dollar, 1963-2016  
Kentucky Compared to Other States



Kentucky Energy Database, EEC-DEDI, 2016

State	Btu/\$U.S. GDP	Rank
West Virginia	2,463	1st
Kentucky	2,028	3rd
U.S. Average	1,248	-
Hawaii	433	50th

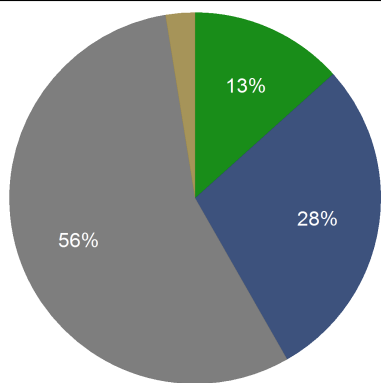
Kentucky ranked 3rd in terms of residential energy consumption relative to one dollar of state GDP. Residential energy intensity decreased by 10 percent compared with 2014.

State	kWh/\$U.S. GDP	Rank
Mississippi	0.19	1st
Kentucky	0.15	6th
U.S. Average	0.08	-
Hawaii	0.03	50th

In 2016, Kentucky ranked 6th in terms of residential electricity use relative to one dollar of state GDP, a decrease of 0.4 percent. Higher energy intensity is a result of relatively low GDP and low incomes, and the number of mobile homes, which use electric heat.

# Transportation Energy Consumption

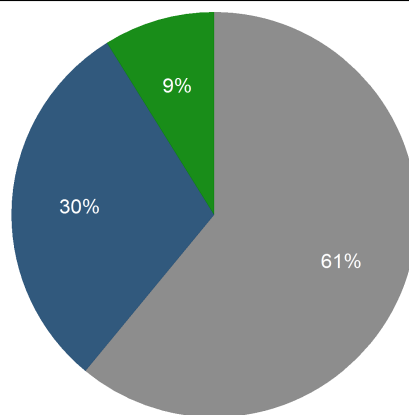
Kentucky Transportation Energy Consumption by Fuel, 2015



Jet Fuel Diesel Gasoline  
Natural Gas

DEDI Energy Database, 2012

Kentucky Transportation Energy Expenditures by Fuel, 2015



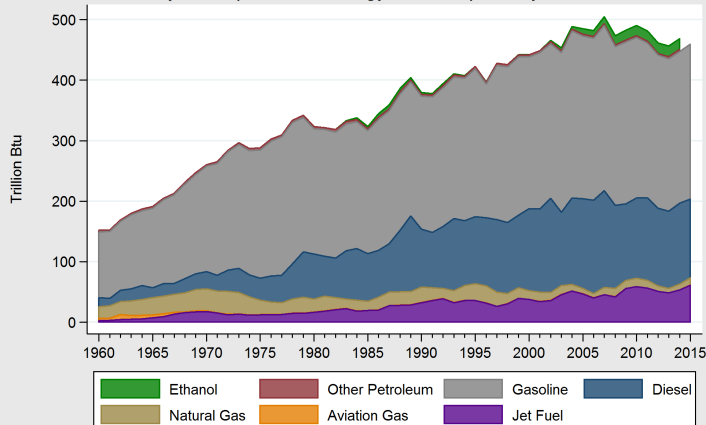
Gasoline Diesel Jet Fuel

Kentucky Energy Database, EEC-DEDI, 2016

Fuel Type	Billion Btu	1 Year Change
Total	459,828	+3%
Gasoline	256,108	+2%
Diesel	130,477	-3%
Jet Fuel	61,398	+16%
Natural Gas*	11,689	+22%
Other Petroleum	0	-100%

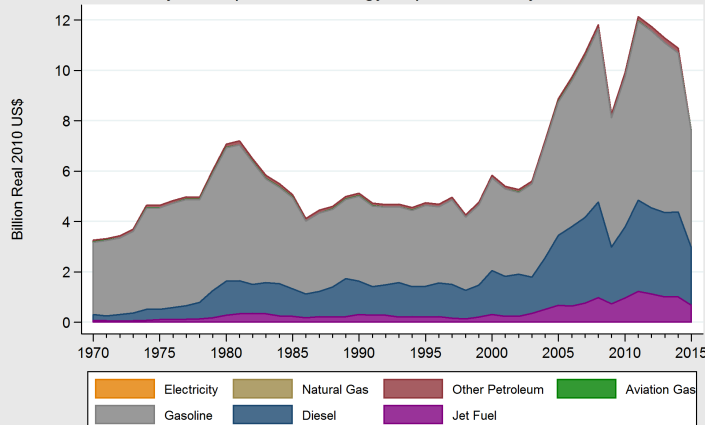
Fuel Type	Million Dollars	1 Year Change
Total	8,588	-30%
Gasoline	5,018	-27%
Diesel	2,841	-32%
Jet Fuel	729	-33%
Other Petroleum	0	-100%

Kentucky Transportation Energy Consumption by Fuel, 1960-2015



Kentucky Energy Database, EEC-DEDI, 2017  
Data Source: EIA-SEDS

Kentucky Transportation Energy Expenditures by Fuel, 1970-2015



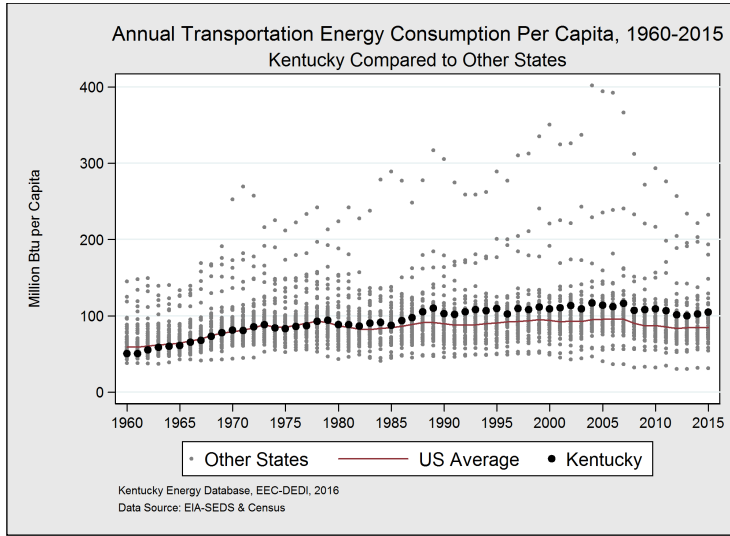
Kentucky Energy Database, EEC-DEDI, 2015  
Data Source: EIA-SEDS

Transportation sector energy consumption in Kentucky was 459 trillion Btu in 2015, a 3 percent increase compared with 2014. Gasoline was 56 percent of transportation energy consumption in 2015, followed by diesel at 28 percent. The other 16 percent of transportation energy consumption came from jet fuel and natural gas.

Transportation energy expenditures were approximately \$8.5 billion in Kentucky in 2015. Compared with 2014, transportation energy expenditures decreased by 30 percent. Gasoline was the largest component of transportation energy expenditures with 58 percent of spending in 2015. Diesel expenditures were 33 percent of transportation energy costs in Kentucky in 2015. (Consumption of natural gas by way of transmission pipelines is not tabulated in terms of transportation sector energy expenditures).

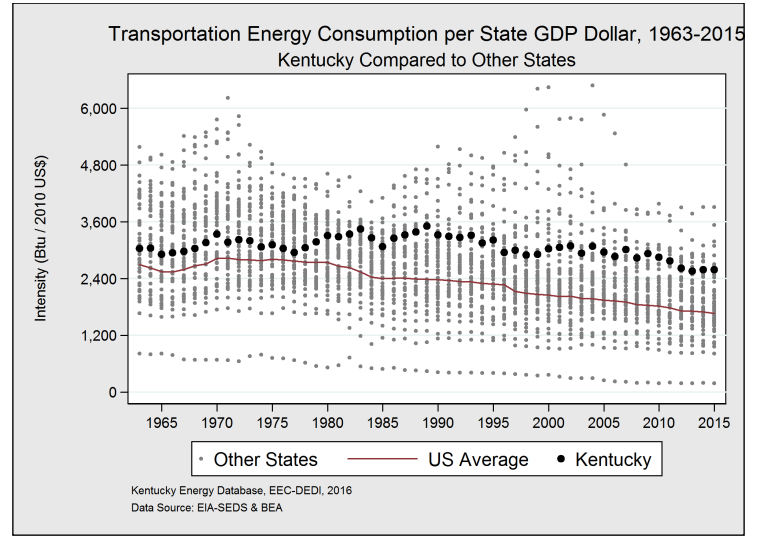


# Transportation Energy Intensity



State	MMBtu per Capita	Rank
Alaska	232	1st
Kentucky	105	11th
U.S. Average	85	-
New York	54	50th

In 2015, Kentucky transportation energy consumption per capita increased by 2.6 percent compared with 2014, which is 11th highest of all states.



State	Btu/\$U.S. GDP	Rank
Mississippi	3,914	1st
Kentucky	2,586	9th
U.S. Average	1,661	-
New York	812	50th

In 2015, Kentucky ranked 9th in terms of transportation energy consumption per dollar of state GDP. Transportation energy intensity decreased by 0.15 percent compared with 2014.

# Kentucky Coal Production

County	Tons	1 Year Change	Percentage
Total	42,910,338	-30.0%	100%
Union	8,607,528	-5.6%	20.1%
Ohio	4,742,266	-29.7%	11.1%
Hopkins	4,281,379	-37.4%	10.0%
Pike	4,136,454	-40.1%	9.6%
Webster	3,744,015	-36.2%	8.7%
Perry	3,591,754	-46.0%	8.4%
Harlan	3,457,164	-9.8%	8.1%
Muhlenberg	3,051,705	-14.5%	7.1%
McLean	1,274,873	+51.2%	3.0%
Bell	1,082,091	-21.7%	2.5%
Leslie	945,906	-30.5%	2.2%
Martin	945,048	-37.9%	2.2%
Knott	681,708	-67.0%	1.6%

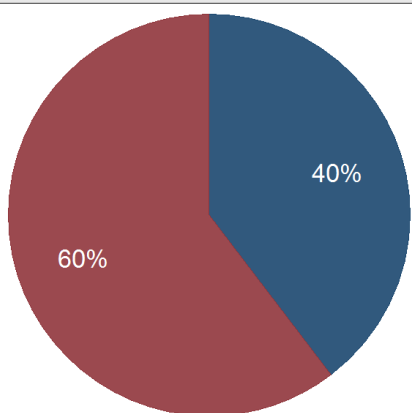
County	Tons	1 Year Change	Percentage
Floyd	640,971	-70.2%	1.5%
Magoffin	344,489	+33.3%	0.8%
Pulaski	212,367	+11,639.5%	0.5%
Whitley	210,838	-16.8%	0.5%
Johnson	204,438	+67.4%	0.5%
Daviess	194,922	-41.8%	0.5%
Letcher	184,786	-64.7%	0.4%
Knox	161,808	-14.3%	0.4%
Lawrence	131,221	-64.9%	0.3%
Breathitt	79,315	-68.4%	0.2%
Laurel	3,292	-62.0%	<0.01%

During 2016, coal production in the Commonwealth decreased to 42.9 million tons. In 2016, Union County remained the top producer of coal in Kentucky throughout the entire year. Pike County, the largest producer from 1978 to 2011, mined the most in eastern Kentucky.

In Kentucky, coal mining is divided between two different geologic basins—the Central Appalachian Basin of eastern Kentucky and the Illinois Basin of western Kentucky. Kentucky is the only major coal exporting state to span two geologic basins, and the chemical composition and accessibility of the coal from each is distinct. Eastern Kentucky has recorded coal mining since as early as 1790 and western Kentucky is known to have had mining operations in 1820. The coalfield of eastern Kentucky has coal with a relatively higher heat content and lower sulfur content than western Kentucky. Eastern Kentucky coal is also more difficult to mine. As a result of differences regarding the extractability and quality of the coal, eastern Kentucky is overall more expensive than western Kentucky coal. The difference in the delivered price of coal between the two coalfields is a result of numerous factors that affect both the supply of and demand for coal, including transportation costs, the ease of accessing coal and the subsequent mining techniques employed, and the chemical properties and heat content of the coal.

# Kentucky Coal Production

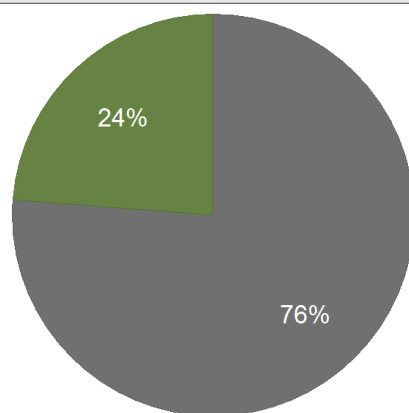
Kentucky Total Coal Production, 2016



Eastern Kentucky Western Kentucky

Kentucky Energy Database, EEC-DEDI & US-DOL-MSHA-MDRS Queried on: 1 Sep 2017

Kentucky Total Coal Production, 2016



Underground Surface

Kentucky Energy Database, EEC-DEDI & US-DOL-MSHA-MDRS Queried on: 1 Sep 2017

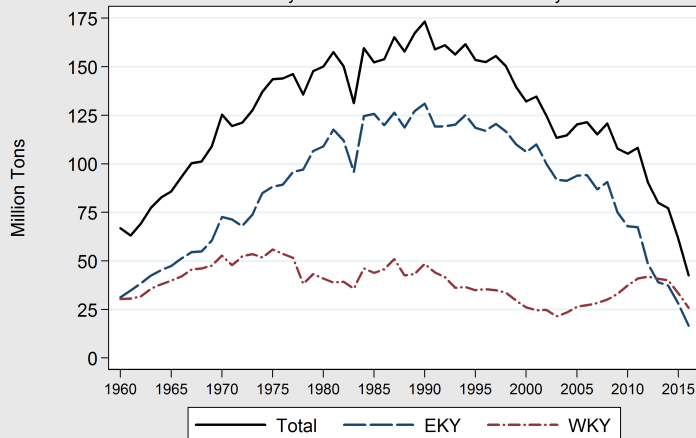
Region	2016 Tonnage	Annual Change
Total	42,910,338	-30.0%
Western Kentucky	25,896,688	-22.2%
Eastern Kentucky	17,013,650	-39.0%

Kentucky coal mines produced 42.9 million tons in 2016, a decrease of 30 percent from 2015. Production declined in both the eastern and western coalfields in 2016.

Mine Type	2016 Tonnage	Annual Change
Total	42,910,338	-30.0%
Underground	32,711,308	-25.0%
Surface	10,199,030	-42.7%

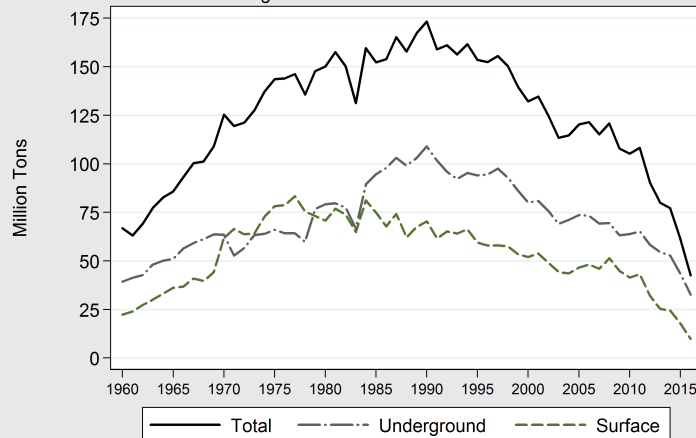
The majority of Kentucky coal production has been from underground operations since 1979, following the passage of the Surface Mine Control and Reclamation Act of 1977.

Kentucky Total Coal Production, 1960-2016  
Eastern Kentucky Production & Western Kentucky Production



Eastern Kentucky has been the top-producing region in Kentucky since 1912, when eastern Kentucky overtook western Kentucky. Western Kentucky coal mines have produced the majority of coal in the Commonwealth since the third quarter of 2013 and were the main source of Kentucky coal from 1886 to 1911.

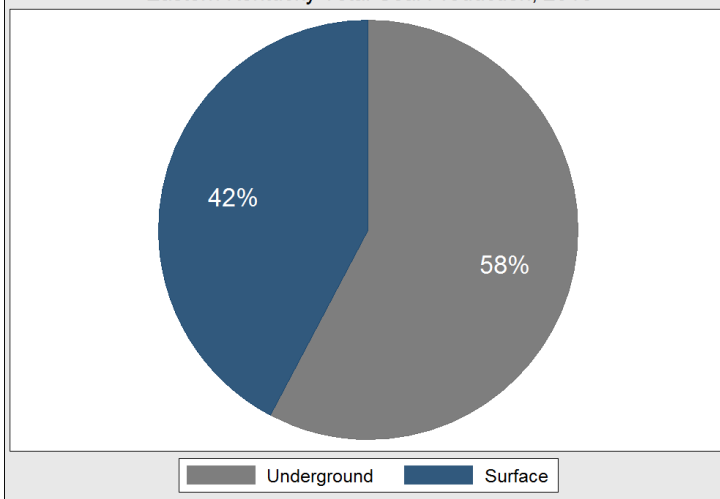
Kentucky Total Coal Production, 1960-2016  
Underground Production vs. Surface Production



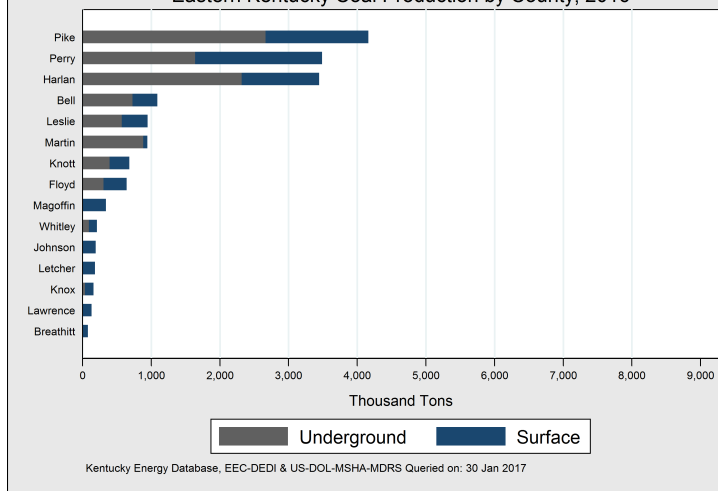
Underground coal mines produced 32.7 million tons of coal, or 76 percent of total Kentucky production in 2016, a decrease of 25 percent from 2015. Surface mining operations, which mined 10.2 million tons of coal, decreased production by 42.7 percent since 2015. Production declines in both surface and underground mining since 1990 have been concentrated in the eastern coalfield.

# Eastern Kentucky Coal Production

Eastern Kentucky Total Coal Production, 2016



Eastern Kentucky Coal Production by County, 2016

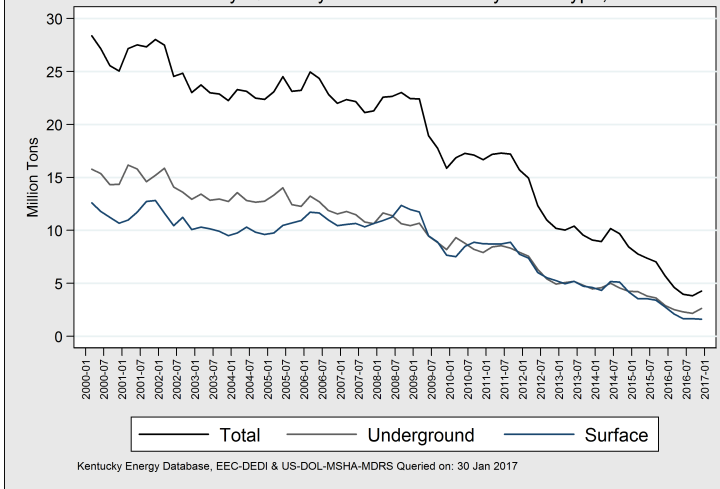


Mine Type	2016 Tonnage	Annual Change
Total	17,013,650	-39.0%
Surface	7,359,606	-44.6%
Underground	9,654,044	-33.9%

Eastern Kentucky coal production decreased in 2016 by 39 percent to 17 million tons of coal, 58 percent from underground mines and 42 percent from surface mines.

Eastern County	2016 Tonnage	Annual Change
Pike	4,136,454	-40.1%
Perry	3,591,754	-46.0%
Harlan	3,457,164	-9.8%
Bell	1,082,091	-21.7%
Leslie	945,906	-30.5%
Martin	945,048	-37.9%
Knott	681,708	-67.0%
Floyd	640,971	-70.2%
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Johnson	204,438	+67.4%
Letcher	184,786	-64.7%
Knox	161,808	-14.3%
Lawrence	131,221	-64.9%
Breathitt	79,315	-68.4%
Laurel	3,292	-62.0%

Eastern Kentucky Quarterly Coal Production by Mine Type, 2000-2016



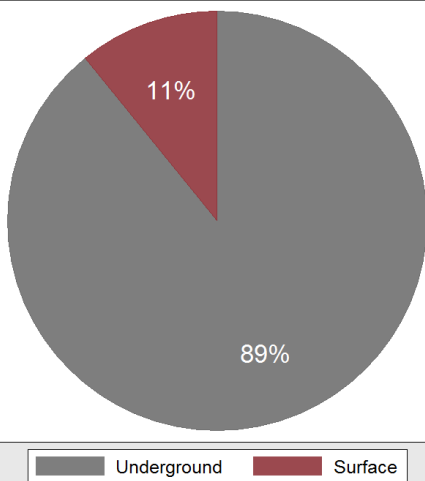
Annual production slowed at both underground and surface mining operations in eastern Kentucky in 2016, by 33.9 and 44.6 percent respectively.

Eastern Kentucky underground coal production during the fourth quarter of 2016 was 2.6 million tons, an increase of 22 percent from the third quarter. Eastern Kentucky surface mines produced 1.8 millions tons in the fourth quarter of 2016, a 37 percent year-over-year decrease.

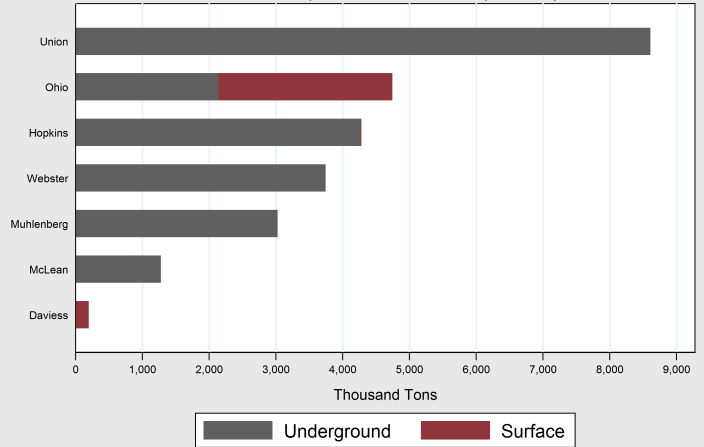
With the exception of Magoffin, Johnson and Pulaski counties, Eastern Kentucky counties experienced decreases in coal production during 2016. Pike County reduced coal production by 40.1 percent. Pike county still remained the highest coal-producing county in eastern Kentucky and fourth highest coal producing county in Kentucky. Pulaski experienced the largest increase in coal production.

# Western Kentucky Coal Production

Western Kentucky Total Coal Production, 2016



Western Kentucky Coal Production by County, 2016



Kentucky Energy Database, EEC-DEDI & US-DOL-MSHA-MDRS Queried on: 30 Jan 2017

Mine Type	2016 Tonnage	Annual Change
Total	25,896,688	-22.2%
Underground	23,057,264	-20.0%
Surface	2,839,424	-37.5%

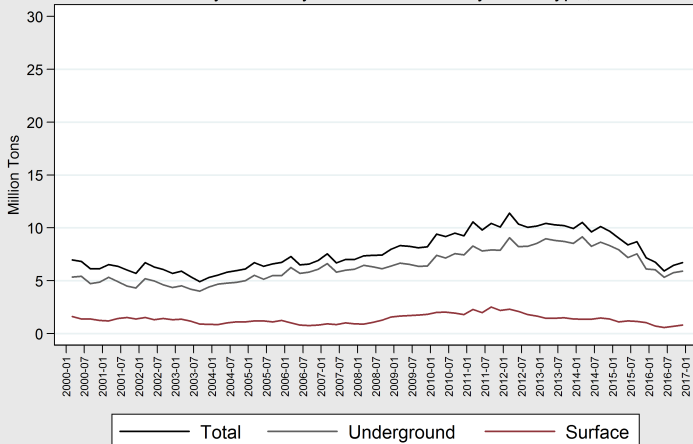
Western Kentucky mined 25.9 million tons of coal in 2016, a decrease of 22.4 percent from 2015. Underground mines accounted for 89 percent of regional production in 2016.

Western County	2016 Tonnage	Annual Change
Union	8,607,528	-5.6%
Ohio	4,742,266	-29.7%
Hopkins	4,281,379	-37.5%
Webster	3,744,015	-36.2%
Muhlenberg	3,051,705	-14.5%
McLean	1,274,873	+51.2%
Daviess	194,922	-41.8%

Union County remained Kentucky's leading coal producing county, mining 8.6 million tons during 2016, though production in the county decreased by 5.6 percent from the year prior.

Most western Kentucky mining since 1985 has been underground. As a result of the topography and basinal structure of the Illinois Basin, surface coal production is relatively more accessible on the edges of the coalfield, further from the Ohio River, where much of the economically viable coal has been extracted in years past. The topography, in part, explains the relative increase in underground mining in the region since 1983 and the relative decrease in surface mining since peak regional surface production in 1972.

Western Kentucky Quarterly Coal Production by Mine Type, 2000-2016

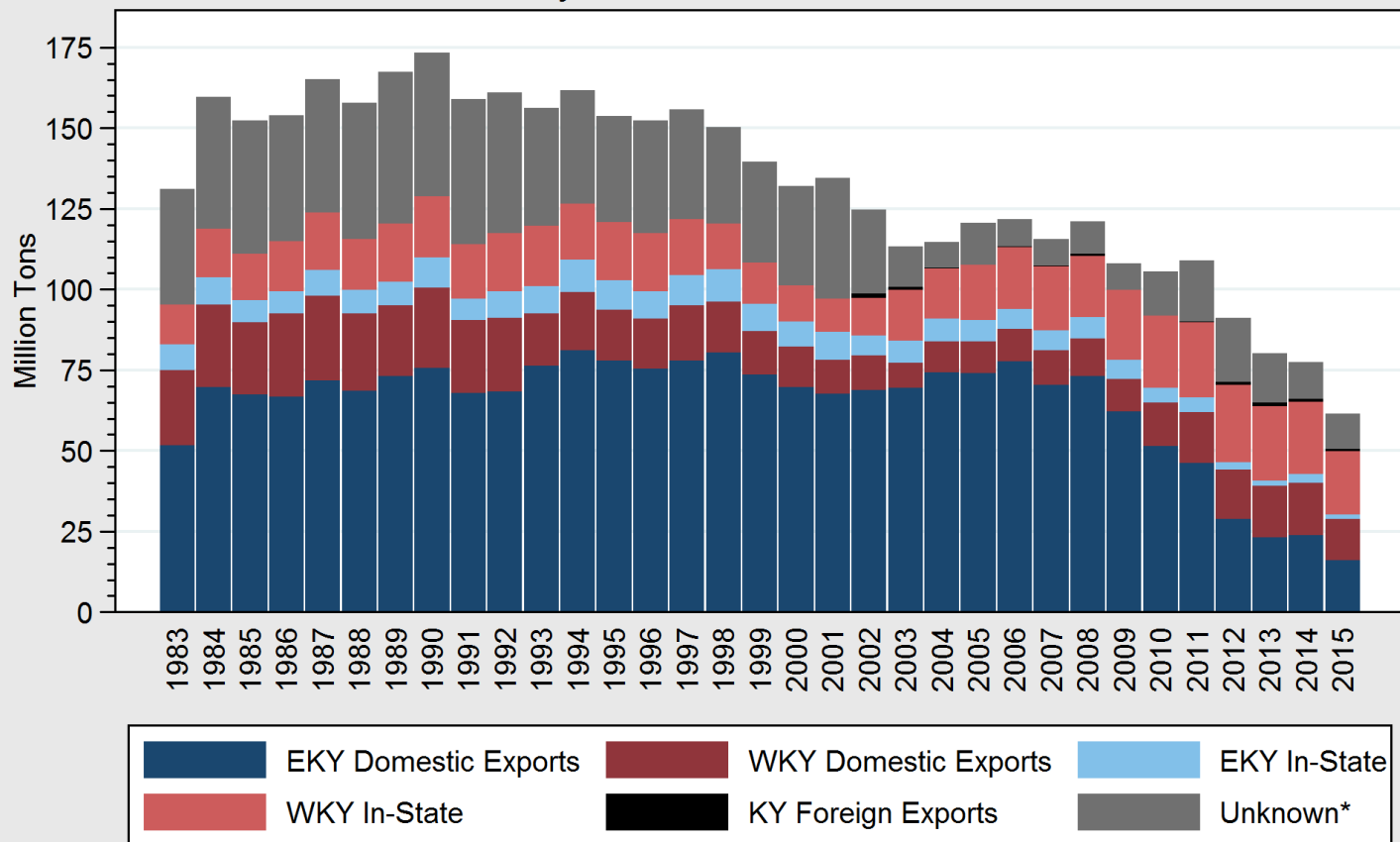


Kentucky Energy Database, EEC-DEDI & US-DOL-MSHA-MDRS Queried on: 30 Jan 2017

Surface mining made up 11 percent of coal production in western Kentucky. The majority of western Kentucky coal production was excavated by surface mining until 1985. In fact, Muhlenberg County was the Commonwealth's leading coal producer from 1961 to 1978, predominantly through the utilization of surface mining techniques.

# Kentucky Coal Distribution, 2015

Kentucky Coal Distribution, 1983-2015



Kentucky Energy Database, EEC-DEDI, 2016  
Data Source: EIA-923 & U.S. Census Bureau-Foreign Trade Division

\*Combination of Industrial, Institutional, & Unknown

Coal Distribution by Destination, 2015

Coal and Destination	Thousand Tons	Percentage
Total Production	61,414	100.0%
WKY In-State	19,809	32.3%
EKY Out-of-State†	16,003	26.1%
WKY Out-of-State†	12,736	20.7%
Industrial/Unknown	10,885	17.7%
EKY In-State	1,376	2.2%
Foreign Exports	605	1.0%

†Totals labeled "Out-of-State" represent shipments of coal to consumers within the United States, and may be considered domestic exports. A difference of approximately 11 million tons exists between total production and total distribution in the table above—a product of coal stockpiling, lags in data reporting, calendar year parameters, comparison of statistics across multiple data sources, and reporting errors.

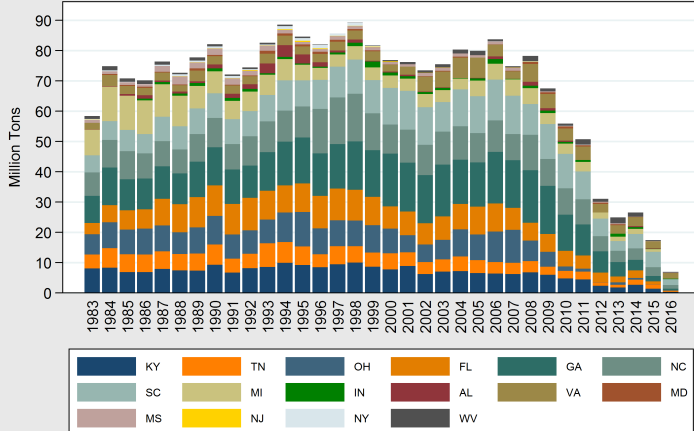
The annual distribution of coal mined in Kentucky is a combination of in-state consumers, out-of-state power plants, factories, and foreign exports. Demand from out-of-state consumers has consistently been the largest component of Kentucky coal deliveries since 1990.

Eastern Kentucky coal has predominantly been sold to states in the southeastern United States. Conversely, western Kentucky coal has mostly been mined for in-state consumption. Kentucky remains the single-largest consumer of Kentucky coal, increasing its consumption as other states have decreased their consumption of coal from Kentucky. Known foreign exports in 2015 reached 605 thousand tons, or 1.0 percent of known coal deliveries.



# Kentucky Coal Deliveries

Eastern Kentucky Coal Deliveries by Destination, 1983-2016



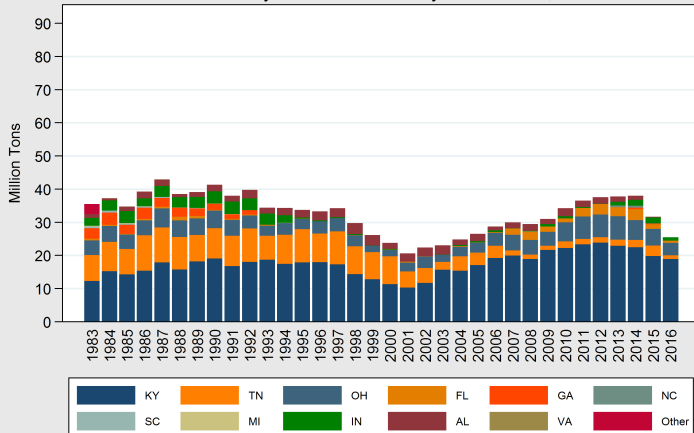
Kentucky Energy Database, EEC-DEDI, 2016  
Data Source: Form EIA 923

Known shipments of steam coal from eastern Kentucky to power plants within the United States decreased by 60 percent in 2016 to 9.5 million tons. The largest markets for eastern Kentucky coal are traditionally located in the southeast, and were led by South Carolina, North Carolina, and Virginia during the year. Overall, coal mined in the region was shipped to 16 different states in 2016.

Eastern Kentucky Coal Deliveries, 2016

Destination	Thousand Tons	Percentage
Total	9,585	100%
South Carolina	3,498	36.5%
Virginia	1,825	19.0%
North Carolina	1,343	14.0%
Tennessee	921	9.6%
Kentucky	576	6.0%
Georgia	485	5.1%
West Virginia	243	2.5%
Indiana	224	2.3%
Florida	114	1.2%
Ohio	102	1.1%
New York	80	0.8%
Maryland	75	0.8%
Mississippi	47	0.5%
Michigan	38	0.4%
New Jersey	11	0.1%
Alabama	3	0.03%

Western Kentucky Coal Deliveries by Destination, 1983-2016



Kentucky Energy Database, EEC-DEDI, 2016  
Data Source: Form EIA 923

Known shipments of steam coal from western Kentucky to power plants within the United States decreased by 21.1 percent in 2016 from 32.5 to 25.7 million tons. The largest market for western Kentucky coal is consistently Kentucky, which represented 73.6 percent of western Kentucky coal deliveries during the year. Overall, coal mined in western Kentucky was shipped to 8 different states in 2016. Western Kentucky shipped 4.9 million less tons than in 2008, or a decrease of 16 percent.

Western Kentucky Coal Deliveries, 2016

Destination	Thousand Tons	Percentage
Total	25,671	100%
Kentucky	18,906	73.6%
Florida	3,705	14.4%
Tennessee	1,134	4.4%
Indiana	1,034	4.0%
Ohio	683	2.7%
Mississippi	165	0.6%
West Virginia	30	0.1%
Illinois	14	0.1%

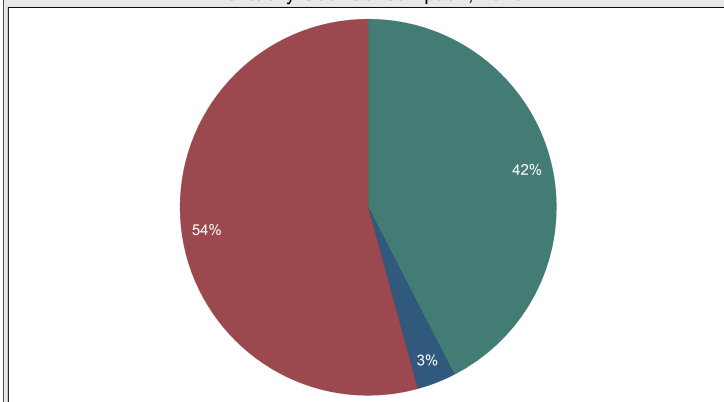
Kentucky Coal Deliveries, 2016

Origin	Thousand Tons	1 Year Change
Total	35,256	-29.4%
WKY	25,671	-21.1%
EKY	9,585	-44.8%

Total Kentucky coal deliveries have decreased by 75.1 million tons, or by 68 percent since 2008, primarily because of reduced shipments from eastern Kentucky.

# Kentucky In-State Coal Consumption

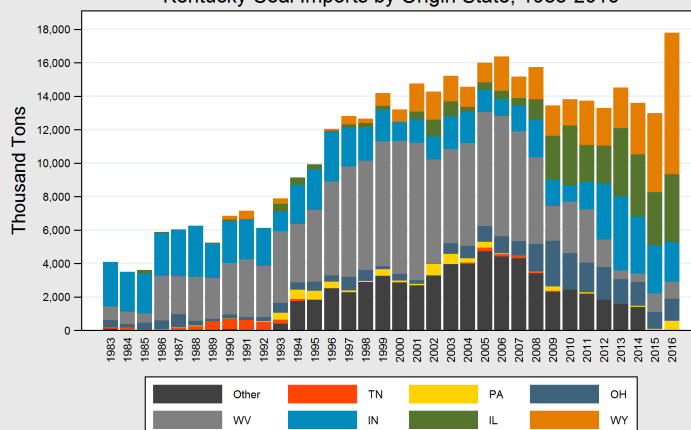
Kentucky Coal Consumption, 2015



Kentucky Energy Database, EEC-DEDI, 2016

Data Source: Form EIA-923. EKY=Eastern Kentucky, WKY=Western Kentucky  
Note: Data is updated through September of 2016. Data for 2016 is preliminary.

Kentucky Coal Imports by Origin State, 1983-2016



Kentucky Energy Database, EEC-DEDI, 2016

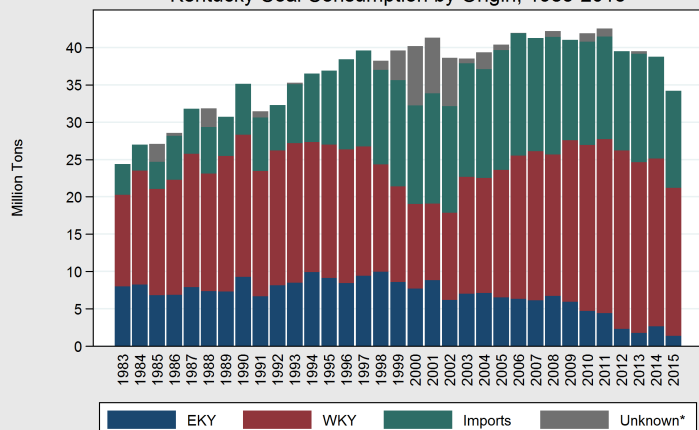
Data Source: Form EIA 923

Origin of Coal	Thousand Tons	1 Year Change
Total	38,063	-1.7%
Western Kentucky	22,275	-1.3%
Imports	13,605	-6.3%
Eastern Kentucky	2,183	+34.2%

All values have been rounded to the nearest thousand tons.

Imported Coal	Thousand Tons	1 Year Change
Total Imports	17,794	+37%
Wyoming	8,450	+79%
Illinois	4,065	+28%
Indiana	2,361	-18%
Ohio	1,304	+29%
West Virginia	1,035	-7%
Pennsylvania	579	+491%

Kentucky Coal Consumption by Origin, 1983-2015



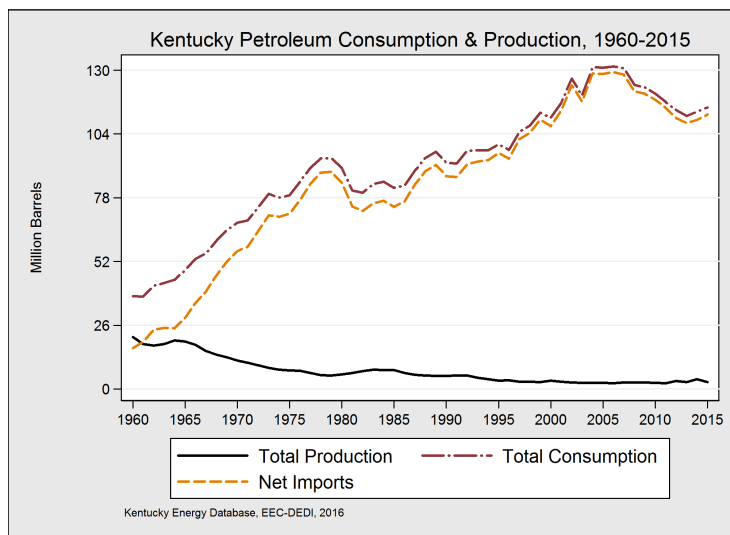
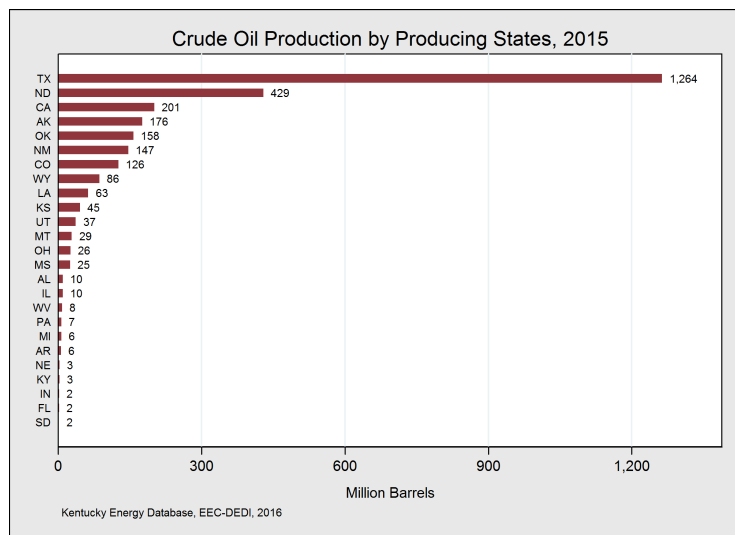
Kentucky Energy Database, EEC-DEDI, 2016

\*Combination of Industrial, Institutional, & Unknown

Coal consumption in Kentucky decreased by 12 percent in 2015 to 34.2 million tons. Coal mined in western Kentucky was by far the largest source of coal used within the Commonwealth, representing 58 percent of coal consumption. Conversely, coal from eastern Kentucky accounted for 4 percent of the coal consumed in Kentucky in 2015. Kentucky imported coal from 7 different states during 2015, totaling 13 million tons, or 38 percent of coal consumption.

Several factors affect the use of imported coal in Kentucky including the price, delivery cost, heat content, and the sulfur content of a particular coal. For electrical power generation, utilities must balance the economic and environmental costs of these factors when purchasing coal. As a result, electric utilities, municipalities, and power producers often blend coal from a variety of sources to maintain a diversified cost-effective fuel resource while complying with environmental regulations. Since 1990, electric utilities in Kentucky have increasingly used coal containing relatively higher sulfur content, a trend accelerated through the installation of sulfur dioxide scrubbers on many coal-fired generators throughout the state. Nationally, many other electric utilities have elected to install similar environmental control systems, thereby altering traditional coal sourcing requirements. The net result of these recent decisions in Kentucky has meant an increasing reliance on western Kentucky coal supplies, and a diminishing demand for eastern Kentucky coal. The relatively low price of coal from several western states has also increased imports for electric power generation.

# Kentucky Crude Oil Production



Production	2015 Million Barrels	Rank
Texas	1,264	1st
Kentucky	4.1	22nd

Crude oil production in Kentucky decreased by 15 percent in 2015 to produce 2.8 million barrels. Annual crude oil production in Kentucky had remained between 2.4 and 2.9 million barrels since the year 2000, but has recently increased with more widespread application of horizontal wells and nitrogen foam and hydraulic fracture stimulations. Despite this increase, in-state crude oil production contributes to less than one percent of total U.S. production.

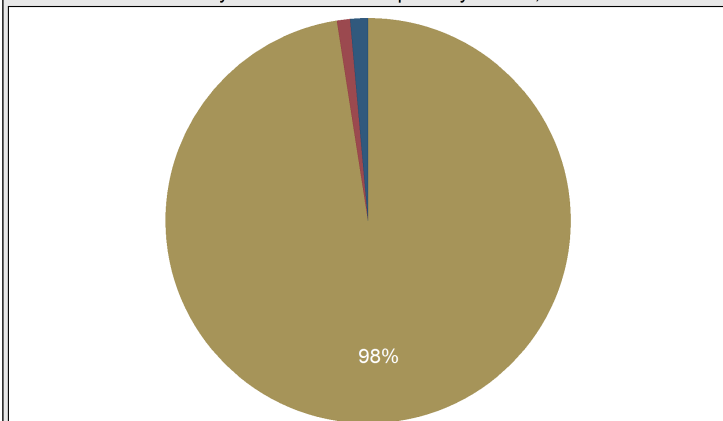
Though Kentucky is a producer of petroleum, on average it has imported 88 percent of petroleum supplies since 1960. As statewide consumption has increasingly outstripped production, petroleum imports have increased from 44 to 98 percent between 1960 and 2015. Since 2006, petroleum consumption has reversed trends and decreased by 13 percent.

Additional information on the location of oil fields and wells is available from the Kentucky Geological Survey Geologic Map Information Service at:

<http://kgs.uky.edu/kgsmmap/kgsgeoserver/viewer.asp>

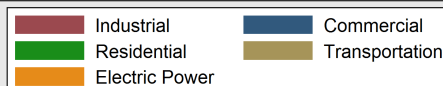
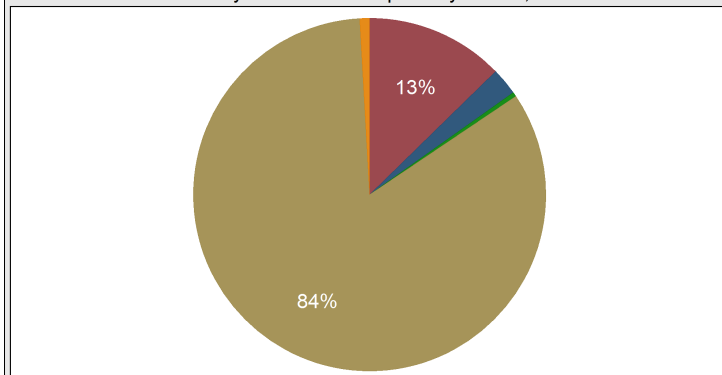
# Kentucky Liquid Fuel Consumption

Kentucky Gasoline Consumption by Sector, 2015



Kentucky Energy Database, EEC-DEDI, 2016

Kentucky Diesel Consumption by Sector, 2015

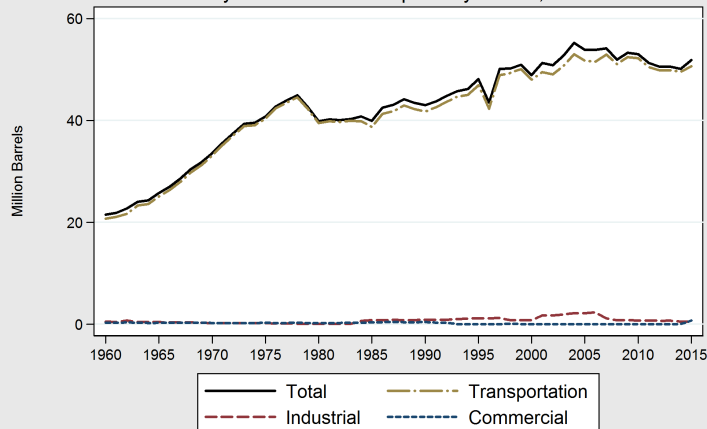


Kentucky Energy Database, EEC-DEDI, 2016

Sector	Thousand Barrels	Percentage
Total	51,883	100%
Transportation	50,614	98%
Industrial	534	1%
Commercial	735	1%

Sector	Thousand Barrels	Percentage
Total	27,087	100%
Transportation	22,621	84%
Industrial	3,436	13%
Commercial	675	2%
Electric Power	244	<1%
Residential	111	<1%

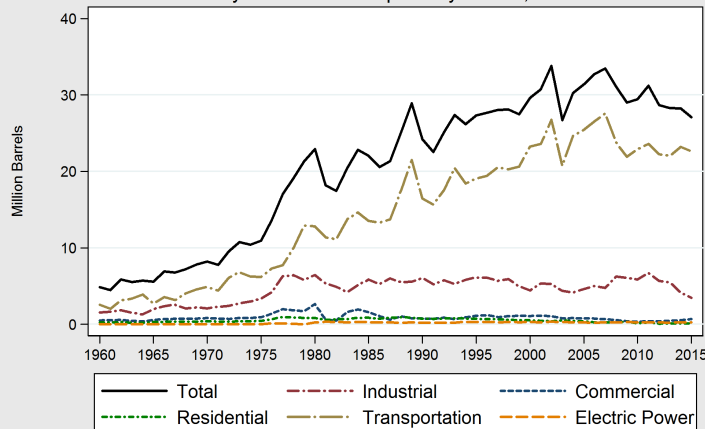
Kentucky Gasoline Consumption by Sector, 1960-2015



Kentucky Energy Database, EEC-DEDI, 2016  
Data Source: EIA-SEDS

In 2015, Kentucky consumed 51.8 million barrels of gasoline, with almost 98 percent used for transportation. Compared with 2014, total gasoline consumption in Kentucky increased by 3.5 percent.

Kentucky Diesel Consumption by Sector, 1960-2015

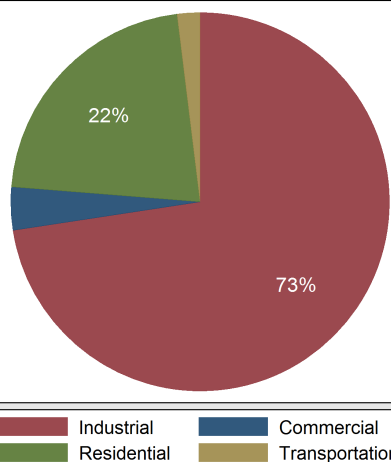


Kentucky Energy Database, EEC-DEDI, 2016  
Data Source: EIA-SEDS

In 2015, Kentucky consumed 27.1 million barrels of diesel fuel, a 4.1 percent decrease in overall consumption from 2014. The vast majority of diesel consumption—84 percent—was consumed by the transport sector, mostly for trucking on highways, marine vessels, and railroad consumers. Industrial users, predominately manufacturing facilities and farms, consumed 13 percent. The commercial, residential, and electric power sectors made up the remaining three percent in 2015.

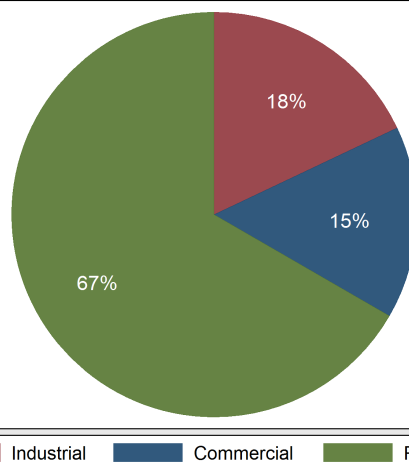
# Kentucky Liquid Fuel Consumption

Kentucky Propane Consumption by Sector, 2015



Kentucky Energy Database, EEC-DEDI, 2016

Kentucky Kerosene Consumption by Sector, 2015

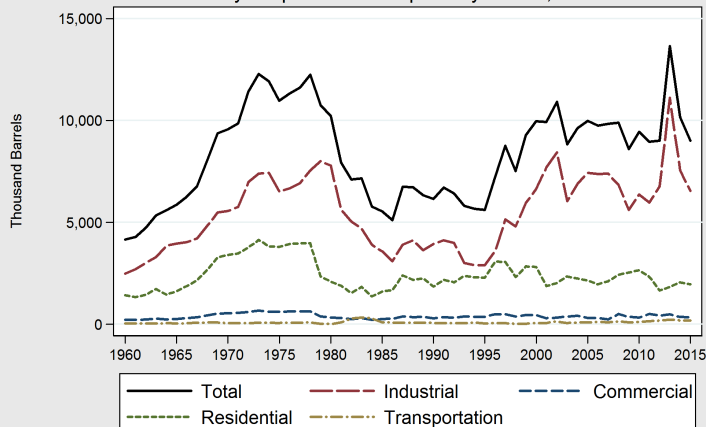


Kentucky Energy Database, EEC-DEDI, 2016

Sector	Thousand Barrels	Percentage
Total	9,015	100%
Industrial	6,543	73%
Residential	1,965	22%
Commercial	331	4%
Transportation	176	1%

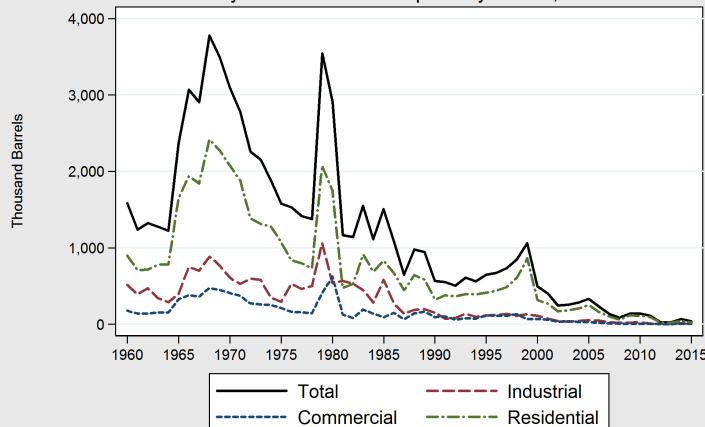
Sector	Thousand Barrels	Percentage
Total	39	100%
Residential	26	66%
Industrial	7	18%
Commercial	6	16%

Kentucky Propane Consumption by Sector, 1960-2015



Kentucky Energy Database, EEC-DEDI, 2016  
Data Source: EIA-SEDS

Kentucky Kerosene Consumption by Sector, 1960-2015



Kentucky Energy Database, EEC-DEDI, 2016  
Data Source: EIA-SEDS

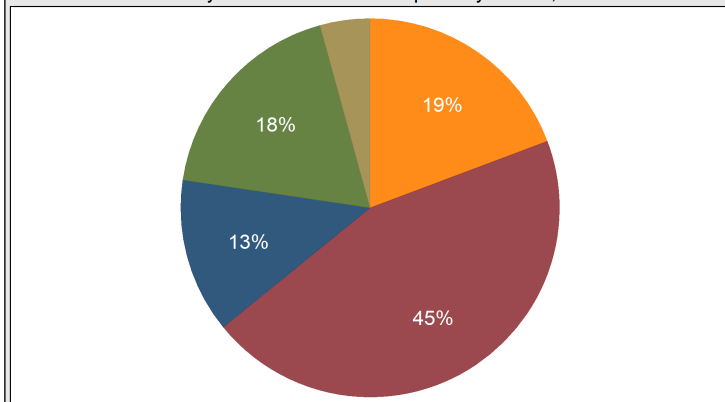
In 2015, more than nine million barrels of liquid petroleum gas (LPG), which is mostly propane, but also includes ethane and butane, was consumed in Kentucky. Since 2014, consumption decreased by 11 percent. With 73 percent of total consumption, the industrial sector was the largest end-user of LPG, followed by the residential sector with 22 percent. The commercial and transportation sectors comprised the remaining eight percent of LPG consumption in 2015.

In 2015, Kentucky consumed 39 thousand barrels of kerosene. The residential sector was by far the largest consumer of kerosene, consuming 66 percent of the total for home heating. The industrial sector was the next largest consumer with 18 percent of consumption. Compared with 2014, Kentucky kerosene consumption decreased by 41 percent.

\*These quantities exclude kerosene-type jet fuel, which is itemized in transportation energy consumption.

# Kentucky Natural Gas Consumption

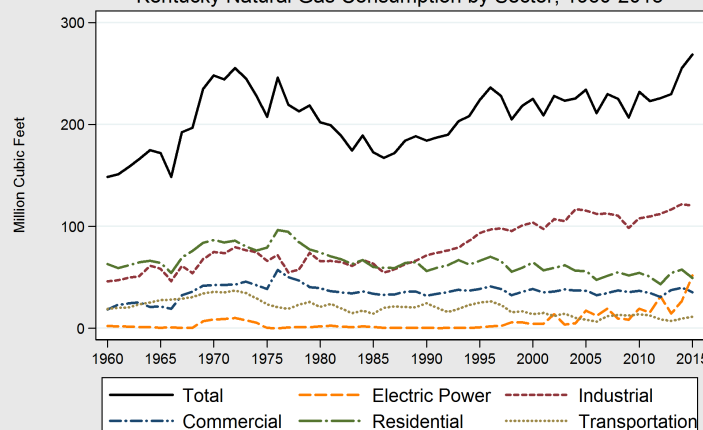
Kentucky Natural Gas Consumption by Sector, 2015



■ Electric Power    ■ Industrial    ■ Commercial  
■ Residential    ■ Transportation\*

Kentucky Energy Database, EEC-DEDI, 2016

Kentucky Natural Gas Consumption by Sector, 1960-2015



Kentucky Energy Database, EEC-DEDI, 2016  
Data Source: EIA-SEDS

Sector	Million Cubic Feet	1 Year Change
Total	268,572	+5%
Industrial	120,557	-1%
Residential	49,426	-14%
Commercial	35,435	-11%
Electric Power	51,723	+93%
Transportation*	11,431	+22%

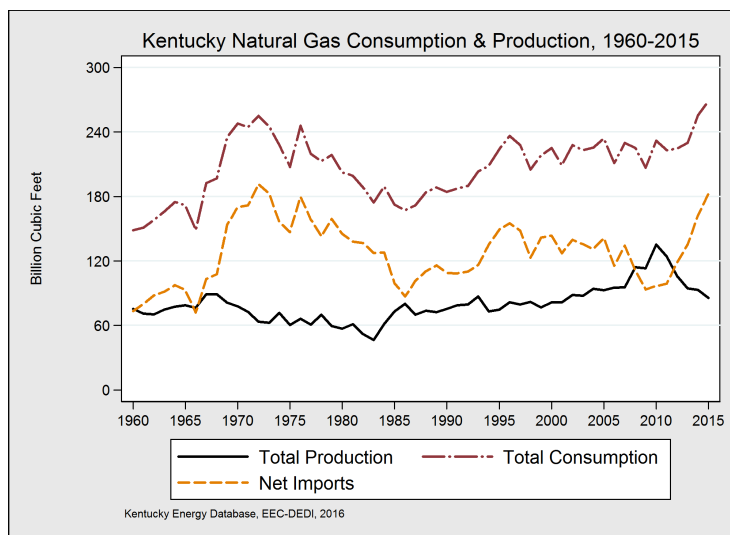
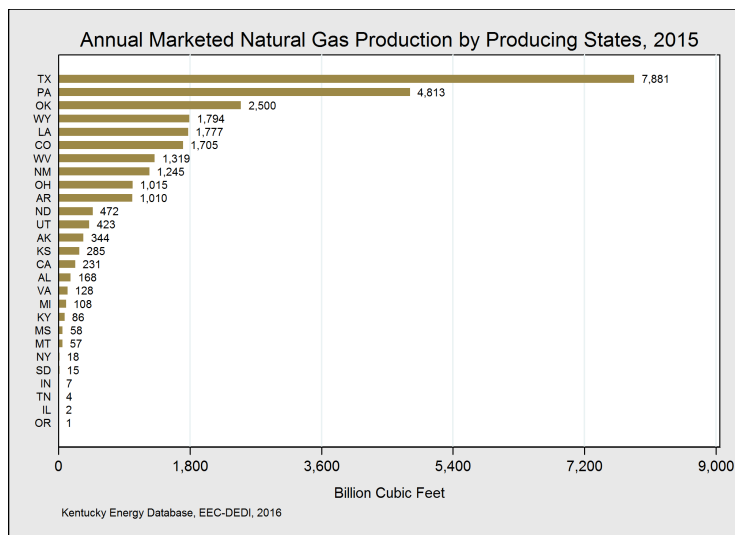
\*Natural gas consumption by the transportation sector is the summation of vehicle fuel usage and natural gas used in the movement of natural gas resources through transmission and distribution pipelines. In Kentucky in 2015, direct vehicle fuel usage of natural gas was approximately 46 million cubic feet. The remainder (11,385 MMcf) was consumed as natural gas pipeline fuel.

Kentucky's consumption of natural gas grew by 5 percent in 2015 to consume a total of 268,572 million cubic feet, approximately one percent of United States total consumption. The industrial sector was by far the largest consumer of natural gas, using 45 percent of the state total. The electric power sector—with 19 percent of total natural gas consumption in 2015—is at record levels. The residential sector was the third largest consumer of natural gas with 18 percent of consumption. Consumption of natural gas for electricity will likely increase in the future, natural gas combined cycle (NGCC) plants have replaced coal-fired boilers at the Cane Run and Big Sandy. Paradise power plants and NGCC turbines are installed at Riverside. The commercial and transportation sectors consumed 13 percent and 4 percent of statewide consumption respectively.

The commercial and residential sectors consume natural gas to generate heat while industrial consumers, which include agriculture, primarily use natural gas as a process feedstock in manufacturing operations. As a result, residential and commercial consumption follows a seasonal pattern, with notable fluctuation due to weather while industrial consumption is more consistent throughout the year. The sizeable consumption by the industrial sector is reflective of the large presence of industrial firms within Kentucky.



# Kentucky Natural Gas Production



State	2015 BCF	Rank
Texas	~7,881	1st
Kentucky	~86	19th

The Commonwealth of Kentucky produced 86 billion cubic feet (Bcf) of natural gas in 2015, an 8 percent decrease in natural gas production from 2014. As shown in the map above, the majority of economically extractable natural gas is located in eastern Kentucky. Given a favorable price of natural gas, statewide production has the capacity to increase substantially, but production is expected to remain less than other states.

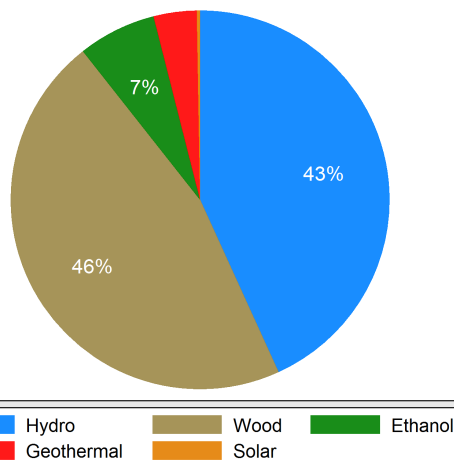
Though Kentucky is a natural gas producer, Kentucky is a net importer of natural gas. Kentucky imported 68 percent of annual natural gas consumption in 2015.

Additional information on the location of natural gas fields and wells is available from the Kentucky Geological Survey Geologic Map Information Service at:

<http://kgs.uky.edu/kgsmap/kgsgeoserver/viewer.asp>

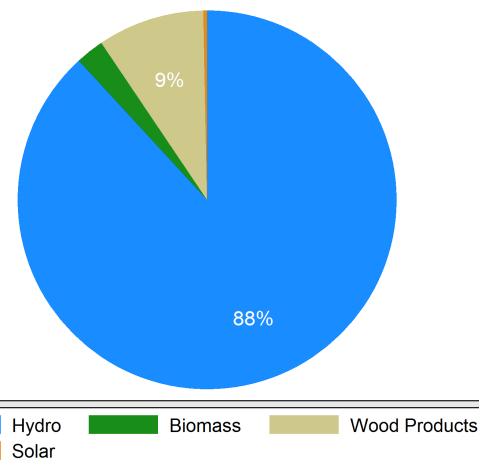
# Kentucky Renewable Energy

Kentucky Renewable Energy Production by Fuel Type, 2015



Kentucky Energy Database, EEC-DEDI, 2016

Kentucky Renewable Electricity Generation by Fuel Type, 2016

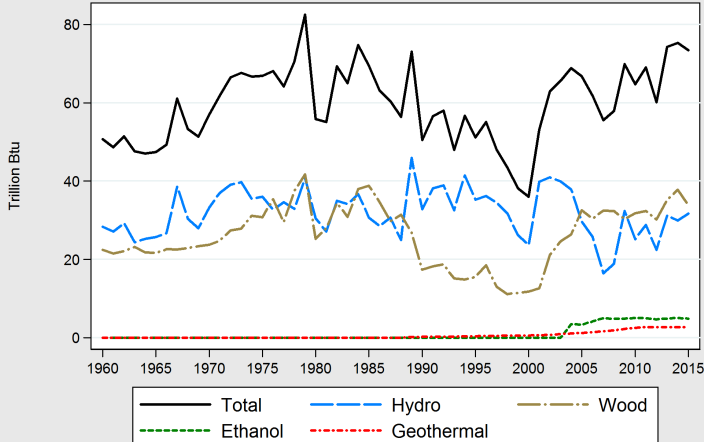


Kentucky Energy Database, EEC-DEDI, 2016

Fuel Type	Billion Btu	Percentage
Total	73,424	100%
Wood & Biomass	33,916	46%
Hydroelectric*	31,717	43%
Ethanol†	4,882	7%
Geothermal	2,712	4%
Solar	197	<1%

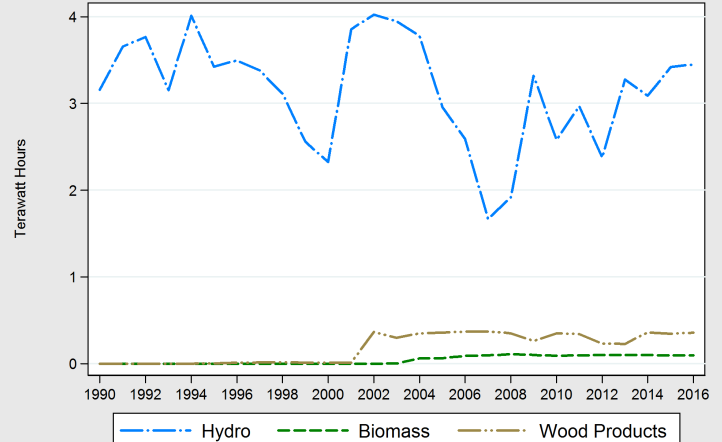
Fuel Type	Gigawatt Hours	1 Year Change
Total	3,914	+1.4%
Hydroelectric*	3,450	+0.9%
Woody Biomass	358	+4.0%
Biomass	100	-0.02%
Solar	12	+100%

Kentucky Renewable Energy Production by Fuel, 1960-2015



Kentucky Energy Database, EEC-DEDI, 2016

Kentucky Renewable Electricity Generation by Fuel, 1990-2016



Kentucky Energy Database, EEC-DEDI, 2016

In 2015, Kentucky produced 73.4 trillion Btu of energy from renewable resources, a 2.9 percent decrease compared with 2014. Year-to-year fluctuations are mostly due to variations in hydroelectric power, which itself is a reflection of rainfall. Hydroelectric, wood and biomass waste was 89 percent of all renewable energy produced in Kentucky in 2015 with hydroelectric producing 46 percent, and the rest 43 percent.

†Ethanol includes the biomass inputs used in the production of ethanol. These data exclude the energy losses associated with making ethanol and the co-products gleaned during production and thereafter sold.

Hydroelectric power generated 88 percent of renewable electricity in Kentucky in 2016, or 3,450 gigawatt-hours of electricity. Total renewable electricity generation decreased by 1.4 percent compared with 2015 as hydroelectric generation and wood biomass increased from the year prior.

\*Hydroelectric generation is directly accounted through gigawatt-hour consumption, whereas hydroelectric production (billion Btu) is a calculated fossil fuel displacement conversion, or the amount of fossil fuel energy required to generate an equal amount of electricity.

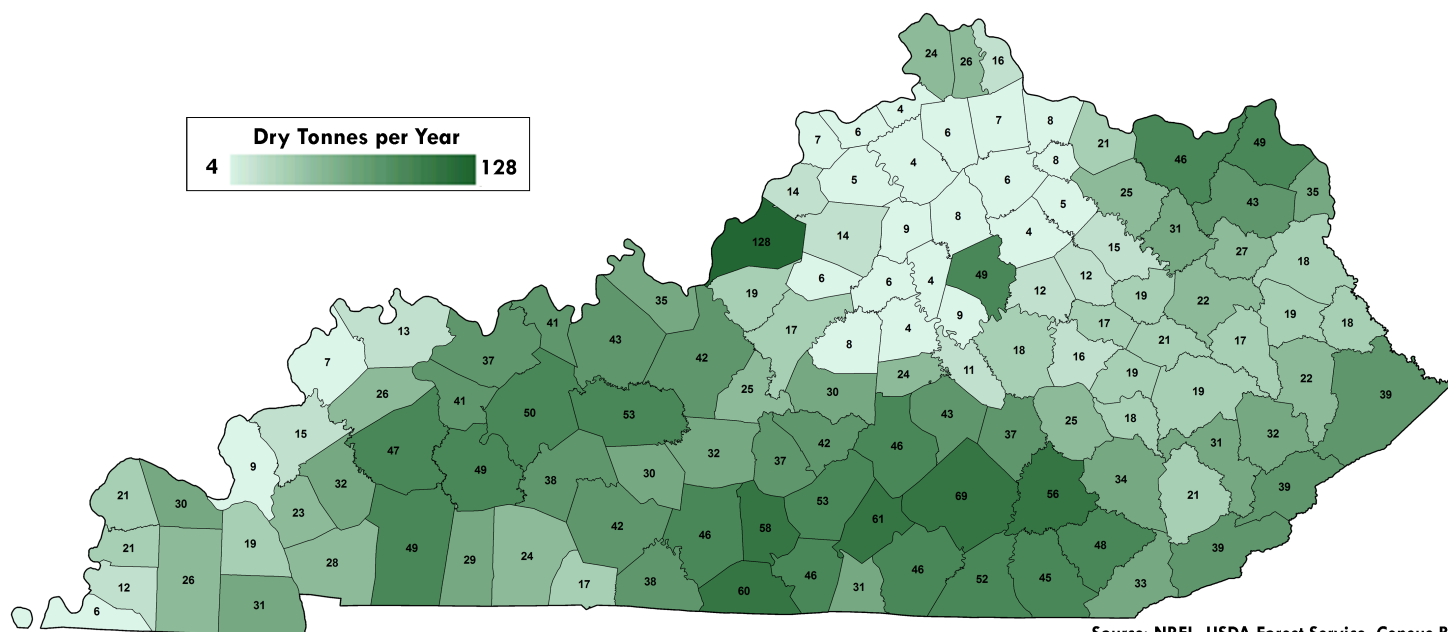
# Kentucky Renewable Energy



Above: 10 MW generating facility at E.W. Brown. Photo courtesy of LG&E-KU.

# Kentucky Biomass Resource Potential

## Woody Biomass Resources, 2014



Source: NREL, USDA Forest Service, Census Bureau  
Kentucky Energy Database, EEC-DEDI, 2015

Kentucky has considerable existing biomass resources and areas suitable for development in every region of the state. Kentucky's climate provides an environment in which a variety of renewable energy sources can be produced, including woody biomass resources and crop harvests. The map above displays sustainably harvested woody biomass from primary and secondary wood mill residues, urban wood waste, and forest residues. Mill residues are the wood scraps, materials, and bark generated at wood product manufacturers, which are predominant in the southern and western part of Kentucky. Urban wood waste includes utility tree removal and trimming as well as trees removed for construction. Urban wood waste is most common near Louisville, Lexington, northern Kentucky, Elizabethtown, and Bowling Green. Forest residues are the unused parts of trees left after logging and exist in southern, eastern, and western Kentucky.

Under proper management, biomass resources can provide annual yields of primary energy commodities that can be converted into liquid fuels or electricity. In Kentucky, the refinement of biodiesel and ethanol from soybeans and corn grown on Kentucky's cropland is the most prominent source of biomass-based energy production. During 2013, the state produced more than 861 thousand barrels of ethanol. Existing production and refinement capacity coupled with infrastructure assets that include interstates, navigable rivers, railroads, and other energy industries makes Kentucky an ideal location for future development.

Beyond biofuel production, Kentucky also utilizes biomass resources to generate electricity on an annual basis. For example, in 2014 wood, wood wastes, crop residues, and landfill gas resources generated 361 gigawatt-hours of electricity in Kentucky. However, this biomass-based electricity generation remains less than one percent of total electricity generation in Kentucky, and reflects the current market challenges faced by biomass commodities.

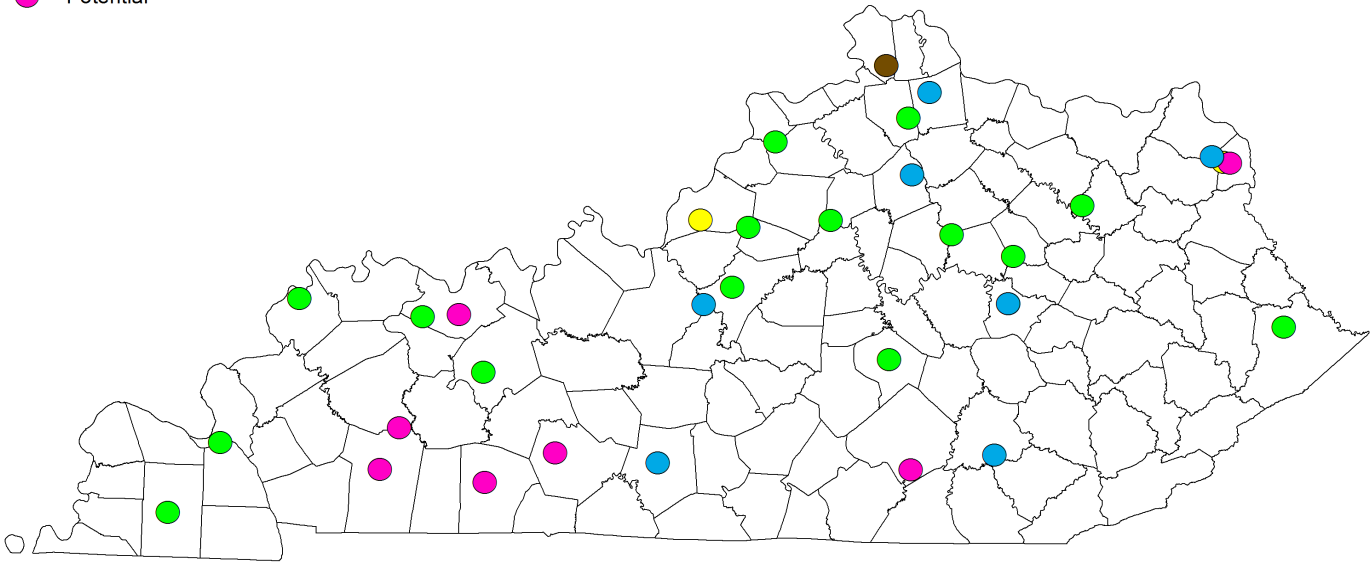
Many of Kentucky's universities are involved in research efforts that are designed to test the scalability of various biomass projects and promote the commercialization of existing biomass resources.

# Kentucky Biomass Resources

## Landfill Gas to Energy

### Current Status

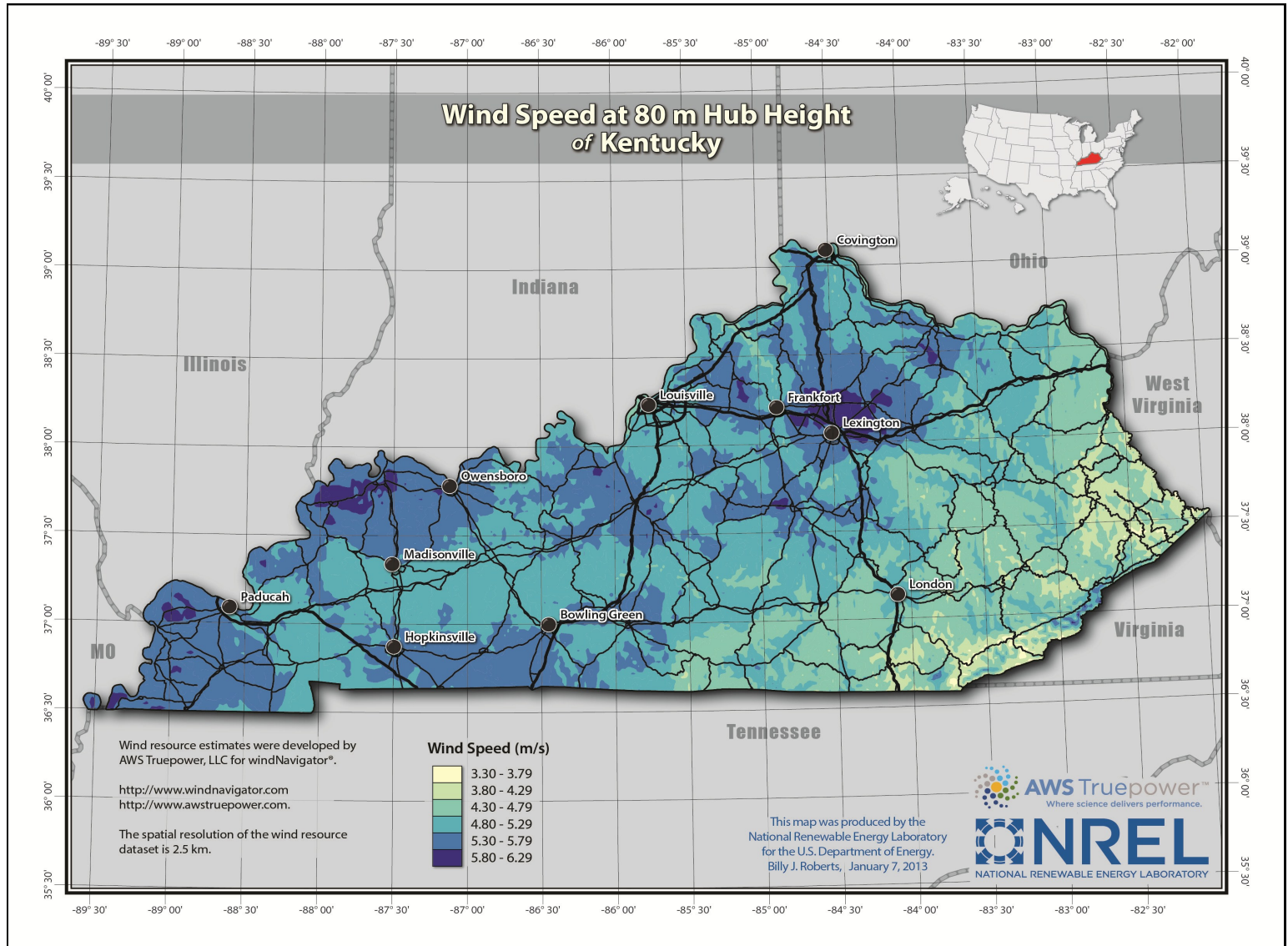
- Candidate
- Planned
- Operational
- Construction
- Other
- Potential



Landfill energy projects are a subset of biomass energy projects. For Kentucky, there are eight operational projects and 15 landfills that are considered Candidates for projects. A Candidate landfill is classified as accepting waste or has been closed for five years or less, has at least one million tons of waste, and does not have an operational, under-construction, or planned project; can also be designated based on actual interest by the site. Potential landfills do not meet the candidate definition, whether because of complete or incomplete data. However, the landfill could have LFG energy project potential based on site-specific needs or if data were complete. Landfill to energy classification and data is from the Landfill Methane Outreach Program Landfill/Project database. Information in the database is compiled from a variety of sources by voluntary submittal, is updated periodically, and can change. <https://www.epa.gov/lmop/project-and-landfill-data-state>

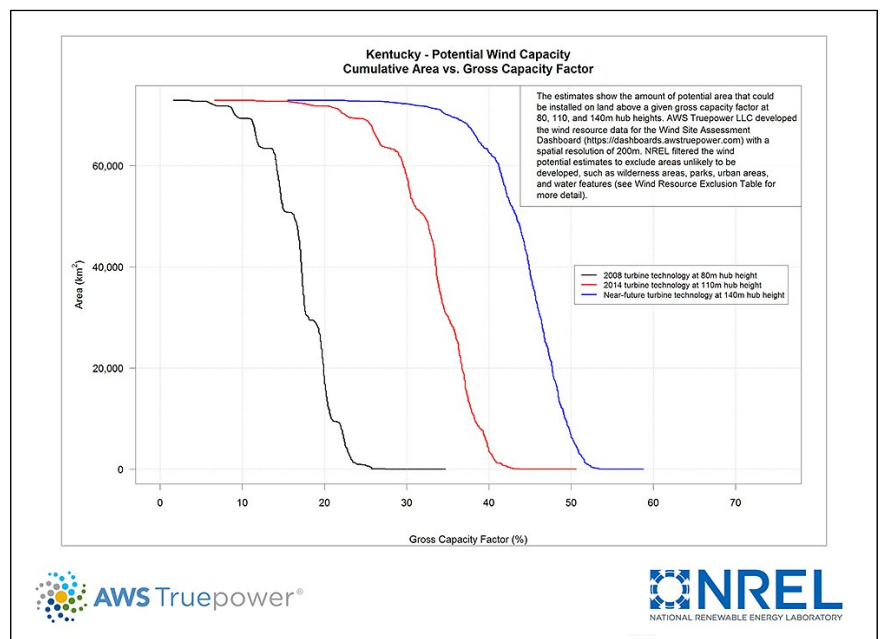


# Kentucky Wind Power Potential



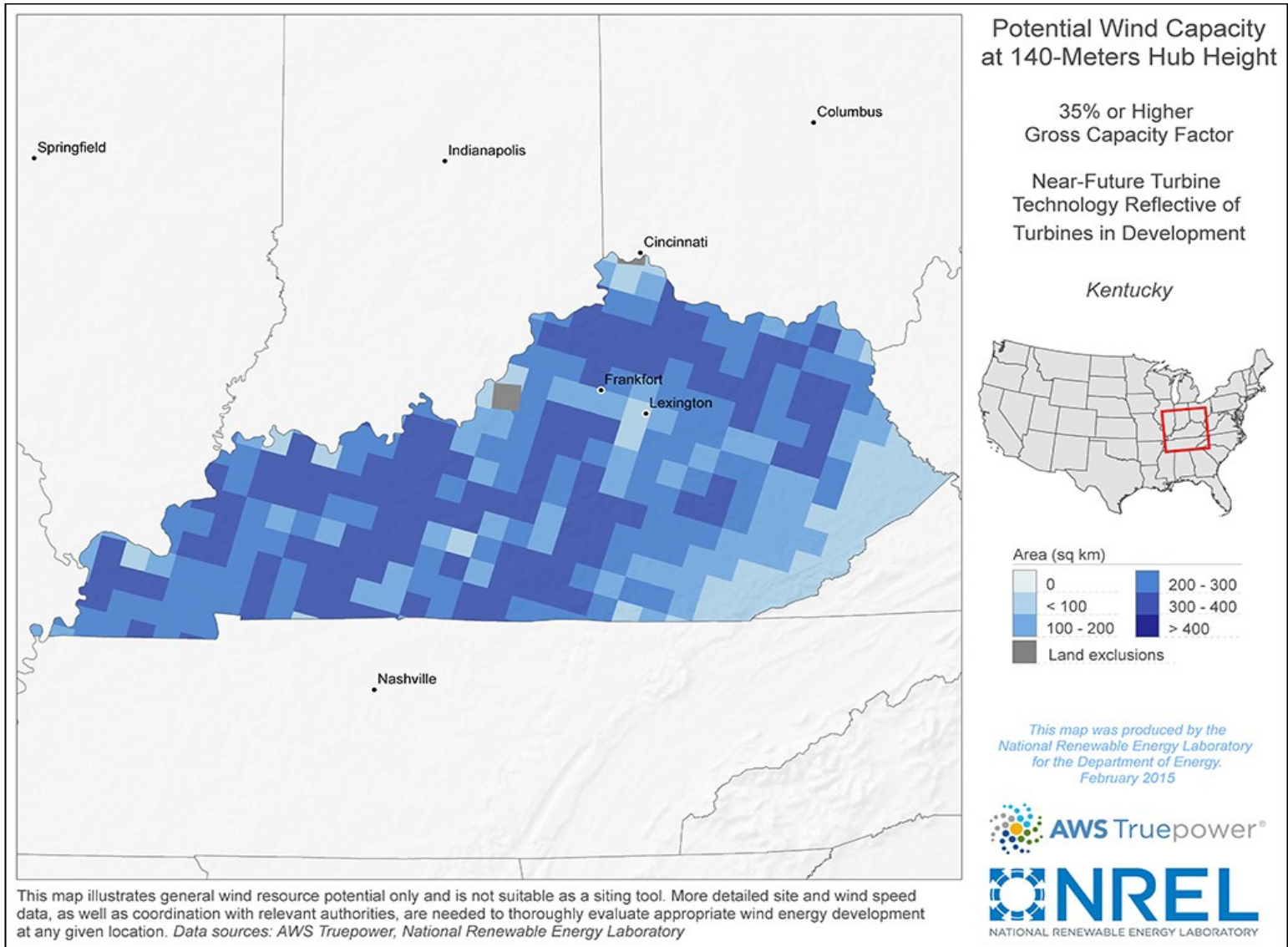
Wind Mill Hub Height	Potential Capacity (MW)	Percent of United States
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80m	0	0%
110m	76,606	0.7%
140m	128,123	1.3%





# Kentucky Wind Power Potential

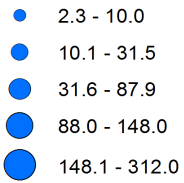


Kentucky's wind resource is yet undetermined, but limited relative to most states including Indiana, Ohio and West Virginia. Wind maps published by the National Renewable Energy Lab (NREL) in 2010 provide an initial assessment of the potential resource and establish areas of Kentucky that may be developable for utility-scale wind. This initial assessment was intended to direct wind developers to the windiest parts of the state. Developers have installed wind speed monitoring equipment in two areas. Over time, the collection of higher resolution data on wind speeds and wind patterns will help determine the economic feasibility of wind turbine construction within these areas.

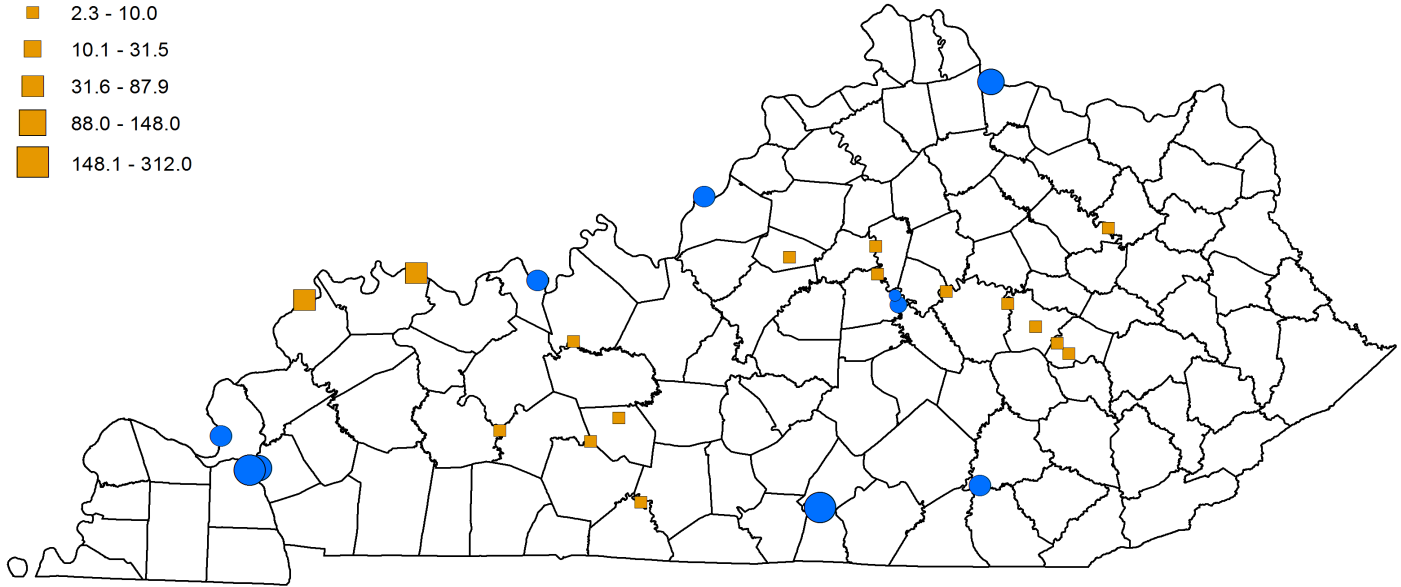
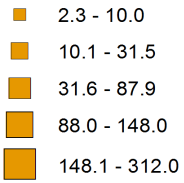
According to The National Renewable Energy Laboratory (NREL) areas generally considered to have suitable wind resources for wind development are those with annual average wind speeds of greater than or equal to 6.5 meters per second (m/s) at a height of 80 meters. These windy areas identified by NREL would support wind farms with a gross capacity factor of 30 percent and higher. As a result, Kentucky's wind energy potential is 61 MW—less than .001 percent of the nearly 11 million MW potential nationally. At 100 meters, Kentucky's wind energy potential increases to 699 MW, which ranks 42nd nationally. The NREL assessment does provide wind energy potentials at lower wind speeds. However, NREL does not generally characterize low wind speed areas as suitable for wind development.

# Hydroelectricity

## Operating

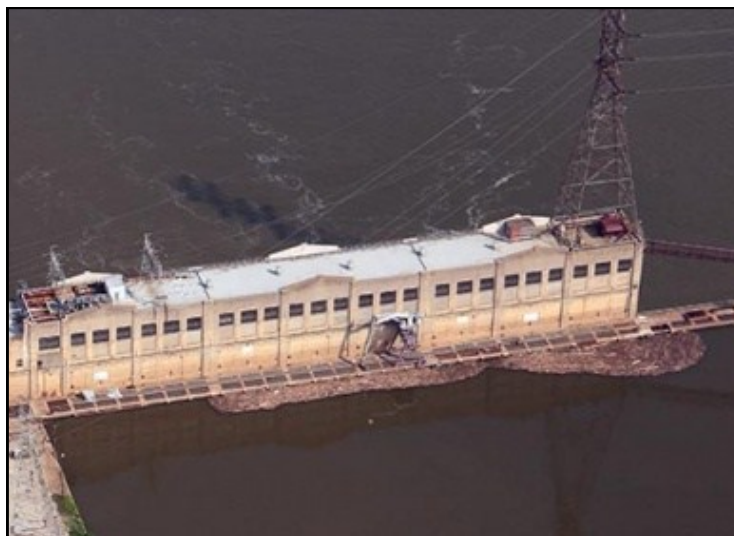


## Planned



Planned Projects	Capacity (MW)	County
Cave Run Dam	5	Bath
Barren River Lake Dam	4.8	Allen
Green River Lock & Dam 3	10	Muhlenberg
Green River Lock and Dam 5	7	Warren
Heidelberg Hydroelectric Project	2.6	Lee
Kentucky River Lock & Dam 11	5	Estill
Kentucky River Lock & Dam 9	7.2	Jessamine
Kentucky River Lock & Dam 13	5	Lee
Kentucky River Lock & Dam 5	9.3	Woodford
Kentucky River Lock & Dam 6	6	Woodford
Newburgh Hydroelectric Project	56.7	Henderson
Nolin Lake Dam	7	Edmonson
Ravenna Hydroelectric Project	2.6	Estill
Rough River Lake Dam	10	Breckinridge
Taylorsville Lake Dam	3	Spencer
Uniontown Hydroelectric Project	66.6	Union

# Hydroelectricity



Pictured above: The 102 MW Ohio Falls on the Ohio River, which began operation in 1927. Photo courtesy of LG&E and KU.



Pictured above: The 2.4 MW Mother Anne Lee Hydroelectric Station at Lock 7 on the Kentucky River. Photo taken by EEC staff.

Name	Units	Capacity (MW)	2016 Generation (MWh)	Initial Year of Operation	Owner
Barkley	4	130	486,040	1966	U.S. Army CoE
Laurel Dam	1	61	66,028	1977	U.S. Army CoE
Wolf Creek	6	270	843,628	1928	U.S. Army CoE
Dix Dam	3	24	78,642	1925	LG&E and KU
Ohio Falls	8	80	316,437	1927	LG&E and KU
Mother Ann Lee	3	2	9,712	1927	Lock 7 Hydro Partners
Kentucky Dam	5	184	924,69	1948	TVA
Meldahl	3	105	379,397	2016	AMP
Cannelton	3	88	373,677	2016	AMP
Smithland	3	76	-	2017	AMP

Kentucky has 10 hydroelectric facilities that combined generated 3.4 terawatt-hours (TWh) in 2016 or 4.3 percent of Kentucky's total electricity generation. Five of Kentucky's hydroelectric dams were constructed to mitigate flooding and to ensure navigation and Dix Dam is the lone exception, which originally provided electricity to the area. These facilities generate electricity throughout the year, though most generation occurs in the winter and spring when rainfall is more common. The United States Army Corps Of Engineers operates the Barkley, Wolf Creek, and Laurel Dams, as well as Louisville Gas & Electric's Ohio Falls Dam. Kentucky Utilities operates Dix Dam and the Tennessee Valley Authority operates the Kentucky Dam. American Municipal Power, Inc. constructed two dams in Kentucky along the Ohio River, Cannelton and Meldahl. These dams will divert water from dams operated by the United States Army Corps. of Engineers and will operate along with seasonal river flows. Once completed, these dams are expected to generate 1.02 TWh annually.

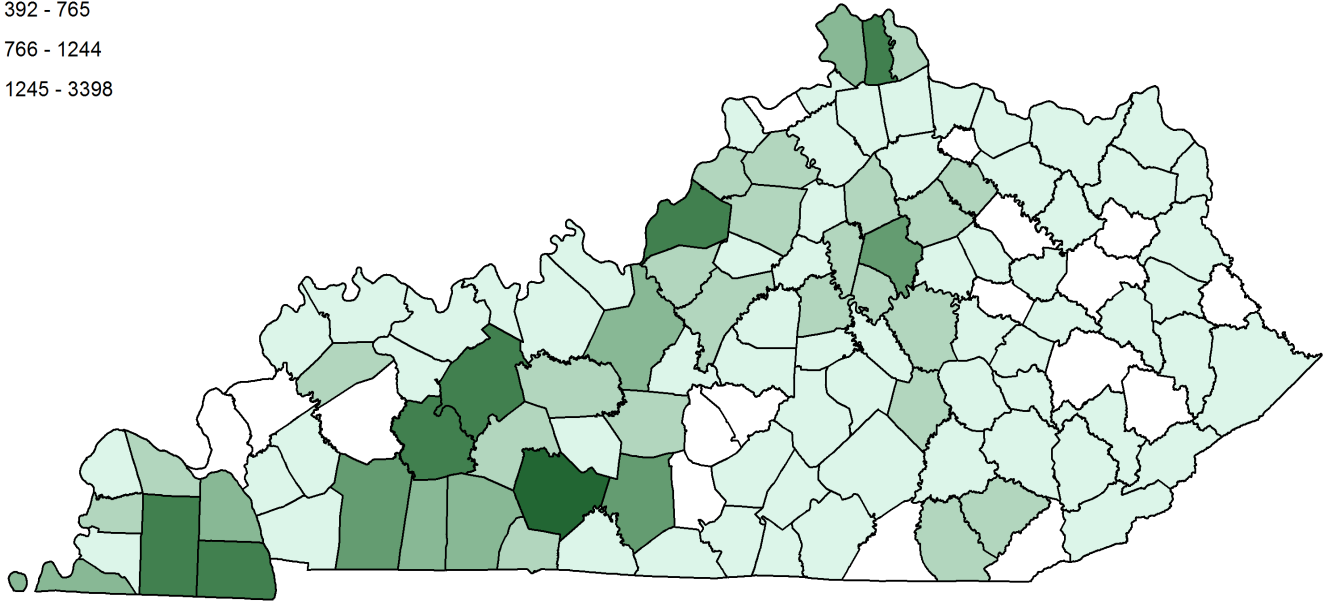
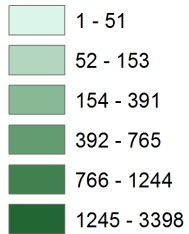
American Municipal Power, Inc. constructed three dams in Kentucky along the Ohio River, Cannelton and Meldahl. These dams will divert water from dams operated by the United States Army Corps. of Engineers and will operate along with seasonal river flows. Once completed, these dams are expected to generate 1.02 TWh annually.



# Distributed Renewable Energy

## Renewable Energy Interconnections

Cumulative Installed Capacity (kW)



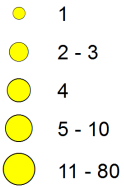
Pictured below are the 25 kW tracking solar photovoltaic arrays on top of the University of Kentucky Davis Marksbury Building, with the Patterson Office Tower in the background. *Photo taken for the Kentucky EEC by the University of Kentucky.*



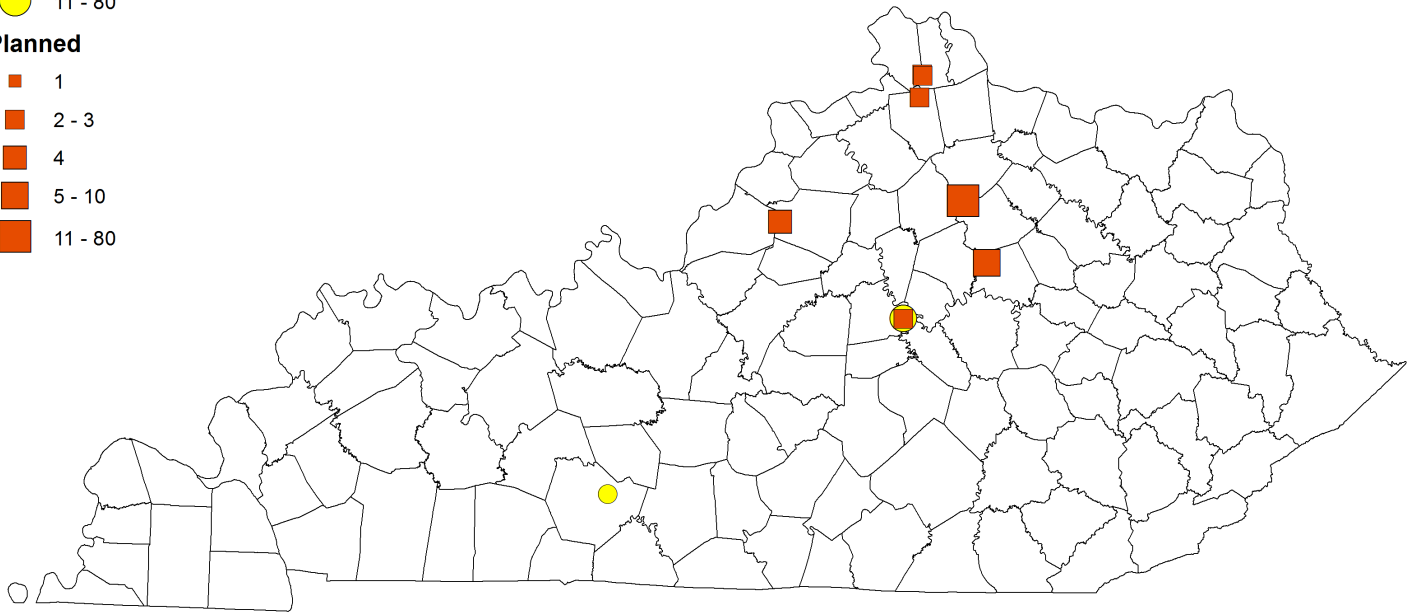
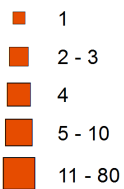
# Kentucky Solar Power Potential

## Utility Scale Solar and Storage Projects

### Operating



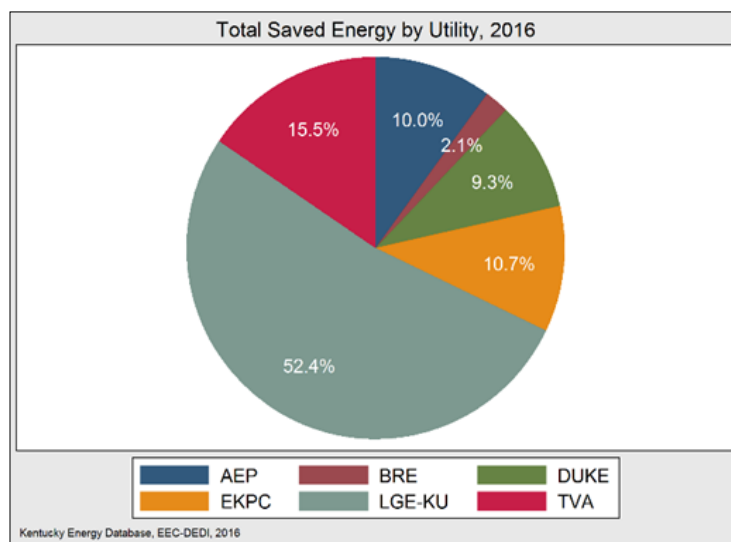
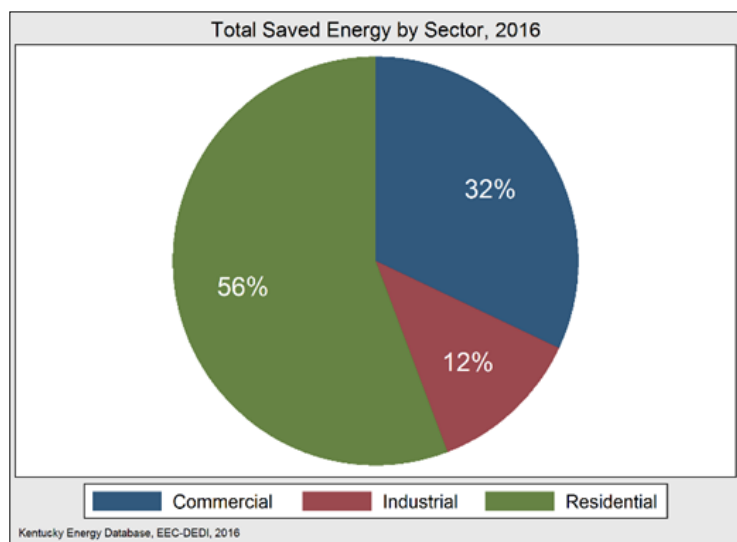
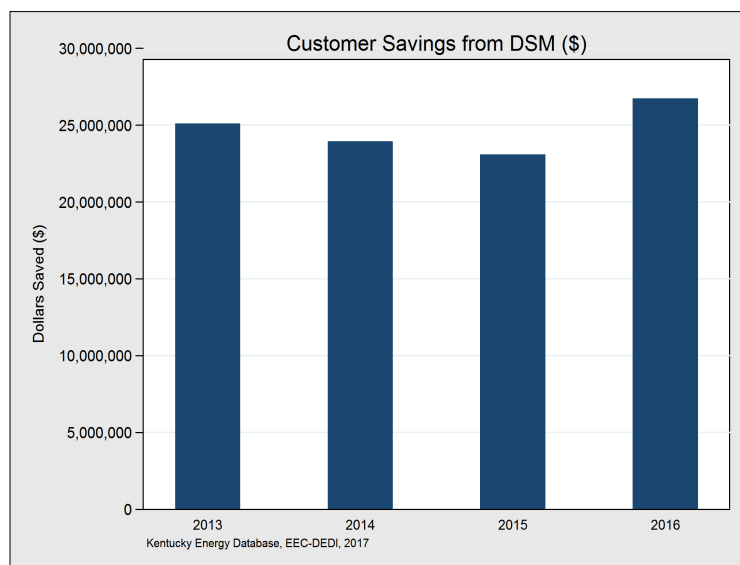
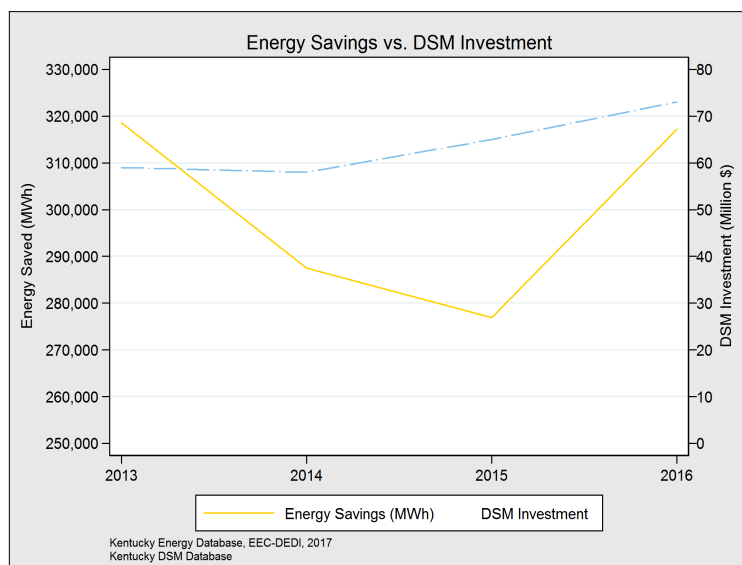
### Planned



Name	Capacity	Status
Bowling Green Solar Project	2.1	Operating
E.W. Brown Solar Project	10.0	Operating
EPRI Energy Storage Research and	1.0	Operating
Bluebird Solar	80.0	Planned
Community Solar Project	4.0	Planned
Cooperative Solar One	8.5	Planned
Crittenden Solar Facility	2.8	Planned
EPRI Energy Storage Research and	2.0	Planned
Walton 1 Solar Facility	2.0	Planned
Walton 2 Solar Facility	2.0	Planned

# KY Demand Side Management

As per KRS 278.285, jurisdictional electric utilities may offer demand side management (DSM) programs that are designed to encourage energy savings through a range of educational or incentive offerings. Utility DSM programs are evaluated on such factors as costs versus benefits; how well the programs support a utility's specific long-range integrated resource plan; fairness across customer classes; and affordability to customers. To encourage such programs, the statute allows utilities, through rate adjustments, to recover the (1) cost of the programs, (2) an incentive, and (3) any lost revenue as a result of reduced sales. All jurisdictional generation and transmission utilities (i.e., Big Rivers Electric (BRE), Kentucky Power (AEP), East Kentucky Power Co-operative (EKPC), LG&E-KU, Duke Energy), plus the Tennessee Valley Authority (TVA), voluntarily submit annual data on their DSM programs. These data do not include DSM programs municipal utilities may offer. DSM investment, statewide, was \$72.9 M in 2016, increasing 24.5% since 2013. Measures installed have an average 10-11 year effective useful life so that savings (energy and dollars) compound over time as more measures are installed.

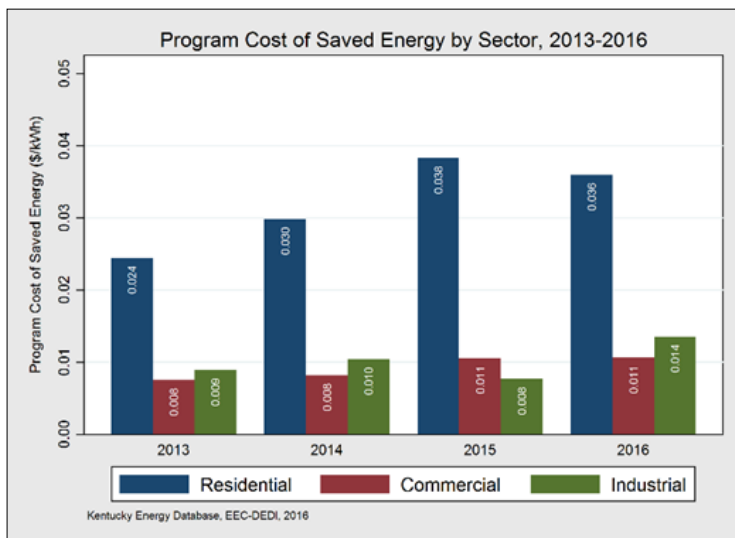
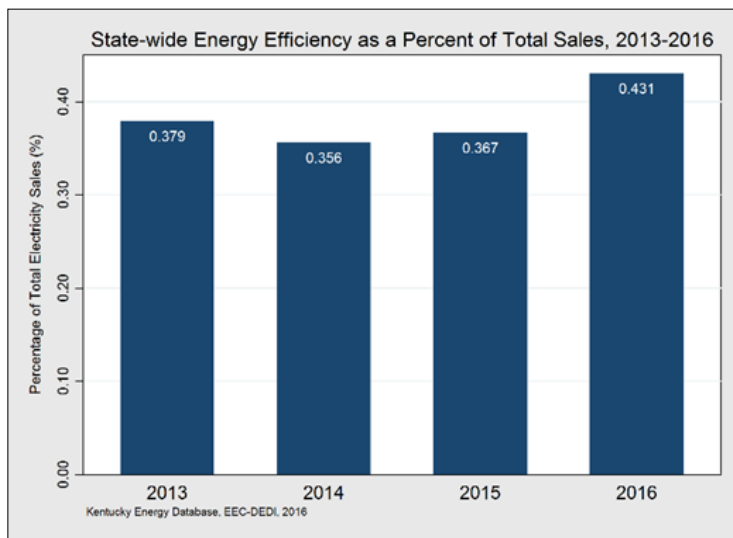


	Savings (MWh)	% of Total
Total	317,189	100%
Residential	176,888	56%
Commercial	101,553.	32%
Industrial	38,747	12%

LG&E-KU, being the largest electric provider in the state, also is able to save the most energy through their DSM programs, representing 52.4% of all 2016 energy savings, followed by TVA (15.5%), East Kentucky Power, Kentucky Power (10.7%), Duke (9.3%), and Big Rivers (2.1%).

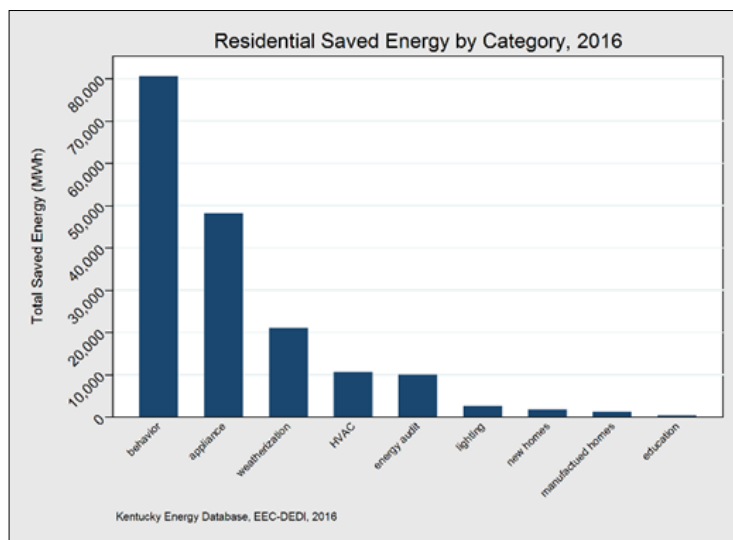


# KY Demand Side Management

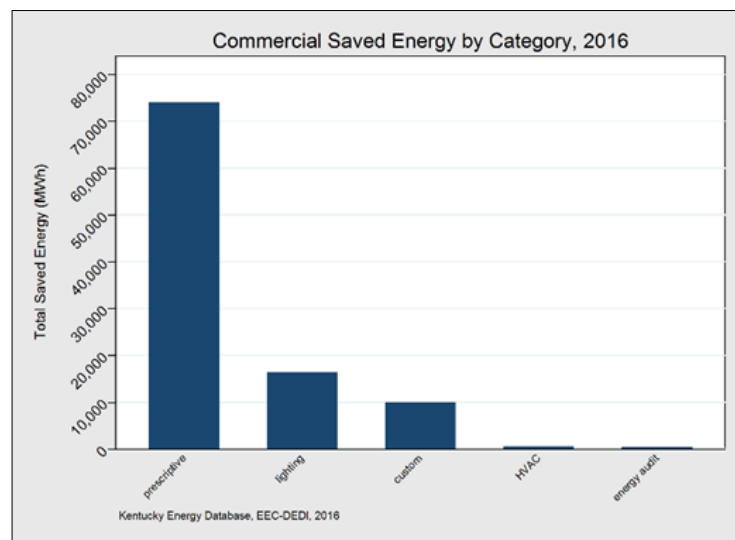


	Savings (MWh)	% Savings
2013	318,597	0.379
2014	287,509	0.356
2015	276,882	0.367
2016	317,189	0.431

The cost of saved energy is a measure of the cost of delivering DSM programs and incentives to customers, calculated as the total program cost divided by the total energy savings over the life of the efficiency measures installed. Residential DSM program costs are more than double the cost of commercial or industrial energy savings.

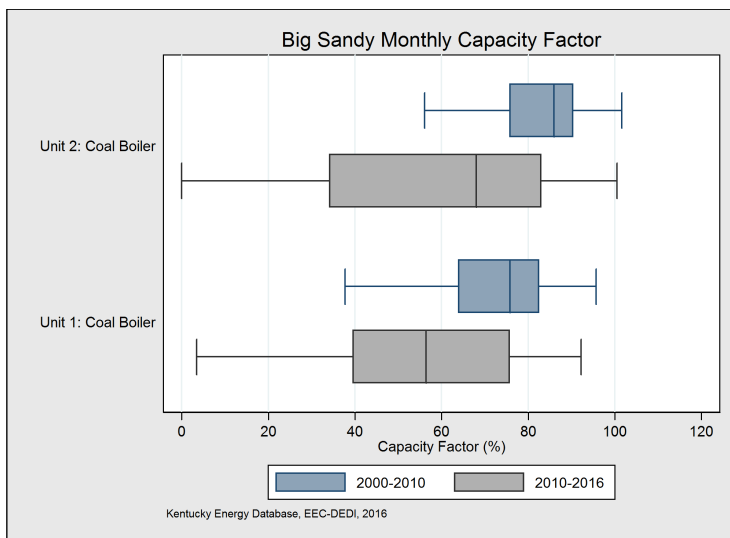
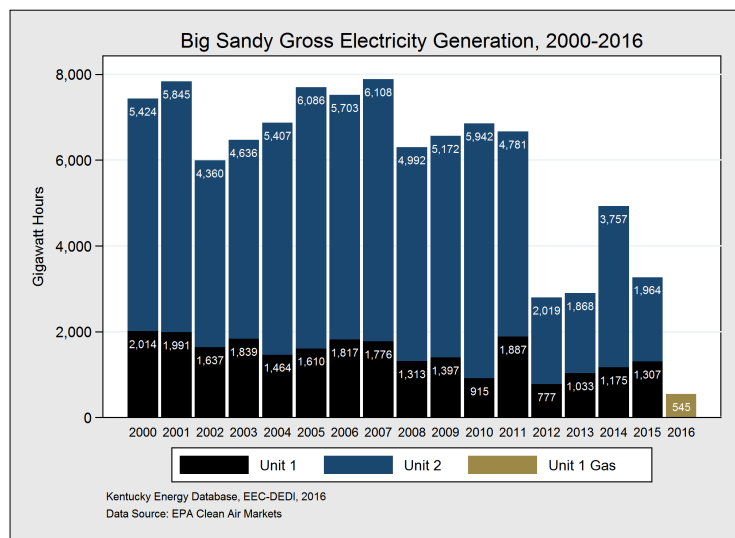


Behavioral, appliance, and weatherization programs represent 85% of all residential DSM energy savings.



Prescriptive measures represent 73% of all commercial DSM energy savings. Prescriptive measures are targeted energy efficiency measures proven to be cost effective and eligible for customer incentives.

# Big Sandy Power Plant



Unit Number	Online Year	Retire Year	Fuel	Capacity (MW)	Capacity Factor* (%)	Gross Generation* (GWh)	Net Generation* (GWh)	CO <sub>2</sub> Rate* (lbs./MWh)	SO <sub>2</sub> Rate* (lbs./MWh)	NO <sub>x</sub> Rate* (lbs./MWh)
Plant	1963		Natural Gas	268	22%	545	530	1,163	0.5	1.6
1	1963		Natural Gas	268	22%	545	530	1,163	0.5	1.6
2	1969	2016	Coal	816		0	0			

The Big Sandy Power Plant, near Louisa in Lawrence County, is 54 years old and consisted of two coal-fired electricity generating units, which came online in 1963 and 1969, respectively. The plant has a total nameplate capacity of 1,096 MW and is owned by Kentucky Power, a subsidiary of American Electric Power. In 2016, the plant generated 545 MWh of electricity, down from 3.3 GWh in 2015. Big Sandy's two coal-fired units were retired in 2016 and Unit 1 has been converted to a 268 MW natural gas combined cycle unit. Big Sandy's plant-wide capacity factor was 22 percent in 2016. The plant primarily burned coal trucked from eastern Kentucky in 2015, from Pike, Magoffin, Floyd, and Johnson counties. The picture below is of the Big Sandy Power Plant taken by Kentucky EEC staff.

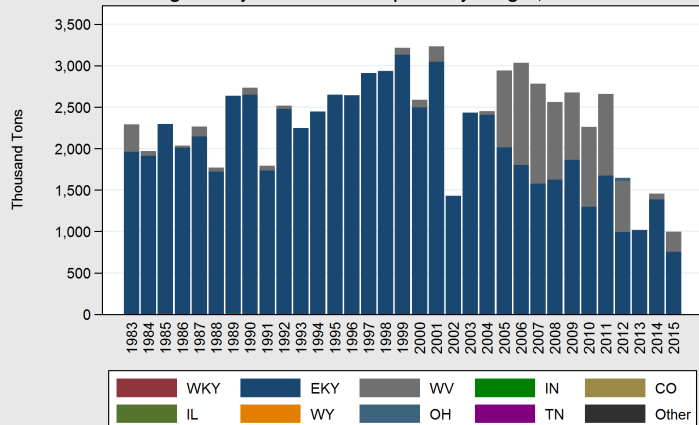


\*2016

†Converting to Natural Gas Combined Cycle

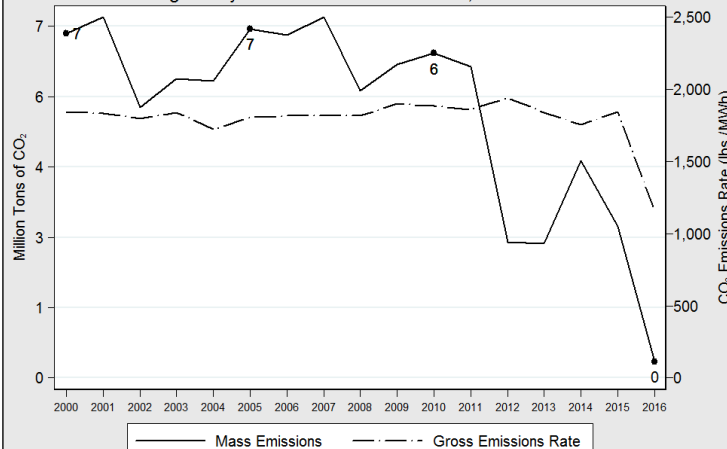
# Big Sandy Power Plant

Big Sandy Coal Consumption by Origin, 1983-2016



Kentucky Energy Database, EEC-DEDI, 2015  
Data Source: FERC-423 & EIA-923

Big Sandy Carbon Dioxide Emissions, 2000-2016



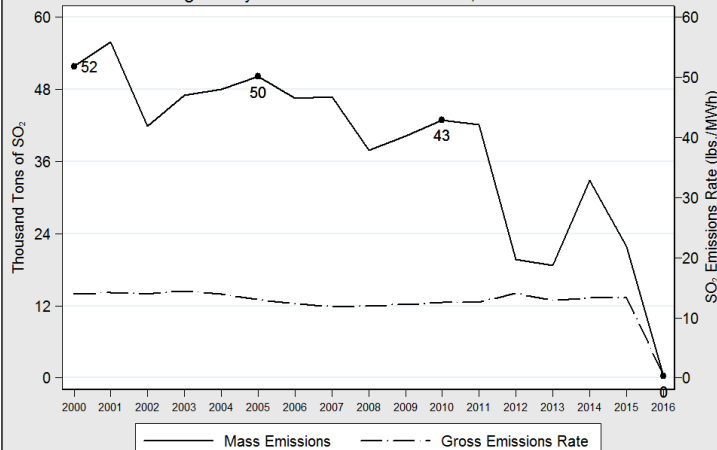
Kentucky Energy Database, EEC-DEDI, 2016  
Data Source: EPA Clean Air Markets

State	2015 Tons	Percentage
Total	998,643	100%
Eastern Kentucky	759,497	76%
West Virginia	239,146	24%

Carbon Dioxide	2016 Value	Since 2000
Emissions (Tonnage)	317,238	-95%
Rate (lbs./MWh)	1,163	-37%

The Big Sandy Power Plant emitted 317 thousand tons of CO<sub>2</sub> in 2016, a decrease of 95 percent since 2000. The rate of CO<sub>2</sub> emissions has sharply decreased in recent years and is the result of the conversion of unit 1 and retirement of unit 2.

Big Sandy Sulfur Dioxide Emissions, 2000-2016

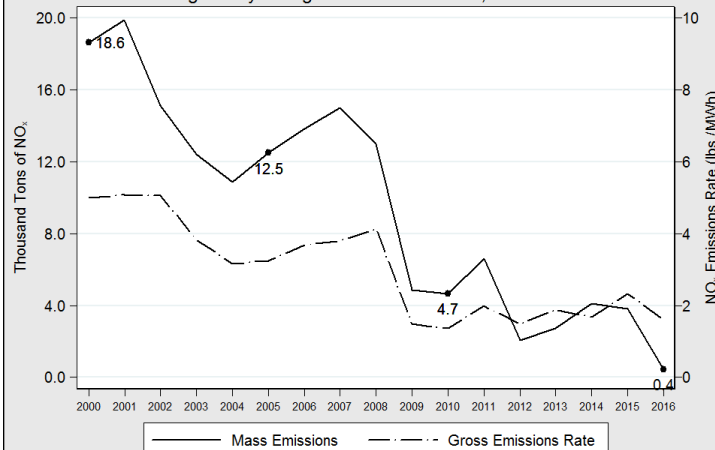


Kentucky Energy Database, EEC-DEDI, 2016  
Data Source: EPA Clean Air Markets

Sulfur Dioxide	2016 Value	Since 2000
Emissions (Tonnage)	137	-99.7%
Rate (lbs./MWh)	0.5	-96%

The Big Sandy Power Plant emitted 137 tons of SO<sub>2</sub> in 2016, more than any power plant in Kentucky that year, but a decrease of 99 percent since 2000. The SO<sub>2</sub> emissions rate has decreased at the plant by 96 percent during that period.

Big Sandy Nitrogen Oxide Emissions, 2000-2016

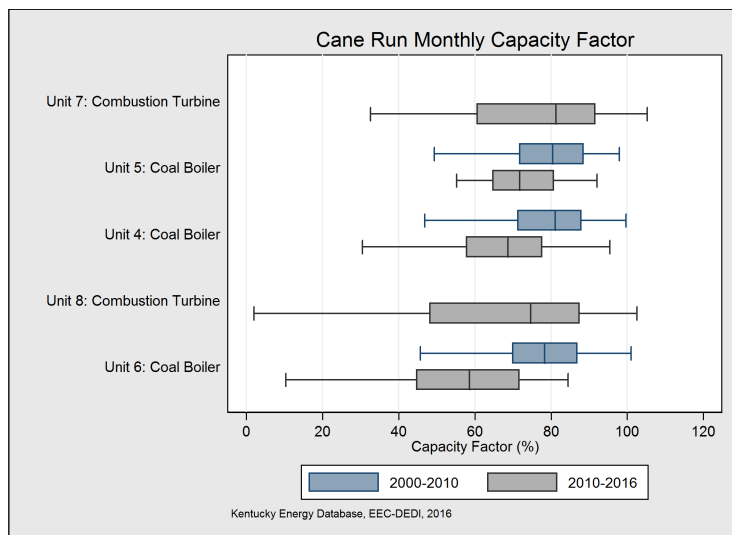
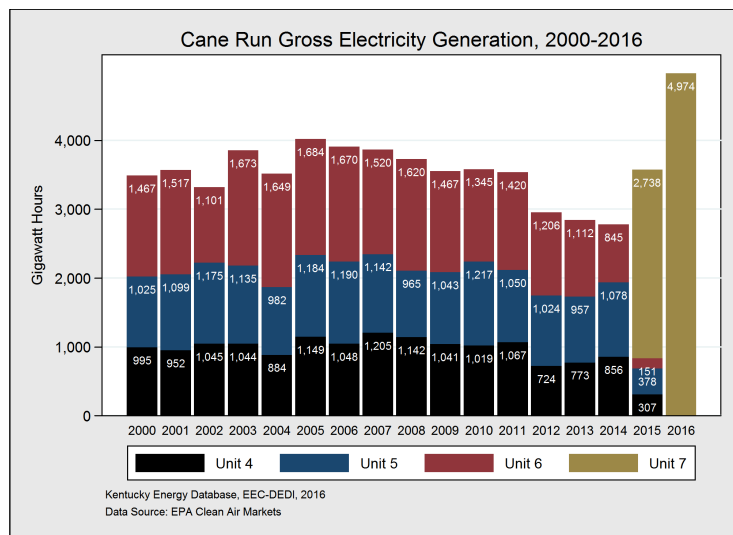


Kentucky Energy Database, EEC-DEDI, 2016  
Data Source: EPA Clean Air Markets

Nitrogen Dioxide	2016 Value	Since 2000
Emissions (Tonnage)	438	-97.6%
Rate (lbs./MWh)	1.6	-68%

The Big Sandy Power Plant emitted 438 tons of NO<sub>x</sub> in 2016, a reduction of 98 percent since 2000. The rate of NO<sub>x</sub> emissions decreased by 68 percent during that period.

# Cane Run Station



Unit Number	Online Year	Retire Year	Fuel	Capacity (MW)	Capacity Factor* (%)	Gross Generation* (MWh)	Net Generation* (MWh)	CO <sub>2</sub> Rate* (lbs./MWh)	SO <sub>2</sub> Rate* (lbs./MWh)	NO <sub>x</sub> Rate* (lbs./MWh)
Plant	1954		Coal	640	0%	4,974	4,882	764	.004	.17
4	1962	2015	Coal	155	0%					
5	1966	2015	Coal	168	0%					
6	1969	2015	Coal	240	0%					
7	2015		Natural Gas	640		4,974	4,882	764	0.004	0.17

Cane Run Station, located southwest of Louisville in Jefferson County, began operation in 1954. The plant had six units at one time, but the three oldest coal units were retired by 1987. Units 4, 5, and 6 came online in 1962, 1966, and 1969, respectively. Units 4, 5, and 6 were retired in 2015 and replaced by 640 MW of natural gas combined cycle generation. In 2016, the plant generated 4.9 GWh of electricity, up from 3.5 GWh in 2015.

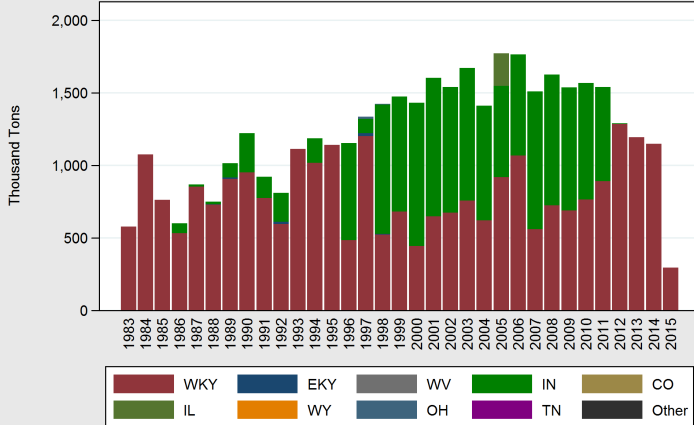
In their last full year of operation, Cane Run's coal units generated 2.7 GWh of electricity with an average capacity factor of 56 percent. Units 4, 5, and 6 generated 71.1 GWh for the Commonwealth over their lifetime with an average capacity factor of 59 percent.

\*2016

Source: EPA Clean Air Markets and Louisville Gas & Electric website

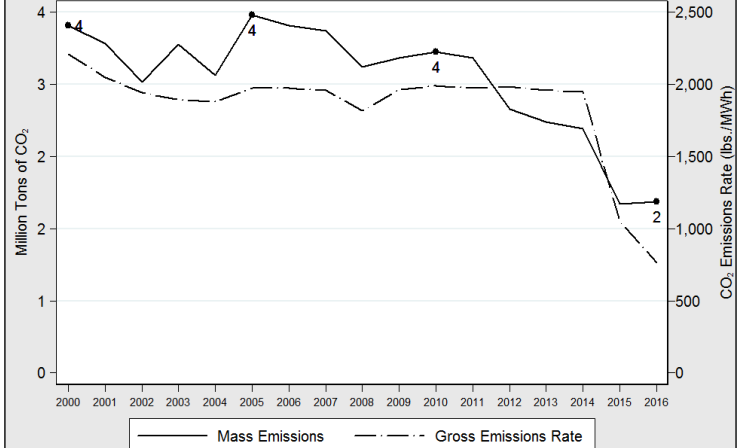
# Cane Run Station

Cane Run Coal Consumption by Origin, 1983-2015



Kentucky Energy Database, EEC-DEDI, 2015  
Data Source: FERC-423 & EIA-923

Cane Run Carbon Dioxide Emissions, 2000-2016



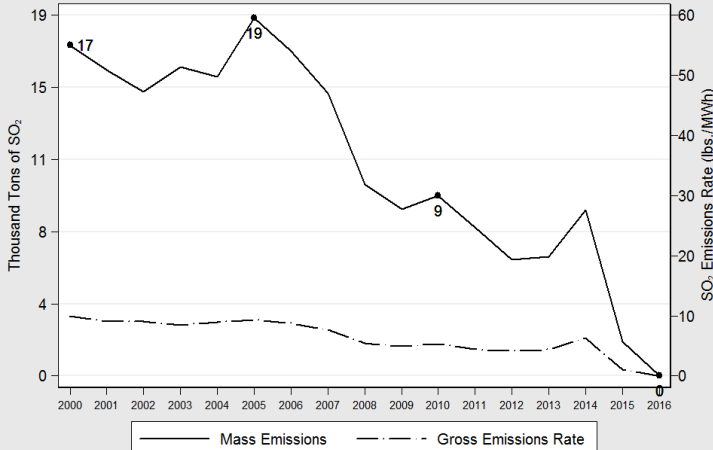
Kentucky Energy Database, EEC-DEDI, 2016  
Data Source: EPA Clean Air Markets

State	2015 Tons	Percentage
Total	293,861	100%
Western Kentucky	293,861	100%

Carbon Dioxide	2016 Value	Since 2000
Emissions (Tonnage)	1,900,925	-51%
Rate (lbs./MWh)	764	-65%

Cane Run Station emitted 1.9 million tons of CO<sub>2</sub> in 2016, a decrease of 51 percent from 2000 levels. The rate of CO<sub>2</sub> emissions decreased by 65 percent over the same period.

Cane Run Sulfur Dioxide Emissions, 2000-2016

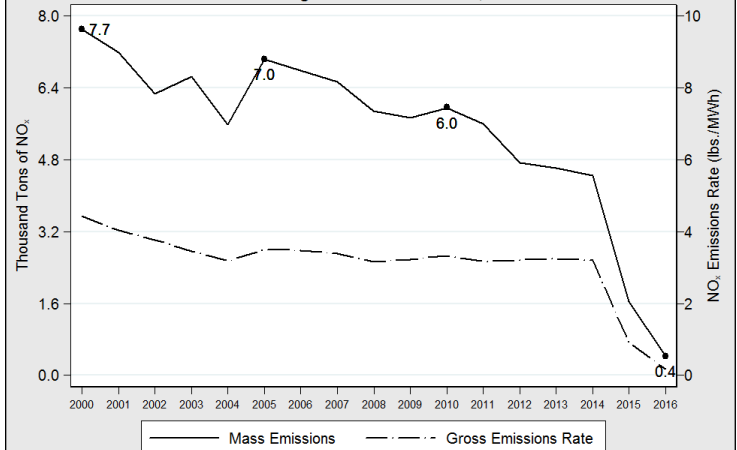


Kentucky Energy Database, EEC-DEDI, 2016  
Data Source: EPA Clean Air Markets

Sulfur Dioxide	2016 Value	Since 2000
Emissions (Tonnage)	9.6	-100%
Rate (lbs./MWh)	.004	-100%

Cane Run Station emitted 9.6 tons of SO<sub>2</sub> in 2016, a decrease of 100 percent since 2000. The rate of SO<sub>2</sub> emissions decreased by 100 percent during that period.

Cane Run Nitrogen Oxide Emissions, 2000-2016

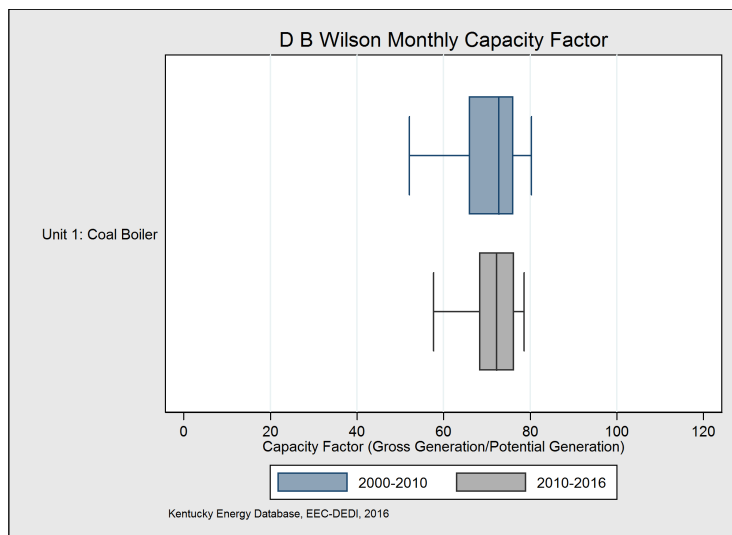
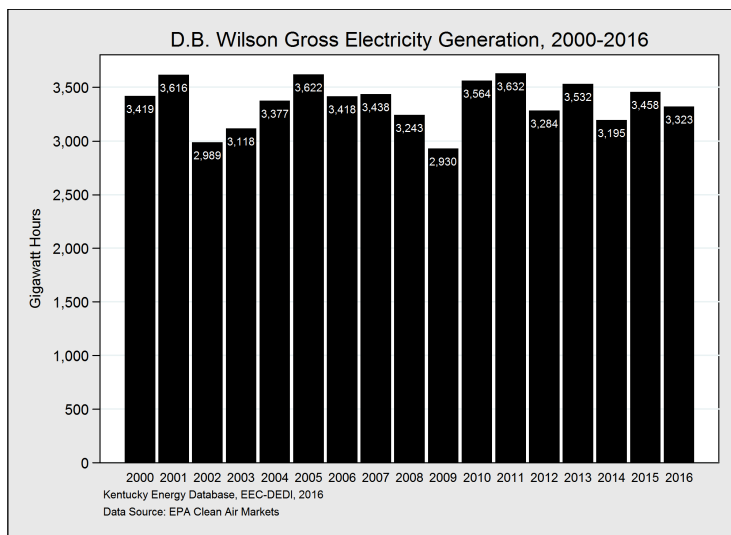


Kentucky Energy Database, EEC-DEDI, 2016  
Data Source: EPA Clean Air Markets

Nitrogen Dioxide	2016 Value	Since 2000
Emissions (Tonnage)	428	-94%
Rate (lbs./MWh)	.17	-96%

Cane Run Station emitted 428 tons of NO<sub>x</sub> in 2016, a reduction of 94 percent since 2000. The rate of NO<sub>x</sub> emissions decreased by 96 percent during that period.

# D. B. Wilson Station



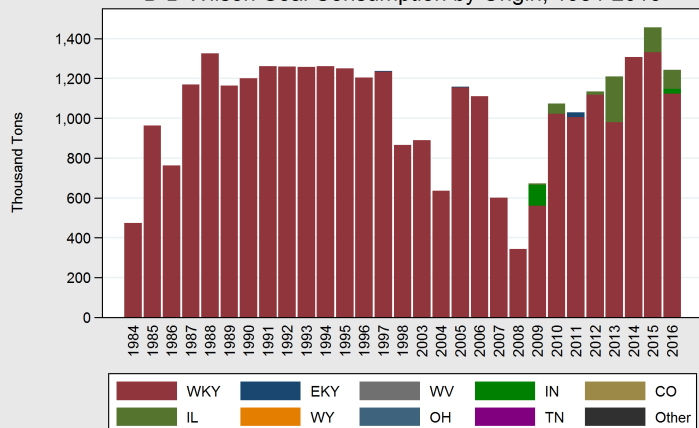
Unit Number	Online Year	Retire Year	Fuel	Capacity (MW)	Capacity Factor* (%)	Gross Generation* (MWh)	Net Generation* (MWh)	CO <sub>2</sub> Rate* (lbs./MWh)	SO <sub>2</sub> Rate* (lbs./MWh)	NO <sub>x</sub> Rate* (lbs./MWh)
Plant 1	1984		Coal	566	67%	3,323	3,114			
	1984		Coal	566	67%	3,323	3,114	2,238	4.17	0.69

D. B. Wilson Station, located in Ohio County, is 33 years old and consists of one coal-fired electricity generating unit. The unit came online in 1984 and has a nameplate capacity of 566 MW. In 2016, the plant generated 3.3 GWh of electricity and had a plant-wide capacity factor of 67 percent. Wilson burned predominantly western Kentucky coal in 2016 from Union, Webster, and Muhlenberg counties. Wilson Station is owned by Big Rivers Electric Corporation.

\*2016

# D. B. Wilson Station

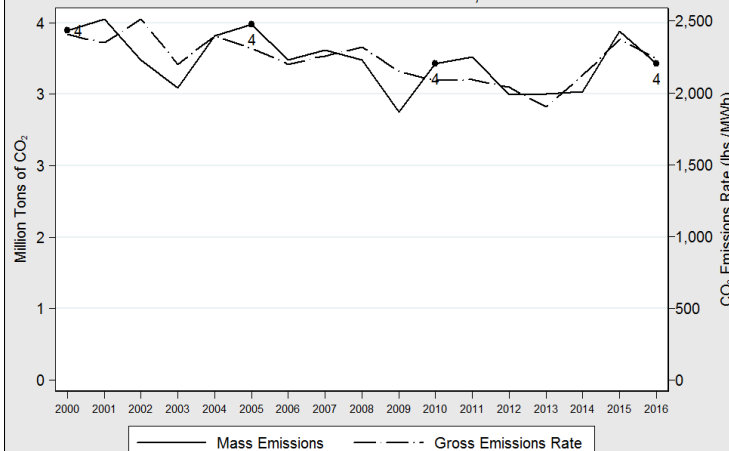
D B Wilson Coal Consumption by Origin, 1984-2016



Kentucky Energy Database, EEC-DEDI, 2015  
Data Source: FERC-423 & EIA-923

State	2016 Tons	Percentage
<b>Total</b>	<b>1,425,831</b>	<b>100%</b>
Western Kentucky	1,307,770	75%
Illinois	94,402	7%
Indiana	23,659	18%

D B Wilson Carbon Dioxide Emissions, 2000-2016

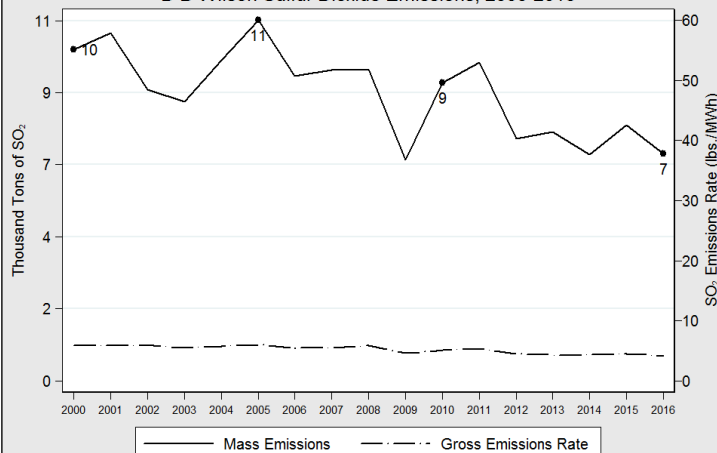


Kentucky Energy Database, EEC-DEDI, 2016  
Data Source: EPA Clean Air Markets

Carbon Dioxide	2016 Value	Since 2000
Emissions (Tonnage)	3,718,923	-10%
Rate (lbs./MWh)	2,238	-7%

The D. B. Wilson Station emitted 3.7 million tons of CO<sub>2</sub> in 2016, a decrease of 10 percent from 2000 levels. The rate of CO<sub>2</sub> emissions decreased by 7 percent during that period.

D B Wilson Sulfur Dioxide Emissions, 2000-2016

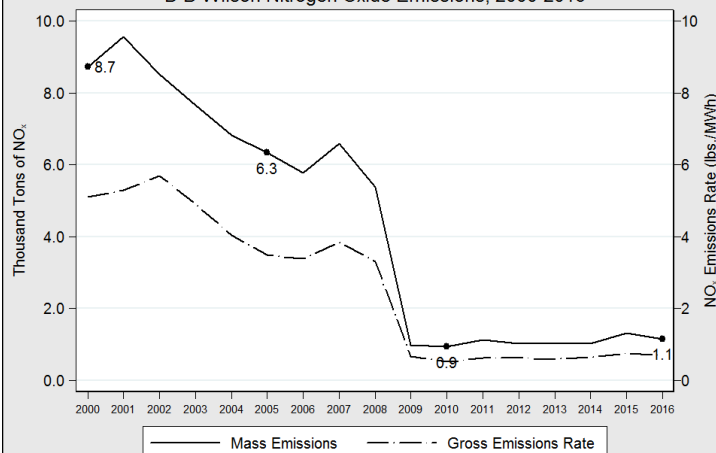


Kentucky Energy Database, EEC-DEDI, 2016  
Data Source: EPA Clean Air Markets

Sulfur Dioxide	2016 Value	Since 2000
Emissions (Tonnage)	6,934	-31%
Rate (lbs./MWh)	4.17	-29%

The D. B. Wilson Station emitted 6.9 thousand tons of SO<sub>2</sub> in 2016, a decrease of 31 percent since 2000. The rate of SO<sub>2</sub> emissions reduced by 29 percent during that period.

D B Wilson Nitrogen Oxide Emissions, 2000-2016



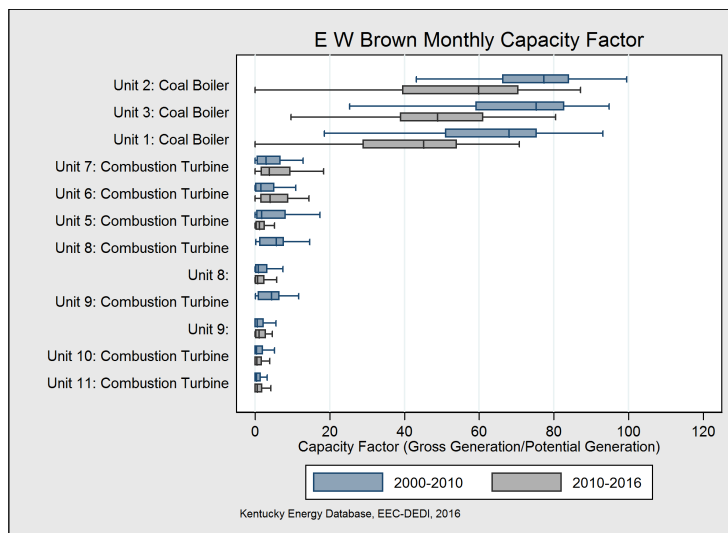
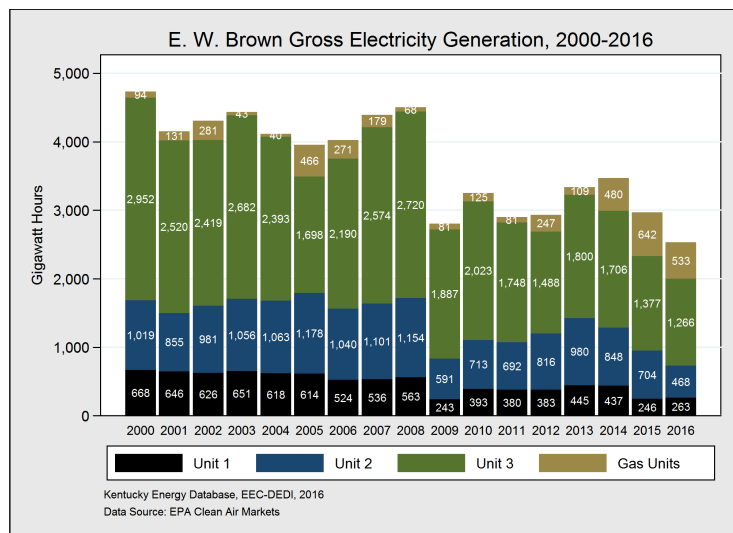
Kentucky Energy Database, EEC-DEDI, 2016  
Data Source: EPA Clean Air Markets

Nitrogen Dioxide	2016 Value	Since 2000
Emissions (Tonnage)	1,151	-87%
Rate (lbs./MWh)	0.69	-86%

The D. B. Wilson Station emitted 1,151 tons of NO<sub>x</sub> in 2016, a reduction of 87 percent since 2000. The rate of NO<sub>x</sub> emissions decreased by 86 percent during that period and is the lowest of Kentucky power plants.



# E. W. Brown Generating Station



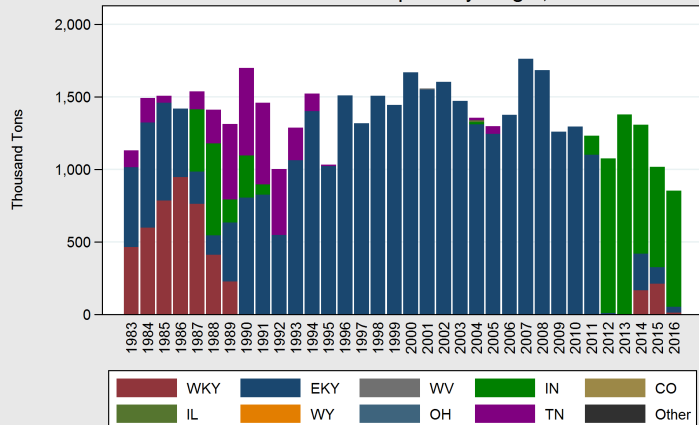
Unit Number	Online Year	Retire Year	Fuel	Capacity (MW)	Capacity Factor* (%)	Gross Generation* (GWh)	Net Generation* (GWh)	CO <sub>2</sub> Rate* (lbs./MWh)	SO <sub>2</sub> Rate* (lbs./MWh)	NO <sub>x</sub> Rate* (lbs./MWh)
Plant	1955		Coal	684	20%	2,531		2,064	0.7	1.78
1	1957		Coal	106	28%	263	218	2,209	0.87	2.61
2	1963		Coal	166	32%	468	410	2,203	0.86	2.55
3	1971		Coal	412	35%	1,266	1,104	2,213	0.90	1.51
5	2001		Natural Gas	112	5%	45		1,520	0.01	0.70
6	1999		Natural Gas	146	2%	29		1,360	0.02	0.53
7	1999		Natural Gas	146	2%	30		1,341	0.01	0.75
8	1995		Natural Gas	102	12%	109		1,533	0.01	1.42
9	1994		Natural Gas	102	14%	128		1,533	0.01	1.62
10	1995		Natural Gas	102	14%	128		1,507	0.01	1.52
11	1996		Natural Gas	102	7%	66		1,620	0.01	1.54

The E. W. Brown Generating Station, located in Mercer County, consists of three coal-fired electricity generating units as well as seven natural gas combustion turbines used to meet peak demand. The plant is 60 years old, and the coal units came online in 1957, 1963, and 1971, respectively. E. W. Brown's coal units have a total nameplate capacity of 684 MW and is owned and operated by [Kentucky Utilities](#). In 2016, the plant generated 2.5 GWh of electricity and its coal-units had a capacity factor of 50 percent. The plant installed scrubbers on its three coal fired units in 2010 to reduce sulfur dioxide emissions. E. W. Brown mostly burned Indiana-based coal in 2016, marking a dramatic shift from the previous decade, during which it relied heavily on coal from eastern Kentucky, primarily from Perry County, but also from Knott, Leslie, Floyd, and Magoffin counties. The plant typically pays a premium for the coal it consumes because of high transportation costs to central Kentucky relative to other plants located on the Ohio and Green Rivers.

\*2016

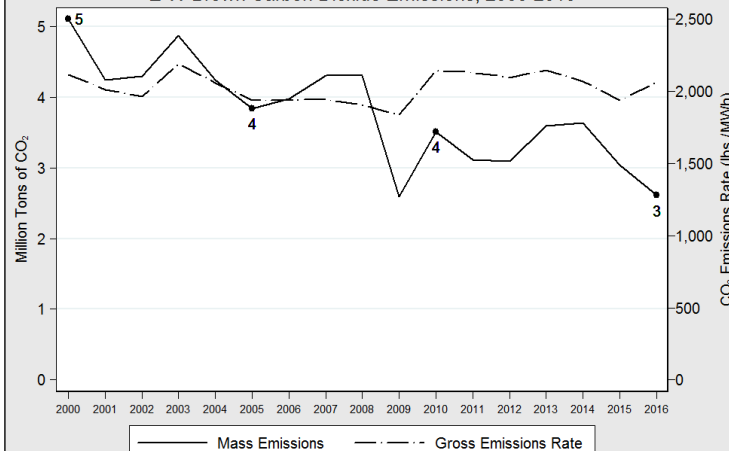
# E. W. Brown Generating Station

E W Brown Coal Consumption by Origin, 1983-2016



Kentucky Energy Database, EEC-DEDI, 2015  
Data Source: FERC-423 & EIA-923

E W Brown Carbon Dioxide Emissions, 2000-2016



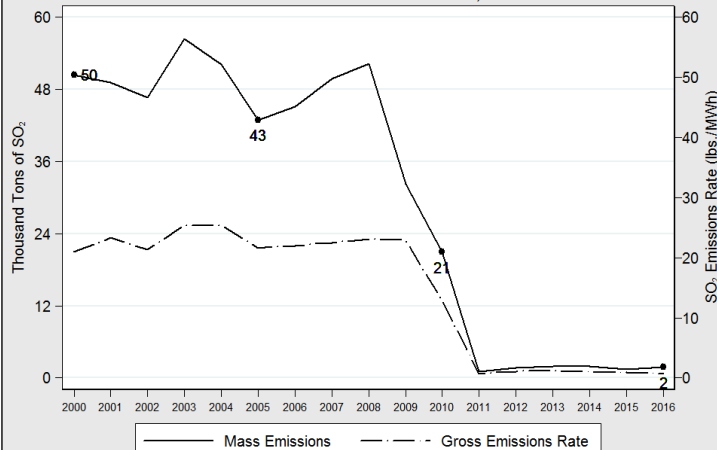
Kentucky Energy Database, EEC-DEDI, 2016  
Data Source: EPA Clean Air Markets

State	2016 Tons	Percentage
<b>Total</b>	<b>851,767</b>	<b>100%</b>
<b>Indiana</b>	<b>800,857</b>	<b>94%</b>
<b>Eastern Kentucky</b>	<b>39,634</b>	<b>5%</b>
<b>Western Kentucky</b>	<b>11,276</b>	<b>1%</b>

Carbon Dioxide	2016 Value	Since 2000
<b>Emissions (Tonnage)</b>	<b>2,611,706</b>	<b>-49%</b>
<b>Rate (lbs./MWh)</b>	<b>2,064</b>	<b>-3%</b>

The E. W. Brown Generating Station emitted 2.6 million tons of CO<sub>2</sub> in 2016, a decrease of 49 percent since 2000. The rate of CO<sub>2</sub> emissions has remained relatively unchanged during that period and is the second highest of Kentucky coal plants.

E W Brown Sulfur Dioxide Emissions, 2000-2016

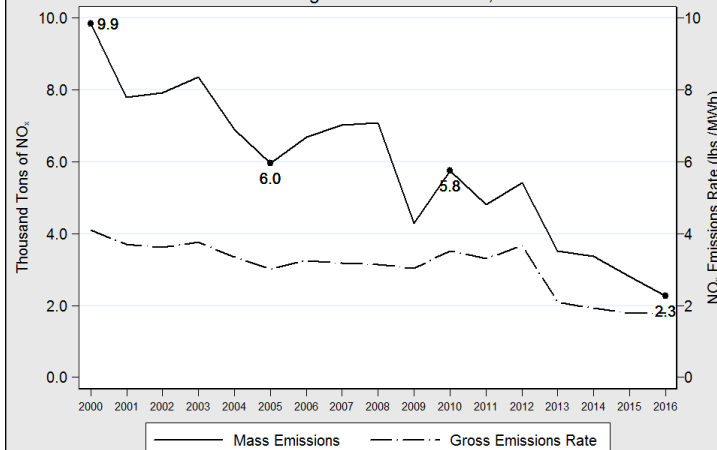


Kentucky Energy Database, EEC-DEDI, 2016  
Data Source: EPA Clean Air Markets

Sulfur Dioxide	2016 Value	Since 2000
<b>Emissions (Tonnage)</b>	<b>890</b>	<b>-98%</b>
<b>Rate (lbs./MWh)</b>	<b>0.7</b>	<b>-97%</b>

The E. W. Brown Generating Station emitted 890 tons of SO<sub>2</sub> in 2016, a decrease of 98 percent since 2000. The rate of SO<sub>2</sub> emissions decreased by 97 percent during that period.

E W Brown Nitrogen Oxide Emissions, 2000-2016

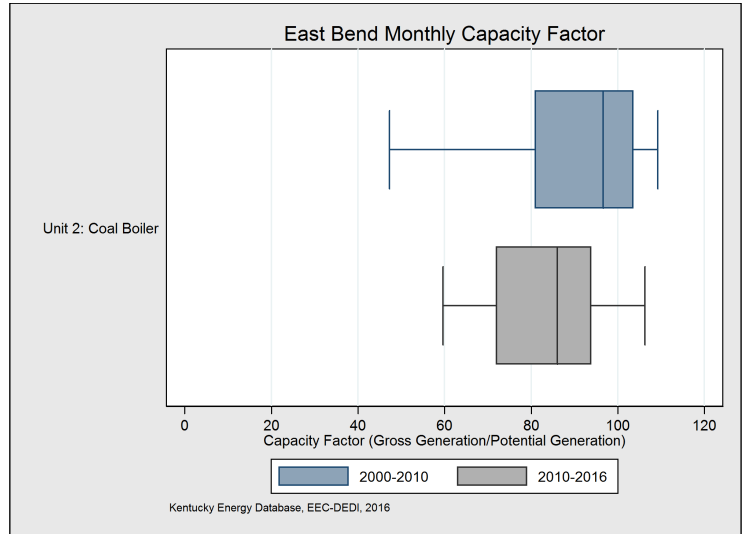
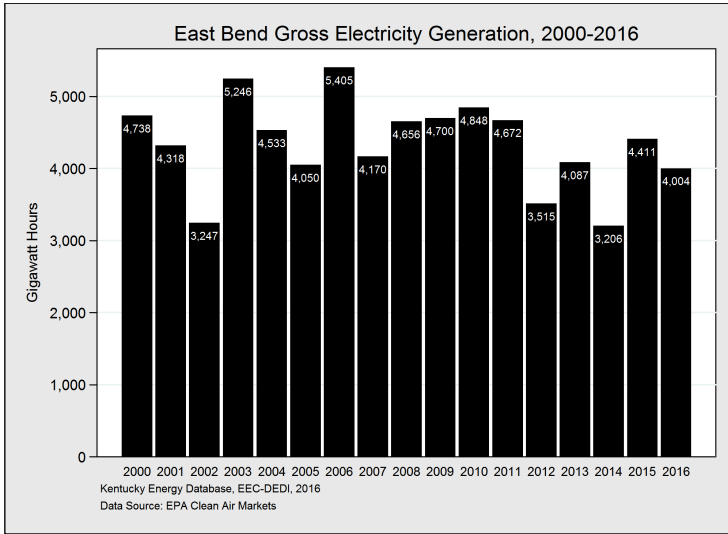


Kentucky Energy Database, EEC-DEDI, 2016  
Data Source: EPA Clean Air Markets

Nitrogen Dioxide	2016 Value	Since 2000
<b>Emissions (Tonnage)</b>	<b>2,258</b>	<b>-77%</b>
<b>Rate (lbs./MWh)</b>	<b>1.78</b>	<b>-56%</b>

The E. W. Brown Generating Station emitted 2,258 tons of NO<sub>x</sub> in 2016, a reduction of 77 percent since 2000. The rate of NO<sub>x</sub> emissions decreased by 56 percent during that period.

# East Bend Generating Station



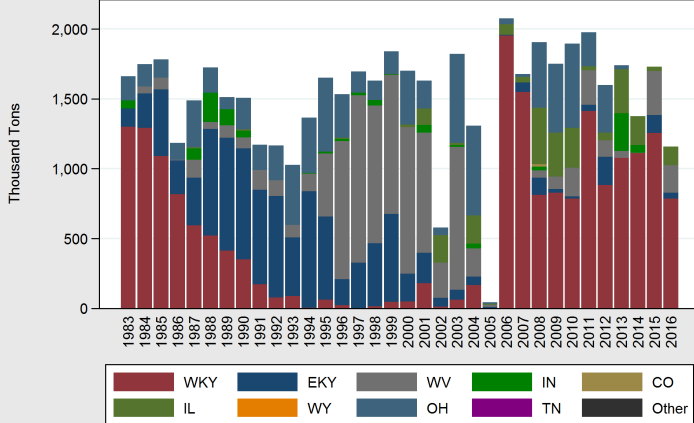
Unit Number	Online Year	Retire Year	Fuel	Capacity (MW)	Capacity Factor* (%)	Gross Generation* (GWh)	Net Generation* (GWh)	CO <sub>2</sub> Rate* (lbs./MWh)	SO <sub>2</sub> Rate* (lbs./MWh)	NO <sub>x</sub> Rate* (lbs./MWh)
Plant	1981		Coal	600	76%	4,004	3,667	2,129	1.33	1.7
2	1981		Coal	600	76%	4,004	3,667	2,129	1.33	1.7

The East Bend Generating Station, located in Boone County, is 36 years old and consists of one coal-fired electricity generating unit. The unit came online in 1981 and has a nameplate capacity of 600 MW. The coal plant is owned by Duke Energy, but was originally constructed and owned jointly by Cincinnati Gas & Electric and Dayton Power & Light. In 2016, the plant generated 4 TWh of electricity and had a capacity factor of 76 percent. After the installation of sulfur dioxide scrubbers in 2005, East Bend began shifting its consumption of low-sulfur coal from West Virginia to that of western Kentucky, which has relatively higher sulfur content but a lower cost. In 2016, East Bend used a mix of coal from western Kentucky, Indiana, and Illinois. The western Kentucky coal East Bend consumed originated in Union and Webster County and was delivered via river barge.

\*2014

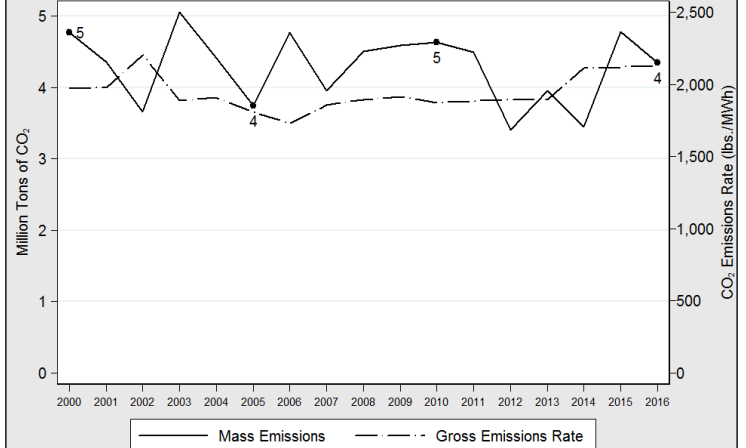
# East Bend Generating Station

East Bend Coal Consumption by Origin, 1983-2016



Kentucky Energy Database, EEC-DEDI, 2015  
Data Source: FERC-423 & EIA-923

East Bend Carbon Dioxide Emissions, 2000-2016



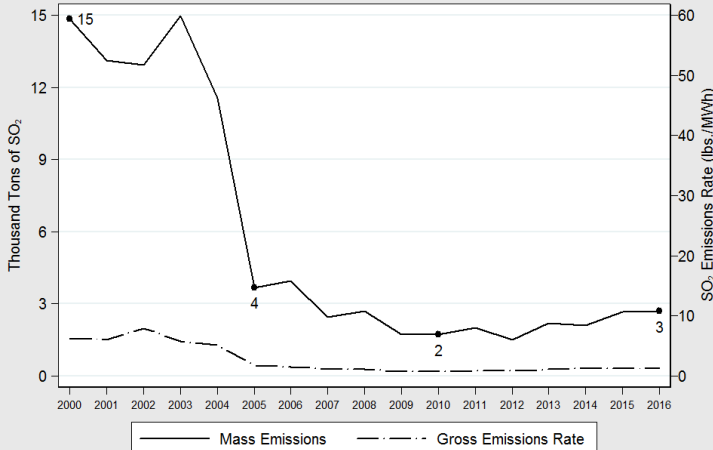
Kentucky Energy Database, EEC-DEDI, 2016  
Data Source: EPA Clean Air Markets

State	2016 Tons	Percentage
<b>Total</b>	<b>1,157,976</b>	<b>100%</b>
Western Kentucky	785,597	68%
Illinois	133,579	12%
West Virginia	196,070	17%
Eastern Kentucky	42,730	4%

Carbon Dioxide	2016 Value	Since 2000
Emissions (Tonnage)	4,261,735	-9%
Rate (lbs./MWh)	2,129	+8%

The East Bend Generating Station emitted 4.2 million tons of CO<sub>2</sub> in 2016, a decrease of 9 percent from 2000 levels. The rate of CO<sub>2</sub> emissions increased by 8 percent during that period.

East Bend Sulfur Dioxide Emissions, 2000-2016

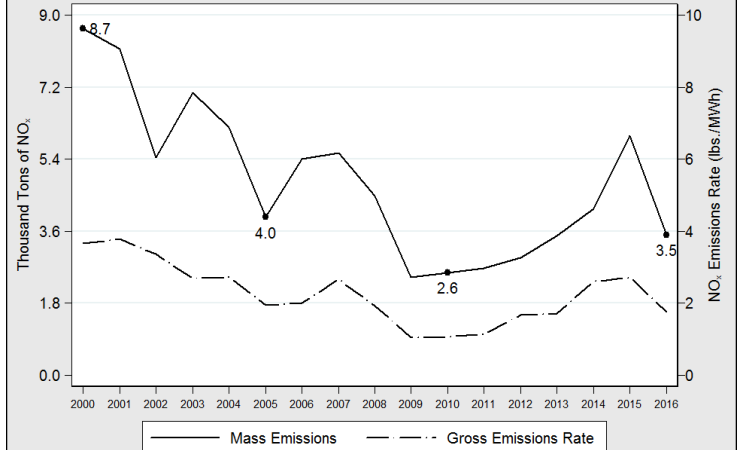


Kentucky Energy Database, EEC-DEDI, 2016  
Data Source: EPA Clean Air Markets

Sulfur Dioxide	2016 Value	Since 2000
Emissions (Tonnage)	2,680	-82%
Rate (lbs./MWh)	1.33	-79%

The East Bend Generating Station emitted 2,680 tons of SO<sub>2</sub> in 2016, a decrease of 82 percent since 2000. The rate of SO<sub>2</sub> emissions reduced by 79 percent during that period.

East Bend Nitrogen Oxide Emissions, 2000-2016

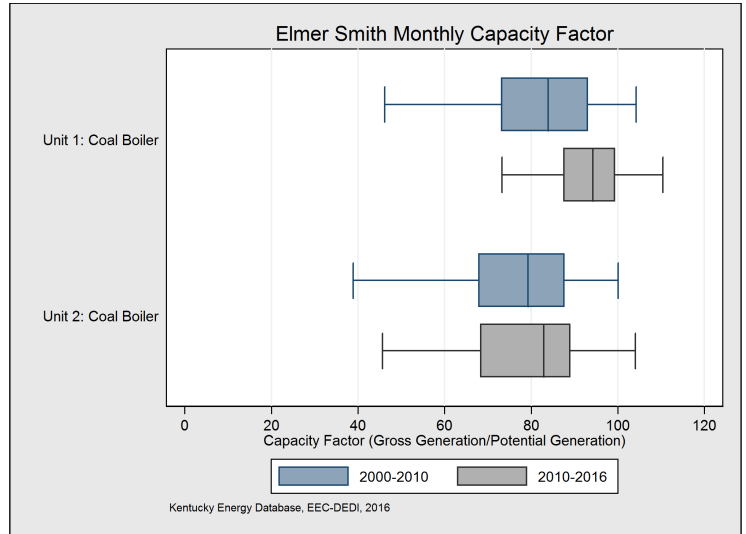
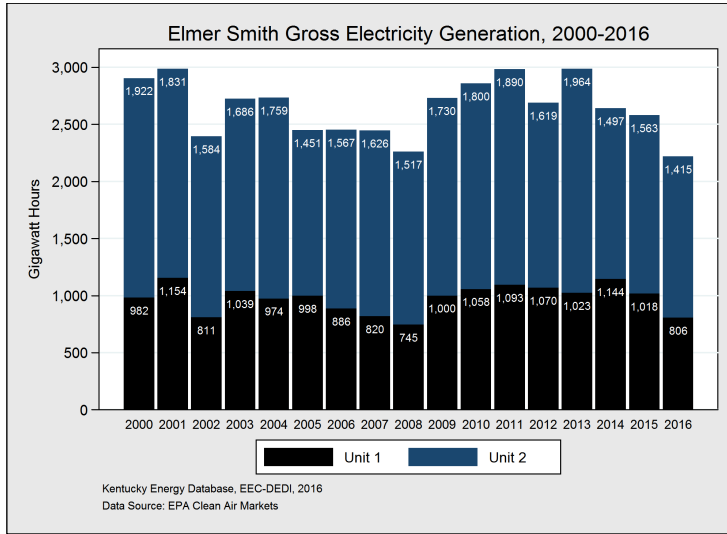


Kentucky Energy Database, EEC-DEDI, 2016  
Data Source: EPA Clean Air Markets

Nitrogen Dioxide	2016 Value	Since 2000
Emissions (Tonnage)	3,512	-60%
Rate (lbs./MWh)	1.7	-52%

The East Bend Generating Station emitted 3,512 tons of NO<sub>x</sub> in 2016, a reduction of 60 percent since 2000. The rate of NO<sub>x</sub> emissions decreased by 52 percent during that period.

# Elmer Smith Station



Unit Number	Online Year	Retire Year	Fuel	Capacity (MW)	Capacity Factor* (%)	Gross Generation* (GWh)	Net Generation* (GWh)	CO <sub>2</sub> Rate* (lbs./MWh)	SO <sub>2</sub> Rate* (lbs./MWh)	NO <sub>x</sub> Rate* (lbs./MWh)
Plant	1964		Coal	401	63%	2,220	2,371	1,969	2.21	2.75
1	1964	2023	Coal	139	66%	805	698	1,998	2.17	2.23
2	1974		Coal	263	61%	1,415	1,257	1,952	2.23	3.05

Elmer Smith Station, located in Henderson County, is 51 years old and consists of two coal-fired electricity generating units, which began operating in 1964 and 1974, respectively. The plant has a total nameplate capacity of 401 MW. In 2016, the plant generated 2.2 GWh of electricity and had a plant-wide capacity factor of 63 percent. The majority of the coal used at Elmer Smith in 2016 was trucked from western Kentucky from Daviess, Muhlenberg, and Ohio counties. In March 2017, Owensboro Municipal Utilities, which operates Elmer Smith, announced Unit 1 would retire by 2023. Elmer Smith Station is owned and operated by Owensboro Municipal Utilities. The picture below is of the Elmer Smith Station taken by Kentucky EEC staff.

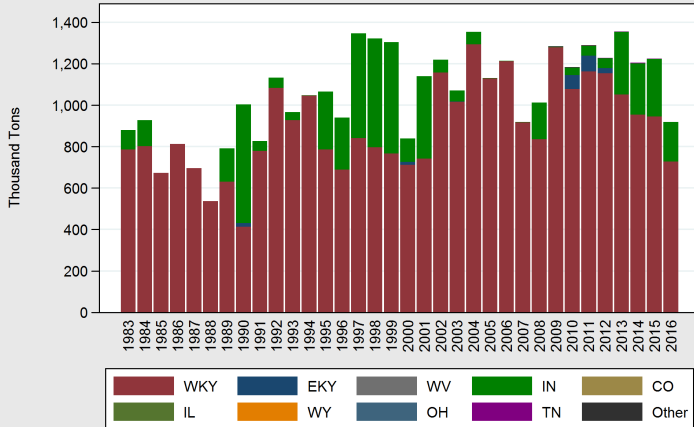


Photo by Kentucky EEC Staff

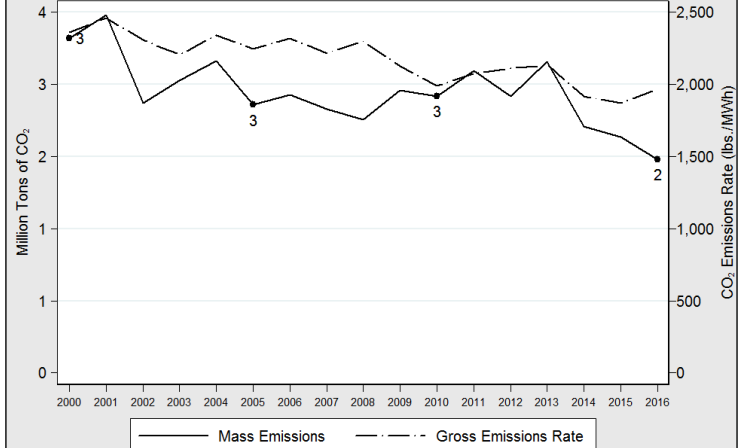
\*2014

# Elmer Smith Station

Elmer Smith Coal Consumption by Origin, 1983-2016



Elmer Smith Carbon Dioxide Emissions, 2000-2016

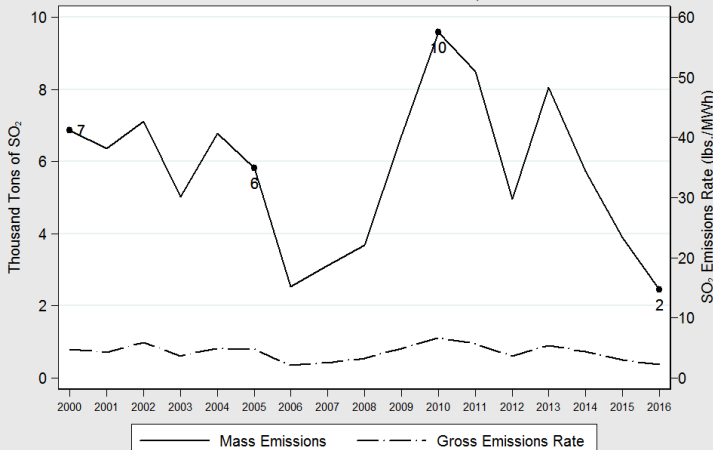


State	2016 Tons	Percentage
Total	919,043	100%
Western Kentucky	727,307	79%
Indiana	191,736	21%

Carbon Dioxide	2016 Value	Since 2000
Emissions (Tonnage)	2,185,616	-36%
Rate (lbs./MWh)	1,969	-17%

Elmer Smith Station emitted 2.1 million tons of CO<sub>2</sub> in 2016, a decrease of 36 percent from 2000 levels. The rate of CO<sub>2</sub> emissions decreased by 17 percent during that period.

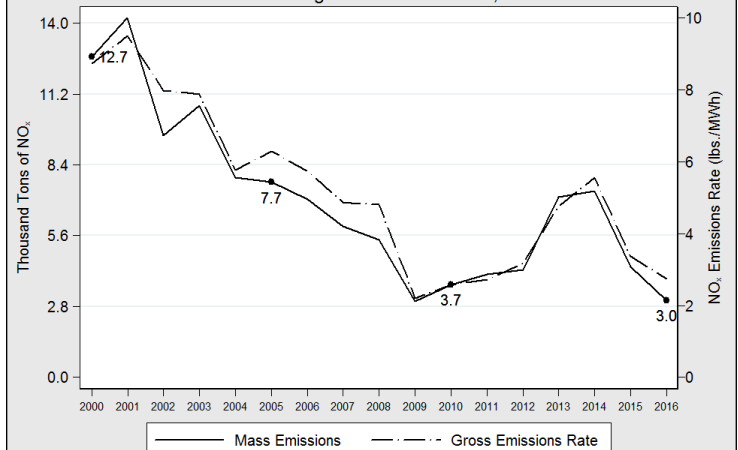
Elmer Smith Sulfur Dioxide Emissions, 2000-2016



Sulfur Dioxide	2016 Value	Since 2000
Emissions (Tonnage)	2,449	-64%
Rate (lbs./MWh)	2.21	-53%

Elmer Smith Station emitted tons of SO<sub>2</sub> in 2016, a decrease of 64 percent since 2000. The rate of SO<sub>2</sub> emissions reduced by 53 percent during that period.

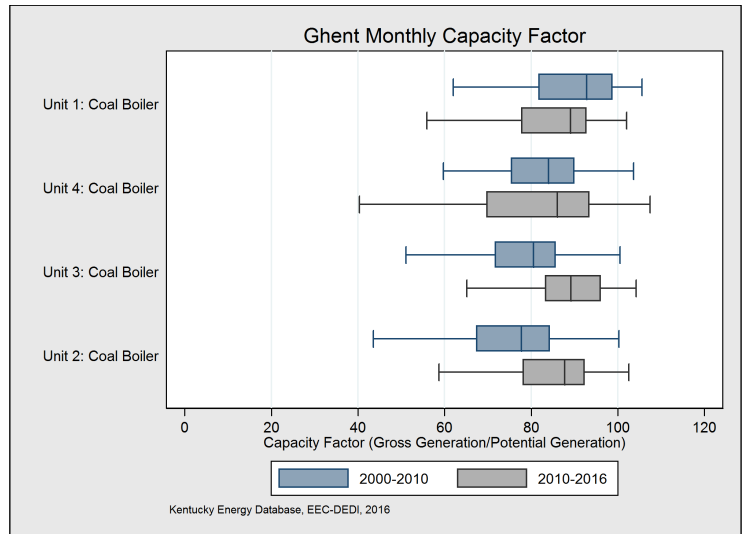
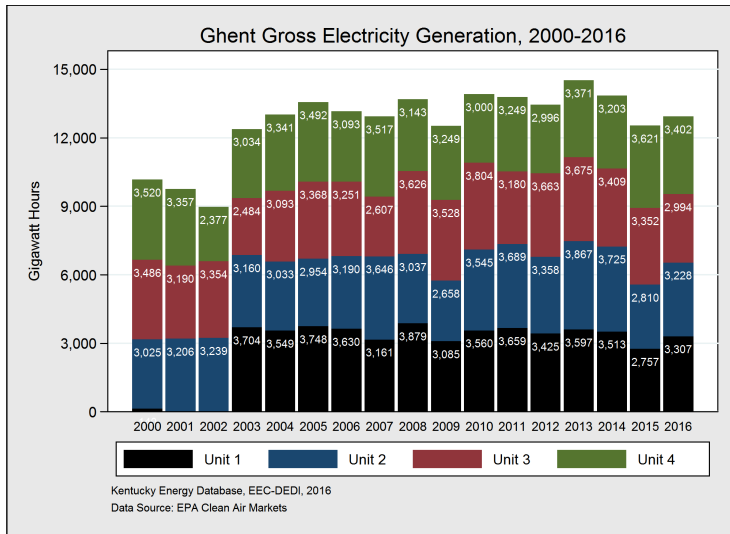
Elmer Smith Nitrogen Oxide Emissions, 2000-2016



Nitrogen Dioxide	2016 Value	Since 2000
Emissions (Tonnage)	3,053	-76%
Rate (lbs./MWh)	2.75	-68%

Elmer Smith Station emitted 3,053 tons of NO<sub>x</sub> in 2016, a reduction of 76 percent since 2000. The rate of NO<sub>x</sub> emissions decreased by 68 percent during that period, but as of 2016 had the highest rate of NO<sub>x</sub> emissions in the state.

# Ghent Generating Station



Unit Number	Online Year	Retire Year	Fuel	Capacity (MW)	Capacity Factor* (%)	Gross Generation* (GWh)	Net Generation* (GWh)	CO <sub>2</sub> Rate* (lbs./MWh)	SO <sub>2</sub> Rate* (lbs./MWh)	NO <sub>x</sub> Rate* (lbs./MWh)
Plant	1973		Coal	1,932	76%	12,931	11,778	1,878	1.57	1.30
1	1974		Coal	479	79%	3,307	3,050	1,984	0.66	0.68
2	1977		Coal	495	74%	3,228	2,971	1,799	2.55	1.95
3	1981		Coal	489	70%	2,994	2,683	1,806	2.04	1.61
4	1984		Coal	469	83%	3,402	3,074	1,915	1.12	1.03

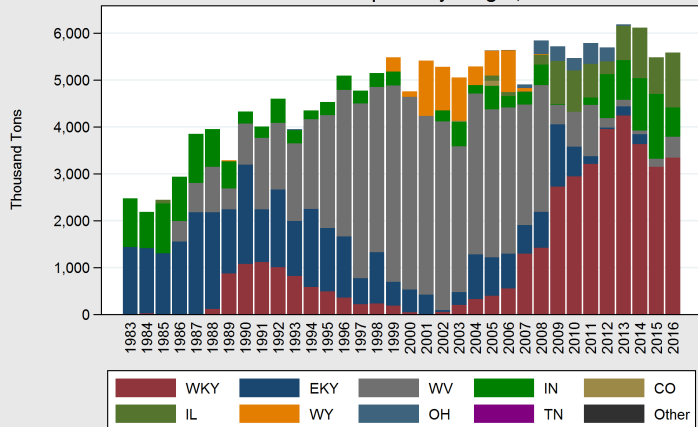
The Ghent Generating Station, located in Carroll County, began operation in 1973 and consists of four coal-fired electricity generating units. The units came online in 1974, 1977, 1981, and 1984, respectively. The plant is owned by Kentucky Utilities and has a total nameplate capacity of 1,932 MW, making it the largest of Kentucky Utilities' electricity plants. In 2016, the plant had a plant-wide capacity factor of 76 percent and generated 12.9 GWh of electricity. All four units at Ghent underwent retrofits to control for sulfur dioxide emissions from 2007 to 2009. The majority of coal consumed by Ghent in 2016 was transported by river barge from the western Kentucky counties: Union, Ohio, Magoffin, McLean, Webster, and Daviess. The plant burned smaller amounts of coal from Indiana, Illinois, West Virginia, and Perry County, in eastern Kentucky. This is a significant change from the 2000s, when it used mostly coal from West Virginia.

\*2014

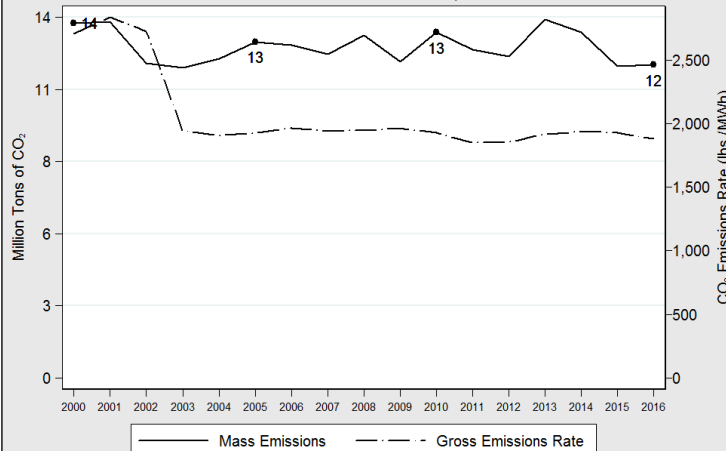


# Ghent Generating Station

Ghent Coal Consumption by Origin, 1983-2016



Ghent Carbon Dioxide Emissions, 2000-2016

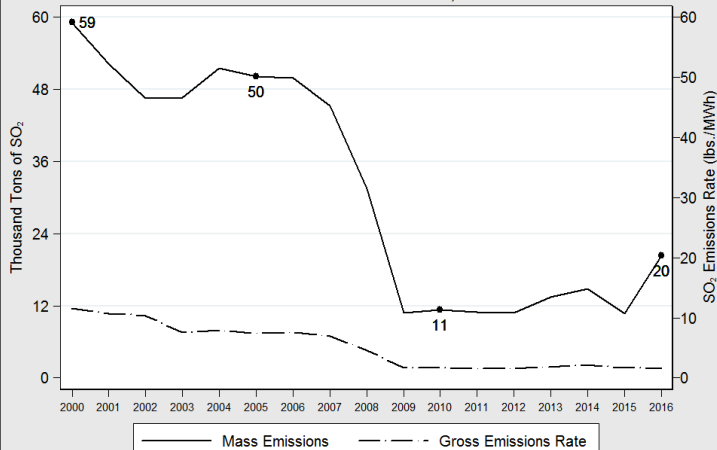


State	2016 Tons	Percentage
<b>Total</b>	<b>5,583,442</b>	<b>100%</b>
Western Kentucky	3,337,685	60%
Indiana	625,127	11%
Illinois	1,174,727	21%
West Virginia	445,903	8%

Carbon Dioxide	2016 Value	Since 2000
Emissions (Tonnage)	12,145,624	-12%
Rate (lbs./MWh)	1,878	-31%

The Ghent Generating Station emitted 12.1 million tons of CO<sub>2</sub> in 2016, a decrease of 12 percent from 2000 levels. The rate of CO<sub>2</sub> emissions decreased by 31 percent during that period.

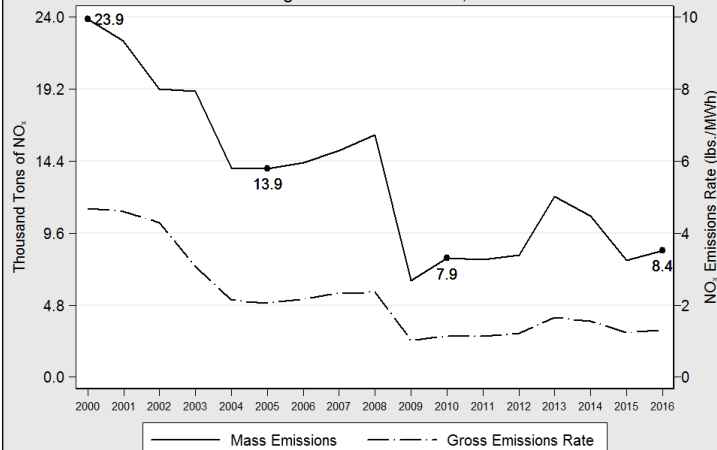
Ghent Sulfur Dioxide Emissions, 2000-2016



Sulfur Dioxide	2016 Value	Since 2000
Emissions (Tonnage)	10,169	-83%
Rate (lbs./MWh)	1.57	-86%

The Ghent Generating Station emitted 10,169 tons of SO<sub>2</sub> in 2016, a decrease of 83 percent since 2000. The rate of SO<sub>2</sub> emissions reduced by 86 percent during that period.

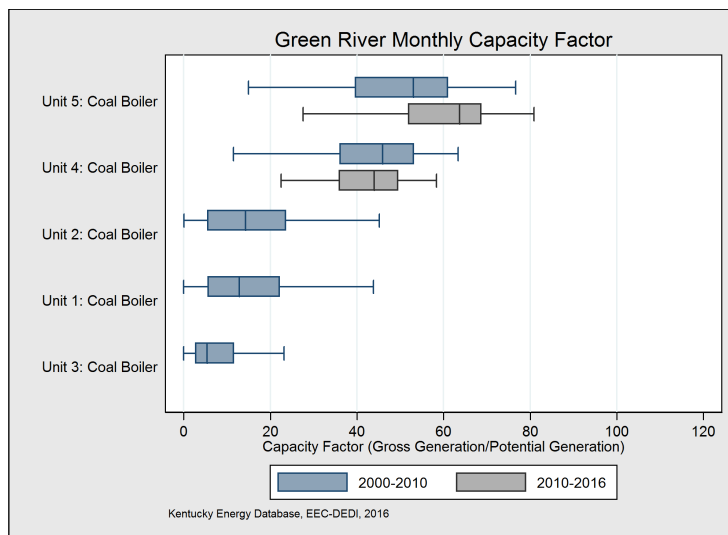
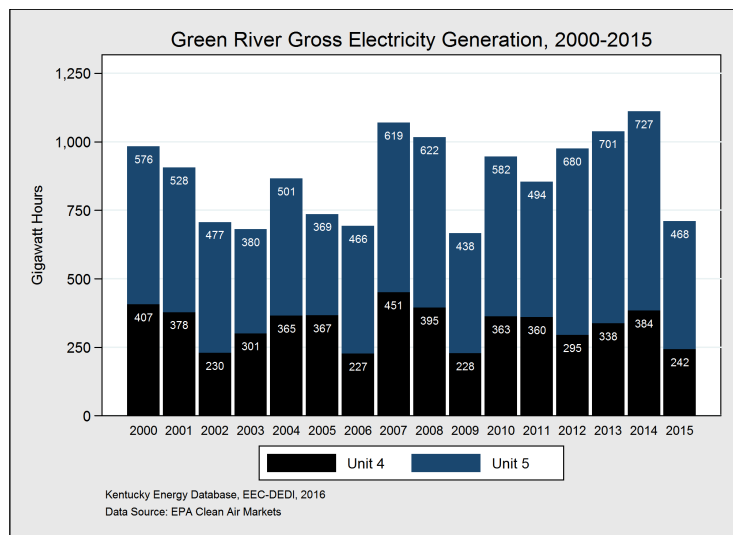
Ghent Nitrogen Oxide Emissions, 2000-2016



Nitrogen Dioxide	2016 Value	Since 2000
Emissions (Tonnage)	8,431	-65%
Rate (lbs./MWh)	1.30	-72%

The Ghent Generating Station emitted 8,431 tons of NO<sub>x</sub> in 2016, a reduction of 65 percent since 2000. The rate of NO<sub>x</sub> emissions decreased by 72 percent since 2000.

# Green River Generating Station



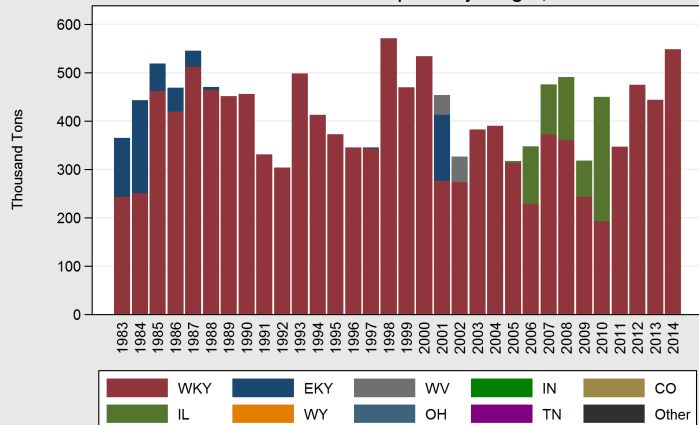
Unit Number	Online Year	Retire Year	Fuel	Capacity (MW)	Capacity Factor* (%)	Gross Generation* (GWh)	Net Generation* (GWh)	CO <sub>2</sub> Rate* (lbs./MWh)	SO <sub>2</sub> Rate* (lbs./MWh)	NO <sub>x</sub> Rate* (lbs./MWh)
Plant	1950	2015	Coal	215	38%	710	656	2,135	39.55	4.54
4	1959	2015	Coal	95	29%	242	222	2,534	46.16	5.40
5	1954	2015	Coal	120	45%	468	434	1,924	36.06	4.08

The Green River Generating Station, located in Muhlenberg County, was 65 years old in 2015 and consisted of two coal-fired electricity generating units. The units have ceased operation and were retired at the end of September 2015. The units came online in 1950 and 1959, respectively. The plant had a total nameplate capacity of 215 MW. In 2015, the plant generated slightly more than 710 GWh of electricity and had a plant-wide capacity factor of 38 percent. Most of the coal burned at Green River has originated in western Kentucky since at least 1990, but the plant has not registered coal deliveries since 2014. Green River Generating Station is owned and operated by Kentucky Utilities.

\*2014

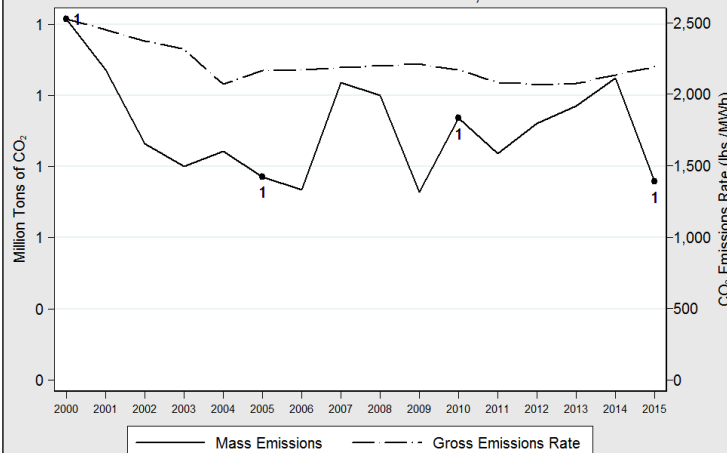
# Green River Generating Station

Green River Coal Consumption by Origin, 1983-2014



Kentucky Energy Database, EEC-DEDI, 2015  
Data Source: FERC-423 & EIA-923

Green River Carbon Dioxide Emissions, 2000-2015



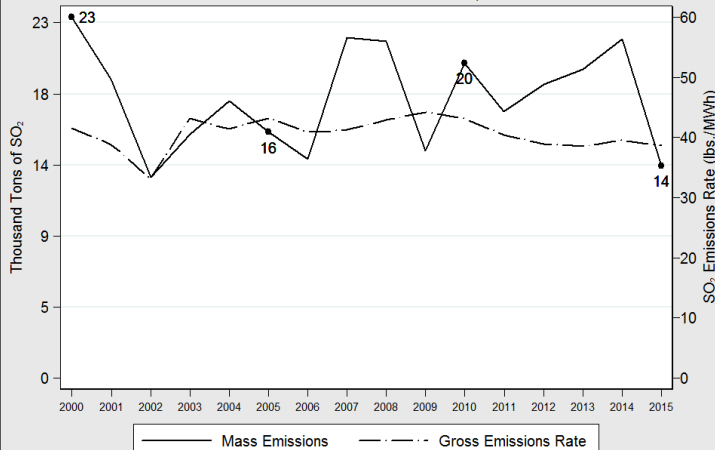
Kentucky Energy Database, EEC-DEDI, 2015  
Data Source: EPA Clean Air Markets

State	2014 Tons	Percentage
Total	548,085	100%
Western Kentucky	548,085	100%

Carbon Dioxide	2015 Value	Since 2000
Emissions (Tonnage)	779,385	-45%
Rate (lbs./MWh)	2,193	-13%

The Green River Generating Station emitted 779 thousand tons of CO<sub>2</sub> in 2016, a decrease of 45 percent from 2000 levels. The rate of CO<sub>2</sub> emissions decreased by 13 percent during that period.

Green River Sulfur Dioxide Emissions, 2000-2015

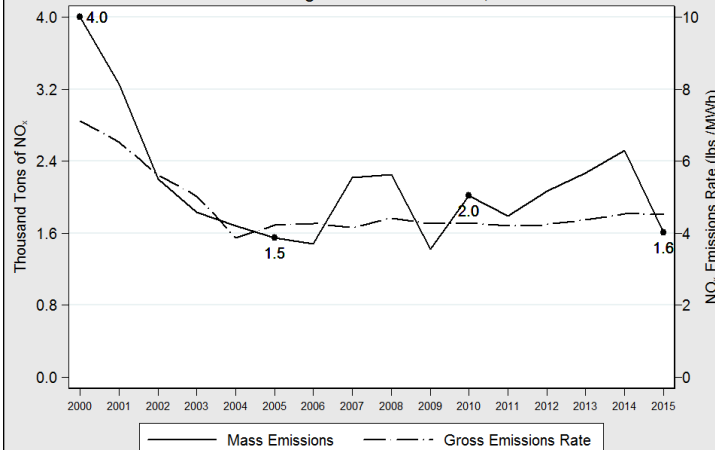


Kentucky Energy Database, EEC-DEDI, 2015  
Data Source: EPA Clean Air Markets

Sulfur Dioxide	2015 Value	Since 2000
Emissions (Tonnage)	13,733	-41%
Rate (lbs./MWh)	38.65	-7%

The Green River Generating Station emitted 13 thousand tons of SO<sub>2</sub> in 2015, a decrease of 41 percent since 2000. The rate of SO<sub>2</sub> emissions reduced by 7 percent during that period.

Green River Nitrogen Oxide Emissions, 2000-2015

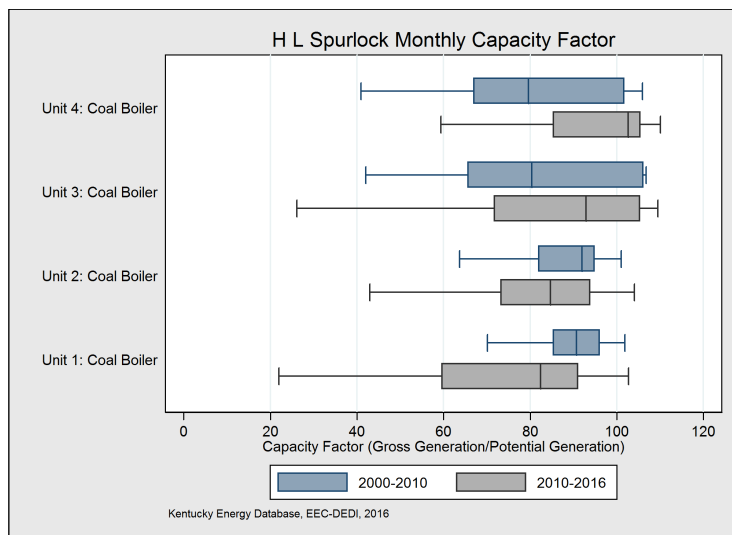
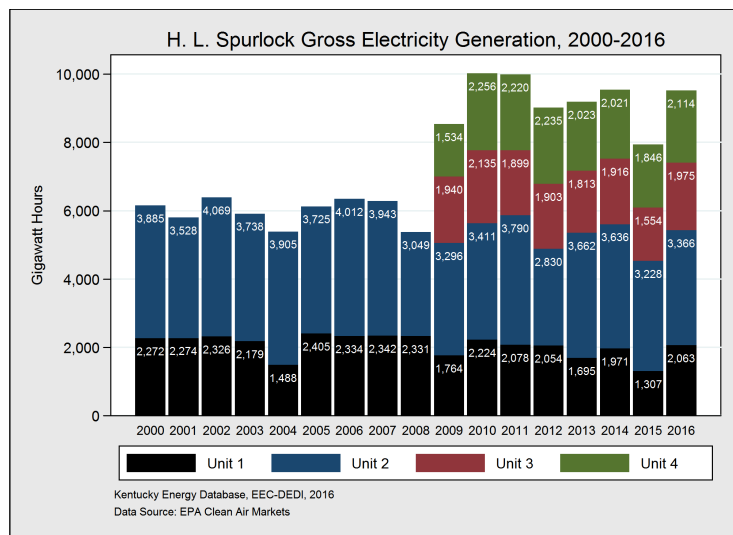


Kentucky Energy Database, EEC-DEDI, 2015  
Data Source: EPA Clean Air Markets

Nitrogen Dioxide	2015 Value	Since 2000
Emissions (Tonnage)	1,607	-60%
Rate (lbs./MWh)	4.52	-36%

The Green River Generating Station emitted 1,607 tons of NO<sub>x</sub> in 2015, a reduction of 60 percent since 2000. The rate of NO<sub>x</sub> emissions decreased by 36 percent during that period.

# H. L. Spurlock Power Station



Unit Number	Online Year	Retire Year	Fuel	Capacity (MW)	Capacity Factor* (%)	Gross Generation* (GWh)	Net Generation* (GWh)	CO <sub>2</sub> Rate* (lbs./MWh)	SO <sub>2</sub> Rate* (lbs./MWh)	NO <sub>x</sub> Rate* (lbs./MWh)
Plant	1977		Coal	1,346	80%	9,518	8,561	1,885	0.98	0.71
1	1977		Coal	300	78%	2,063	1,869	1,963	1.01	0.85
2	1981		Coal	510	75%	3,366	3,084	1,967	0.92	0.87
3	2005		Coal	268	84%	1,975	1,743	1,797	1.22	0.52
4	2008		Coal	268	90%	2,114	1,862	1,759	0.87	0.50

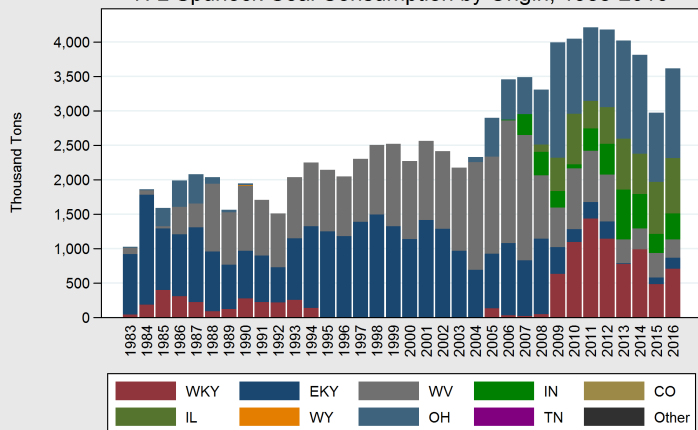
The H. L. Spurlock Power Station, located in Mason County, is 38 years old and consists of four coal-fired electricity generating units. The units came online in 1977, 1981, 2005, and 2009, respectively. Spurlock has a total nameplate capacity of 1,346 MW. In 2016, the plant generated 9.5 GWh of electricity and had a plant-wide capacity factor of 80 percent. To lower sulfur dioxide emissions, desulfurization scrubbers were installed on unit 3 in 2004, on unit 2 in 2008, and on units 1 and 4 in 2009. Spurlock used a mix of coal from Ohio and Union counties in western Kentucky, and from the states of Indiana, Illinois, Ohio, and West Virginia in 2016. From the 1990s through the mid-2000s, Spurlock used a mix of mostly eastern Kentucky and West Virginia coal. Spurlock Power Station is owned and operated by East Kentucky Power Cooperative. Photo courtesy of EKPC.



\*2014

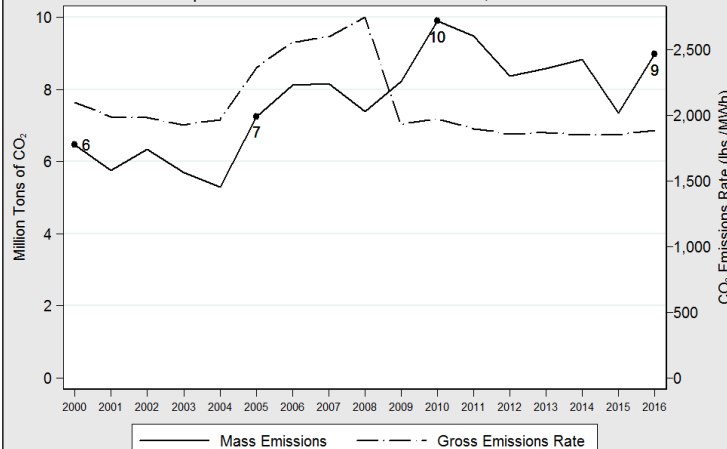
# H. L. Spurlock Power Station

H L Spurlock Coal Consumption by Origin, 1983-2016



Kentucky Energy Database, EEC-DEDI, 2015  
Data Source: FERC-423 & EIA-923

H L Spurlock Carbon Dioxide Emissions, 2000-2016



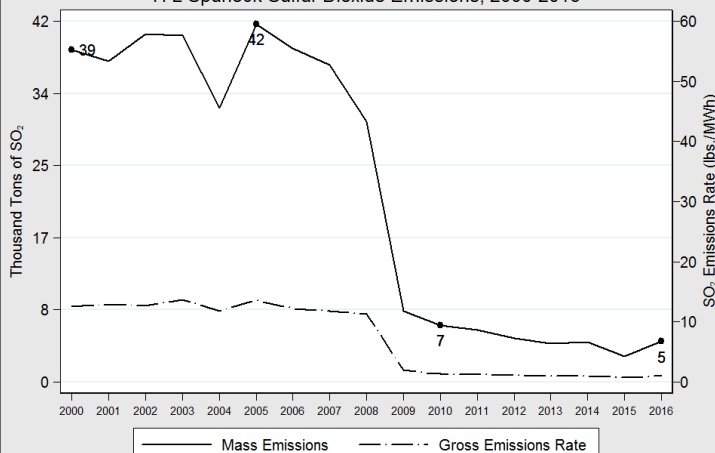
Kentucky Energy Database, EEC-DEDI, 2016  
Data Source: EPA Clean Air Markets

State	2016 Tons	Percentage
<b>Total</b>	<b>3,458,772</b>	<b>100%</b>
Ohio	1,303,640	38%
Western Kentucky	707,438	20%
Illinois	808,124	23%
Indiana	375,799	11%
West Virginia	263,771	8%

Carbon Dioxide	2016 Value	Since 2000
Emissions (Tonnage)	8,968,185	+39%
Rate (lbs./MWh)	1,885	-10%

The H. L. Spurlock Power Station emitted 8.8 million tons of CO<sub>2</sub> in 2016, an increase of 39 percent from 2000 levels. The rate of CO<sub>2</sub> emissions decreased by 10 percent during that period.

H L Spurlock Sulfur Dioxide Emissions, 2000-2016

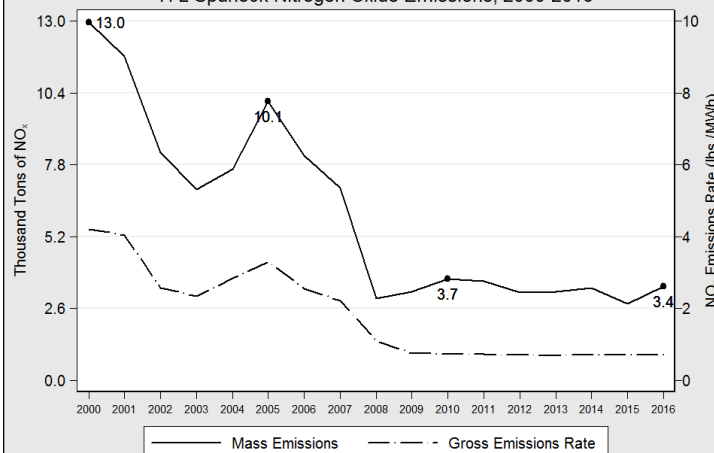


Kentucky Energy Database, EEC-DEDI, 2016  
Data Source: EPA Clean Air Markets

Sulfur Dioxide	2016 Value	Since 2000
Emissions (Tonnage)	4,702	-88%
Rate (lbs./MWh)	0.98	-92%

The H. L. Spurlock Power Station emitted 4,702 tons of SO<sub>2</sub> in 2016, a decrease of 88 percent since 2000. The rate of SO<sub>2</sub> emissions reduced by 92 percent during that period and now has the second lowest rate of SO<sub>2</sub> emissions in the Commonwealth.

H L Spurlock Nitrogen Oxide Emissions, 2000-2016

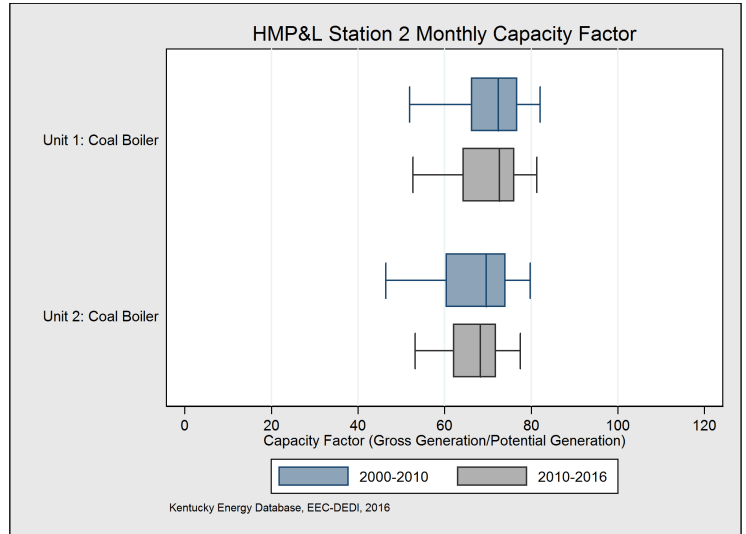
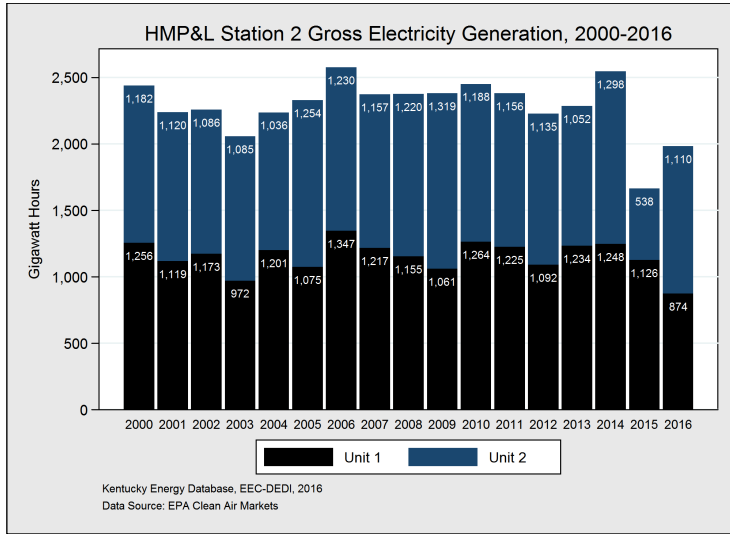


Kentucky Energy Database, EEC-DEDI, 2016  
Data Source: EPA Clean Air Markets

Nitrogen Dioxide	2016 Value	Since 2000
Emissions (Tonnage)	3,398	-74%
Rate (lbs./MWh)	0.71	-83%

The H. L. Spurlock Power Station emitted 3,398 tons of NO<sub>x</sub> in 2016, a reduction of 74 percent since 2000. The rate of NO<sub>x</sub> emissions decreased by 83 percent during that period.

# Henderson Station



Unit Number	Online Year	Retire Year	Fuel	Capacity (MW)	Capacity Factor* (%)	Gross Generation* (GWh)	Net Generation* (GWh)	CO <sub>2</sub> Rate* (lbs./MWh)	SO <sub>2</sub> Rate* (lbs./MWh)	NO <sub>x</sub> Rate* (lbs./MWh)
Plant	1973		Coal	405	55%	1,984	1,779	2,076	2.22	1.97
1	1973		Coal	200	49%	874	781	1,973	2.18	2.26
2	1974		Coal	205	62%	1,110	998	2,158	2.25	1.76

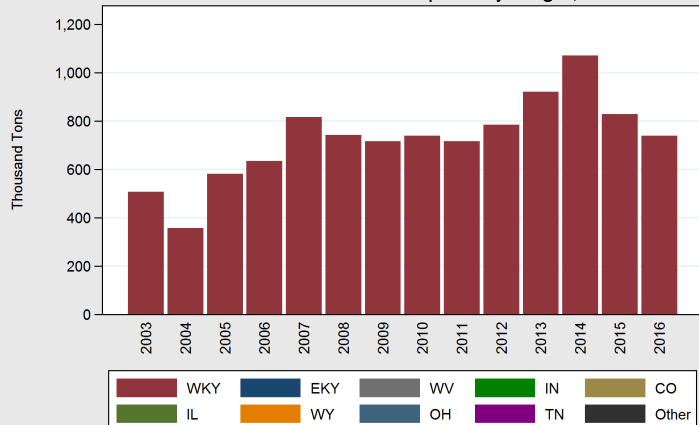
Henderson Municipal Power and Light (HMP&L) Station 2, located in Webster County, is 42 years old, and consists of two coal-fired electricity generating units. The plant is owned by Henderson Municipal Power & Light, is operated by Big Rivers Electric Corporation, and its units came online in 1973 and 1974, respectively. The plant has a total nameplate capacity of 405 MW. In 2016, the plant generated 1.9 GWh of electricity and had a plant -wide capacity factor of 55 percent. HMP&L used only coal from western Kentucky in 2016, primarily trucked from Hopkins and Webster counties, just as it has since at least 2003.

\*2014



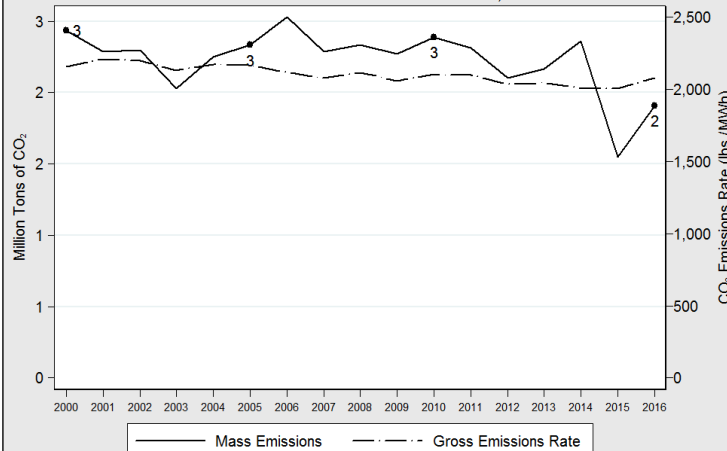
# Henderson Station

HMP&L Station 2 Coal Consumption by Origin, 2003-2016



Kentucky Energy Database, EEC-DEDI, 2015  
Data Source: FERC-423 & EIA-923

HMP&L Station 2 Carbon Dioxide Emissions, 2000-2016



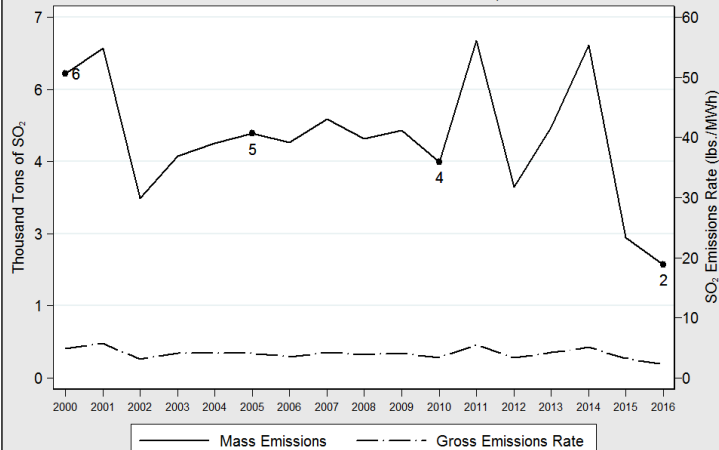
Kentucky Energy Database, EEC-DEDI, 2016  
Data Source: EPA Clean Air Markets

State	2016 Tons	Percentage
<b>Total</b>	<b>739,302</b>	<b>100%</b>
<b>Western Kentucky</b>	<b>739,302</b>	<b>100%</b>

Carbon Dioxide	2016 Value	Since 2000
Emissions (Tonnage)	2,060,433	-22%
Rate (lbs./MWh)	2,076	-4%

Henderson Station emitted 2 million tons of CO<sub>2</sub> in 2016, a decrease of 22 percent from 2000 levels. The rate of CO<sub>2</sub> emissions decreased by 4 percent during that period.

HMP&L Station 2 Sulfur Dioxide Emissions, 2000-2016

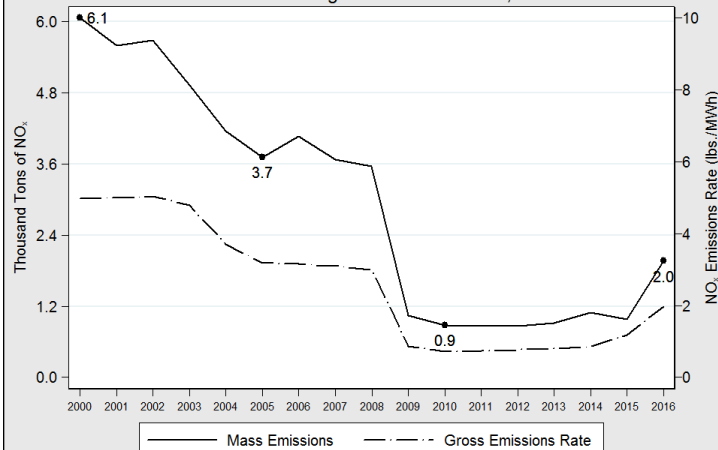


Kentucky Energy Database, EEC-DEDI, 2016  
Data Source: EPA Clean Air Markets

Sulfur Dioxide	2016 Value	Since 2000
Emissions (Tonnage)	2,198	-63%
Rate (lbs./MWh)	2.22	-54%

Henderson Station emitted 6,459 tons of SO<sub>2</sub> in 2016, a decrease of 63 percent since 2000. The rate of SO<sub>2</sub> emissions decreased by 54 percent during that period.

HMP&L Station 2 Nitrogen Oxide Emissions, 2000-2016

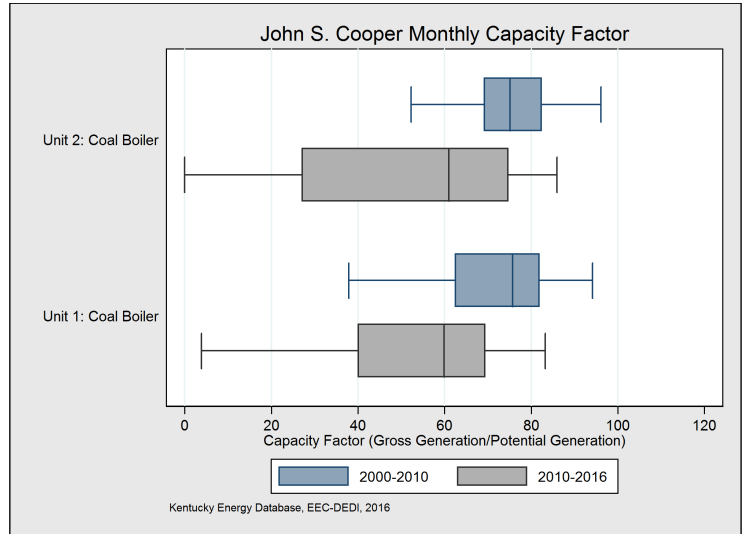
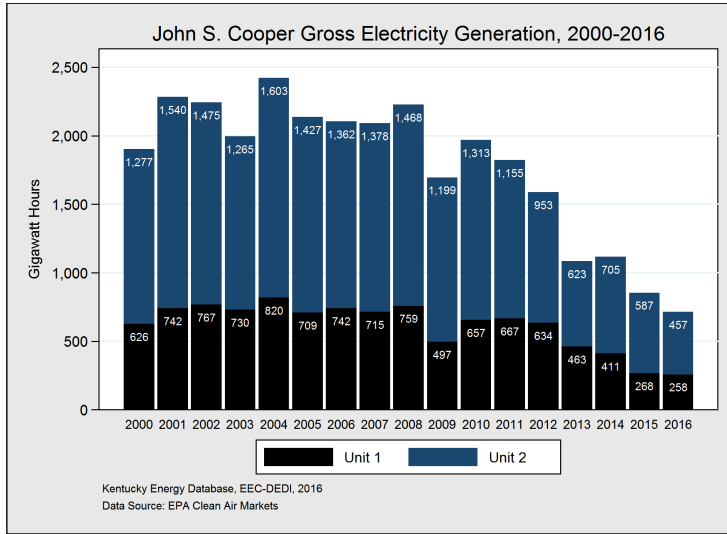


Kentucky Energy Database, EEC-DEDI, 2016  
Data Source: EPA Clean Air Markets

Nitrogen Dioxide	2016 Value	Since 2000
Emissions (Tonnage)	1,960	-68%
Rate (lbs./MWh)	1.97	-60%

Henderson Station emitted 1,960 tons of NO<sub>x</sub> in 2016, a reduction of 68 percent since 2000. The rate of NO<sub>x</sub> emissions decreased by 60 percent during that period.

# John S. Cooper Power Station



Unit Number	Online Year	Retire Year	Fuel	Capacity (MW)	Capacity Factor* (%)	Gross Generation* (GWh)	Net Generation* (GWh)	CO <sub>2</sub> Rate* (lbs./MWh)	SO <sub>2</sub> Rate* (lbs./MWh)	NO <sub>x</sub> Rate* (lbs./MWh)
Plant	1965		Coal	341	24%	715	643	2,018	0.9	1.56
1	1965		Coal	116	25%	258	238	2,040	1.75	2.36
2	1969		Coal	225	23%	457	405	2,006	0.41	1.12

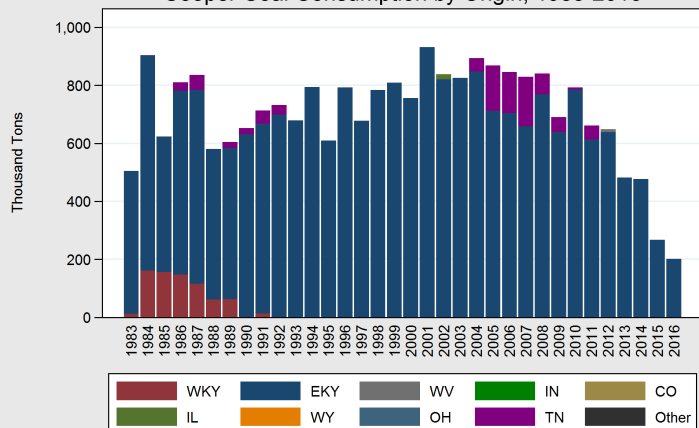
The John Sherman Cooper Power Station, located in Pulaski County, is 50 years old and consists of two coal-fired electricity generating units. The units came online in 1965 and 1969, respectively. The plant has a total nameplate capacity of 341 MW. In 2016, the plant generated 0.7 GWh of electricity and had a plant-wide capacity factor of 24 percent. A scrubber was installed on unit 2 in 2012 to lower sulfur dioxide emissions and a baghouse. Cooper sourced all of its coal from eastern Kentucky in 2016 from Perry, Leslie, Bell, Estill, Rockcastle, and Knox counties. John S. Cooper Power Station is owned and operated by East Kentucky Power Cooperative. Photo courtesy of EKPC.

\*2016



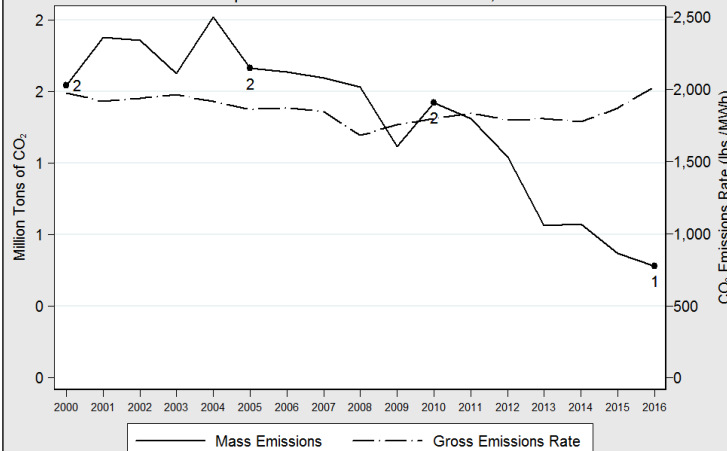
# John S. Cooper Power Station

Cooper Coal Consumption by Origin, 1983-2016



Kentucky Energy Database, EEC-DEDI, 2015  
Data Source: FERC-423 & EIA-923

John S. Cooper Carbon Dioxide Emissions, 2000-2016



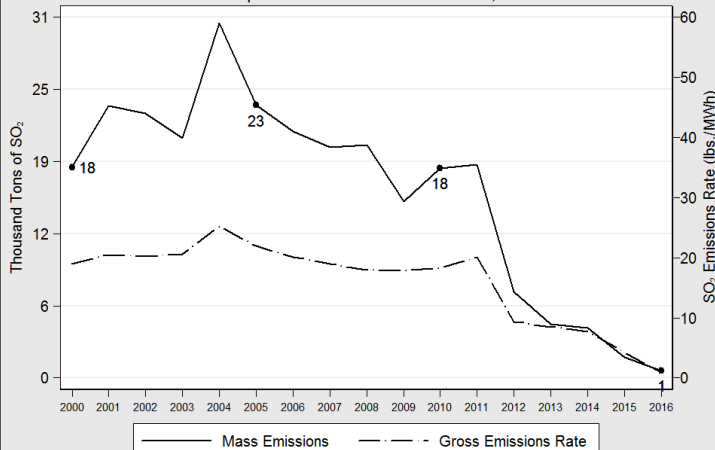
Kentucky Energy Database, EEC-DEDI, 2016  
Data Source: EPA Clean Air Markets

State	2016 Tons	Percentage
Total	201,900	100%
Eastern Kentucky	201,900	100%

Carbon Dioxide	2016 Value	Since 2000
Emissions (Tonnage)	721,551	-62%
Rate (lbs./MWh)	2,018	-2%

The John S. Cooper Power Station emitted 721 thousand tons of CO<sub>2</sub> in 2016, a decrease of 62 percent from 2000 levels. The rate of CO<sub>2</sub> emissions decreased by 2 percent during that period.

John S. Cooper Sulfur Dioxide Emissions, 2000-2016

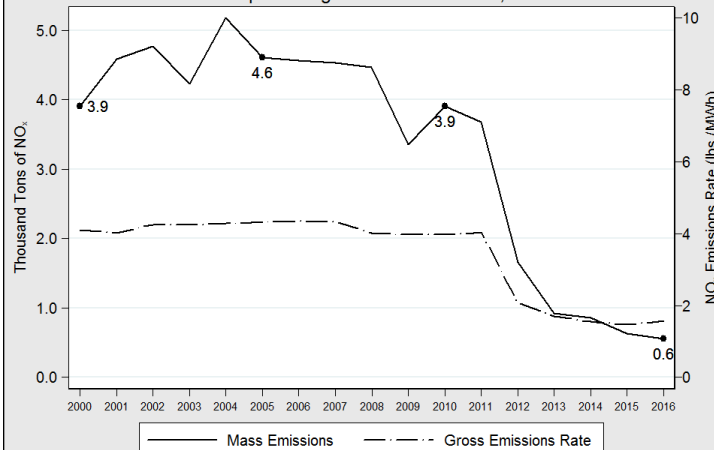


Kentucky Energy Database, EEC-DEDI, 2016  
Data Source: EPA Clean Air Markets

Sulfur Dioxide	2016 Value	Since 2000
Emissions (Tonnage)	320	-98%
Rate (lbs./MWh)	0.9	-95%

The John S. Cooper Power Station emitted 320 tons of SO<sub>2</sub> in 2016, a decrease of 98 percent since 2000. The rate of SO<sub>2</sub> emissions reduced by 95 percent during that period.

John S. Cooper Nitrogen Oxide Emissions, 2000-2016

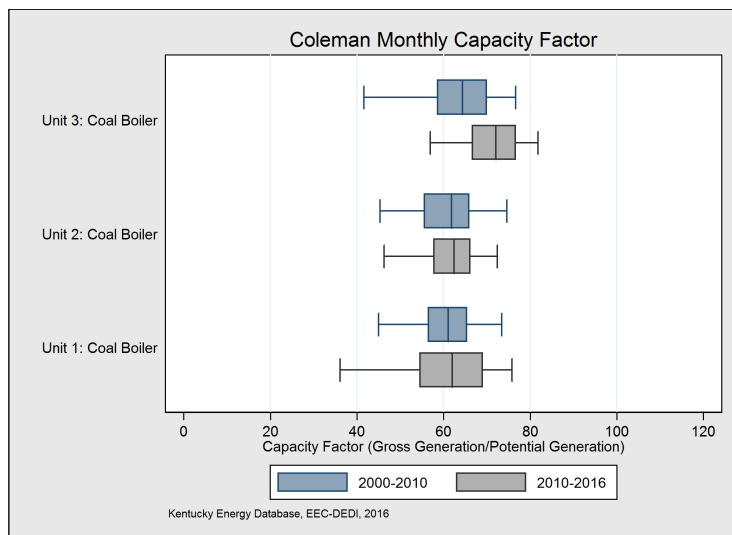
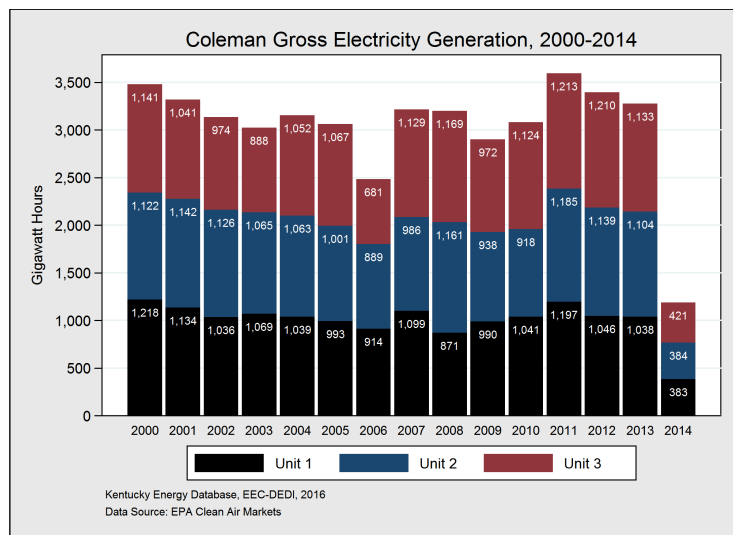


Kentucky Energy Database, EEC-DEDI, 2016  
Data Source: EPA Clean Air Markets

Nitrogen Dioxide	2016 Value	Since 2000
Emissions (Tonnage)	559	-86%
Rate (lbs./MWh)	1.56	-62%

The John S. Cooper Power Station emitted 559 tons of NO<sub>x</sub> in 2016, a reduction of 86 percent since 2000. The rate of NO<sub>x</sub> emissions decreased by 62 percent during that period.

# Kenneth C. Coleman Station



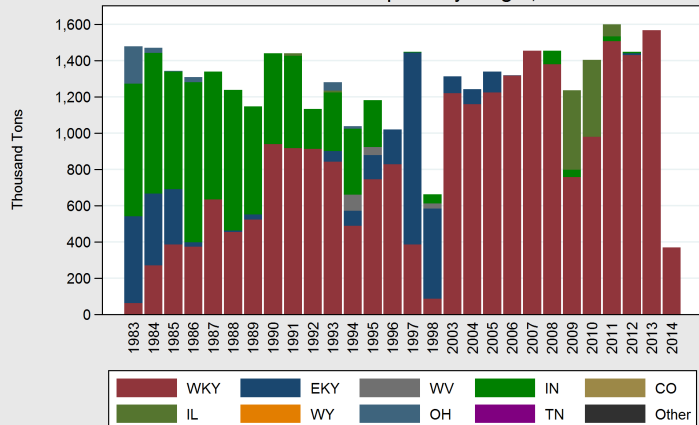
Unit Number	Online Year	Retire Year	Fuel	Capacity (MW)	Capacity Factor* (%)	Gross Generation* (GWh)	Net Generation* (GWh)	CO <sub>2</sub> Rate* (lbs./MWh)	SO <sub>2</sub> Rate* (lbs./MWh)	NO <sub>x</sub> Rate* (lbs./MWh)
Plant	1969	Idled	Coal	602	23%	1,188	1,065	2,086	1.56	3.62
1	1969	Idled	Coal	205	21%	383	349	2,080	1.50	3.58
2	1970	Idled	Coal	205	21%	384	328	2,074	1.58	3.61
3	1971	Idled	Coal	192	25%	421	388	2,103	1.58	3.68

Kenneth C. Coleman Station, located in Hawesville in Hancock County, is 46 years old and consists of three coal-fired electricity generating units. The plant is owned by Big Rivers Electric Corporation and its units came online in 1969, 1970, and 1971, respectively. Coleman is currently idled, and has not produced electricity since May 2014. The plant has a total nameplate capacity of 602 MW. In 2014, the plant generated 1.2 GWh of electricity and had a plant-wide capacity factor of 23 percent. Coleman had upgrades to control the release of pollutants in 2005, which has greatly reduced plant-wide emissions of sulfur dioxide. The plant exclusively used coal from Muhlenberg, Union, and Webster counties in western Kentucky in 2014, and the region has been the major source of its coal for the past decade.

\*2014

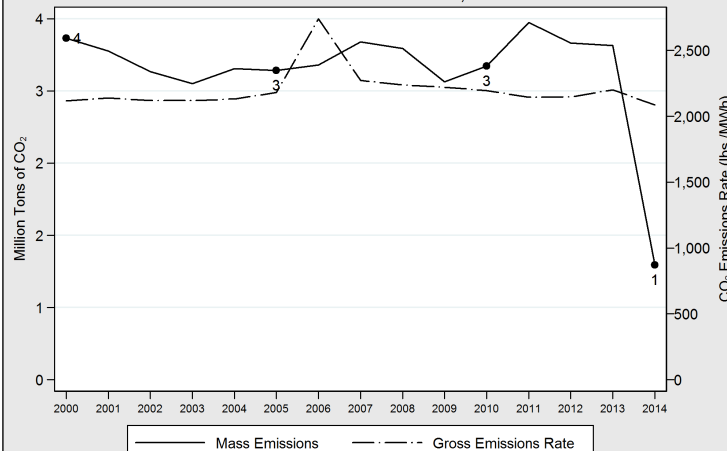
# Kenneth C. Coleman Station

Coleman Coal Consumption by Origin, 2003-2016



Kentucky Energy Database, EEC-DEDI, 2015  
Data Source: FERC-423 & EIA-923

Coleman Carbon Dioxide Emissions, 2000-2014



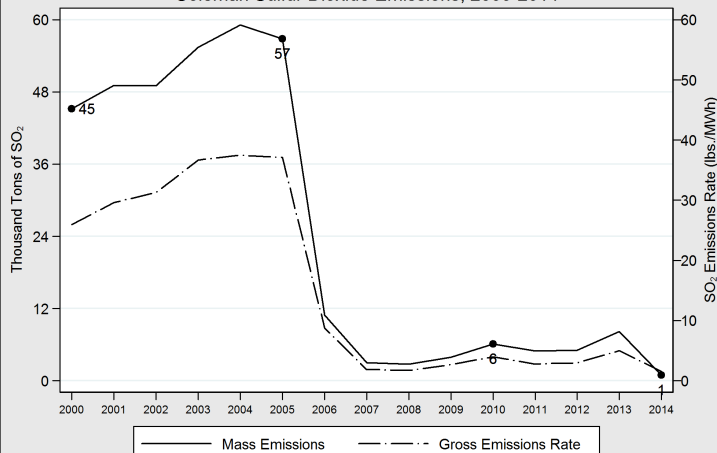
Kentucky Energy Database, EEC-DEDI, 2015  
Data Source: EPA Clean Air Markets

State	2014 Tons	Percentage
Total	369,730	100%
Western Kentucky	369,730	100%

Carbon Dioxide	2014 Value	Since 2000
Emissions (Tonnage)	1,238,322	-66%
Rate (lbs./MWh)	2,086	-2%

The Kenneth C. Coleman Station emitted 1.2 million tons of CO<sub>2</sub> in 2014, a decrease of 66 percent from 2000 levels. The rate of CO<sub>2</sub> emissions decreased by 2 percent over the same period.

Coleman Sulfur Dioxide Emissions, 2000-2014

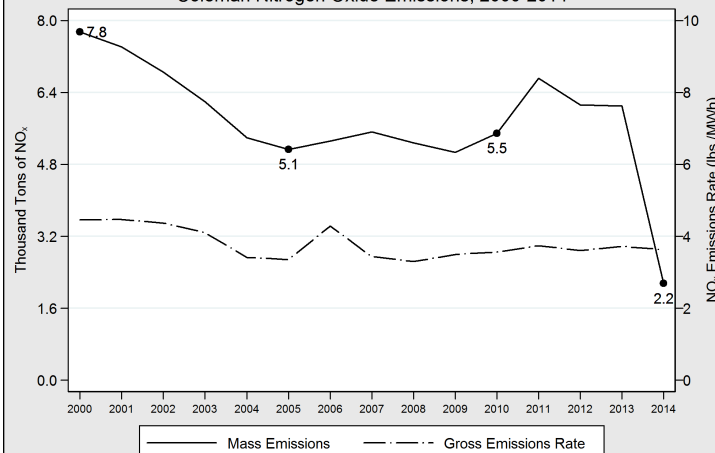


Kentucky Energy Database, EEC-DEDI, 2015  
Data Source: EPA Clean Air Markets

Sulfur Dioxide	2014 Value	Since 2000
Emissions (Tonnage)	923	-98%
Rate (lbs./MWh)	1.56	-94%

The Kenneth C. Coleman Station emitted 923 tons of SO<sub>2</sub> in 2014, a decrease of 98 percent since 2000. The rate of SO<sub>2</sub> emissions decreased by 81 percent during that period.

Coleman Nitrogen Oxide Emissions, 2000-2014

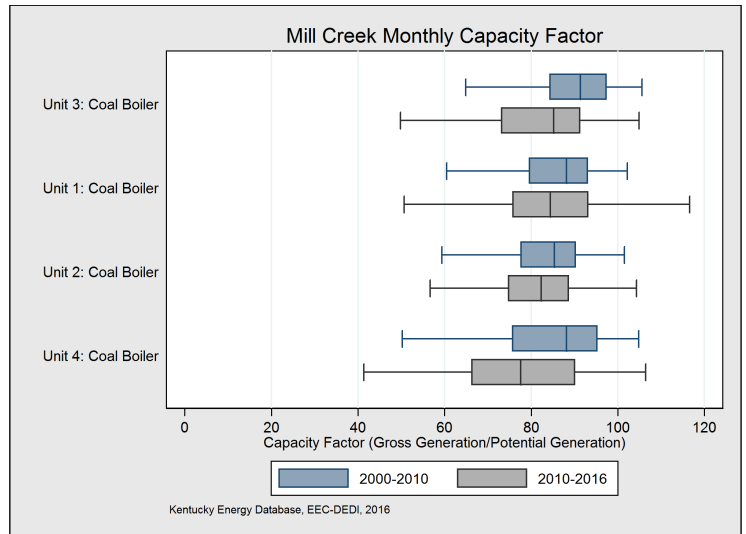
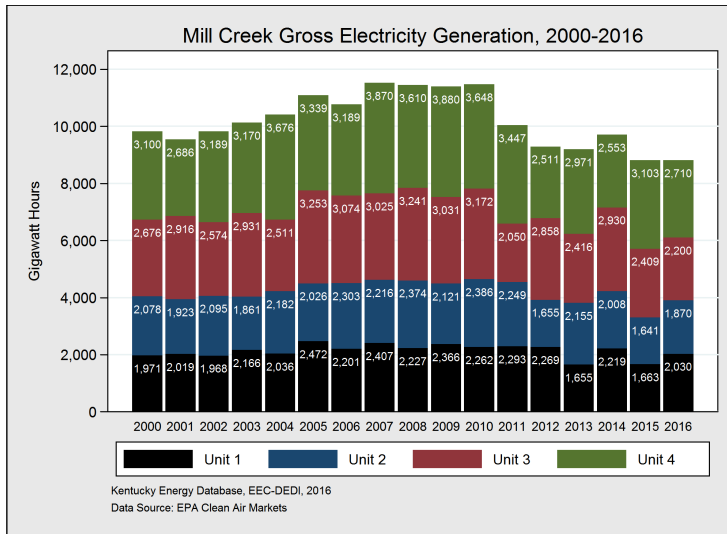


Kentucky Energy Database, EEC-DEDI, 2015  
Data Source: EPA Clean Air Markets

Nitrogen Dioxide	2014 Value	Since 2000
Emissions (Tonnage)	2,152	-72%
Rate (lbs./MWh)	3.62	-19%

The Kenneth C. Coleman Station emitted 2,152 tons of NO<sub>x</sub> in 2014, a reduction of 72 percent since 2000. The rate of NO<sub>x</sub> emissions decreased by 19 percent during that period.

# Mill Creek Generating Station



Unit Number	Online Year	Retire Year	Fuel	Capacity (MW)	Capacity Factor* (%)	Gross Generation* (GWh)	Net Generation* (GWh)	CO <sub>2</sub> Rate* (lbs./MWh)	SO <sub>2</sub> Rate* (lbs./MWh)	NO <sub>x</sub> Rate* (lbs./MWh)
Plant	1972		Coal	1,472	68%	8,810	7,930	1,898	0.98	1.56
1	1972		Coal	303	77%	2,030	1,802	1,831	0.54	2.63
2	1974		Coal	301	71%	1,870	1,652	1,827	0.58	2.63
3	1978		Coal	391	64%	2,200	2,007	1,952	2.05	0.78
4	1982		Coal	477	65%	2,710	2,469	1,953	0.72	0.66

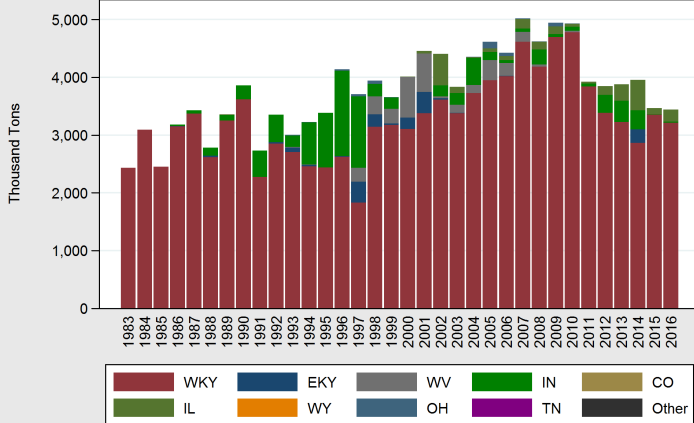
The Mill Creek Generating Station, located in Jefferson County, is 43 years old and consists of four coal-fired electricity generating units. The units came online in 1972, 1974, 1978, and 1982, respectively and are owned by Louisville Gas & Electric. The plant has a total nameplate capacity of 1,472 MW and is the third-largest power plant in Kentucky by capacity. In 2016, Mill Creek had a plant-wide capacity factor of 68 percent and generated 8.8 GWh of electricity, third most of all power plants in Kentucky. The majority of Mill Creek's coal came from western Kentucky in 2016 from Webster, Ohio, Union, McLean, and Hopkins counties.

\*2014



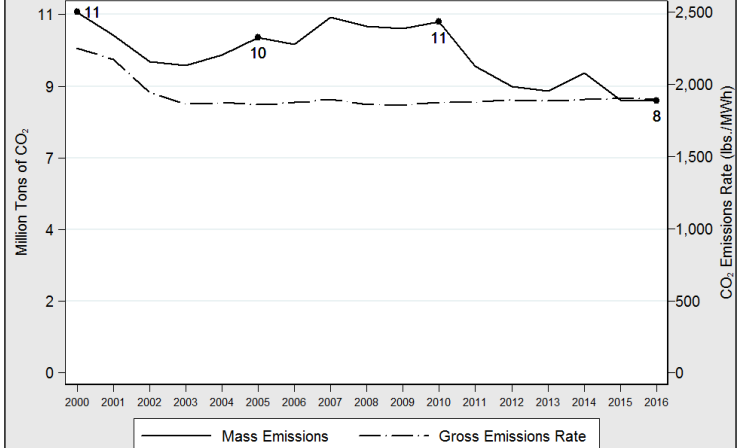
# Mill Creek Generating Station

Mill Creek Coal Consumption by Origin, 1983-2016



Kentucky Energy Database, EEC-DEDI, 2015  
Data Source: FERC-423 & EIA-923

Mill Creek Carbon Dioxide Emissions, 2000-2016



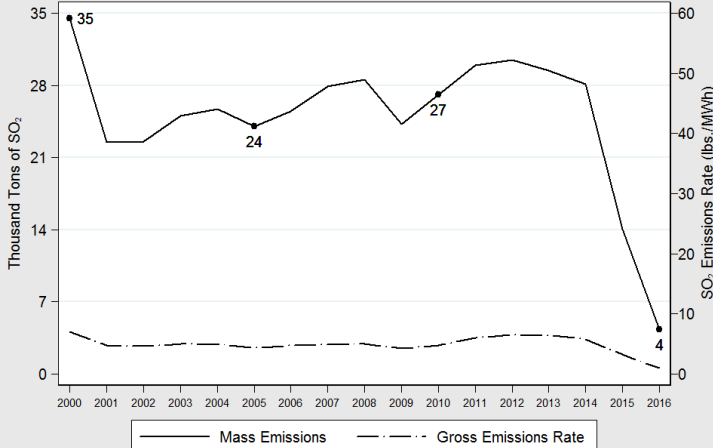
Kentucky Energy Database, EEC-DEDI, 2016  
Data Source: EPA Clean Air Markets

State	2016 Tons	Percentage
<b>Total</b>	<b>3,439,756</b>	<b>100%</b>
Western Kentucky	3,212,895	93%
Indiana	17,804	1%
Illinois	209,057	6%

Carbon Dioxide	2016 Value	Since 2000
Emissions (Tonnage)	8,361,459	-24%
Rate (lbs./MWh)	1,898	-16%

The Mill Creek Generating Station emitted 8.3 million tons of CO<sub>2</sub> in 2016, a decrease of 24 percent from 2000 levels. The rate of CO<sub>2</sub> emissions decreased by 16 percent during that period.

Mill Creek Sulfur Dioxide Emissions, 2000-2016

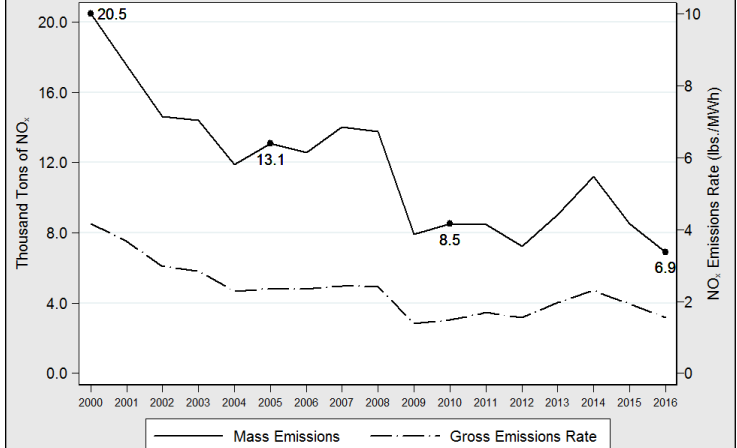


Kentucky Energy Database, EEC-DEDI, 2016  
Data Source: EPA Clean Air Markets

Sulfur Dioxide	2016 Value	Since 2000
Emissions (Tonnage)	4,335	-87%
Rate (lbs./MWh)	.98	-86%

The Mill Creek Generating Station emitted 4 thousand tons of SO<sub>2</sub> in 2016, a decrease of 87 percent since 2000. The rate of SO<sub>2</sub> emissions reduced by 86 percent during that period.

Mill Creek Nitrogen Oxide Emissions, 2000-2016

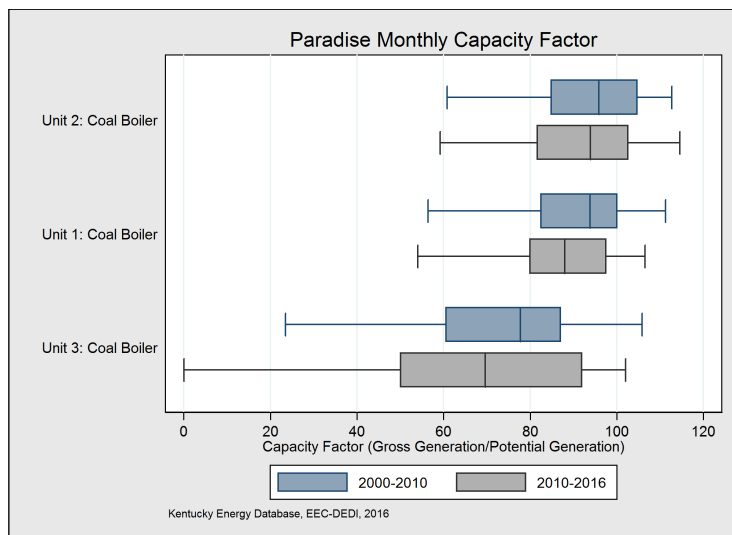
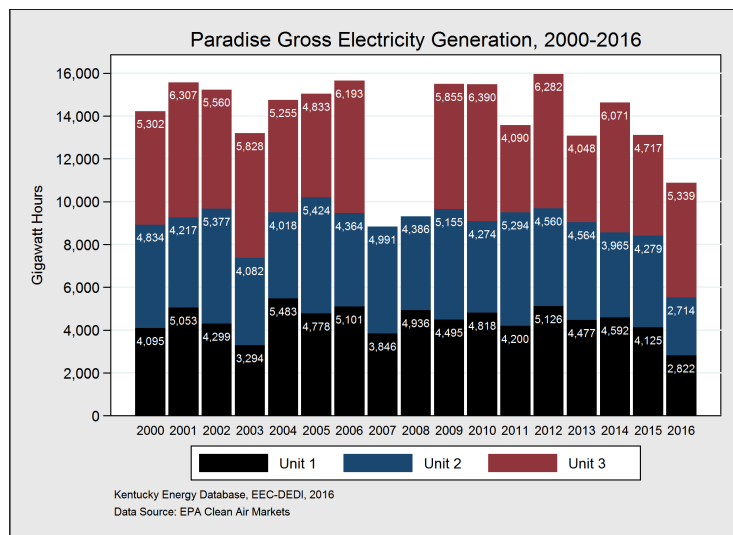


Kentucky Energy Database, EEC-DEDI, 2016  
Data Source: EPA Clean Air Markets

Nitrogen Dioxide	2016 Value	Since 2000
Emissions (Tonnage)	6,886	-66%
Rate (lbs./MWh)	1.56	-62%

The Mill Creek Generating Station emitted 6,886 tons of NO<sub>x</sub> in 2016, a reduction of 66 percent since 2000. The rate of NO<sub>x</sub> emissions decreased by 62 percent during that period.

# Paradise Fossil Plant



Unit Number	Online Year	Retire Year	Fuel	Capacity (MW)	Capacity Factor* (%)	Gross Generation* (GWh)	Net Generation* (GWh)	CO <sub>2</sub> Rate* (lbs./MWh)	SO <sub>2</sub> Rate* (lbs./MWh)	NO <sub>x</sub> Rate* (lbs./MWh)
Plant	1963		Coal	2,201	56%	10,875	9,936	2,089	2.12	1.39
1	1963	2017	Coal	628	51%	2,822	2,565	2,155	2.91	1.22
2	1963	2017	Coal	602	51%	2,714	2,422	2,269	3.27	1.49
3	1970		Coal	971	63%	5,339	4,949	1,965	1.12	1.44

The Paradise Fossil Plant, located in Muhlenberg County on the former site of Paradise, Kentucky, is 52 years old and consists of three coal-fired electricity generating units. The plant is owned by the Tennessee Valley Authority and its units came online in 1963, and 1970, respectively. The plant has a total nameplate capacity of 2,201 MW. In 2016, the plant had a plant-wide capacity factor of 56 percent and generated 10.8 GWh of electricity, more than any power plant in Kentucky. Units 1 and 2 at Paradise are expected to retire in 2017 and that a natural gas combined-cycle plant will be built with a total capacity of 1,100 MW. Unit 3 had sulfur dioxide scrubbers installed in 2006. Paradise predominantly burned western Kentucky coal in 2016 from Ohio, Hopkins, Muhlenberg, McLean, and Union counties, with Illinois supplying the remaining eight percent.

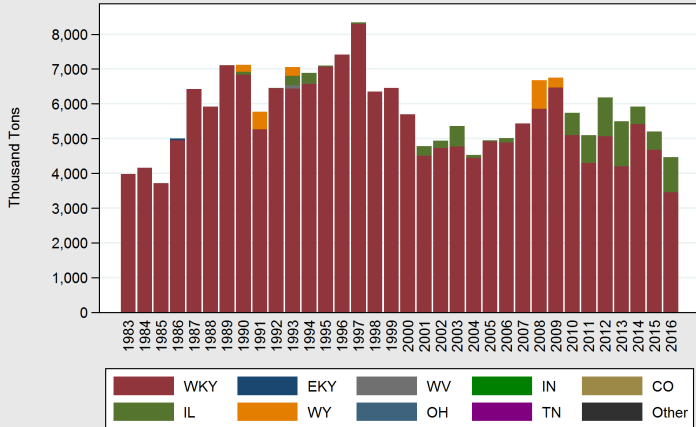


Photo by Kentucky EEC Staff 2015

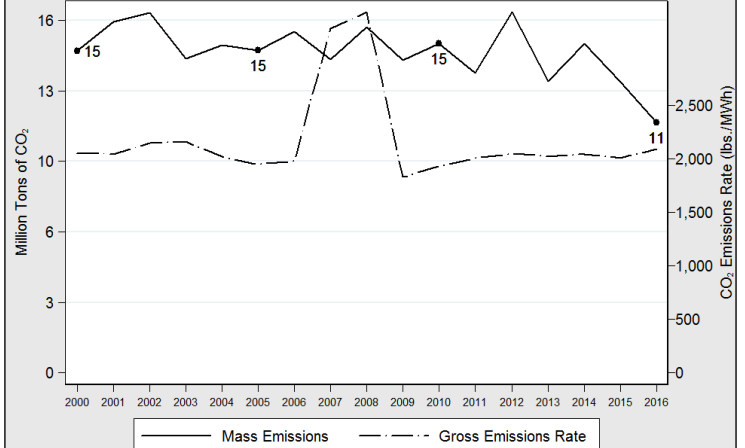
\*2014

# Paradise Fossil Plant

Paradise Coal Consumption by Origin, 1983-2016



Paradise Carbon Dioxide Emissions, 2000-2016

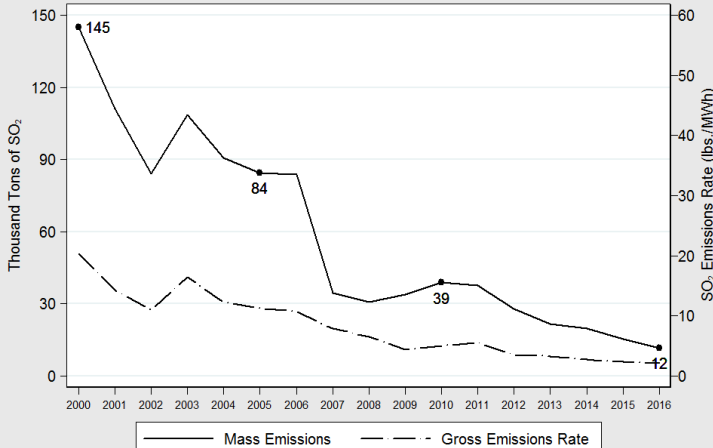


State	2016 Tons	Percentage
<b>Total</b>	<b>4,464,547</b>	<b>100%</b>
Western Kentucky	3,454,091	78%
Illinois	1,010,456	22%

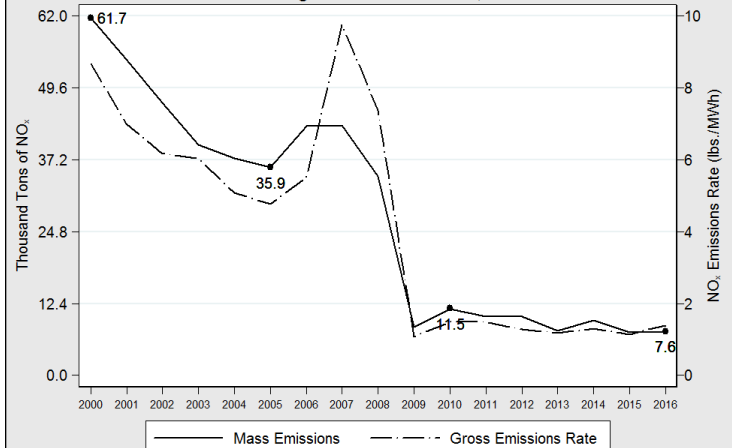
Carbon Dioxide	2016 Value	Since 2000
Emissions (Tonnage)	11,369,821	-22%
Rate (lbs./MWh)	2,089	+2%

The Paradise Fossil Plant emitted 11.3 million tons of CO<sub>2</sub> in 2016, an increase of two percent from 2000 levels. The rate of CO<sub>2</sub> emissions is unchanged relative to the year 2000.

Paradise Sulfur Dioxide Emissions, 2000-2016



Paradise Nitrogen Oxide Emissions, 2000-2016



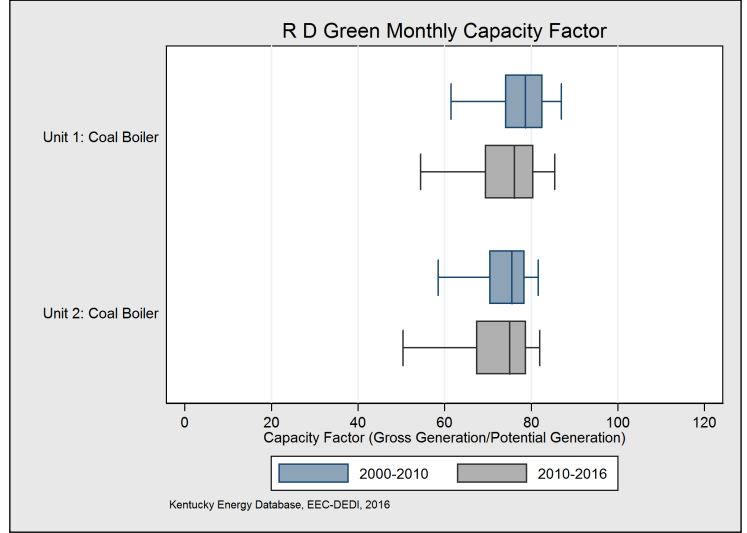
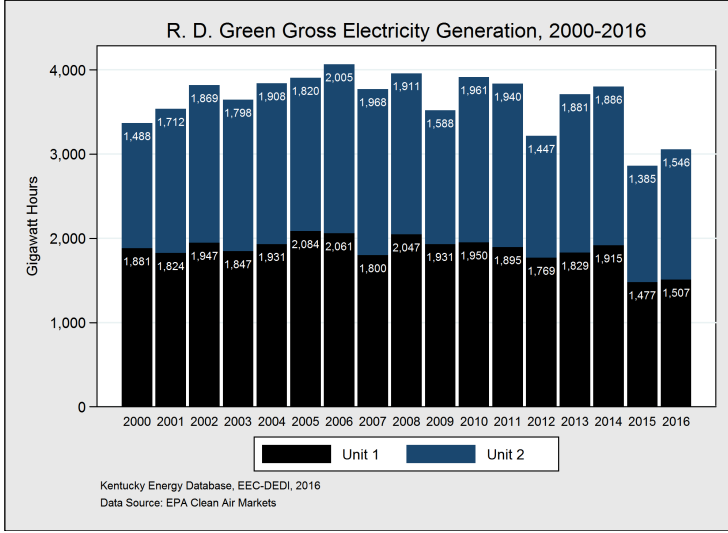
Sulfur Dioxide	2016 Value	Since 2000
Emissions (Tonnage)	11,539	-92%
Rate (lbs./MWh)	2.12	-90%

The Paradise Fossil Plant emitted 11,539 thousand tons of SO<sub>2</sub> in 2016, a decrease of 92 percent since 2000. The rate of SO<sub>2</sub> emissions reduced by 90 percent during that period.

Nitrogen Dioxide	2016 Value	Since 2000
Emissions (Tonnage)	7,582	-88%
Rate (lbs./MWh)	1.39	-84%

The Paradise Fossil Plant emitted 7,582 tons of NO<sub>x</sub> in 2016, a reduction of 88 percent since 2000. The rate of NO<sub>x</sub> emissions decreased by 84 percent during that period.

# R. D. Green Station



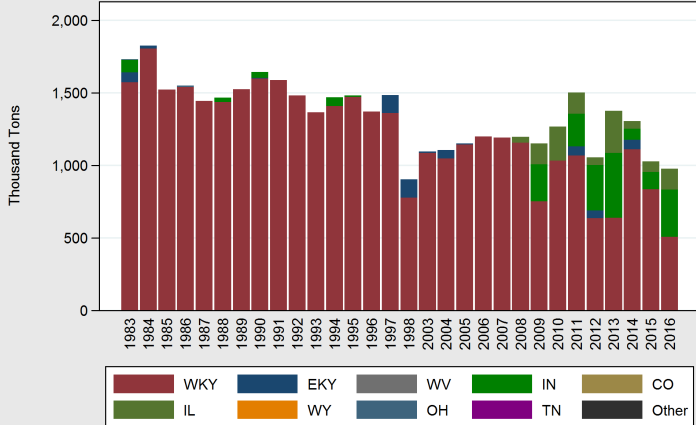
Unit Number	Online Year	Retire Year	Fuel	Capacity (MW)	Capacity Factor* (%)	Gross Generation* (GWh)	Net Generation* (GWh)	CO <sub>2</sub> Rate* (lbs./MWh)	SO <sub>2</sub> Rate* (lbs./MWh)	NO <sub>x</sub> Rate* (lbs./MWh)
Plant	1979		Coal	586	51%	3,053	2,737	2,133	1.75	2.43
1	1979		Coal	293	51%	1,507	1,351	2,101	2.46	2.28
2	1981		Coal	293	85%	1,546	1,386	2,166	1.07	2.58

The R. D. Green Station, located in Webster County, is 38 years old and consists of two coal-fired electricity generating units. The units came online in 1979 and 1981, respectively. The plant is owned by Big Rivers Electric Corporation and has a total nameplate capacity of 586 MW. In 2016, the plant generated 3 GWh of electricity and had a plant-wide capacity factor of 51 percent. Green primarily used a mix of coal from western Kentucky from Union, Hopkins, Daviess, McLean, Muhlenberg, and Webster counties, from Indiana, and Illinois. Green Station is operated by Big Rivers Electric Corporation.

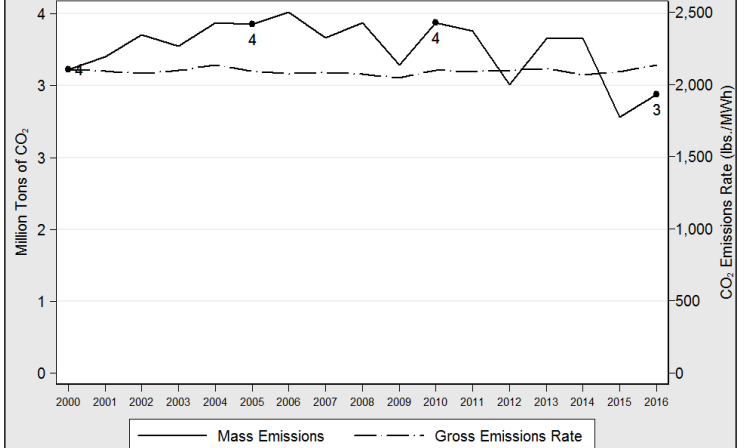
\*2016

# R. D. Green Station

R D Green Coal Consumption by Origin, 1983-2016



R D Green Carbon Dioxide Emissions, 2000-2016

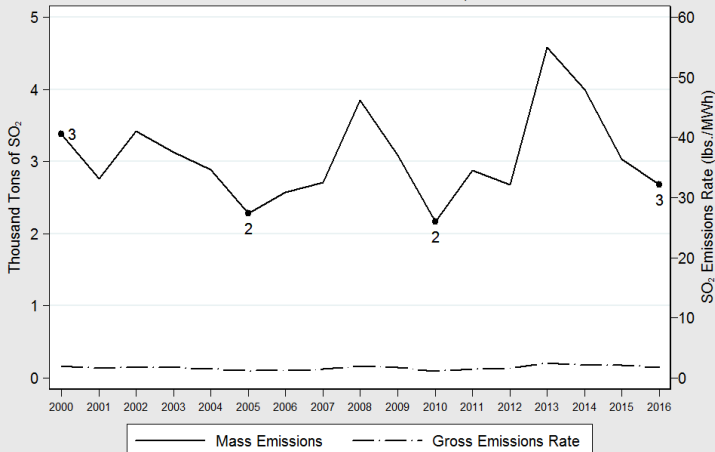


State	2016 Tons	Percentage
Total	977,524	100%
Western Kentucky	505,614	52%
Indiana	326,342	33%
Illinois	145,568	15%

Carbon Dioxide	2016 Value	Since 2000
Emissions (Tonnage)	3,257,884	-8%
Rate (lbs./MWh)	2,133	+1%

The R.D. Green Station emitted 3.2 million tons of CO<sub>2</sub> in 2016, a decrease of 8 percent from 2000 levels. The rate of CO<sub>2</sub> emissions increased marginally during that period.

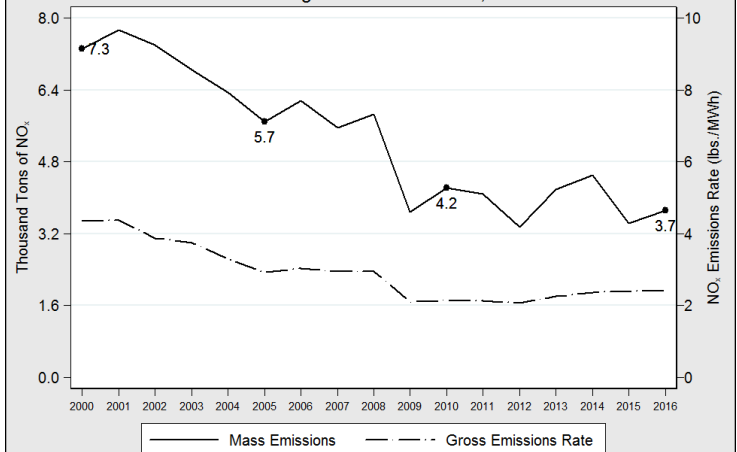
R D Green Sulfur Dioxide Emissions, 2000-2016



Sulfur Dioxide	2016 Value	Since 2000
Emissions (Tonnage)	2,682	-21%
Rate (lbs./MWh)	1.75	-13%

The R.D. Green Station emitted 2,682 tons of SO<sub>2</sub> in 2016, a decrease of 21 percent since 2000. The rate of SO<sub>2</sub> emissions increased by 13 percent during that period.

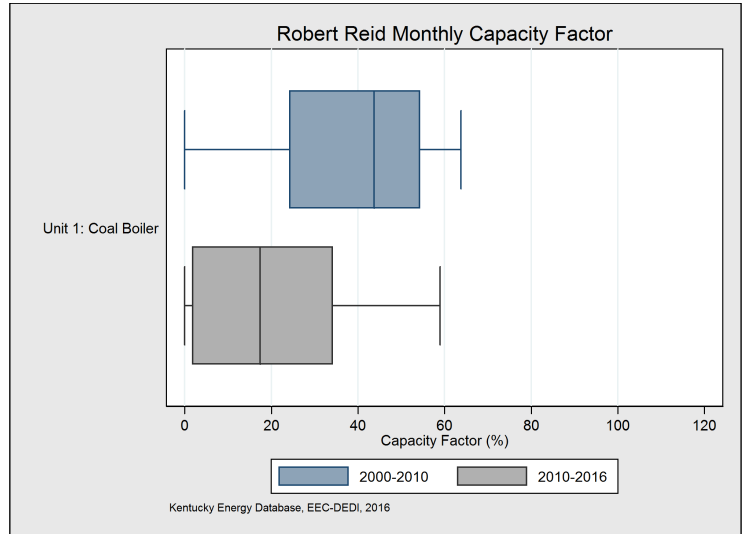
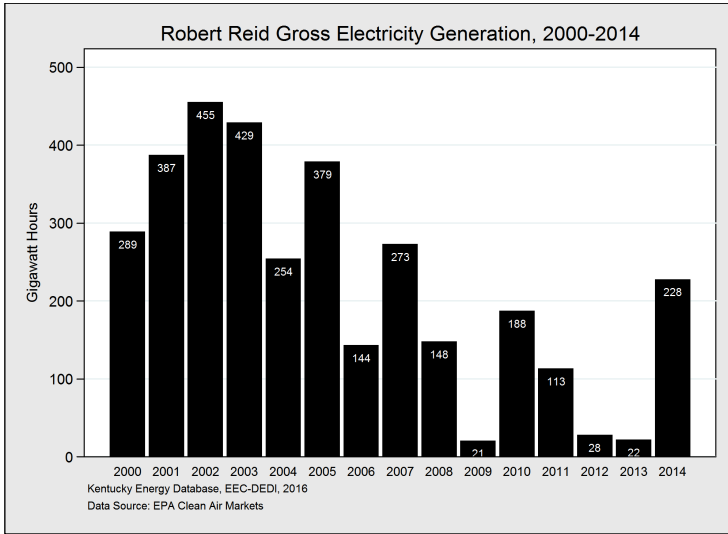
R D Green Nitrogen Oxide Emissions, 2000-2016



Nitrogen Dioxide	2016 Value	Since 2000
Emissions (Tonnage)	3,715	-49%
Rate (lbs./MWh)	2.43	-44%

The R.D. Green Station emitted 3,715 tons of NO<sub>x</sub> in 2016, a reduction of 49 percent since 2000. The rate of NO<sub>x</sub> emissions decreased by 44 percent during that period.

# Robert Reid Power Plant



Unit Number	Online Year	Retire Year	Fuel	Capacity (MW)	Capacity Factor* (%)	Gross Generation* (GWh)	Net Generation* (GWh)	CO <sub>2</sub> Rate* (lbs./MWh)	SO <sub>2</sub> Rate* (lbs./MWh)	NO <sub>x</sub> Rate* (lbs./MWh)
Plant	1966	2015	Coal	96	27%	228		2,327	50.37	4.72
1	1966	2015	Coal	96	27%	228		2,327	50.37	4.72

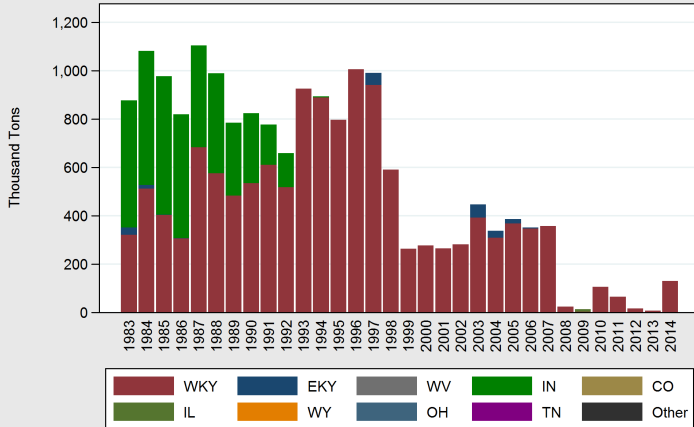
The Robert Reid Power Plant, located in Webster County, is 49 years old and consists of one coal-fired electricity generating unit. The unit came online in 1966, has a nameplate capacity of 96 MW, and is the original generating unit for Big Rivers Electricity Corporation. In 2014, the plant generated 228 GWh of electricity, down from around 455 GWh in 2005. The plant was retired in 2015.

\*2016



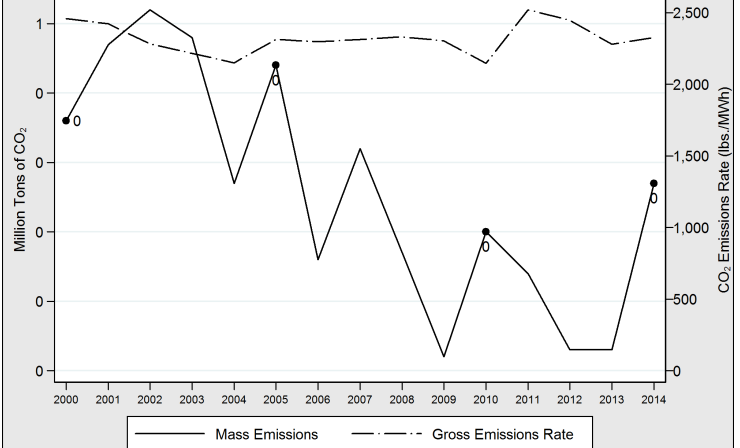
# Robert Reid Power Plant

Robert Reid Coal Consumption by Origin, 1983-2014



Kentucky Energy Database, EEC-DEDI, 2015  
Data Source: FERC-423 & EIA-923

Robert Reid Carbon Dioxide Emissions, 2000-2014



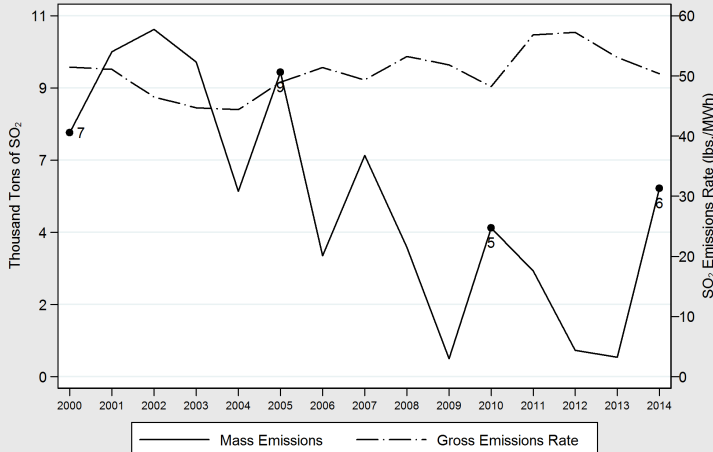
Kentucky Energy Database, EEC-DEDI, 2015  
Data Source: EPA Clean Air Markets

State	2014 Tons	Percentage
Total	130,339	100%
Western Kentucky	130,339	100%

Carbon Dioxide	2014 Value	Since 2000
Emissions (Tonnage)	265,232	-25%
Rate (lbs./MWh)	2,327	-5%

The Robert Reid Power Plant emitted 265 thousand tons of CO<sub>2</sub> in 2014, a decrease of 25 percent from 2000 levels. The rate of CO<sub>2</sub> emissions decreased by five percent during that period.

Robert Reid Sulfur Dioxide Emissions, 2000-2014

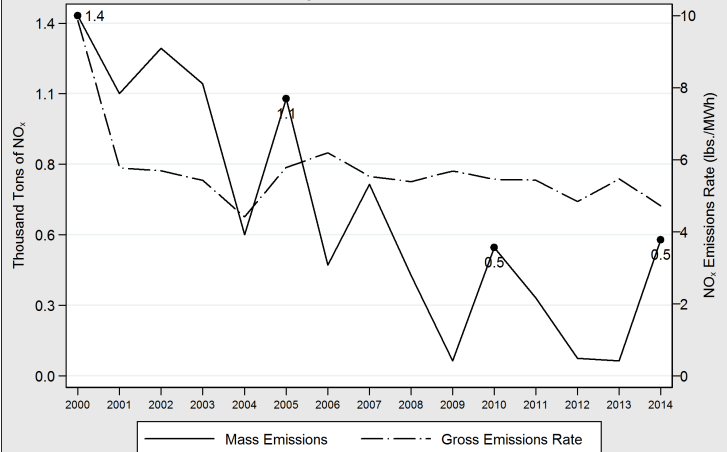


Kentucky Energy Database, EEC-DEDI, 2015  
Data Source: EPA Clean Air Markets

Sulfur Dioxide	2014 Value	Since 2000
Emissions (Tonnage)	5,742	-23%
Rate (lbs./MWh)	50.37	-2%

The Robert Reid Power Plant emitted 5,742 tons of SO<sub>2</sub> in 2014, a decrease of 23 percent since 2000. The rate of SO<sub>2</sub> emissions reduced by two percent during that period. Robert Reid has the highest rate of SO<sub>2</sub> emissions in the Commonwealth.

Robert Reid Nitrogen Oxide Emissions, 2000-2014

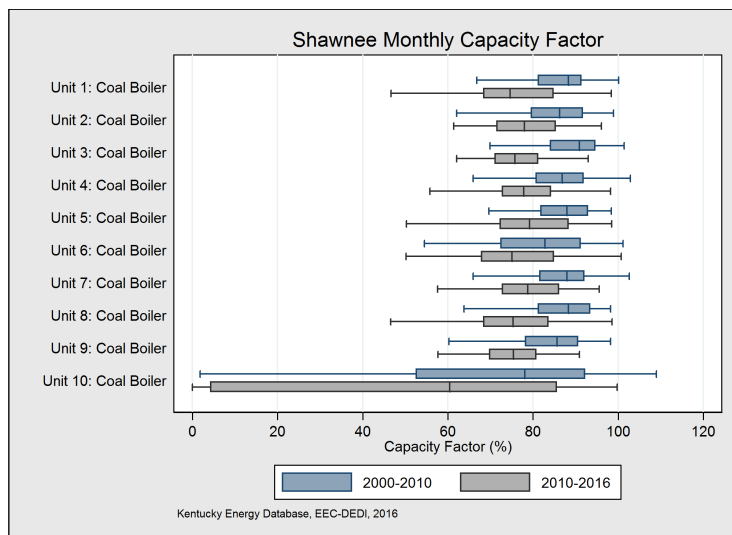
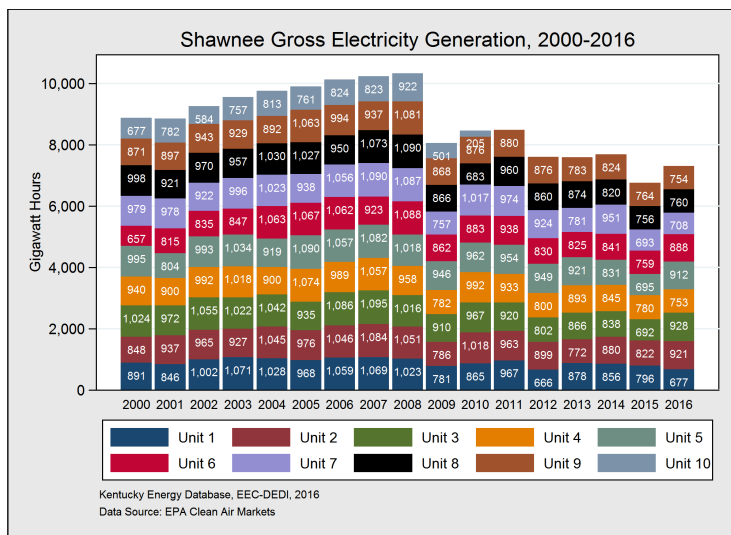


Kentucky Energy Database, EEC-DEDI, 2015  
Data Source: EPA Clean Air Markets

Nitrogen Dioxide	2014 Value	Since 2000
Emissions (Tonnage)	539	-62%
Rate (lbs./MWh)	4.72	-52%

The Robert Reid Power Plant emitted 539 tons of NO<sub>x</sub> in 2014, a reduction of 62 percent since 2000. The rate of NO<sub>x</sub> emissions decreased by 52 percent during that period, though Robert Reid has the highest rate of NO<sub>x</sub> emissions in Kentucky.

# Shawnee Fossil Plant



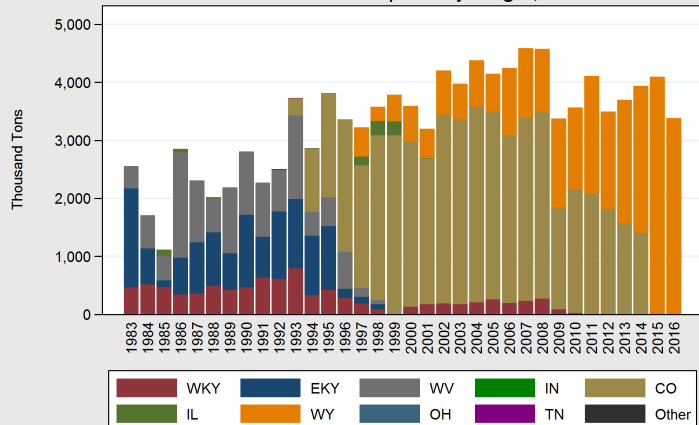
Unit Number	Online Year	Retire Year	Fuel	Capacity (MW)	Capacity Factor* (%)	Gross Generation* (GWh)	Net Generation* (GWh)	CO <sub>2</sub> Rate* (lbs./MWh)	SO <sub>2</sub> Rate* (lbs./MWh)	NO <sub>x</sub> Rate* (lbs./MWh)
Plant	1953		Coal	1,206	69%	7,301	6,618	2,252	6.52	3.01
1	1953		Coal	134	58%	677	621	2,266	6.72	3.29
2	1956		Coal	134	79%	921	833	2,291	6.64	3.33
3	1953		Coal	134	79%	928	856	2,292	6.63	3.32
4	1953		Coal	134	64%	753	693	2,280	6.63	3.39
5	1954		Coal	134	78%	912	828	2,291	6.65	3.35
6	1954		Coal	134	76%	888	811	2,212	6.40	2.57
7	1954		Coal	134	60%	708	596	2,212	6.34	2.58
8	1954		Coal	134	65%	760	691	2,209	6.29	2.59
9	1955		Coal	134	64%	754	690	2,203	6.34	2.57
10	1955	2010	Coal	124		0				

The Shawnee Fossil Plant, located in McCracken County, is 64 years old and consists of 10 coal-fired electricity generating units, though Unit 10 has not been used since August 2010. The plant is owned by the Tennessee Valley Authority and the units came online in 1953, 1954, 1955, and 1956. The plant has a total nameplate capacity of 1,206 MW from operable units. In 2016, the plant generated 7.3 TWh of electricity and had a plant-wide capacity factor of 69 percent. Shawnee burned a mix of coal from Wyoming and Colorado, but burns only coal from Wyoming as of 2015. Shawnee had been utilized to generate electricity for the United States Enrichment Corporation Paducah Gaseous Diffusion Plant until its closure in 2013, but now largely serves Tennessee's electricity demand.

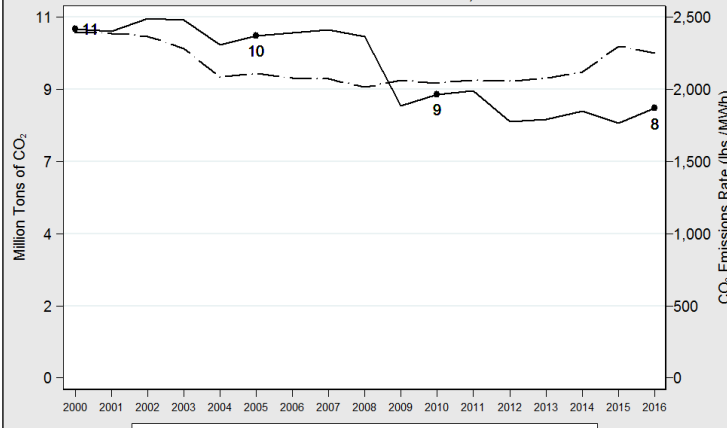
\*2014

# Shawnee Fossil Plant

Shawnee Coal Consumption by Origin, 1983-2016



Shawnee Carbon Dioxide Emissions, 2000-2016

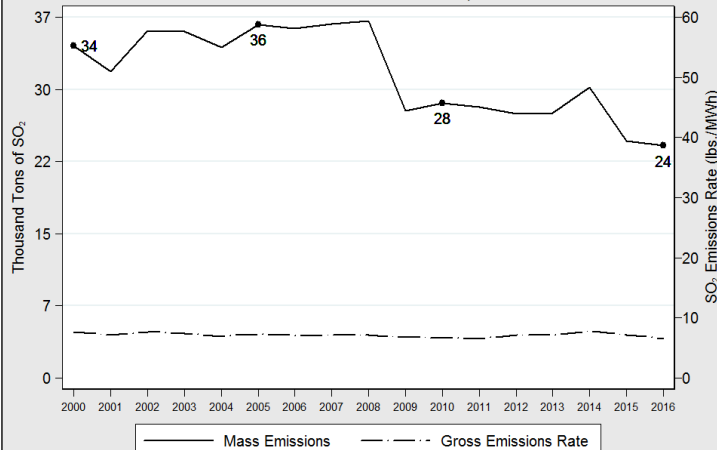


State	2016 Tons	Percentage
<b>Total</b>	<b>3,379,434</b>	<b>100%</b>
<b>Wyoming</b>	<b>3,379,434</b>	<b>100%</b>

Carbon Dioxide	2016 Value	Since 2000
Emissions (Tonnage)	8,223,845	-23%
Rate (lbs./MWh)	2,252	-6%

The Shawnee Fossil Plant emitted 8.2 million tons of CO<sub>2</sub> in 2016, a decrease of 23 percent from 2000 levels. The rate of CO<sub>2</sub> emissions decreased by 6 percent during that period.

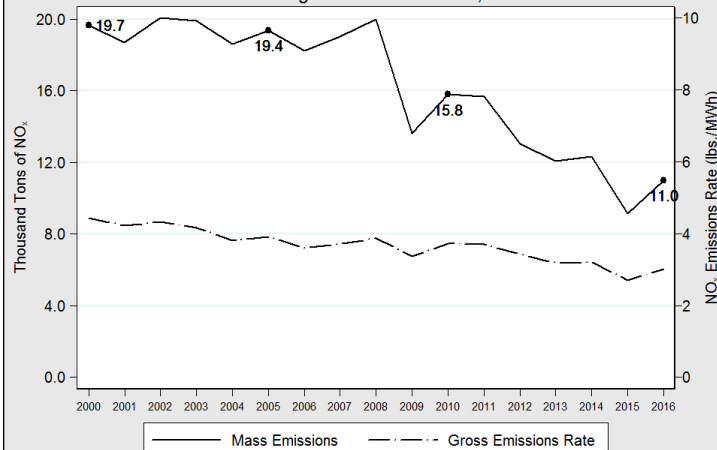
Shawnee Sulfur Dioxide Emissions, 2000-2016



Sulfur Dioxide	2016 Value	Since 2000
Emissions (Tonnage)	23,807	-30%
Rate (lbs./MWh)	6.52	-15%

The Shawnee Fossil Plant emitted 30 thousand tons of SO<sub>2</sub> in 2016, a decrease of 30 percent since 2000. The rate of SO<sub>2</sub> emissions has increased by 15 percent since 2000.

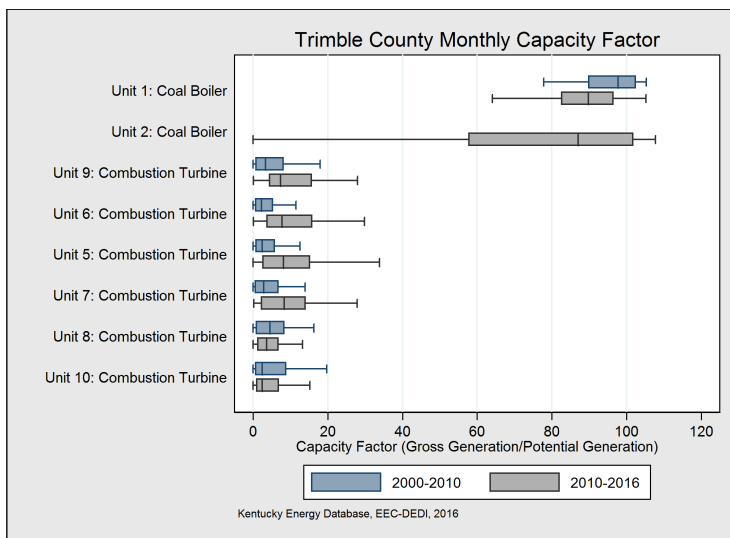
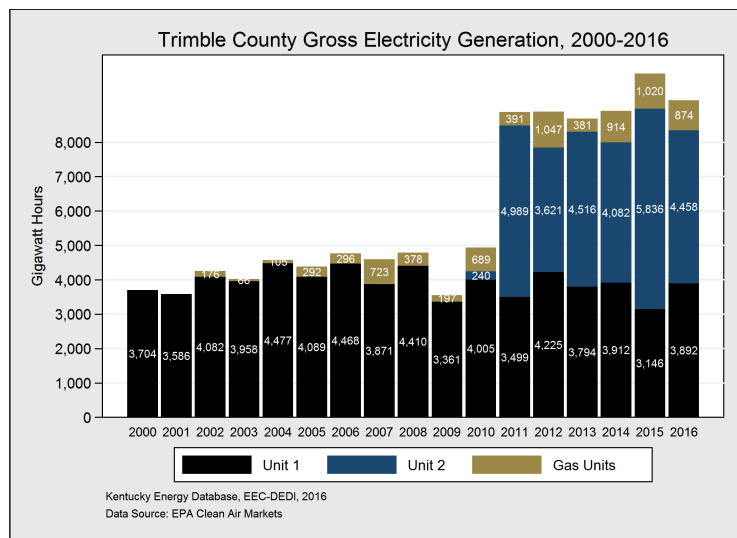
Shawnee Nitrogen Oxide Emissions, 2000-2016



Nitrogen Dioxide	2016 Value	Since 2000
Emissions (Tonnage)	11,002	-44%
Rate (lbs./MWh)	3.01	-32%

The Shawnee Fossil Plant emitted 11,002 tons of NO<sub>x</sub> in 2016, a reduction of 44 percent since 2000. The rate of NO<sub>x</sub> emissions decreased by 32 percent since 2000.

# Trimble County Generating Station



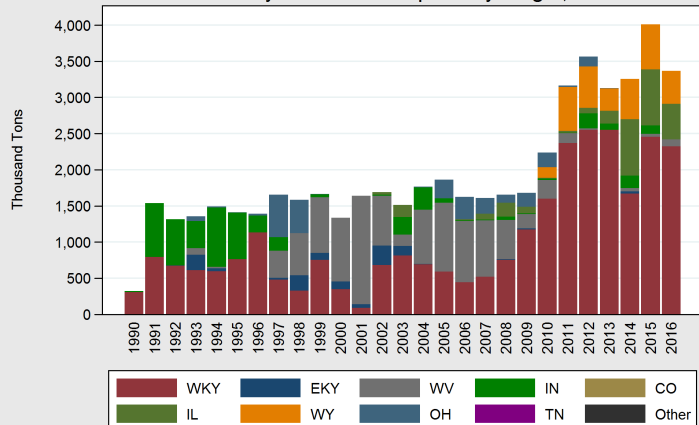
Unit Number	Online Year	Retire Year	Fuel	Capacity (MW)	Capacity Factor* (%)	Gross Generation* (GWh)	Net Generation* (GWh)	CO <sub>2</sub> Rate* (lbs./MWh)	SO <sub>2</sub> Rate* (lbs./MWh)	NO <sub>x</sub> Rate* (lbs./MWh)
Plant	1990		Coal	4,370		9,225		1,799	0.77	0.62
1	1990		Coal	511	87%	3,892	3,565	1,875	1.18	1.01
2	2010		Coal	732	70%	4,458	4,135	1,826	0.56	0.35
5	2002		Natural Gas	157	15%	212		1,322	0.01	0.39
6	2002		Natural Gas	157	7%	90		1,339	0.01	0.38
7	2004		Natural Gas	157	13%	185		1,319	0.01	0.36
8	2004		Natural Gas	157	3%	48		1,317	0.01	0.29
9	2004		Natural Gas	157	13%	179		1,338	0.01	0.36
10	2004		Natural Gas	157	12%	160		1,346	0.01	0.31

The Trimble County Generating Station, near Bedford, consists of two coal-fired electricity generating units and six natural gas combustion turbines. The combustion turbines are used only to meet peak demand because they are more expensive to run, but are easily dispatched with electricity demand changes. The plant is 27 years old, making it the youngest coal-fired electricity generation plant in Kentucky. The coal units came online in 1990 and 2010, respectively. Trimble County Generating Station's coal units have a total nameplate capacity of 1,243 MW. In 2016, the plant generated 9.2 GWh of electricity, 8,350 GWh from coal and 874 GWh from natural gas. The plant's coal units had a combined capacity factor of 76 percent. The majority of the coal used at Trimble County was sourced from McLean, Ohio, Union, and Webster counties in western Kentucky and the other came from Illinois, Indiana, West Virginia, and Wyoming. One of the shipments of coal to Trimble County was mined in Perry County, Kentucky. Trimble County is owned jointly by Louisville Gas & Electric, Illinois Municipal Electric Agency, and Indiana Municipal Power Agency.

\*2016

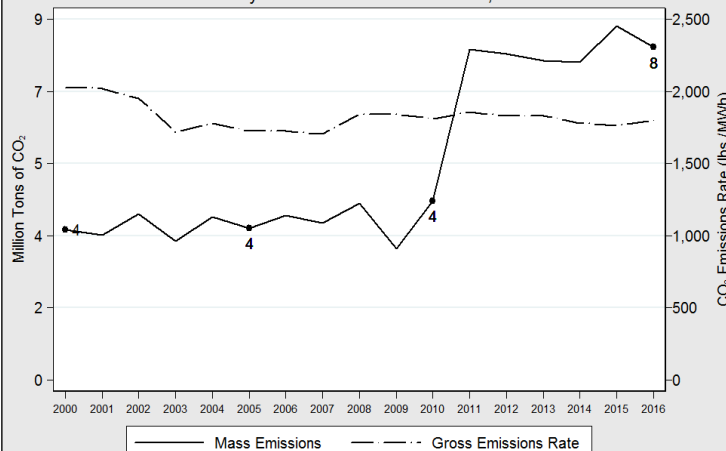
# Trimble County Generating Station

Trimble County Coal Consumption by Origin, 1990-2016



Kentucky Energy Database, EEC-DEDI, 2015  
Data Source: FERC-423 & EIA-923

Trimble County Carbon Dioxide Emissions, 2000-2016



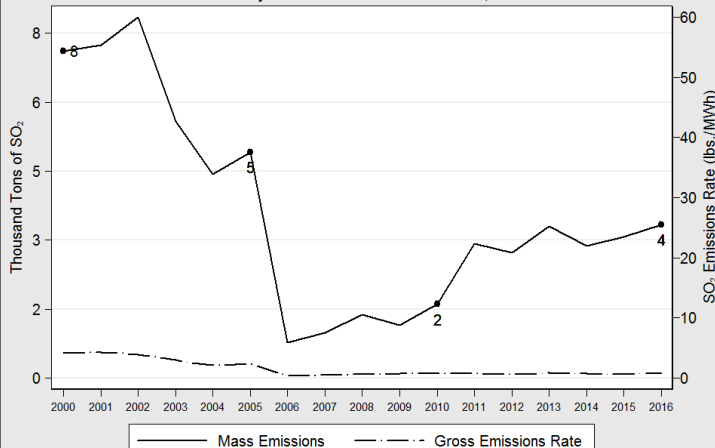
Kentucky Energy Database, EEC-DEDI, 2016  
Data Source: EPA Clean Air Markets

State	2016 Tons	Percentage
<b>Total</b>	<b>3,253,066</b>	<b>100%</b>
Western Kentucky	2,322,830	69%
Illinois	489,336	15%
Wyoming	456,180	14%
West Virginia	96,954	3%

Carbon Dioxide	2016 Value	Since 2000
Emissions (Tonnage)	8,300,718	+121%
Rate (lbs./MWh)	1,799	-11%

The Trimble County Generating Station emitted almost eight million tons of CO<sub>2</sub> in 2016, an increase of 121 percent since 2000. However, the rate of CO<sub>2</sub> emissions decreased by 11 percent during that period.

Trimble County Sulfur Dioxide Emissions, 2000-2016

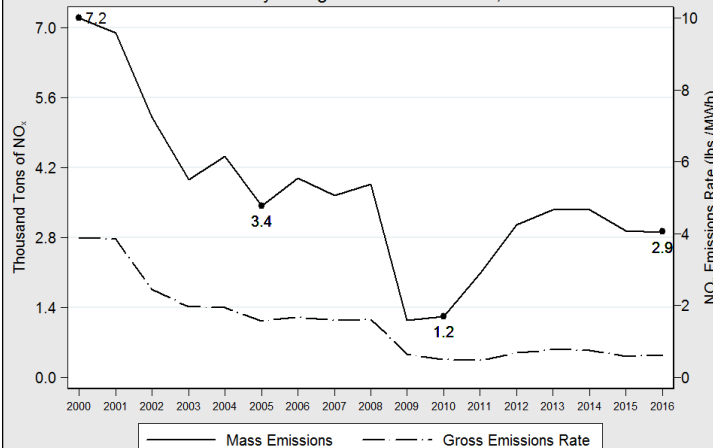


Kentucky Energy Database, EEC-DEDI, 2016  
Data Source: EPA Clean Air Markets

Sulfur Dioxide	2016 Value	Since 2000
Emissions (Tonnage)	3,561	-53%
Rate (lbs./MWh)	0.77	-81%

The Trimble County Generating Station emitted 3,561 tons of SO<sub>2</sub> in 2016, a decrease of 53 percent since 2000. The rate of SO<sub>2</sub> emissions decreased by 81 percent during that period and in 2016 had the lowest rate of SO<sub>2</sub> emissions in the state.

Trimble County Nitrogen Oxide Emissions, 2000-2016

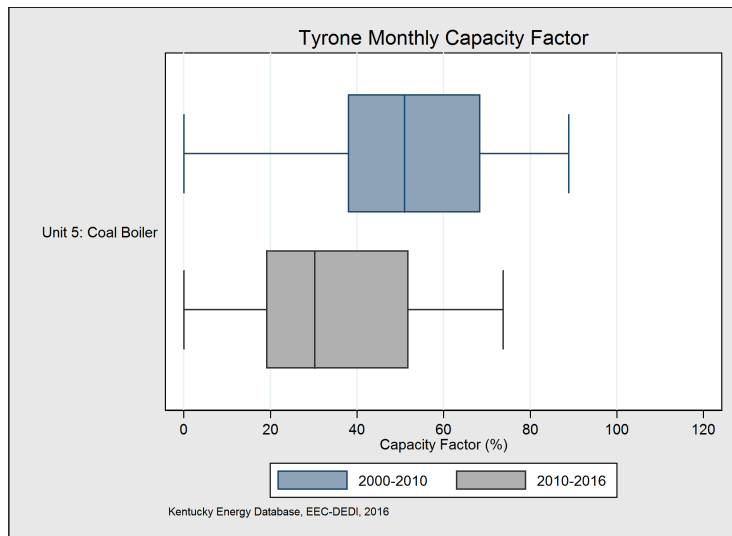
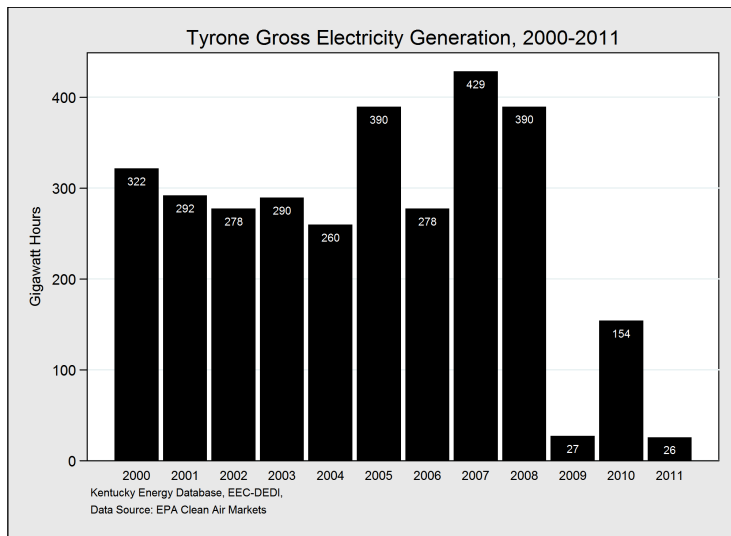


Kentucky Energy Database, EEC-DEDI, 2016  
Data Source: EPA Clean Air Markets

Nitrogen Dioxide	2016 Value	Since 2000
Emissions (Tonnage)	2,905	-60%
Rate (lbs./MWh)	0.62	-84%

The Trimble County Generating Station emitted 2,905 tons of NO<sub>x</sub> in 2016, a reduction of 60 percent since 2000. The rate of NO<sub>x</sub> emissions decreased by 84 percent during that period.

# Tyrone Generating Station



Unit Number	Online Year	Retire Year	Fuel	Capacity (MW)	Capacity Factor* (%)	Gross Generation* (GWh)	Net Generation* (GWh)	CO <sub>2</sub> Rate* (lbs./MWh)	SO <sub>2</sub> Rate* (lbs./MWh)	NO <sub>x</sub> Rate* (lbs./MWh)
Plant 1	1947	2012	Coal	75	40%	26		2,341	15.48	4.88
	1955	2012	Coal	75	40%	26		2,341	15.48	4.88

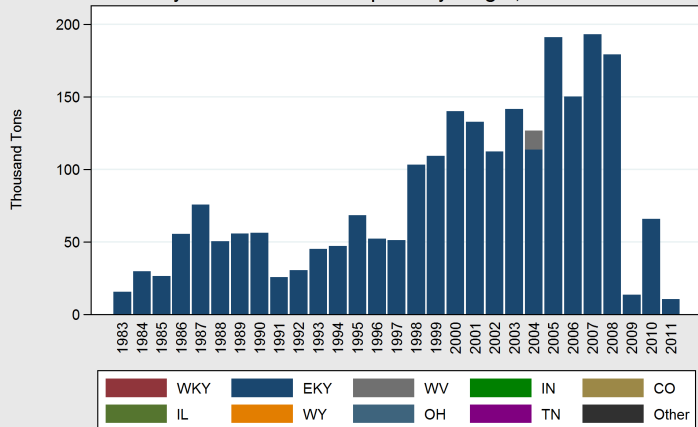
The Tyrone Generating Station, located in Versailles in Woodford County, is 68 years old and consists of one coal-fired electricity generating unit. The unit came online in 1955 and has a nameplate capacity of 75 MW. Tyrone has not generated electricity since 2011. Since 1990, Tyrone has used mostly eastern Kentucky coal trucked from Floyd, Pike, Perry, and Breathitt counties. Tyrone was operated by Kentucky Utilities.

\*2011



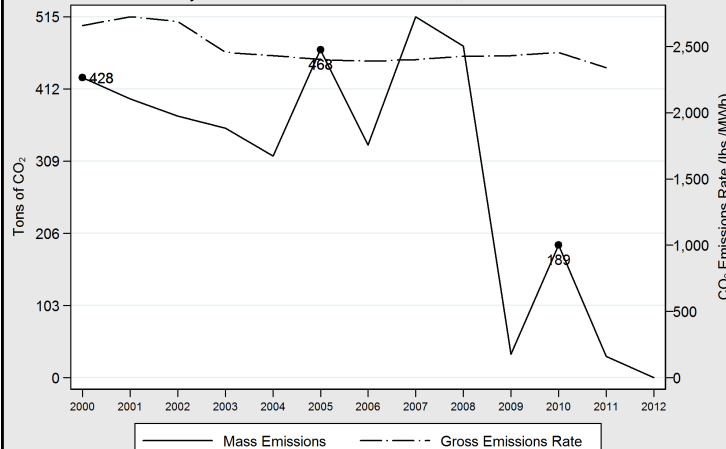
# Tyrone Generating Station

Tyrone Coal Consumption by Origin, 1983-2014



Kentucky Energy Database, EEC-DEDI, 2015  
Data Source: FERC-423 & EIA-923

Tyrone Carbon Dioxide Emissions, 2000-2014



Kentucky Energy Database, EEC-DEDI, 2015  
Data Source: EPA Clean Air Markets

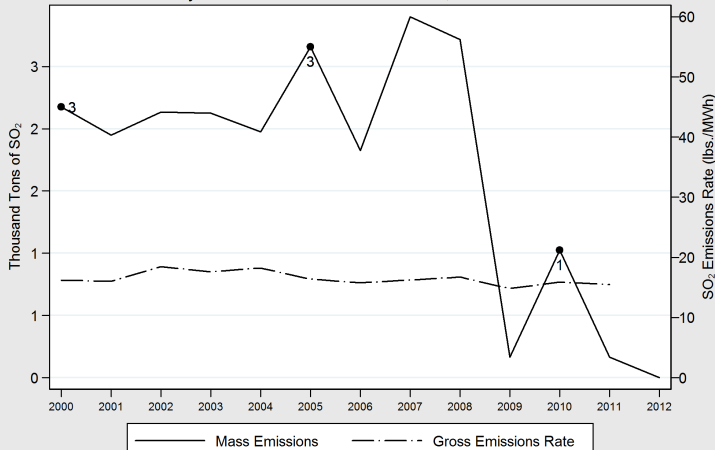
State	2011 Tons	Percentage
Total	10,437	100%
Eastern Kentucky	10,437	100%

The Tyrone Generating Station historically burned eastern Kentucky coal. Tyrone has not generated power since 2011, and has been retired.

Carbon Dioxide	2016 Value	Since 2000
Emissions (Tonnage)	0.00	-100%
Rate (lbs./MWh)	0.00	-100%

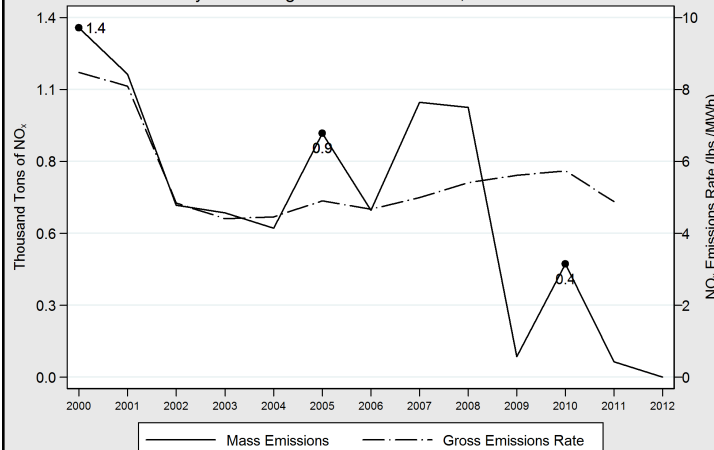
The Tyrone Generating Station emitted 0 tons of CO<sub>2</sub> in 2016, as the facility is no-longer generating power.

Tyrone Sulfur Dioxide Emissions, 2000-2014



Kentucky Energy Database, EEC-DEDI, 2015  
Data Source: EPA Clean Air Markets

Tyrone Nitrogen Oxide Emissions, 2000-2014

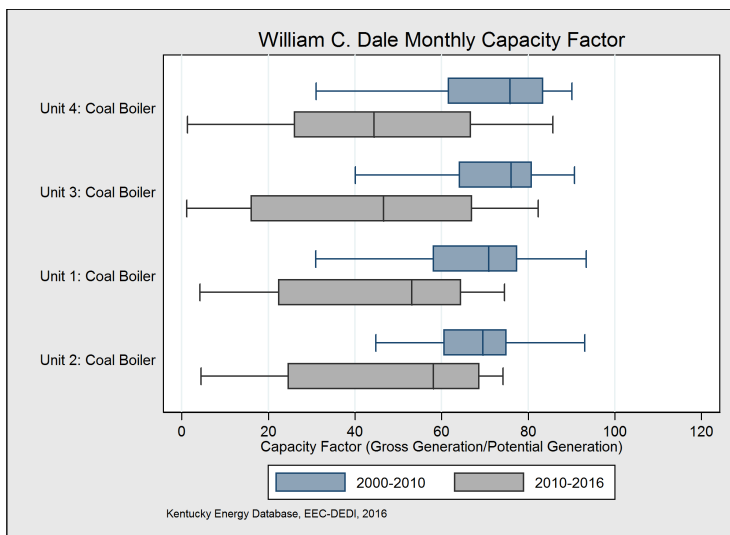
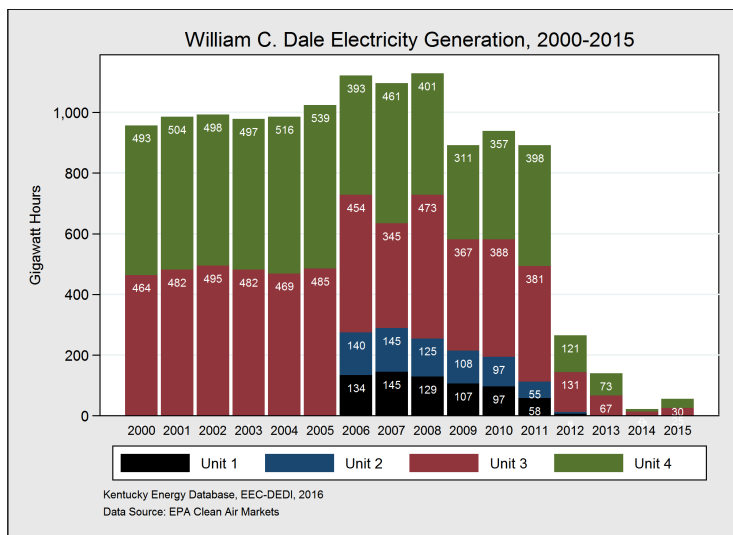


Kentucky Energy Database, EEC-DEDI, 2015  
Data Source: EPA Clean Air Markets

Sulfur Dioxide	2016 Value	Since 2000
Emissions (Tonnage)	0.00	-100%
Rate (lbs./MWh)	0	-100%

Nitrogen Dioxide	2016 Value	Since 2000
Emissions (Tonnage)	0.00	-100%
Rate (lbs./MWh)	0	-100%

# William C. Dale Power Station



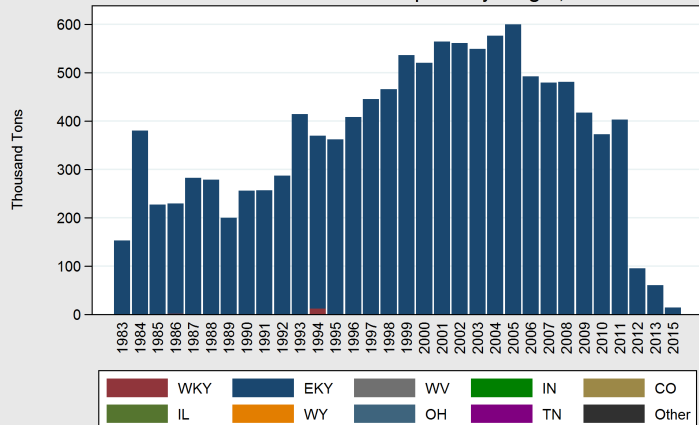
Unit Number	Online Year	Retire Year	Fuel	Capacity (MW)	Capacity Factor* (%)	Gross Generation* (GWh)	Net Generation* (GWh)	CO <sub>2</sub> Rate* (lbs./MWh)	SO <sub>2</sub> Rate* (lbs./MWh)	NO <sub>x</sub> Rate* (lbs./MWh)
Plant	1954	2016	Coal	149	1%	55	48	1,875	12.26	3.65
1	1954	2015	Coal	23						
2	1954	2015	Coal	23						
3	1957	2016	Coal	74	2%	25	22	1,879	12.35	3.70
4	1960	2016	Coal	75	1%	30	26	1,874	12.18	3.63

The William C. Dale Power Station, located in Clark County, is 63 years old and consists of four coal-fired electricity generating units. The units came online in 1954, 1957, and 1960 and are owned by East Kentucky Power Cooperative. The plant has a total nameplate capacity of 195 MW. Units 1 and 2 were retired in 2015. Units 3 and 4 were idled in 2015 and officially retired in 2016. Dale has historically used coal from Eastern Kentucky, which was driven by truck from coal mines in Magoffin and Perry County.

\*2015

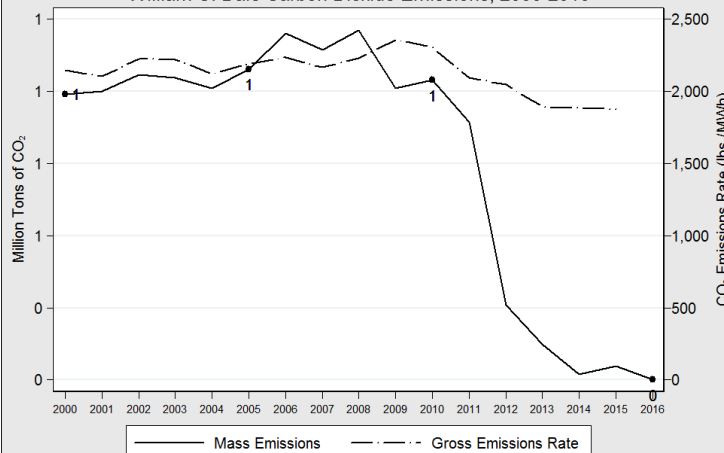
# William C. Dale Power Station

William C. Dale Coal Consumption by Origin, 1983-2016



Kentucky Energy Database, EEC-DEDI, 2015  
Data Source: FERC-423 & EIA-923

William C. Dale Carbon Dioxide Emissions, 2000-2016



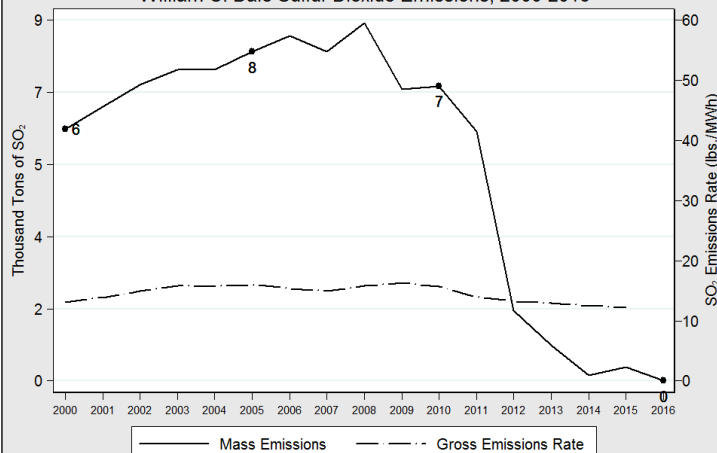
Kentucky Energy Database, EEC-DEDI, 2016  
Data Source: EPA Clean Air Markets

State	2015 Tons	Percentage
Total	13,876	100%
Eastern Kentucky	13,876	100%

Carbon Dioxide	2015 Value	Since 2000
Emissions (Tonnage)	52,354	-95%
Rate (lbs./MWh)	1,875	-13%

The William C. Dale Power Station emitted 52 thousand tons of CO<sub>2</sub> in 2016, a decrease of 95 percent from 2000 levels. The rate of CO<sub>2</sub> emissions decreased by 13 percent during that period. Dale emitted no CO<sub>2</sub> in 2016, as it was not operating.

William C. Dale Sulfur Dioxide Emissions, 2000-2016

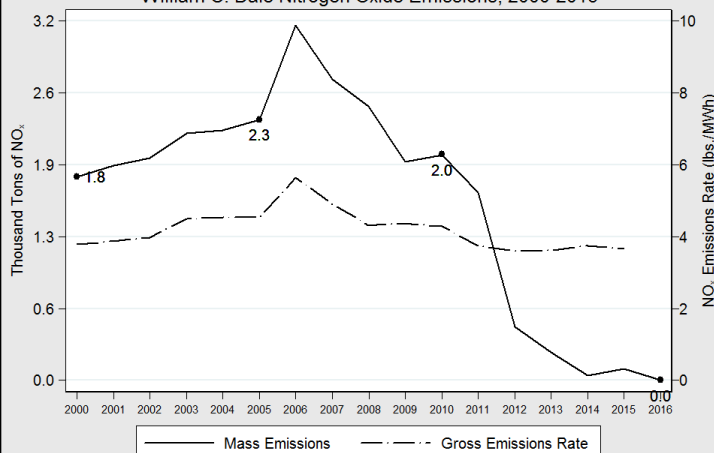


Kentucky Energy Database, EEC-DEDI, 2016  
Data Source: EPA Clean Air Markets

Sulfur Dioxide	2015 Value	Since 2000
Emissions (Tonnage)	342	-95%
Rate (lbs./MWh)	12.26	-7%

The William C. Dale Power Station emitted 342 tons of SO<sub>2</sub> in 2015, a decrease of 95 percent since 2000. The rate of SO<sub>2</sub> emissions reduced by 7 percent during that period, but is the third highest of power plants in Kentucky.

William C. Dale Nitrogen Oxide Emissions, 2000-2016



Kentucky Energy Database, EEC-DEDI, 2016  
Data Source: EPA Clean Air Markets

Nitrogen Dioxide	2015 Value	Since 2000
Emissions (Tonnage)	102	-94%
Rate (lbs./MWh)	3.65	-3%

The William C. Dale Power Station emitted 102 tons of NO<sub>x</sub> in 2015, a reduction of 94 percent since 2000. The rate of NO<sub>x</sub> emissions decreased by 3 percent during that period.



# Acknowledgements

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