Kentucky Coal
Past, Present, and Future

Presentation to the
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University of Cincinnati College of Law
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Overview

• Trends in Kentucky Coal Production, Markets, & Employment: Declining

• Kentucky’s Electricity Portfolio Today: Coal

• Kentucky’s Future Electricity Portfolio: Natural Gas

• The Significance of Electricity to Kentucky: Manufacturing
Kentucky Coal Production & Employment
United States Coal Production, Q4-2013

80.2 MT Underground
157.8 MT Surface

Kentucky Energy Database, EEC-DEDI, 2014
energy.ky.gov
Kentucky Coal Production, Q1-2000

Kentucky Energy Database, EEC-DEDI, 2014

21.1 MT Underground
14.2 MT Surface

Animated Version of this Map at:
http://youtu.be/1JckcUUTSsA
Kentucky Coal Production, Q4-2013

Animated Version of this Map at: http://youtu.be/1JckcUUTSsA

Kentucky Energy Database, EEC-DEDI, 2014

energy.ky.gov
Kentucky Total Coal Production, 1960-2013

Eastern Kentucky Production & Western Kentucky Production

Kentucky Energy Database, EEC-DEDI, 2014
Kentucky Coal Production, 1860-2013

Million Tons

Kentucky Energy Database, EEC-DEDI, 2014
Kentucky Quarterly Coal Mine Employment, 2000-2013

Eastern Kentucky vs. Western Kentucky

Number of Employees

Kentucky Energy Database, EEC-DEDI, 2014

Microdata Source: MSHA-MDRS Queried on: 28 Feb 2014
Change in Coal Mine Employment
Q3-2011 — Q3-2013

Jobs
-1534 - 1000
-999 - 500
-499 - 200
-199 - 1
0
2 - 200
201 - 430

Map by the Kentucky Energy and Environment Cabinet, 2013
Change in Coal Production Employment by Mine, Q3-2011 to Q3-2013

Note: Some coal mines are not visible because of their physical proximity to one-another.

Kentucky Energy Database, EEC-DEDI, 2013
Microdata Source: MSHA-MDRS, Queried 11/15/2013
United States Coal Mine Employment by State, Q3-2011 vs. Q3-2013

Top 15 States with 1,000 Coal Mine Employees or More

Kentucky Energy Database, EEC-DEDI, 2013
Microdata Source: MSHA-MDRS, Queried on: 21 Nov 2013
Kentucky Coal Markets
Kentucky Coal Deliveries, 2013

Animated Version of this Map at: http://youtu.be/ofNBO8g9xuo
Kentucky Coal Deliveries & Future Retirements, 2012

- 15.4 MT
- 53+ MT
- Retirement 2013-2018
- Unknown Future Retirement

Kentucky Energy Database, EEC-DEDI, 2014
United States Coal-Fired Power Plants, 2012

33 GW  Retirement 2013-2018
312 GW  Unknown Future Retirement

Kentucky Energy Database, EEC-DEDI, 2014
A Quick Introduction to

Kentucky’s Electricity Portfolio
Electricity consumption nationally is relatively balanced between coal, natural gas, nuclear power, hydroelectric, and wind.
Over 92% of the electricity generated in Kentucky in 2012 and 2013 came from Kentucky’s coal-fired power plants.
The United States electricity portfolio has always been relatively balanced. Natural gas and renewable increasing. Coal-fired generation is declining.
Kentucky has always depended upon coal.
Peaks show Kentucky’s winter and summer heating and cooling requirements.
A Quick Introduction to

Kentucky’s Future Electricity Portfolio

Download the Full Report

“Economic Challenges Facing Kentucky’s Electricity Generation Under Greenhouse Gas Constraints”
Changes in Federal Regulation

More numerous and more stringent federal environmental regulations affecting coal-fired generation in ways that differ from the past.

Mercury Air Toxics Standards (MATS)
MATS has accounted for a large portion of recent coal plant retirements.

National Ambient Air Quality Standard (NAAQS)
Much more stringent Ozone (O3) standards likely to be proposed.

Cross State Air Pollution Rule (CSAPR)
Supreme Court decision expected in June 2014.

Water Intake & and Effluent Limitations
EPA is past deadline to propose rules for water intake structures.

Coal Combustion Residuals (coal ash)
EPA under pressure to act, especially in light of recent spills; depending on approach EPA takes, could require costly compliance for utilities.

President’s Climate Agenda
EPA using Clean Air Act 111(b) to set an unachievable 1,100 lbs. of CO₂ per MWh limit for new coal power plants. EPA is considering using Clean Air Act 111(d) to establish CO₂ emission standards for existing coal power plants.
Kentucky Electricity Generation, 2015

- Coal: 93%
- Natural Gas: 1%
- Biomass: 1%
- Hydro: 0%

Kentucky Electricity Portfolio Model, EEC-DEDI, 17 Nov 2013 Scenario:1
Kentucky Electricity Generation, 2020

- Coal: 78%
- Natural Gas: 19%
- Hydro: 1%
- Biomass: 2%

Source: Kentucky Electricity Portfolio Model, EEC-DEDI, 17 Nov 2013 Scenario: 1
Significance of Electricity to Kentucky

Download the Full Report

“The Vulnerability of Kentucky’s Manufacturing Economy to Increasing Electricity Prices”
Kentucky Coal & Natural Gas Prices for Electric Power, 1976-2013

Nominal Price per MMBTU ($ US)

Kentucky Energy Database, EEC-DEDI, 2014
Predicting natural gas prices has historically been very difficult for the federal government.
Kentucky has the second-lowest electricity price in the United States.
Kentucky is the single-most electricity intensive economy in the United States. Kentucky consumes more kilowatt-hours to produce a single dollar of GDP than any other state.
Electricity consumption nationally is split fairly equally between commercial, industrial, and residential consumers.
Half of the electricity consumed in Kentucky every year goes to industrial and manufacturing processes.
Electricity consumption in the United States has been historically balanced.
Kentucky electricity consumption has always been primarily for manufacturing.
Employment Depends Upon Electricity – Direct employment for electricity generation, such as power plant operators and coal miners, is a relatively smaller portion of total employment in Kentucky compared to the millions of jobs that depend upon the reliable and inexpensive electricity they produce. Electricity-dependent jobs can be modeled with electricity price elasticity of employment coefficients.
Sensitivity to Electricity Prices Differs by Industry – This study developed price elasticity of employment coefficients for the top five employment sectors in Kentucky by modeling the historical responsiveness of employment nationally. Manufacturers were the most-responsive. Retail stores, restaurants, and hotels were less than half as responsive. Government and healthcare showed no responsiveness whatsoever.
The production of aluminum, iron, steel, chemicals, and glass are some of the most-electricity intensive manufacturing processes, where up to a quarter of total production costs go to electricity expenses.

Other large manufacturing sectors, like motor vehicle assembly, which may be less electricity-intensive, depend upon primary material inputs from more electricity-intensive sectors.

The complete list of all manufacturing sectors is available on page 4 of the associated white paper: [http://energy.ky.gov/Programs/Documents/Vulnerability%20of%20Kentucky’s%20Manufacturing%20Economy.pdf](http://energy.ky.gov/Programs/Documents/Vulnerability%20of%20Kentucky’s%20Manufacturing%20Economy.pdf)
Combined Impact of Electricity-Intensive Sectors - Given a 25% increase in real electricity prices by 2025, Kentucky’s most electricity-intensive economic sectors, (manufacturing, retail trade, restaurants, and hotels) could be expected to shed a combined total of 30,237 full-time jobs and with 95% confidence and robust standard errors between 12,620 and 50,947.
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