Climate Pollution from US Coal

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Third of CO2 emissions / Half of Electricity

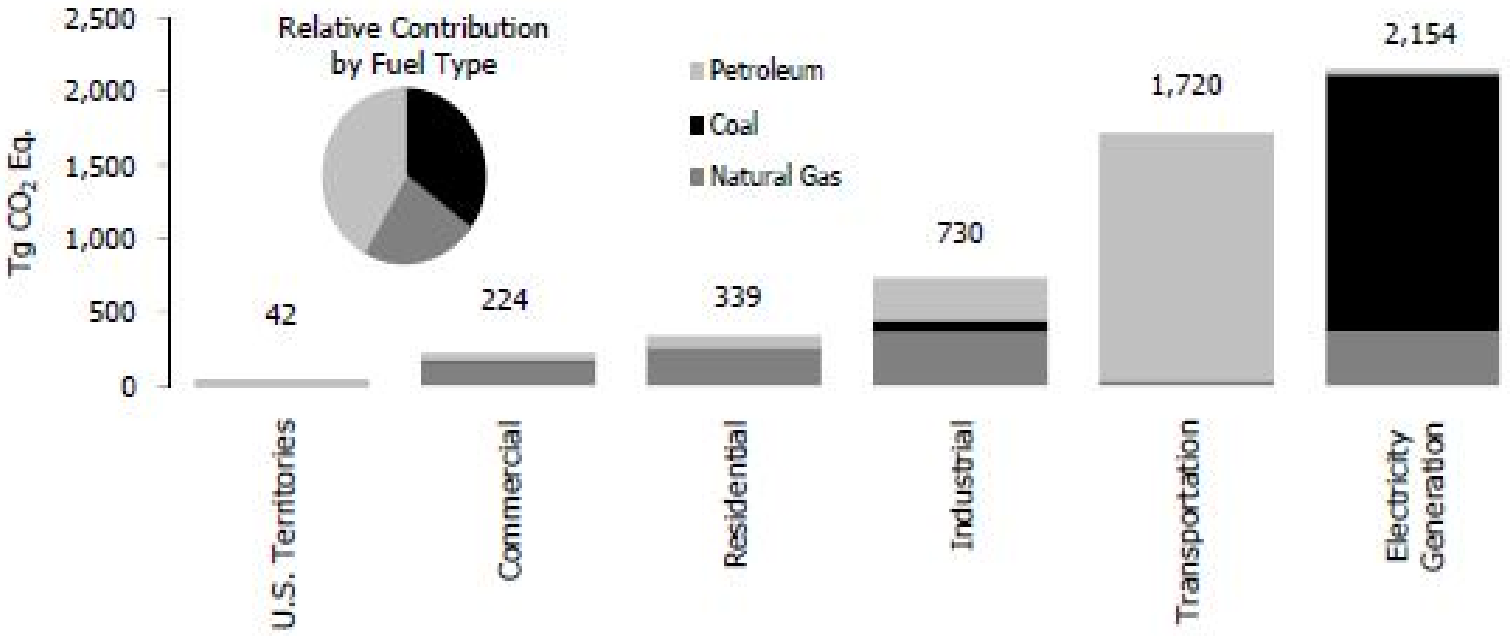

Figure ES-6: 2009 CO_2 Emissions from Fossil Fuel Combustion by Sector and Fuel Type

Note: Electricity generation also includes emissions of less than 0.5 Tg CO_2 Eq. from geothermal-based electricity generation.

Coal

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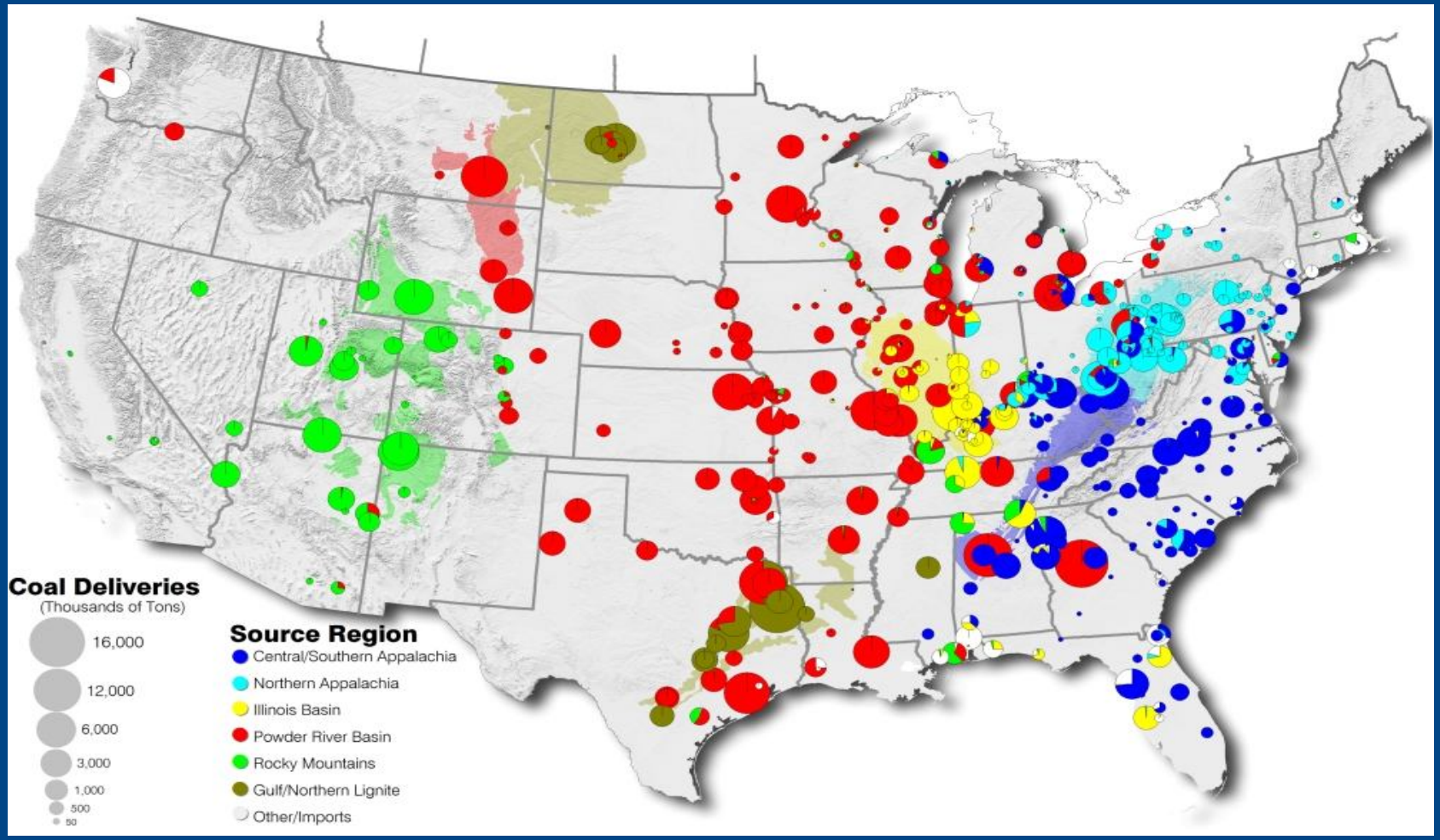
Coal Country (2005)



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Predictions

EIA: CO_2 from coal up 6% by 2020, consistent rise in production/ consumption, static price.

Extractors (Peabody): “Modest rebound in 2011”, “...greater recovery seen in 2012 and beyond...”

Utilities: Coal phase out (Duke, by 2050; Exelon, 10-15% imminent). 25% by 2020 (EEI)

Investors/ Analysts: up to 24% GW gone by 2018 (ICF),

economy-wide CO_2 down by 10% by 2020 (Brattle Group)

Predictions Based on Fixed Costs of Running Plants, Upgrades

-age of facilities (average of 34 years)

-environmental mitigation requirements

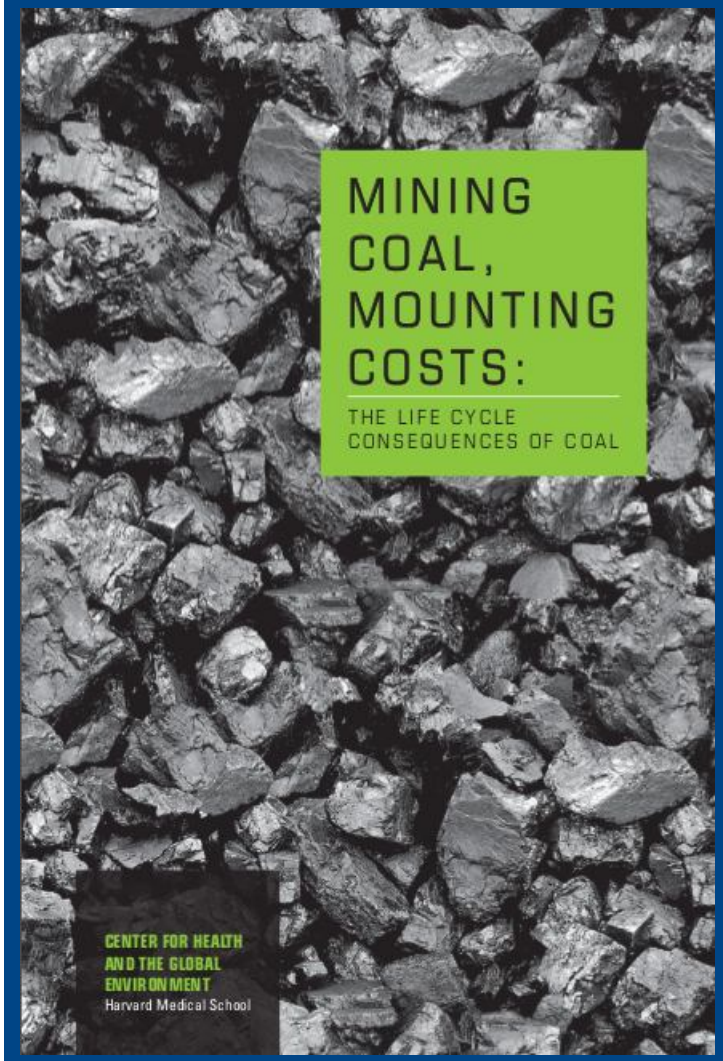
air, water: Hg, SO2, NOx, PMs, effluent, etc.

Doesn't consider restrictions on input...

-labor issues: mine safety, black lung

-public health costs with no plan to internalize

-supply of coal....



	Estimated Costs in 2008 (USD)		
	Low	Best	High
Land Disturbance: Carbon & Methane	$738M	$2.2B	$10.2B
Public Health Burden in Appalachian Communities	$74.6B	$74.6B	$74.6B
Fatalities Among the Public Due to Coal Transport by Rail	$1.8B	$1.8B	$1.8B
Emissions of Air Pollutants from Combustion	$65.1B	$187.5B[2]	$187.5B
Mercury Impacts	$414.8M	$5.5B	$29.3B
Subsidies	$3.2B	$3.2B	$5.4B
Abandoned Mine Lands	$8.8B	$8.8B	$8.8B
Climate Contribution from Combustion	$20.6B	$61.7B	$205.8B

	Estimated Costs in 2008 (USD)		
	Low	Best	High
Totals	$175B	$345B	$523B
Added Costs in ¢/kWh	9¢	18¢	27¢

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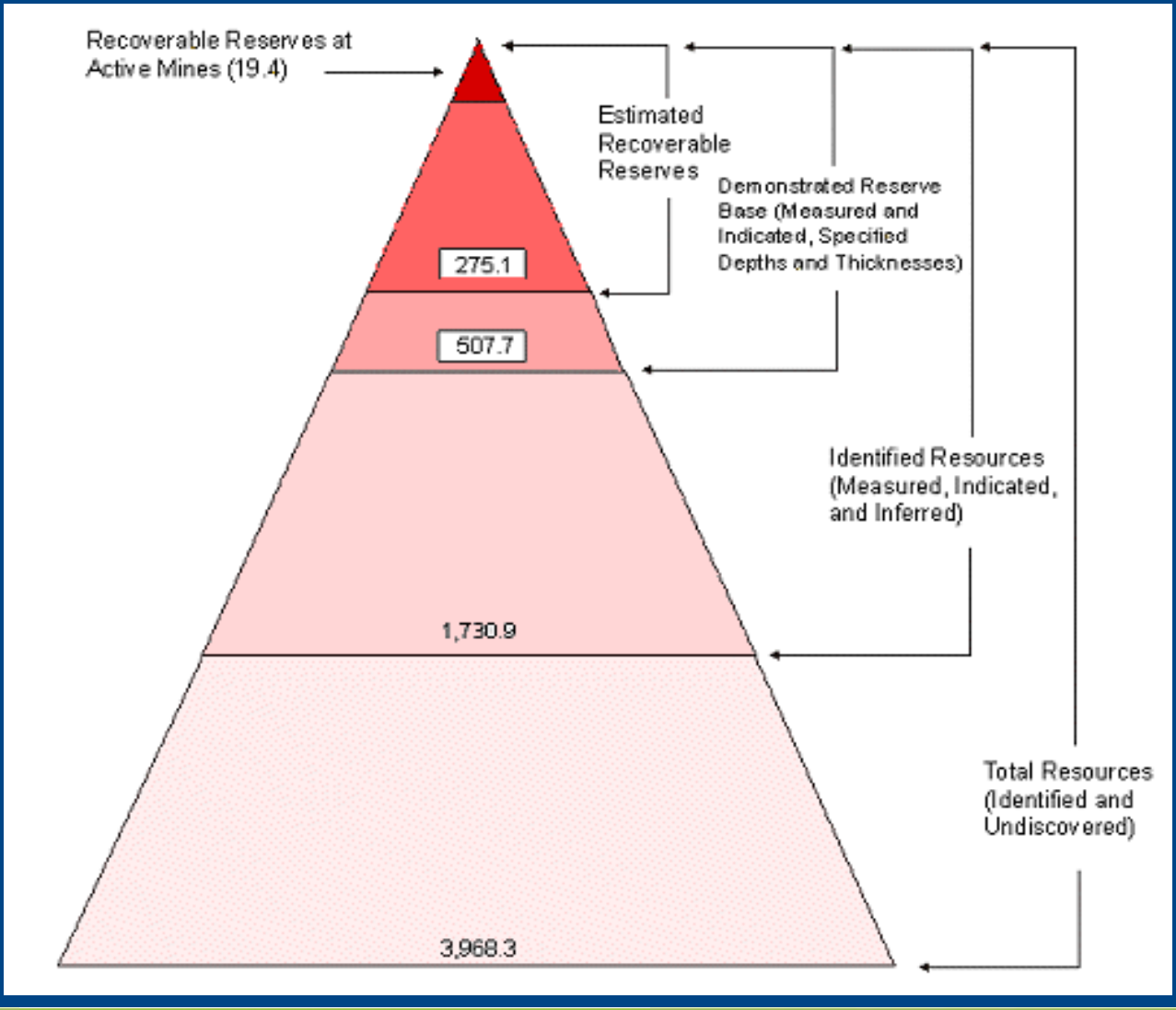
King Coal



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Economically Recoverable Coal

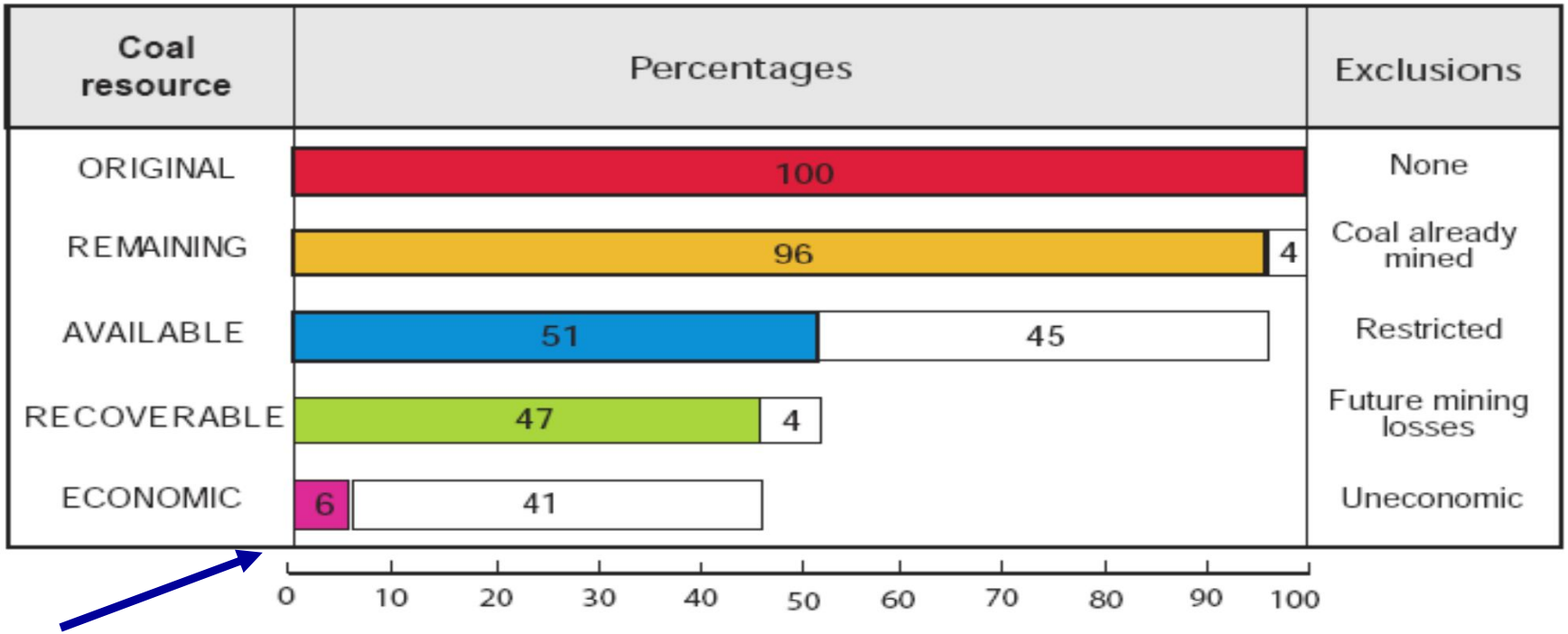


Figure 68. Bar graph showing Gillette coalfield coal resource analysis results for the six coal beds from figure 67, reported as percentages of original resources (at sales price of $10.47 as of January, 2007). Percent of remaining resources are shown in colored bars; excluded resources from the previous category are shown in white bars.

Statistical Differences between USGS and EIA

EIA Demonstrated Reserve Base (DRB)	**486 billion tons**
EIA Coal Reserve (54% DRB)	**261 billion tons**
EIA Life of US Coal Reserves	**249 years**
USGS Coal Reserve – 6% of DRB	**29.16 billion tons**
USGS Life of US Coal Reserves	**27.7 years**

Justified Extrapolation?

"We really can't say we're the Saudia Arabia of coal anymore."
-USGS

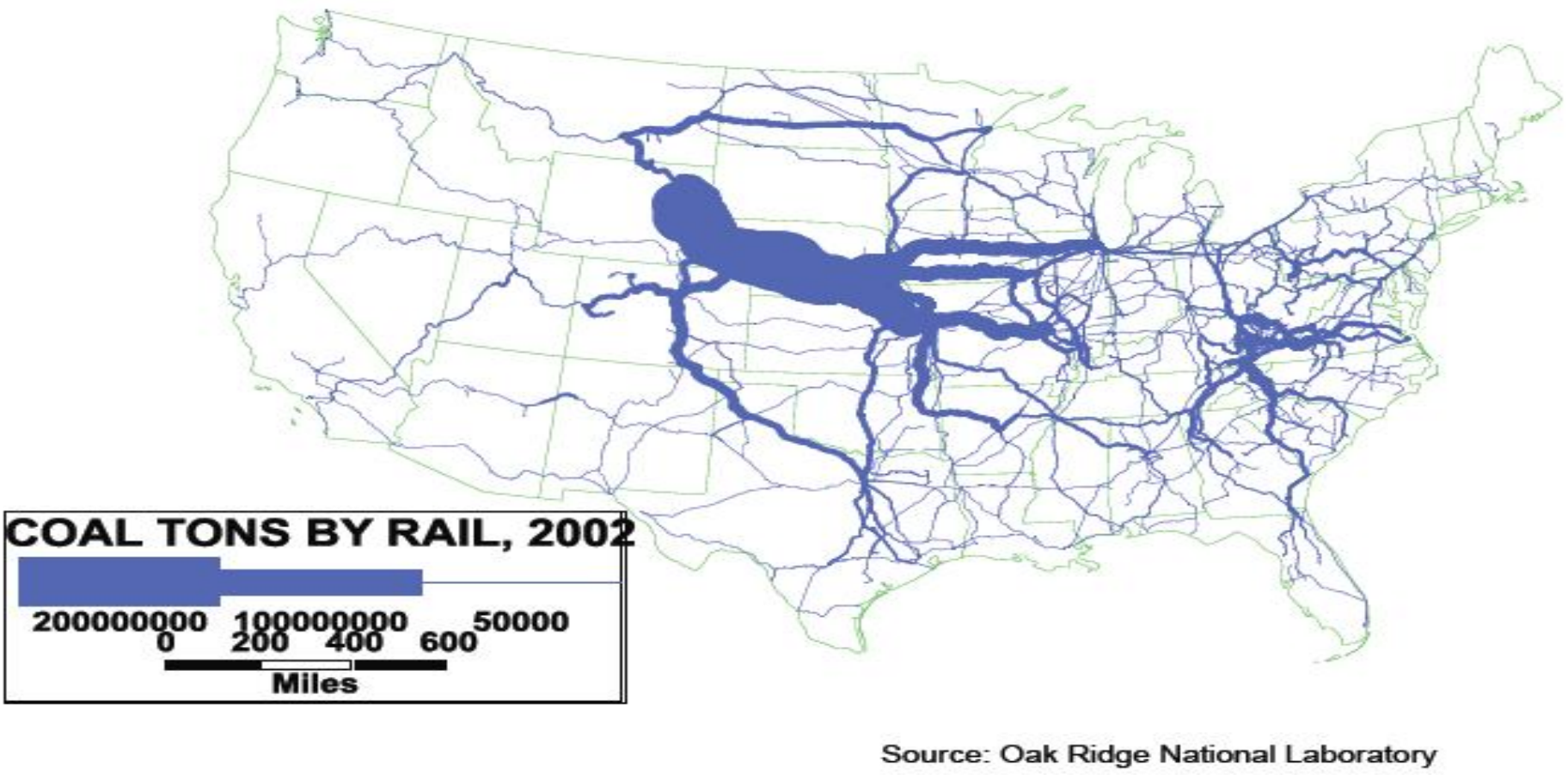
a) increasing production costs for coal

b) the discrete nature of coal mines

c) legal issues facing coal mine expansion

d) transportation

20% of rail traffic

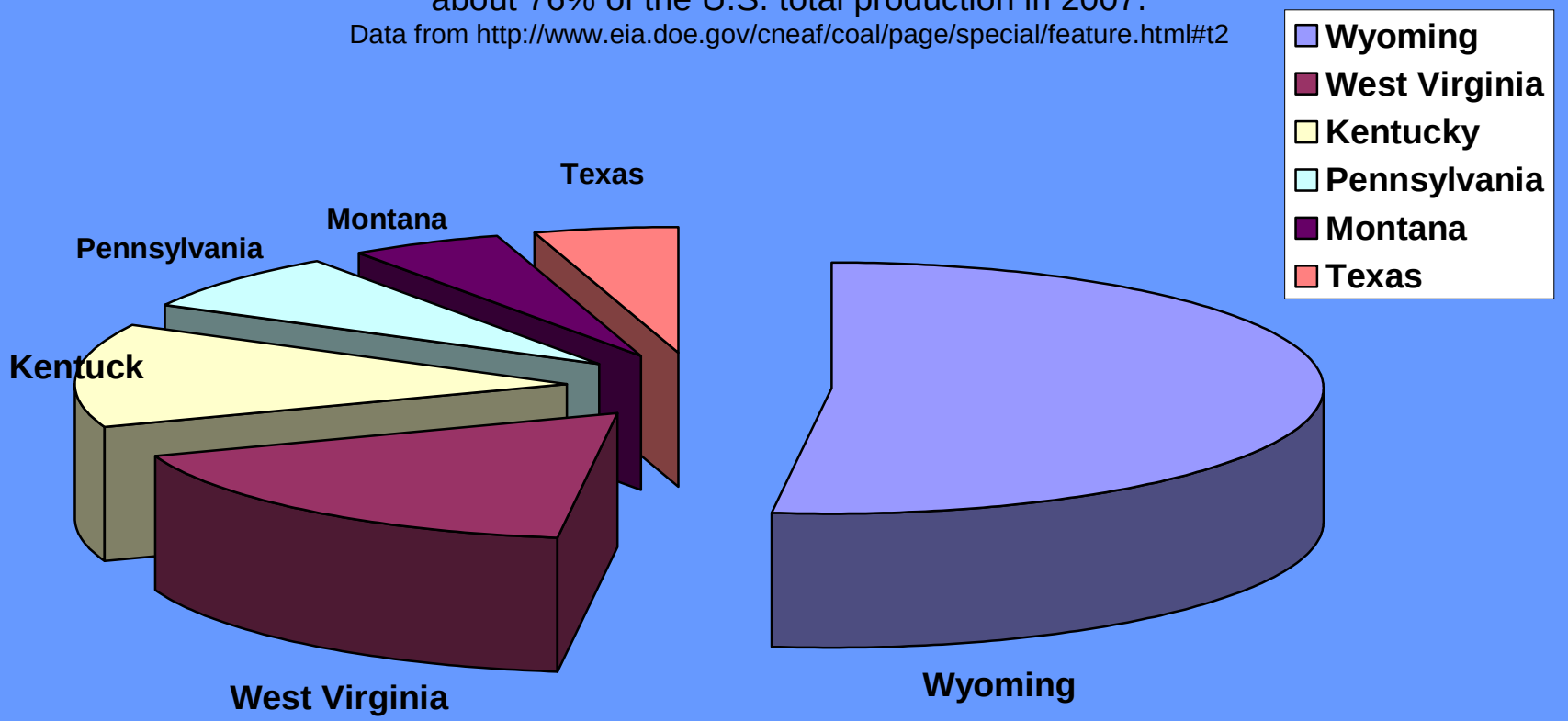


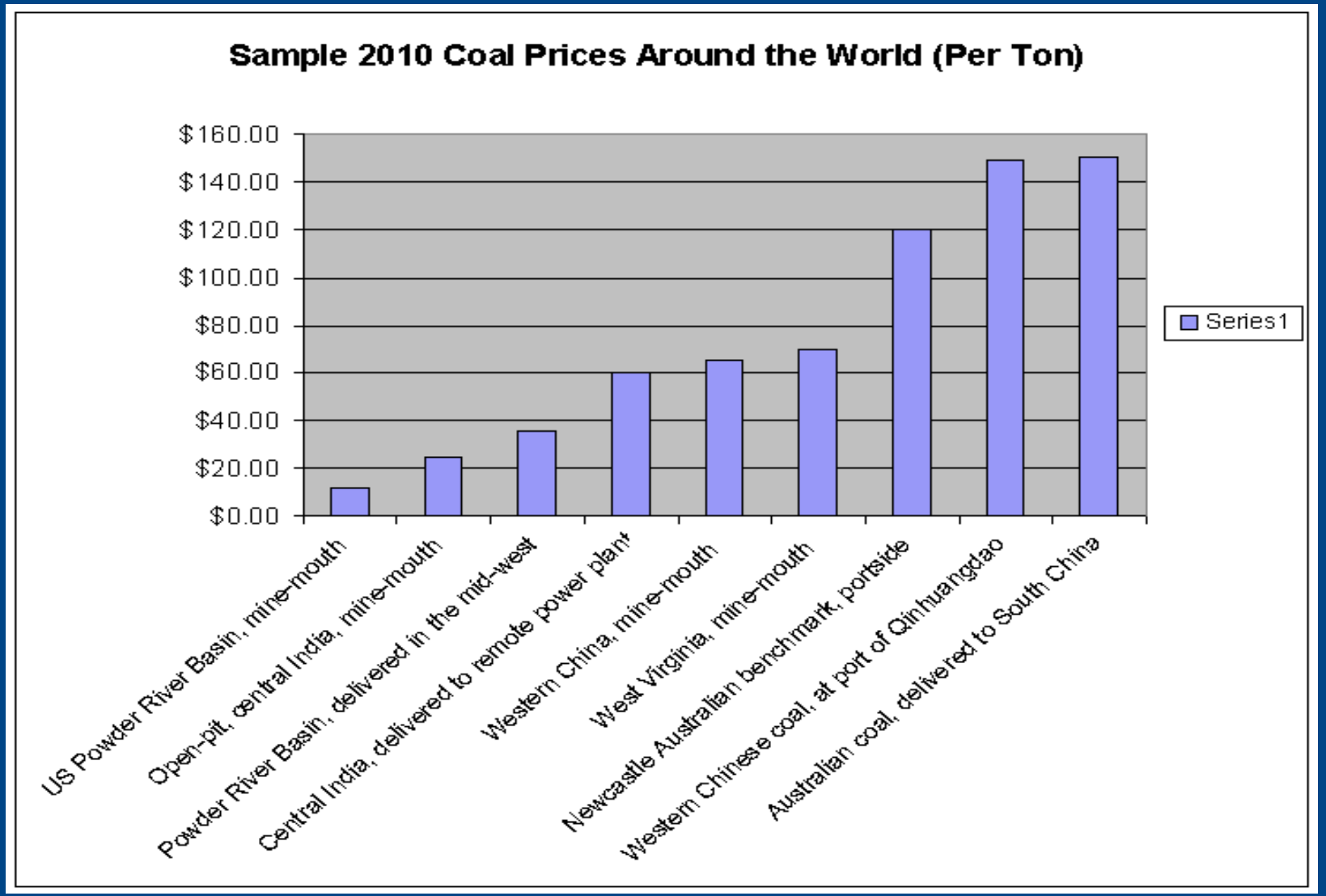
Source: Oak Ridge National Laboratory

Top 6 Coal Producing States in U.S.

These six states produced about 842 million short tons or about 76% of the U.S. total production in 2007.

Data from http://www.eia.doe.gov/cneaf/coal/page/special/feature.html#t2





"We are very much concerned, and it's getting worse." Senior Vice President, AEP

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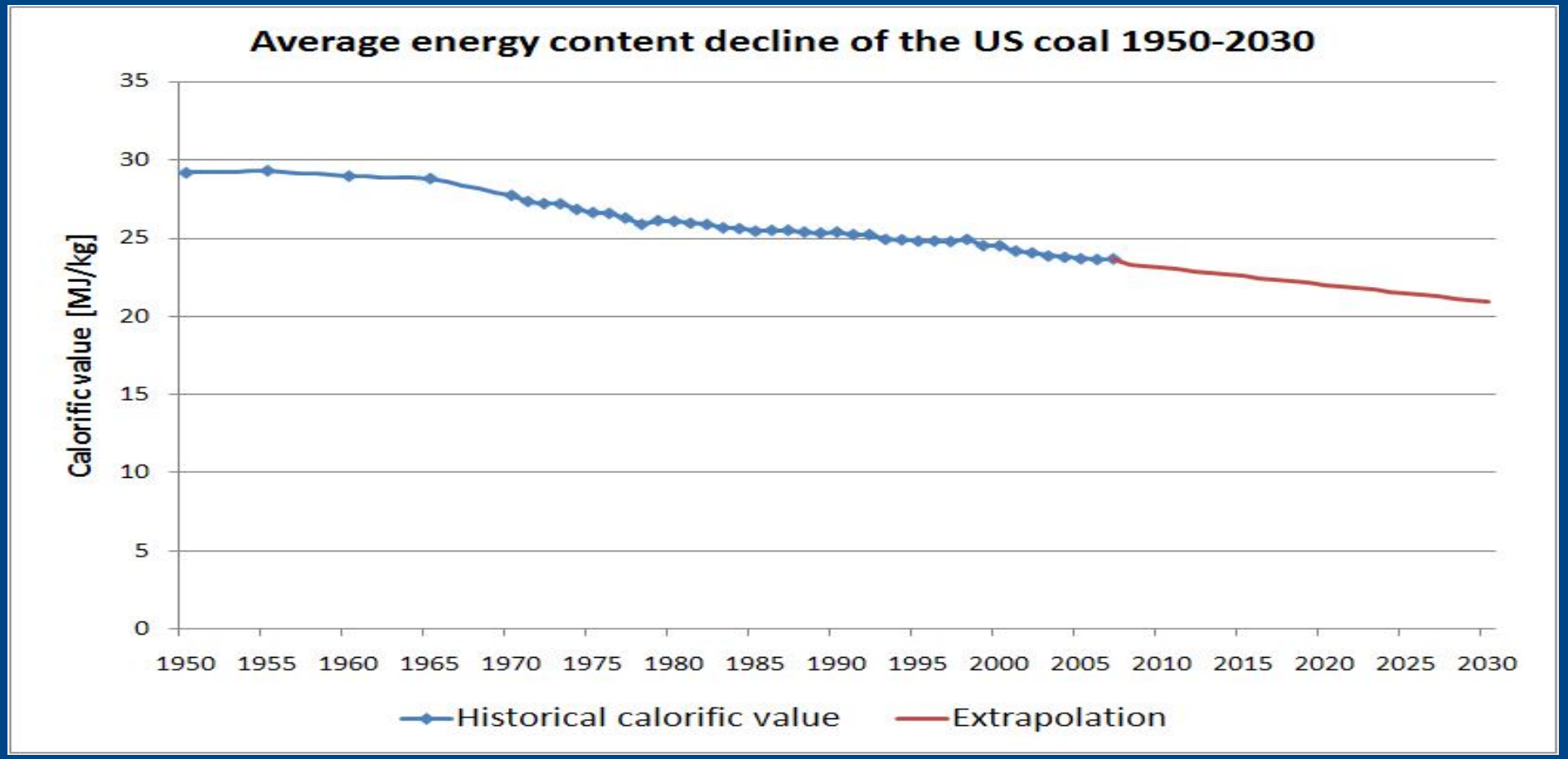
Peak Coal



EIA, Annual Energy Review, 2007.

Table 1
Summary of coal production and CO_2 emissions by largest coal-producing countries on the Earth.

Country	EJ peak[a] (year)	Ultimate coal production (EJ)	Peak coal rate (EJ/y)	Ultimate CO_2 emissions (Gt)	Peak CO_2 rate (Gt/y)
China	2011	4015.6	75.8	365.0	6.9
USA[b]	2015	2756.7	26.8	250.5	2.4
Australia	2042	1714.5	23.5	155.8	2.1
Germany/Poland	1987	1104.4	14.9	100.4	1.4
FSU[c]	1990	1070.3	20.3	97.3	1.8
India	2011	862.6	13.6	78.4	1.2
UK	1912	753.0	7.7	68.4	0.7
S. Africa	2007	478.6	6.8	43.5	0.6
Mongolia	2105	279.2	3.2	25.4	0.3
Indonesia	2012	135.5	5.8	12.3	0.5
Global ultimate/peak	2011	13,170.5	160	1197.0	15.0

[a] Note that sometimes the peaks of produced coal tonnes and EJ do not coincide.
[b] Excluding Alaskan coal
[c] The Former Soviet Union, excluding the Russian Far East coal.

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Thanks!

"It's pretty clear that, whether it's caused by future carbon legislation or action by the EPA, the migration away from coal has begun."
Mayo Shattuck, CEO, Constellation Energy Group

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