

Updated Trends in

U.S. Delivered Coal Prices:

2004-2015

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INTRODUCTION

This report is an updated version of the <u>Trends in U.S. Delivered Coal Costs</u> report published by Clean Energy Action in 2013. The information included is intended to increase awareness of the recent trends in the U.S. coal market and their implications for choices on investments in electrical generation.

Recent Trends in the US Coal Industry

Coal prices have fluctuated greatly over the last two decades (see Figure 1). While the price of coal fell significantly during the 1990's due in large part to the opening of new mines in the Powder River Basin, prices began to rise around 2004 probably due to increased production costs (see Figures 4-7). Prices grew by 6.75% annually throughout the country until 2011 when they began to drop again. These trends can be seen in the historical price of coal, which is shown in Figure 1 for the U.S. and for each state individually starting on page 15.

Some speculate that the recent drop in domestic coal prices is a response to competition from natural gas (see Figures 2, 3) and renewable energy sources. The price of natural gas has decreased significantly in recent years, allowing it to displace coal in many U.S. electricity markets. The implementation of new extraction practices like hydraulic fracturing and horizontal drilling have increased natural gas production and simultaneously allowed prices to drop rapidly (1). While the price of gas per MMBTU is still comparable to that of coal, some natural gas power plants are significantly more efficient than coal fired power plants and require less investment in pollution mitigation, which can make natural gas electricity generation more economical than burning coal (2). Power production from renewable energy sources is also growing rapidly as they become economically viable alternatives to fossil fuels.

The recent downtrend in domestic coal prices has been paralleled by major instability in the coal industry. Since 2012, a series of coal industry bankruptcies have affected more than 50 companies, including Peabody Energy, the largest privately owned coal company in the world, along with Arch Coal and Alpha Natural Resources, the formerly second and third largest coal companies in the country. In addition, almost 50 smaller US coal companies have filed for bankruptcy in recent years. While the stability of any energy market is the result of complex economics, it appears that four main factors have contributed to the current financial strains in the US coal industry: decreasing domestic coal prices, decreasing global demand for metallurgical coal, increasing production costs, and increased environmental regulations.

- 1) Falling domestic coal prices: The domestic price of coal has dropped steadily over the last five years to compete with natural gas and renewable energy markets as discussed above, thereby decreasing profit margins for coal suppliers.
- 2) Decreased global demand for metallurgical coal: American companies like Peabody Energy have previously derived a significant portion of their revenue from selling relatively expensive metallurgical coal, which is used to make steel, to countries like China. In 2010 and 2011 US coal companies invested billions of dollars in expanding their metallurgical coal production but the following year the price of metallurgical coal began a downward

spiral that would leave it at less than half of its peak values (3). This shift left U.S. coal companies with increasing debt burden ratios and billions of dollars of depreciating assets (4).

3) Increased production costs: The historical productivities of the largest coal mines in America (measured in short tons of coal per labor hour) are shown in Figures 7 and 8. These figures reveal a steady decline in productivity that has contributed to increased operating costs of coal mines. These increased operating costs in combination with falling coal prices have devastated profit margins.

The recent decrease in coal mine productivity is generally driven by the geology of coal mining: as coal is mined, the most easily accessible deposits of coal are extracted first (5). For example, in open pit mines, coal deposits that lie close to the Earth's surface and are relatively inexpensive to mine are extracted first. Once these coal deposits have been exhausted, miners begin to extract other seams which are covered by increasing amounts of dirt and rock called *overburden*, which must be moved in order to access the coal. As the ratio of moving dirt to mining coal increases, productivity decreases and production costs grow. The opening of new mines with abundant accessible coal like the Powder River Basin in the West led to lower coal production costs in the 1990's. However, this region has seen decreases in productivity and increases in production costs as overburden ratios and distances between coal deposits and existing rail lines have increased over the last 15 years.

4) Stricter Emissions Regulations: The EPA has recently increased regulations on power plant emissions like mercury and air toxics and taken steps to begin reducing greenhouse gas emissions as well. These regulations can increase costs for fossil fuel-based utilities (6) and lower demand for more polluting fuels like coal.

No one can predict how the complex forces of supply and demand will affect future coal markets but it appears that decreased demand coupled with increased costs have weakened U.S. coal companies and there is no reason to believe that these trends will reverse. This instability raises questions about whether states are best served by investing money in aging coal plants, which depend on volatile coal markets for fuel, or finding a cleaner, fuel-free path to a stable energy future.

Finally, citizens and decision-makers are encouraged to consider that current coal prices do not accurately account for external costs like negative health impacts, contamination of watersheds, decreased agricultural yields, and property damages due to extreme weather events. Furthermore, current prices are artificially depressed by federal and state subsidies of the coal industry. A thorough analysis by nationally respected experts reported that accounting for these external factors conservatively doubles to triples the price of electricity generated from coal (7). These external costs are real and they should be accounted for when making decisions about utility investments to ensure the best outcomes for states and their citizens.

Sources of Data Used in This Report

The data used in this report come from the Energy Information Administration in the U.S. Department of Energy. Delivered coal prices are reported for electric utilities in the EIA's Electric Power Monthly <u>Table 4.10.B</u>. Year-end data for any given year are typically found in the February or March Electric Power Monthly publication for the following year.

Electric Utilities data for some states was not available and was replaced with the data from the "Electric Power Sector" column of the same table. If neither number was reported the data is either represented by a blank or simply not included here. Also, there are some minor inconsistencies in coal prices reported in different years for the same state. For complete accuracy, please refer to the <u>original source data</u> for the state of interest. More information about energy generation in each state can be found in <u>state profile reports</u> published by the EIA.

Coal prices can be reported in dollars per ton or in dollars per MMBTU. Here prices are reported in dollars per MMBTU because this unit accounts for differences in the heat content of the coal.

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- 7. Full cost accounting for the life cycle of coal. Paul Epstein, Jonathan Bounocore, Kevin Eckerle, Michael Hendryx, Benjamin Stout III, Richard Heinberg, Richard Clapp, Beverly May, Nancy Reinhart, Melissa Ahern, Samir Doshi, Leslie Glustrom. 2011, Annals of the New York Academy of Sciences, pp. 73-98.

TABLE 1: DELIVERED COAL PRICES 2004-2015

Data from Table 4.10.B. in the Energy Information Administration's Electric Power Monthly¹. Prices are not adjusted for inflation.

	2004 Coal	2011 Coal	2015 Coal		
_	Price	Price	Price	Compound Increase/Yr	Compound Increase/Yr
State	\$/MMBTU	\$/MMBTU	\$/MMBTU	Between 2004 and 2011	Between 2004 and 2015
Alabama	\$1.51	\$2.87	\$2.44	8.36%	4.46%
Alaska		\$1.65	\$3.27		
Arizona	\$1.28	\$1.98	\$1.99	5.60%	4.09%
Arkansas	\$1.23	\$1.91	\$2.26	5.66%	5.69%
California	\$1.94				
Colorado	\$0.97	\$1.72	\$1.83	7.42%	5.94%
Florida	\$1.89	\$3.50	\$3.08	8.01%	4.54%
Georgia	\$1.79	\$3.75	\$2.93	9.69%	4.58%
Illinois	\$1.16	\$2.01	\$2.02	7.11%	5.17%
Indiana	\$1.21	\$2.47	\$2.32	9.33%	6.10%
Iowa	\$0.90	\$1.44	\$1.61	6.05%	5.43%
Kansas	\$1.03	\$1.75	\$1.70	6.85%	4.66%
Kentucky	\$1.39	\$2.34	\$2.22	6.73%	4.35%
Louisiana	\$1.37	\$2.65	\$3.18	8.60%	7.96%
Maryland	\$1.74	\$3.73	\$2.87	10.00%	4.65%
Massachusetts	\$2.02				
Michigan	\$1.37	\$2.81	\$2.37	9.40%	5.11%
Minnesota	\$1.06	\$1.94	\$1.89	7.85%	5.40%
Mississippi	\$1.73	\$3.95	\$3.06	10.87%	5.32%
Missouri	\$0.92	\$1.72	\$1.90	8.14%	6.82%
Montana	\$0.63	\$1.61	\$1.88	12.44%	10.45%
Nebraska	\$0.66	\$1.52	\$1.34	10.99%	6.65%
Nevada	\$1.36	\$2.60	\$2.47	8.44%	5.57%
New Hampshire	\$2.01	\$3.56	\$3.87	7.41%	6.14%
New Jersey	\$2.27	\$4.17	\$3.83	7.90%	4.87%
New Mexico	\$1.48	\$2.07	\$2.34	4.28%	4.25%
New York	\$1.58	\$4.22	\$2.83	13.07%	5.44%
North Carolina	\$2.00	\$3.66	\$3.47	7.85%	5.14%
North Dakota	\$0.77	\$1.35	\$1.55	7.27%	6.57%
Ohio	\$1.32	\$2.29	\$2.14	7.13%	4.49%
Oklahoma	\$1.01	\$1.76	\$1.97	7.19%	6.26%
Oregon	\$1.19	\$1.79	\$2.38	5.24%	6.50%
Pennsylvania	\$1.23	\$2.55	\$2.35	9.54%	6.06%
South Carolina	\$1.91	\$3.85	\$3.55	9.16%	5.80%
South Dakota	\$1.38	\$2.07	\$2.23	5.20%	4.46%
Tennessee	\$1.33	\$2.82	\$2.39	9.85%	5.47%
Texas	\$1.34	\$1.93	\$2.13	4.67%	4.30%
Utah	\$1.14	\$1.78	\$1.95	5.73%	5.00%
Virginia	\$1.90	\$3.52	\$2.87	8.01%	3.82%
West Virginia	\$1.41	\$2.57	\$2.37	7.79%	4.83%
Wisconsin	\$1.16	\$2.51	\$2.27	10.13%	6.29%
Wyoming	\$0.86	\$1.43	\$1.65	6.56%	6.10%
U.S. Total	\$1.34	\$2.41	\$2.25	7.61%	4.82%

¹ Some states do not report delivered coal prices; missing data is either represented by a blank or simply not included here.

FIGURE 1: UNITED STATES INFLATION-ADJUSTED AVERAGE DELIVERED COAL PRICES 1995-2015

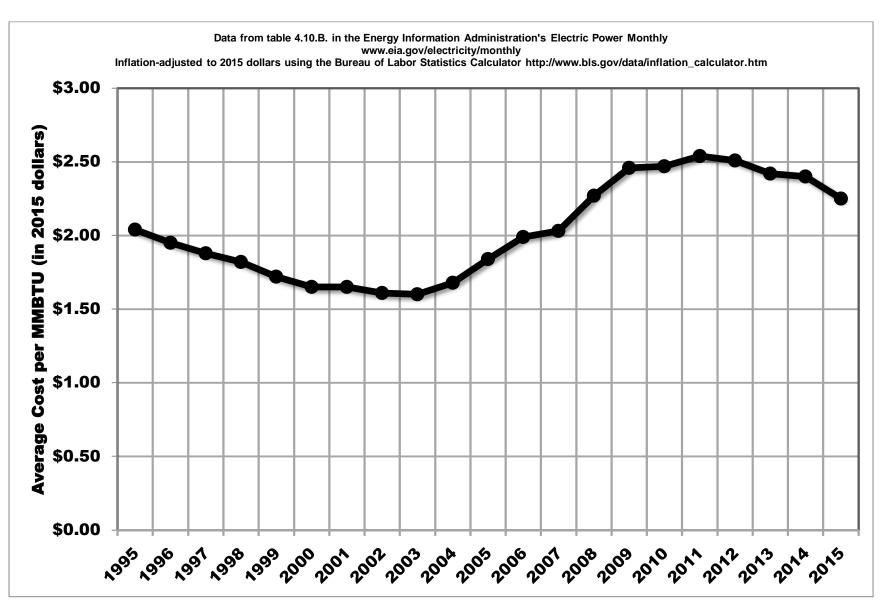


FIGURE 2: UNITED STATES INFLATION-ADJUSTED AVERAGE NATURAL GAS PRICES 1997-2015

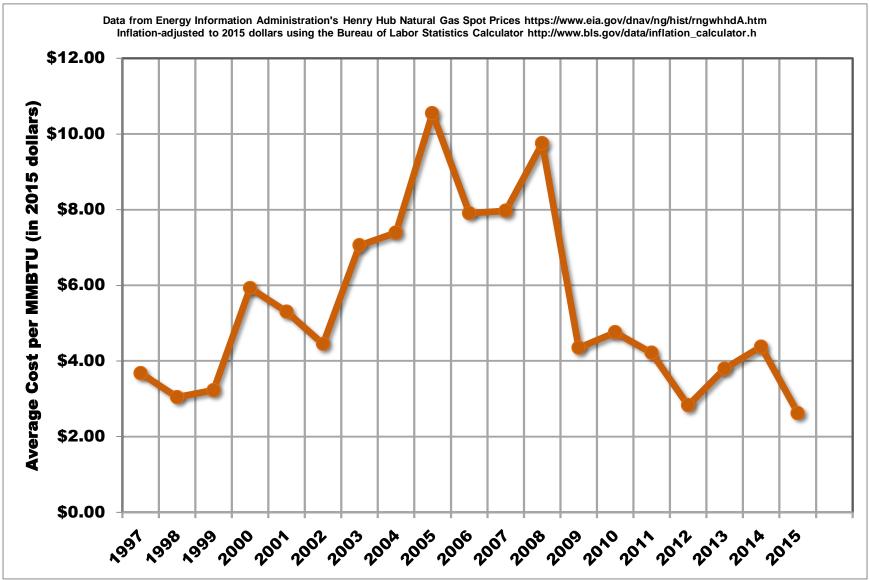


FIGURE 3: UNITED STATES INFLATION-ADJUSTED AVERAGE DELIVERED COAL AND NATURAL GAS PRICES 2004-2015

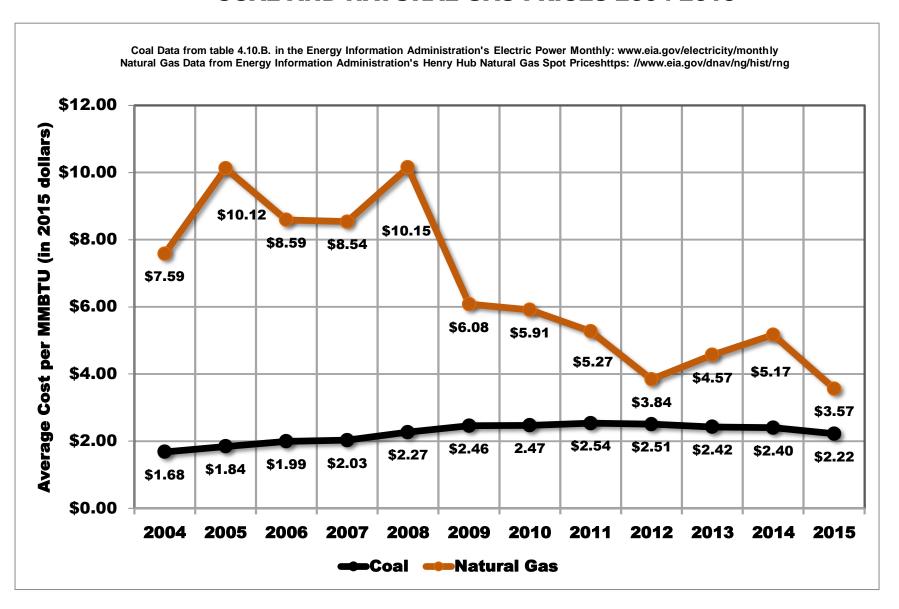
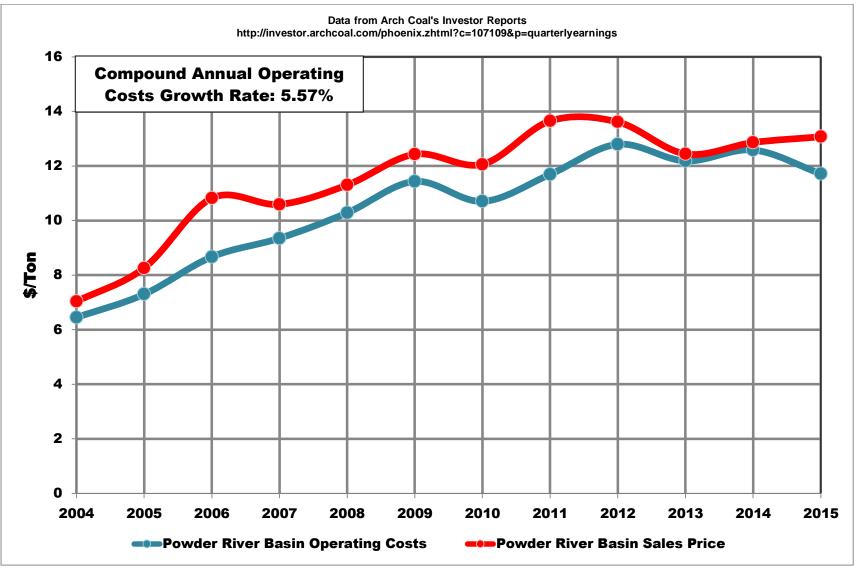


FIGURE 4: ARCH COAL POWDER RIVER BASIN ANNUAL² OPERATING COSTS AND SALES PRICES 2004-2015



² Year average data for 2004 and 2015 were not available so third quarter numbers were used.

FIGURE 5: ARCH COAL APPALACHIA ANNUAL OPERATING COSTS AND SALES PRICES 2004-2015

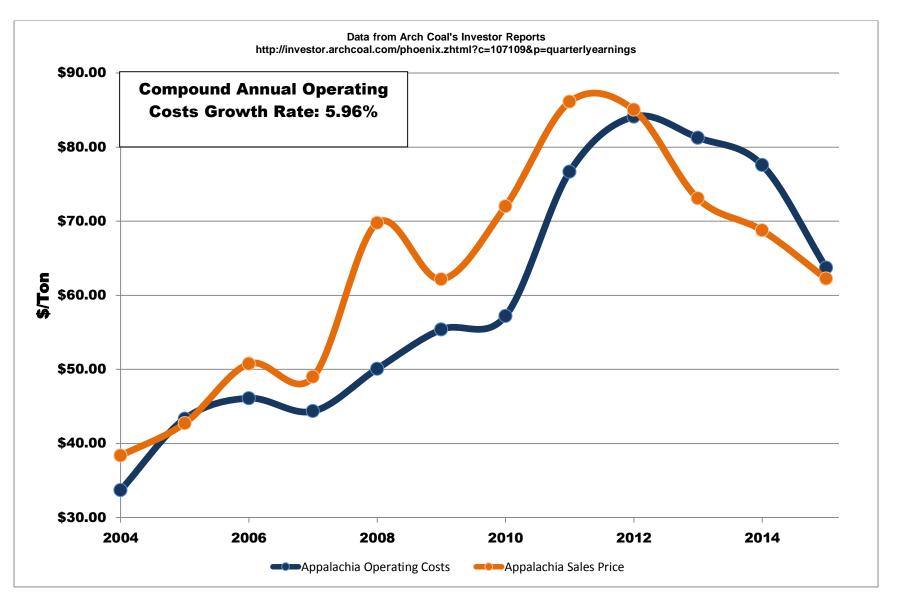


FIGURE 6: AGGREGATE COAL MINE PRODUCTIVITY 2001-2013

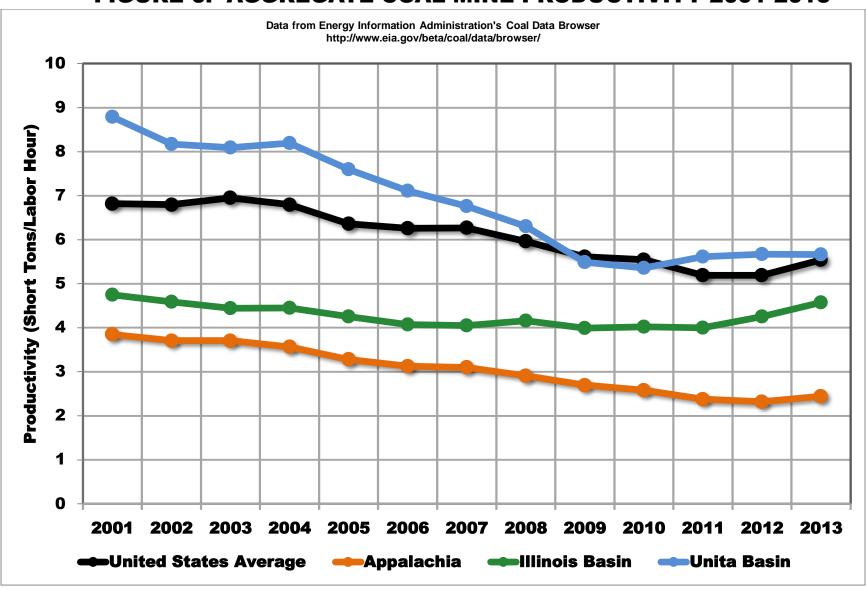
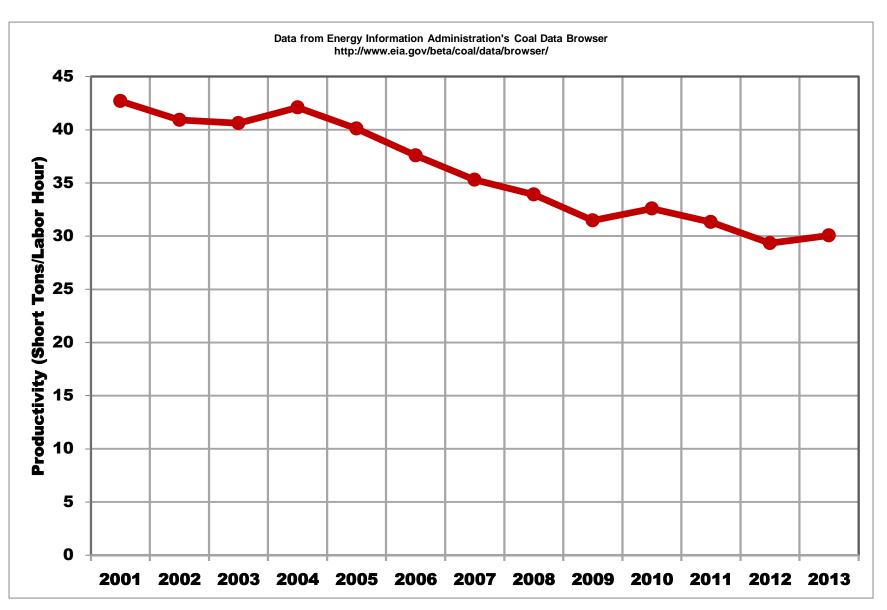
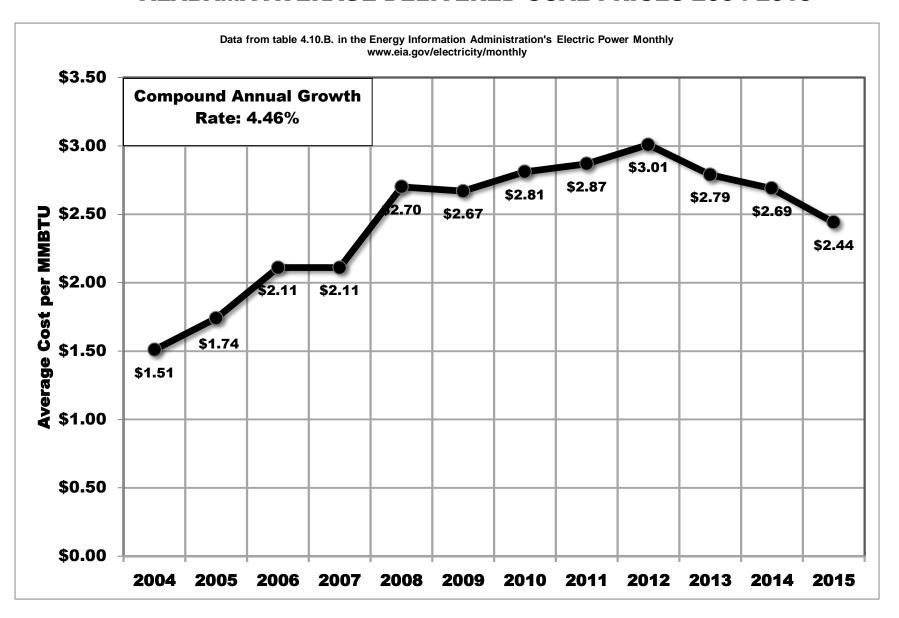


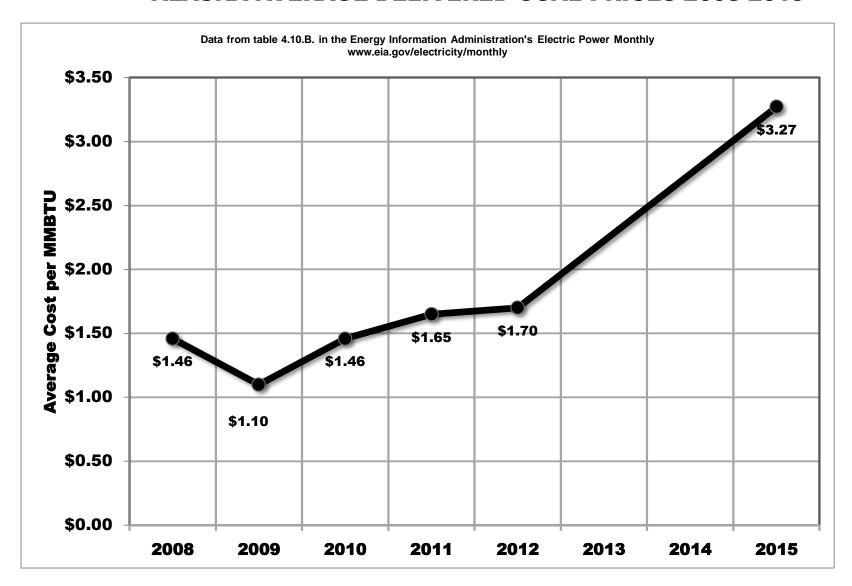
FIGURE 7: POWDER RIVER BASIN COAL MINE PRODUCTIVITY 2001-2013



ALABAMA AVERAGE DELIVERED COAL PRICES 2004-2015

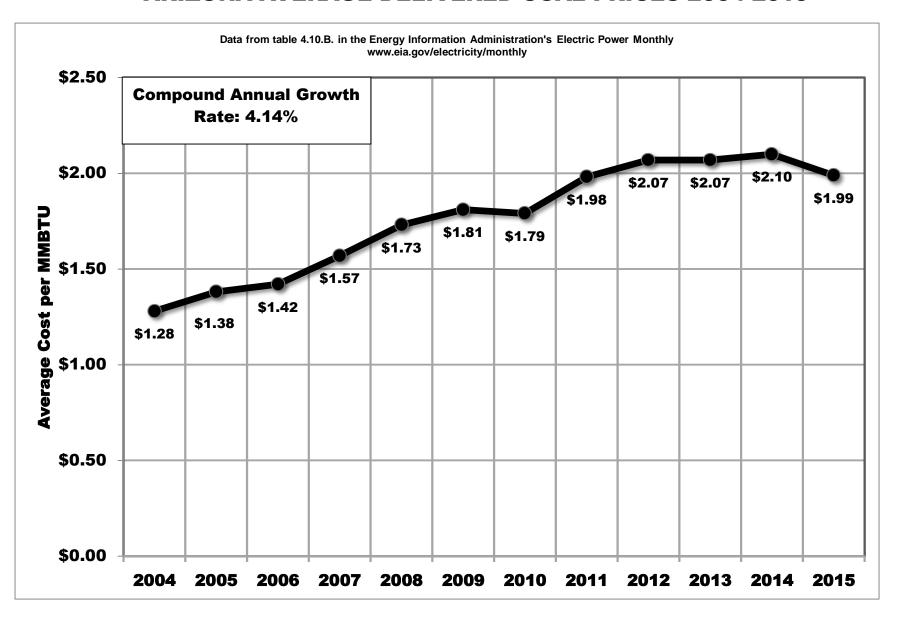


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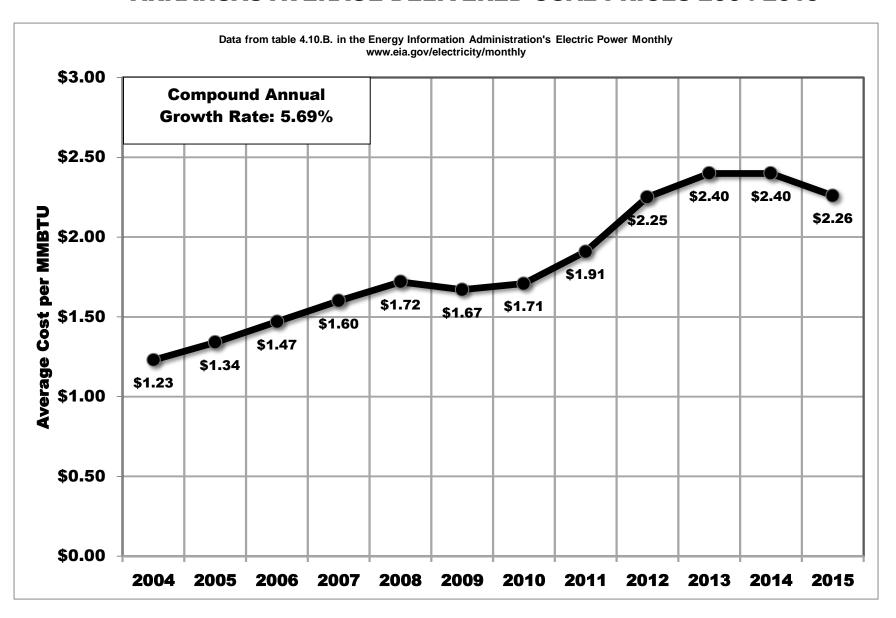


³ Missing data was not available, and no prices were reported before 2008.

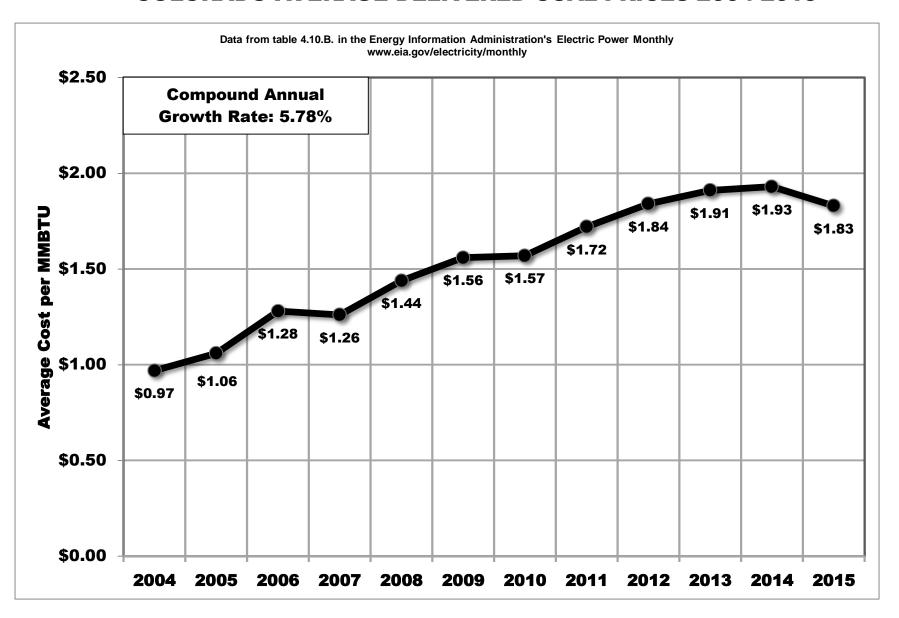
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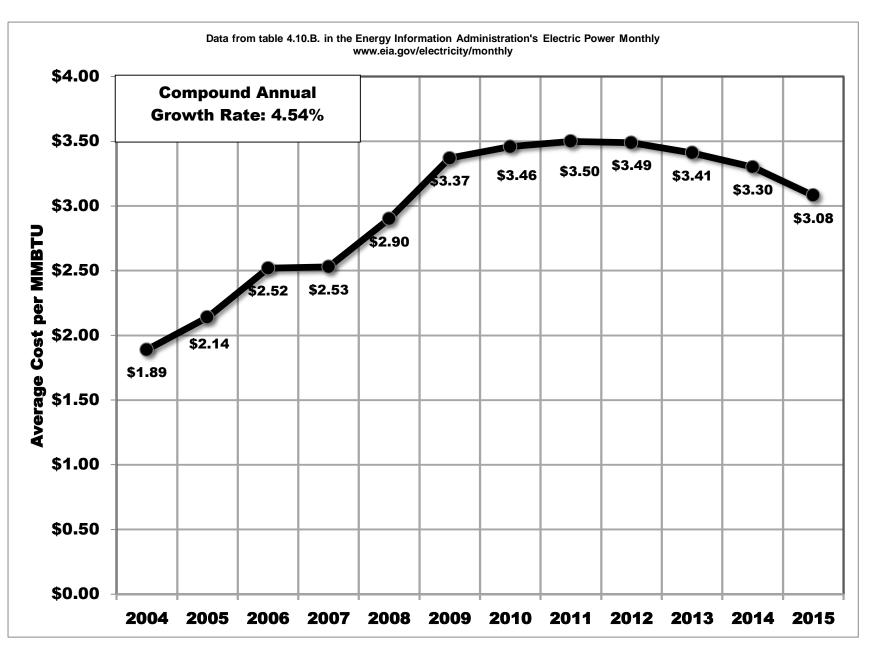
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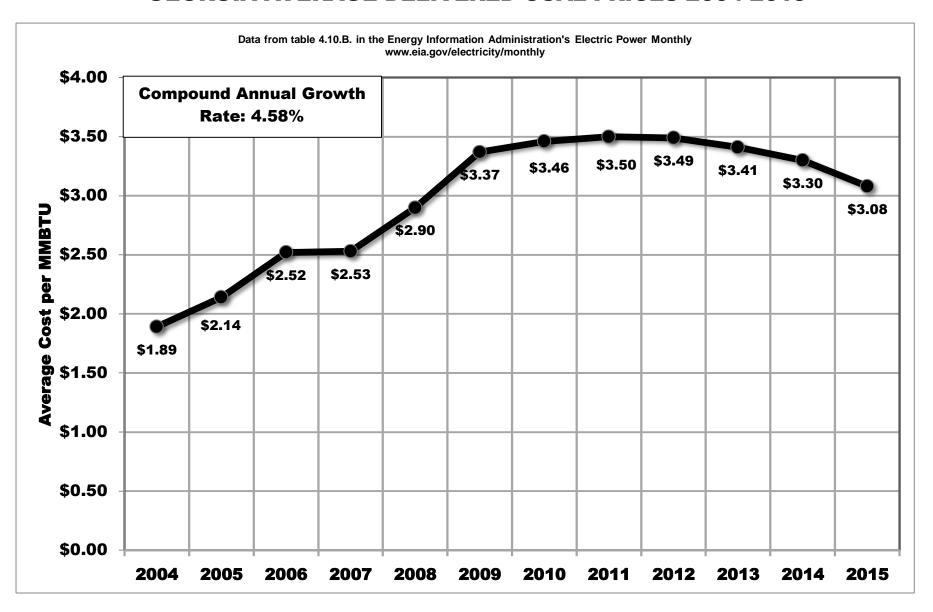
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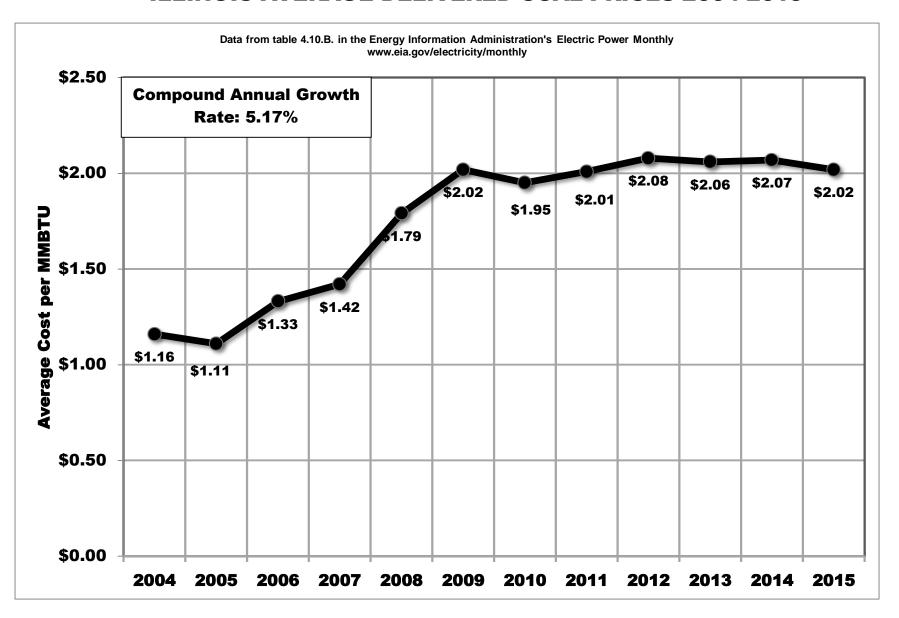
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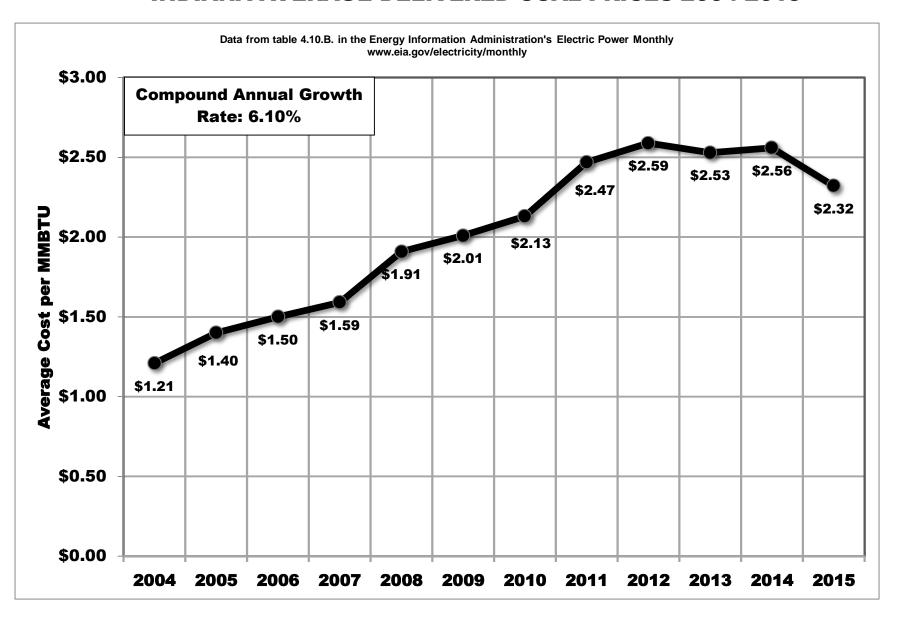
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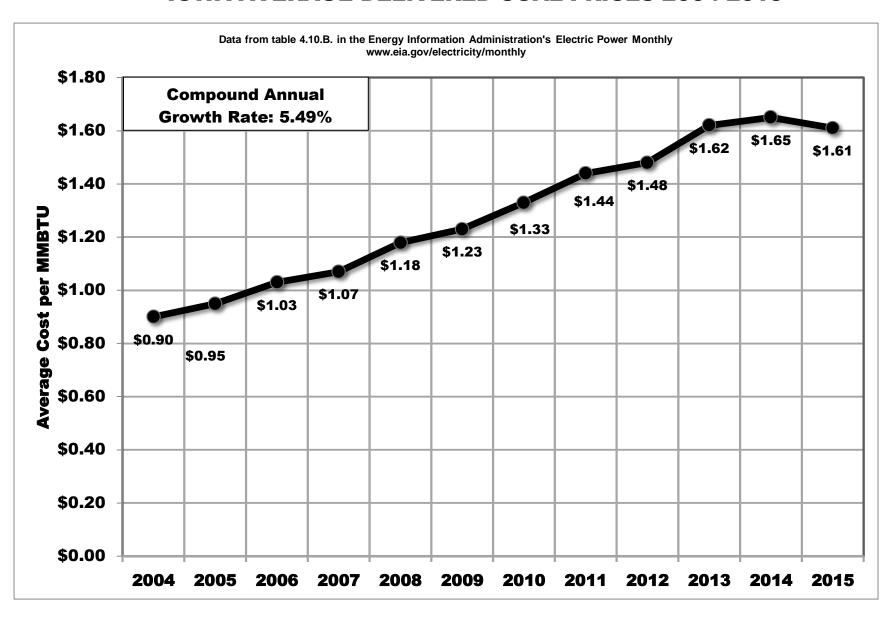
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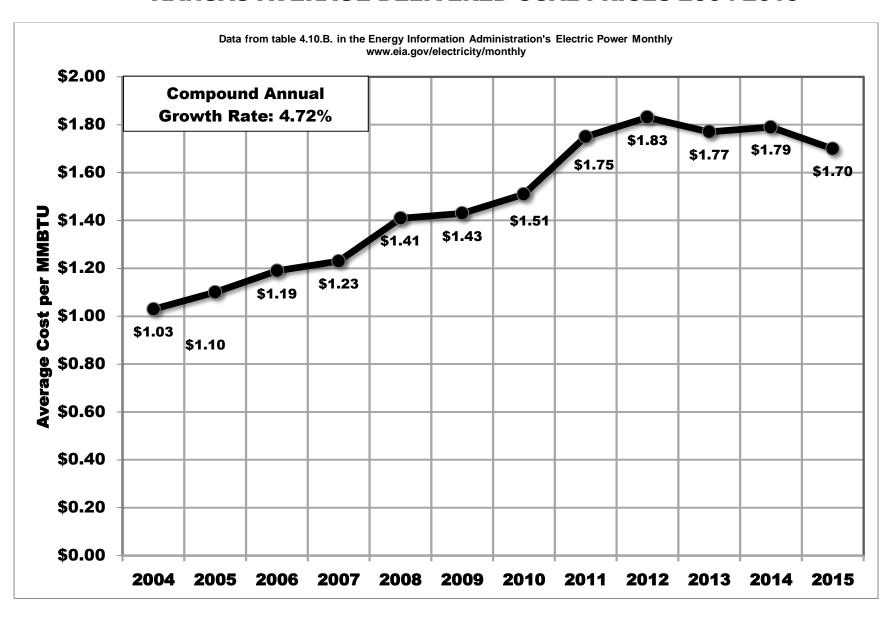
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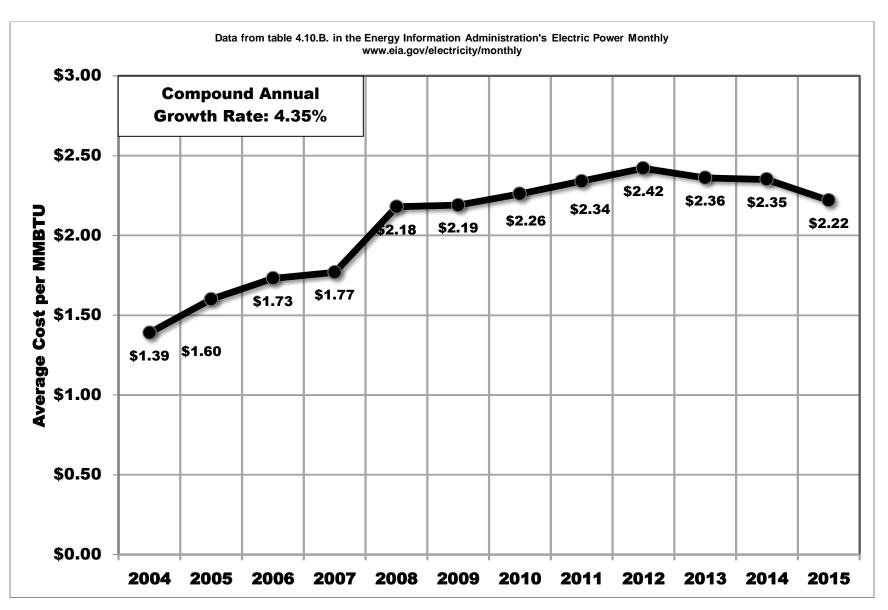
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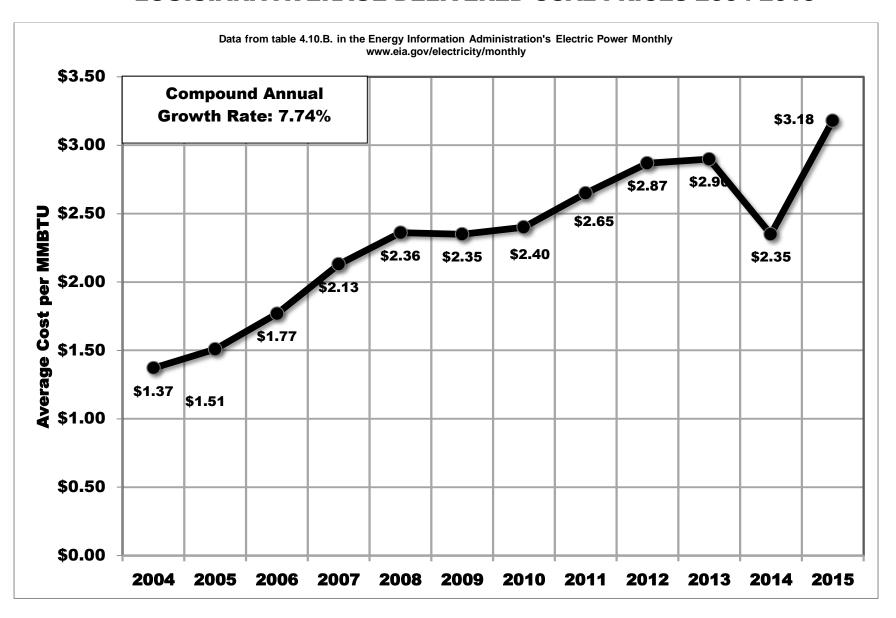
KANSAS AVERAGE DELIVERED COAL PRICES 2004-2015



KENTUCKY AVERAGE DELIVERED COAL PRICES 2004-2015



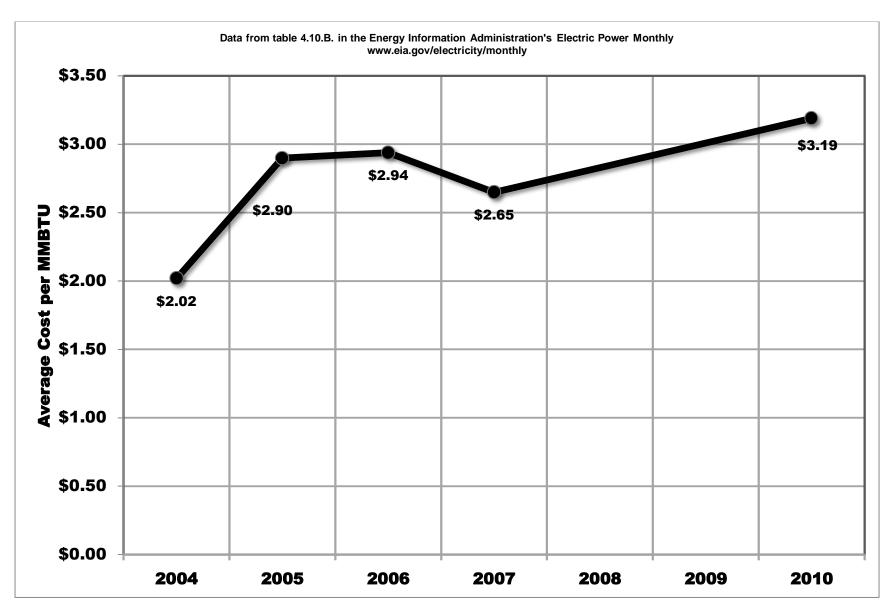
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MARYLAND AVERAGE DELIVERED COAL PRICES 2004-2015

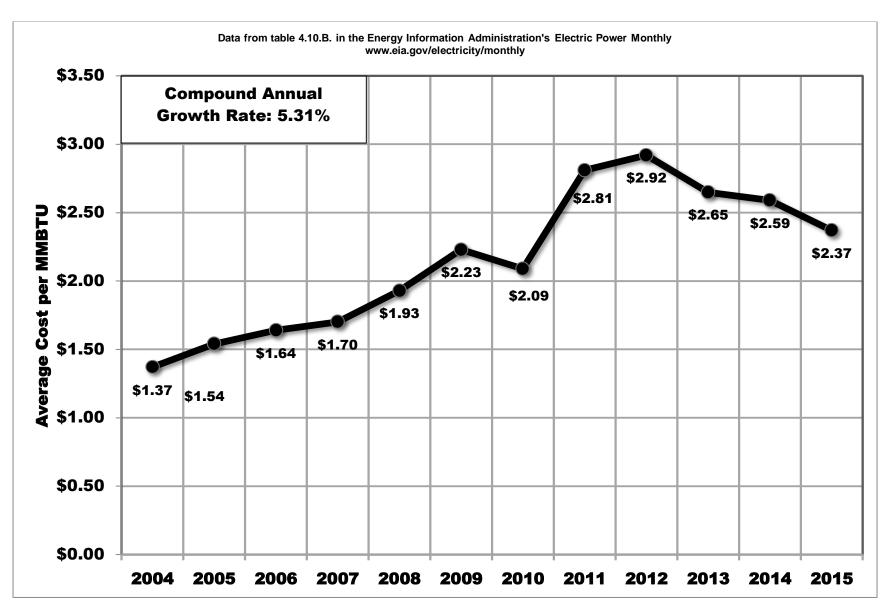


MASSACHUSETTS AVERAGE DELIVERED COAL PRICES 2004-20104

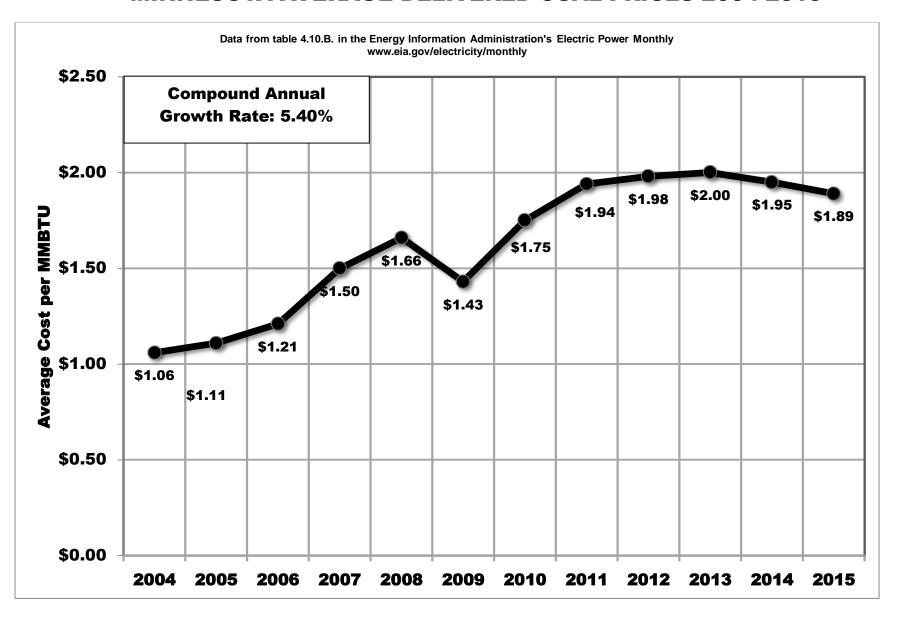


⁴ Data is not available for several years or more recently than 2010.

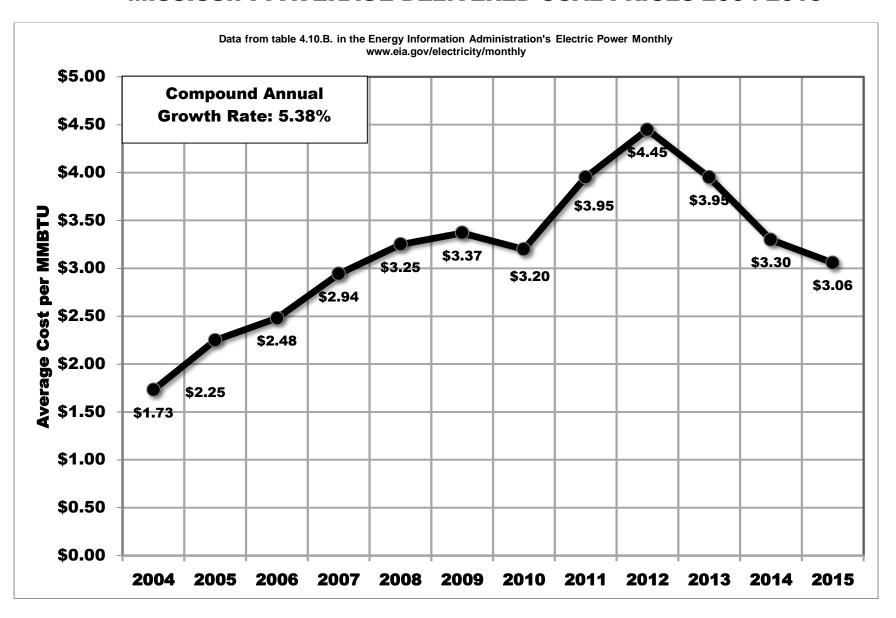
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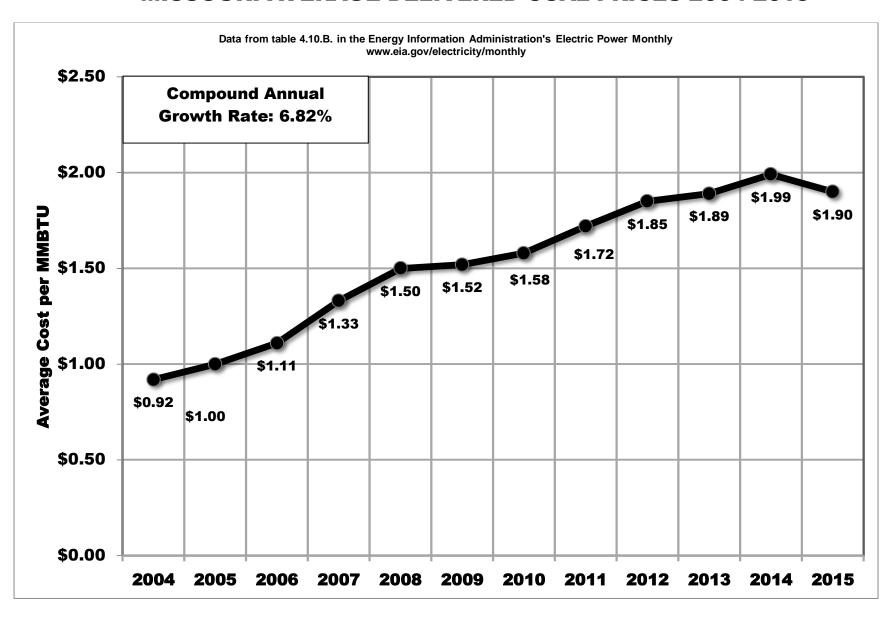
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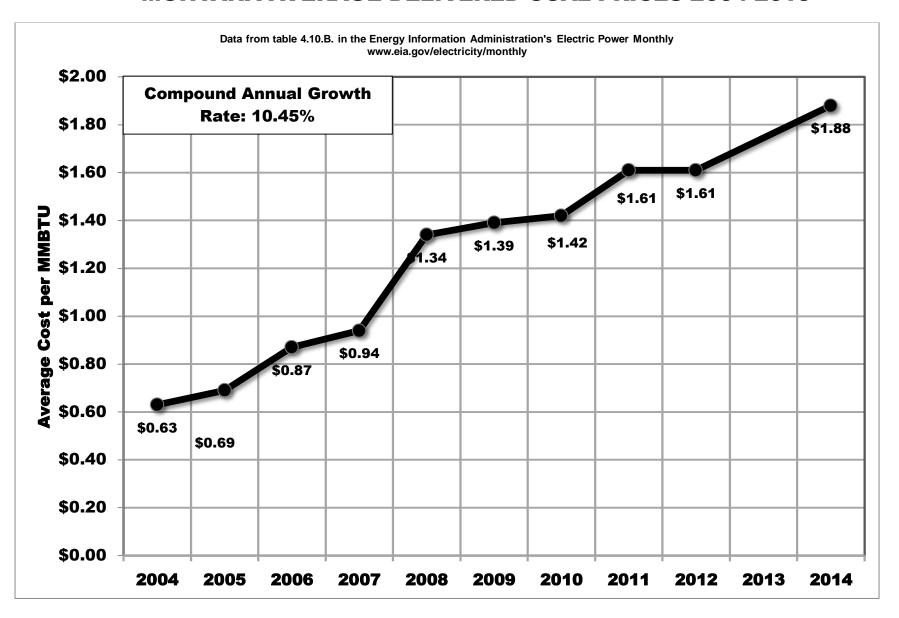
MISSISSIPPI AVERAGE DELIVERED COAL PRICES 2004-2015



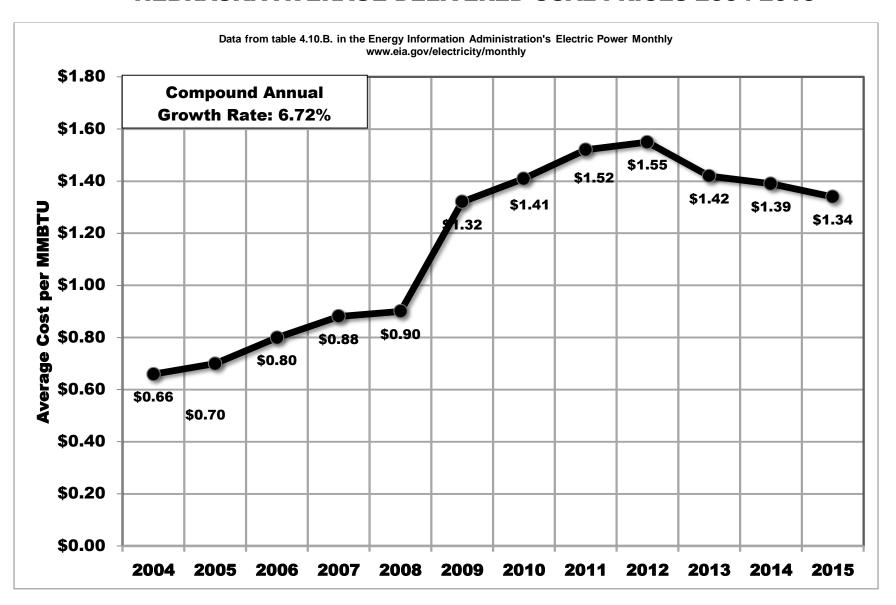
MISSOURI AVERAGE DELIVERED COAL PRICES 2004-2015



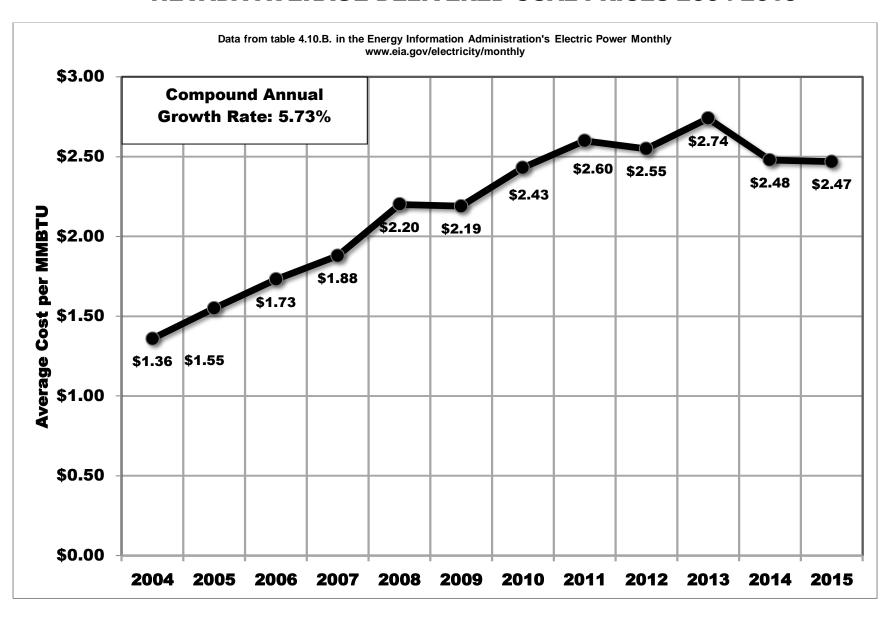
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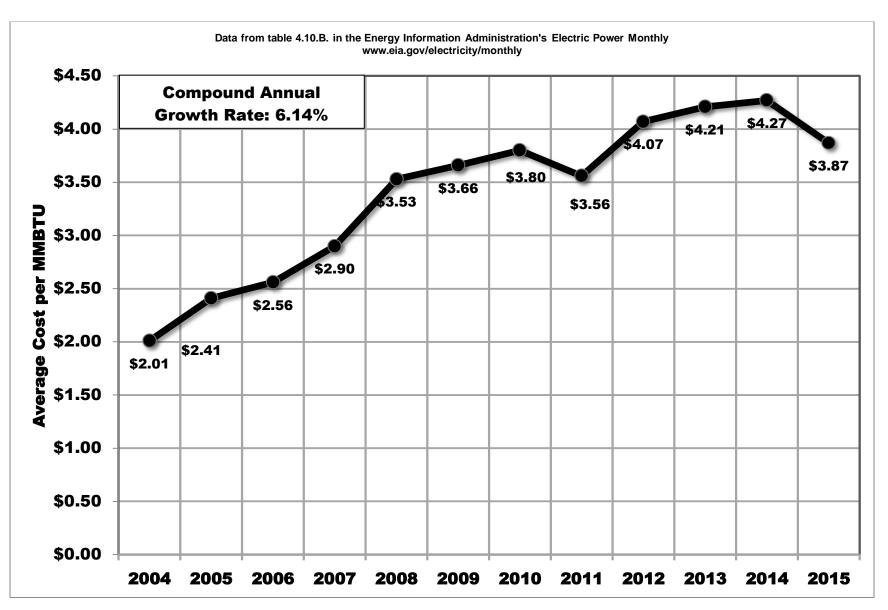
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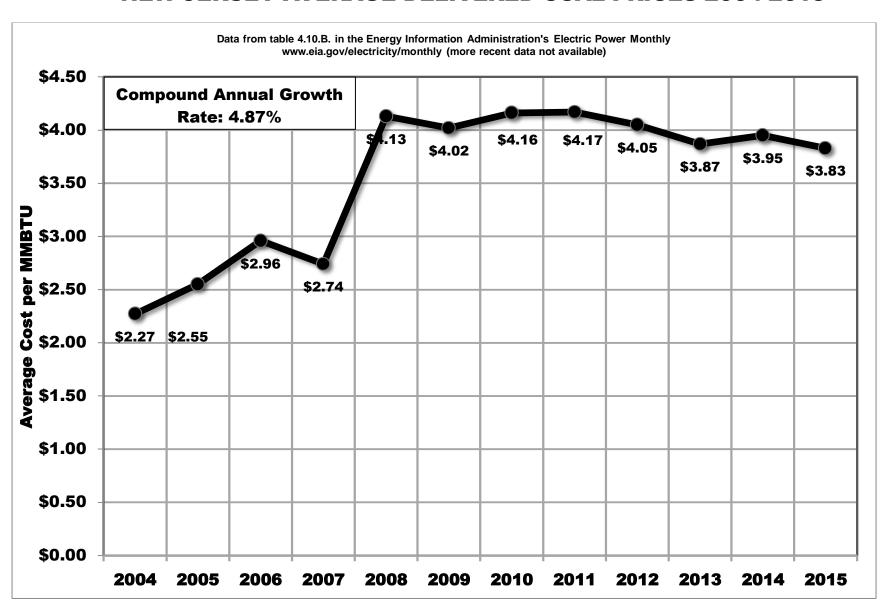
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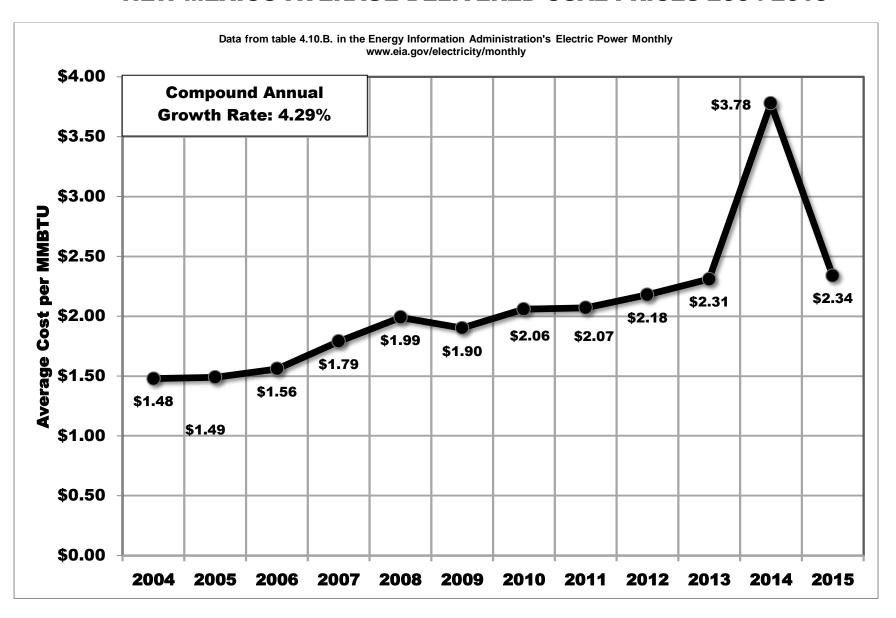
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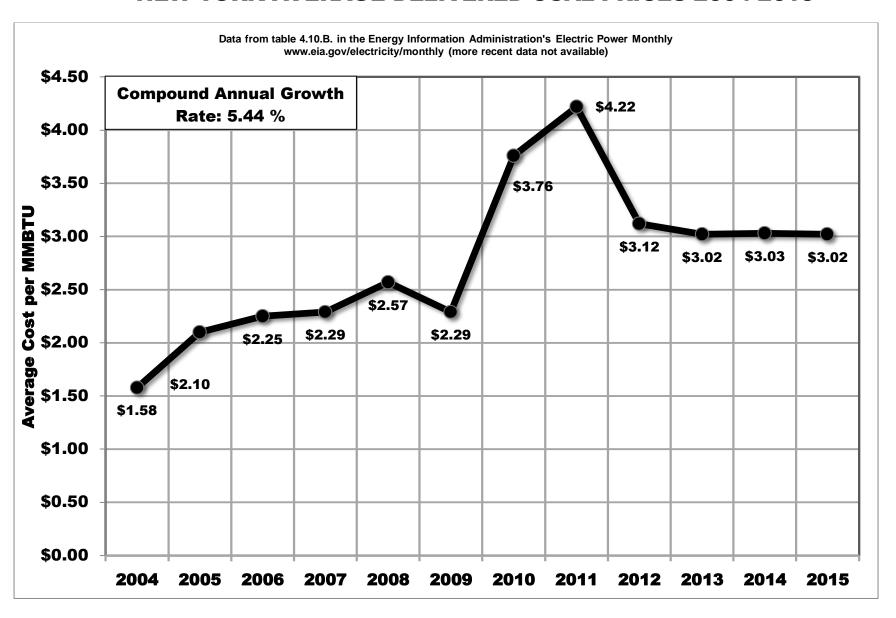
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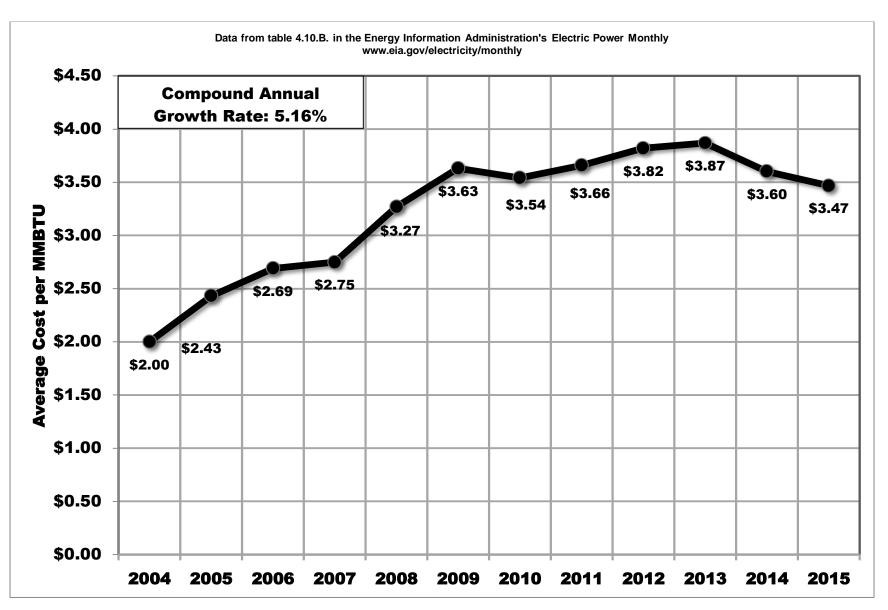
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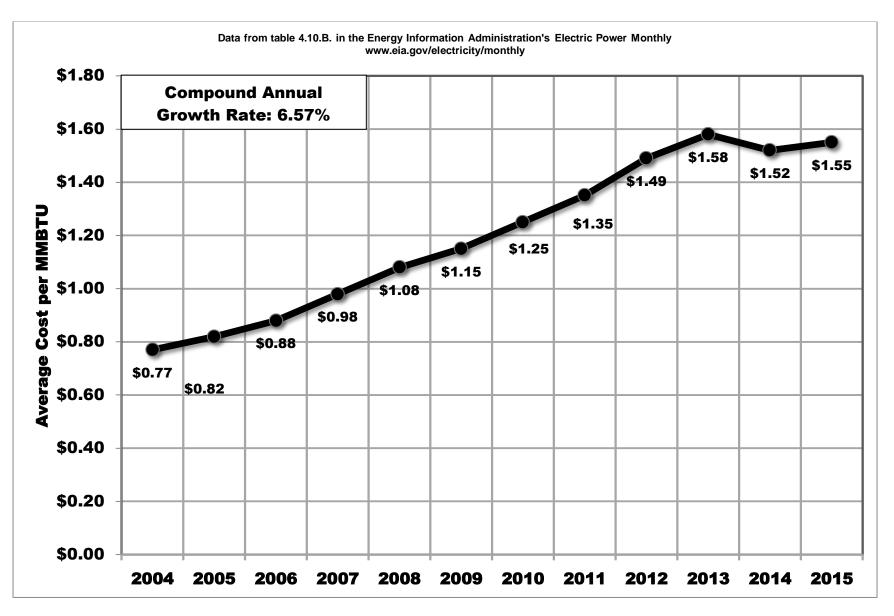
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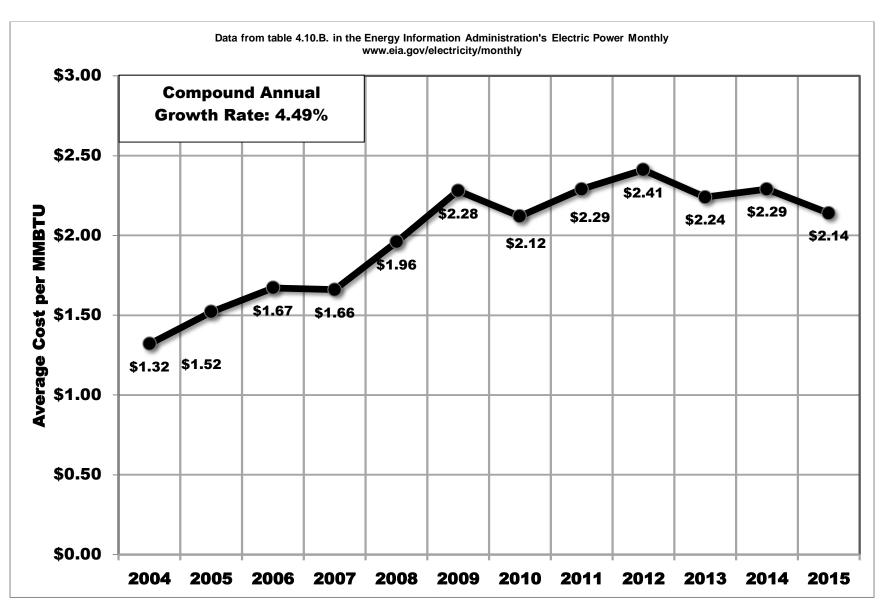
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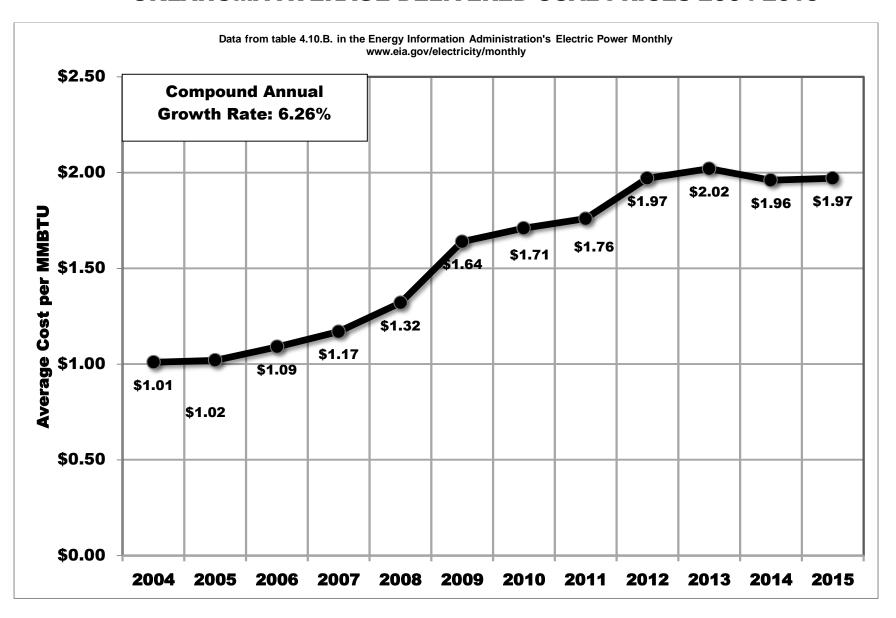
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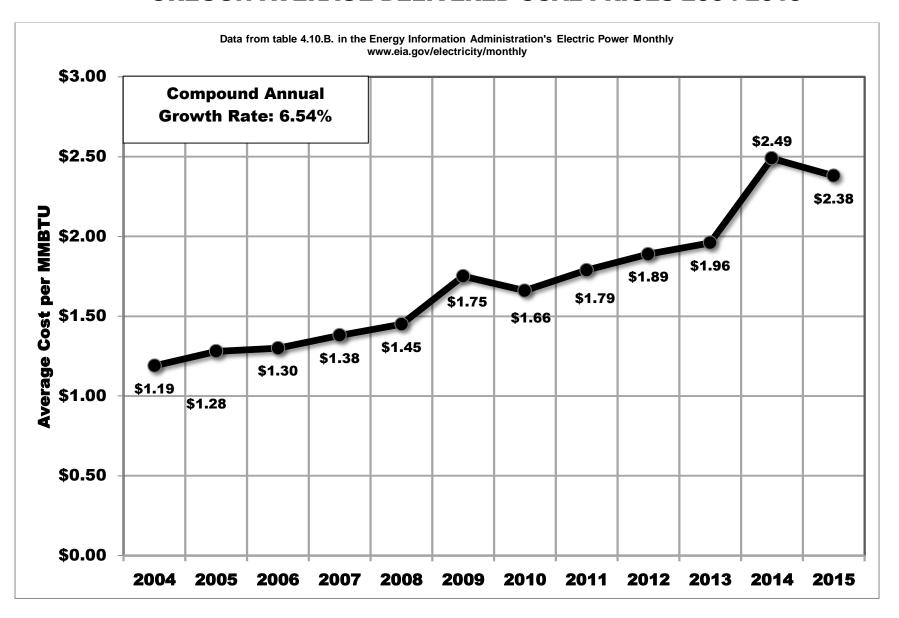
OHIO AVERAGE DELIVERED COAL PRICES 2004-2015



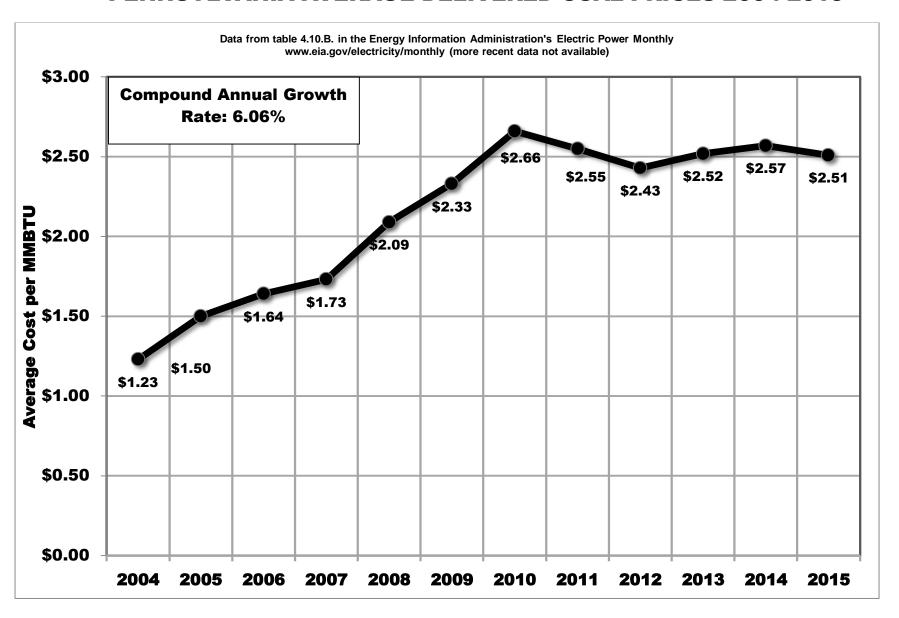
OKLAHOMA AVERAGE DELIVERED COAL PRICES 2004-2015



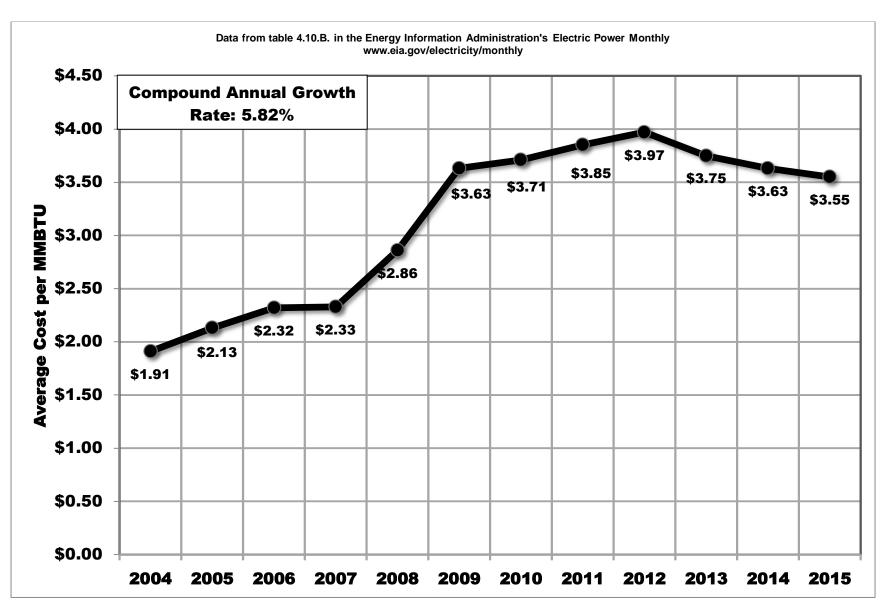
OREGON AVERAGE DELIVERED COAL PRICES 2004-2015



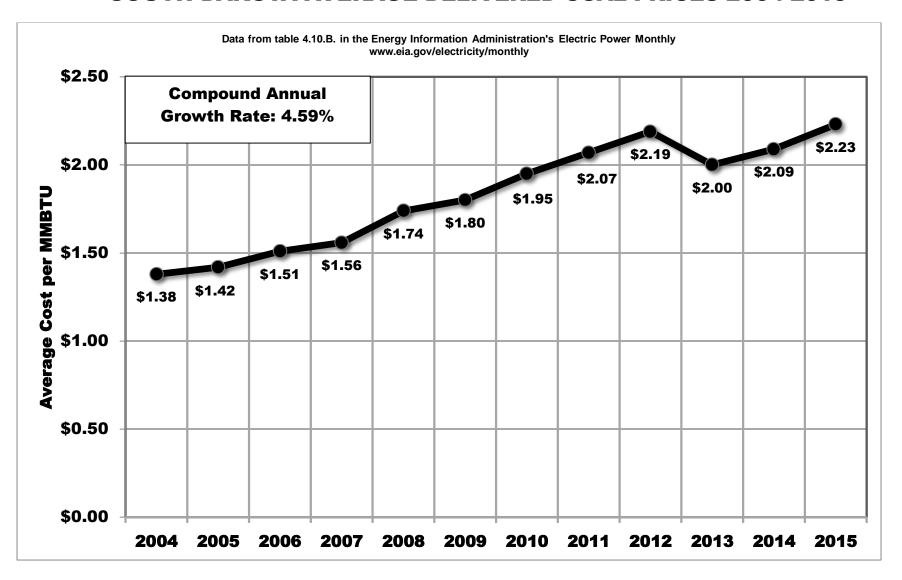
PENNSYLVANIA AVERAGE DELIVERED COAL PRICES 2004-2015



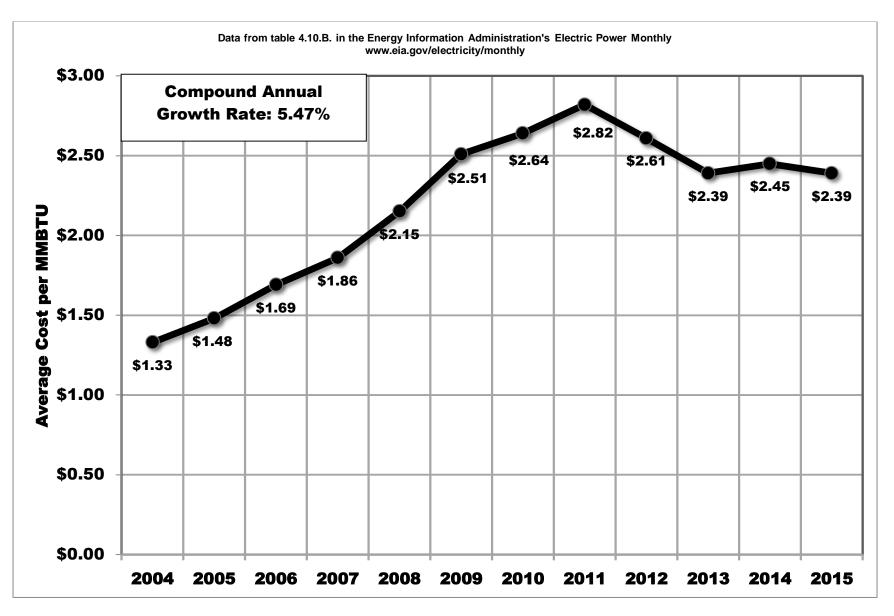
SOUTH CAROLINA AVERAGE DELIVERED COAL PRICES 2004-2015



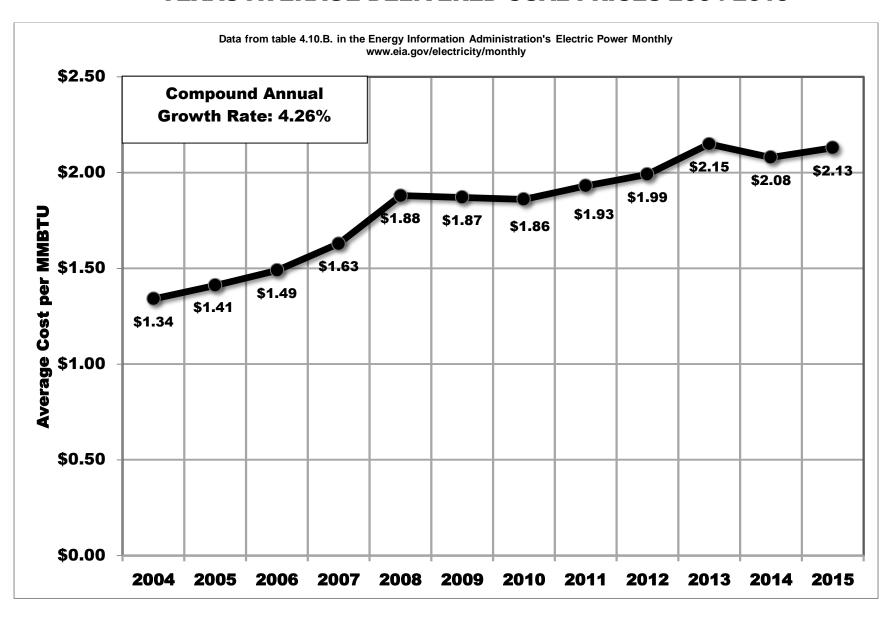
SOUTH DAKOTA AVERAGE DELIVERED COAL PRICES 2004-2015



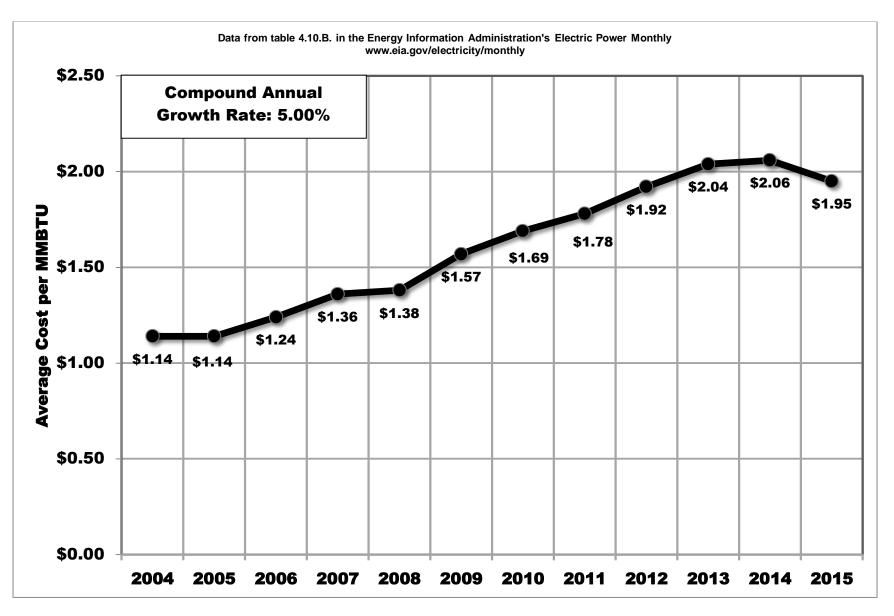
TENNESSEE AVERAGE DELIVERED COAL PRICES 2004-2015



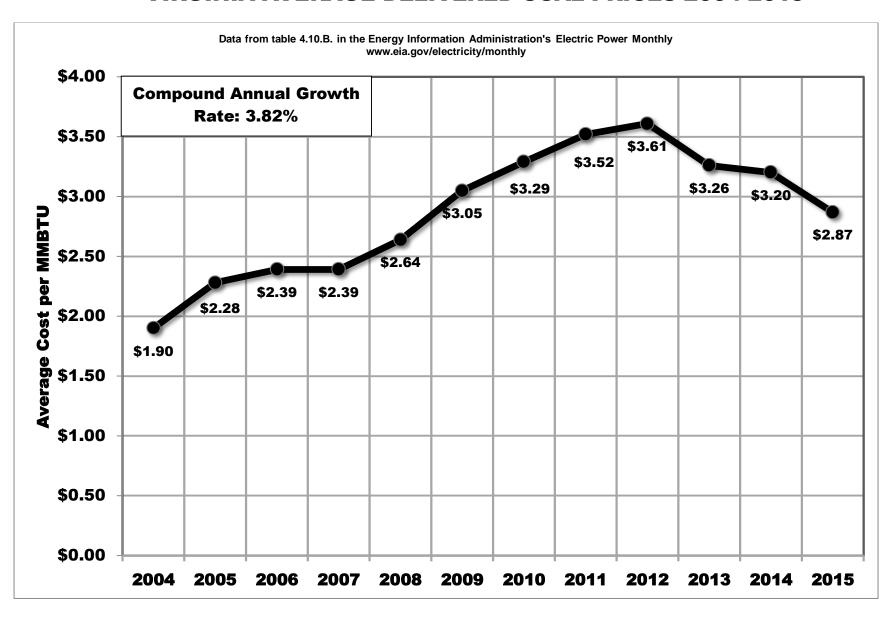
TEXAS AVERAGE DELIVERED COAL PRICES 2004-2015



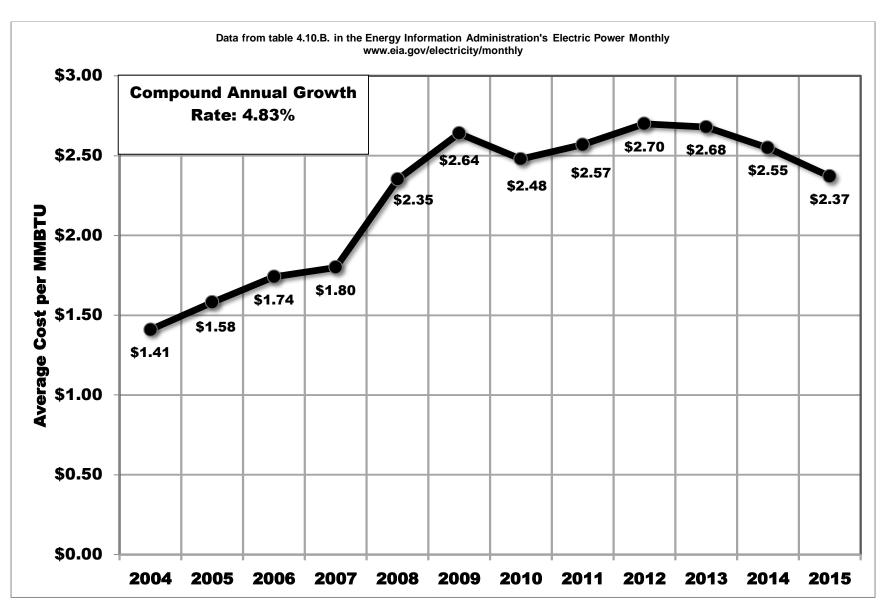
UTAH AVERAGE DELIVERED COAL PRICES 2004-2015



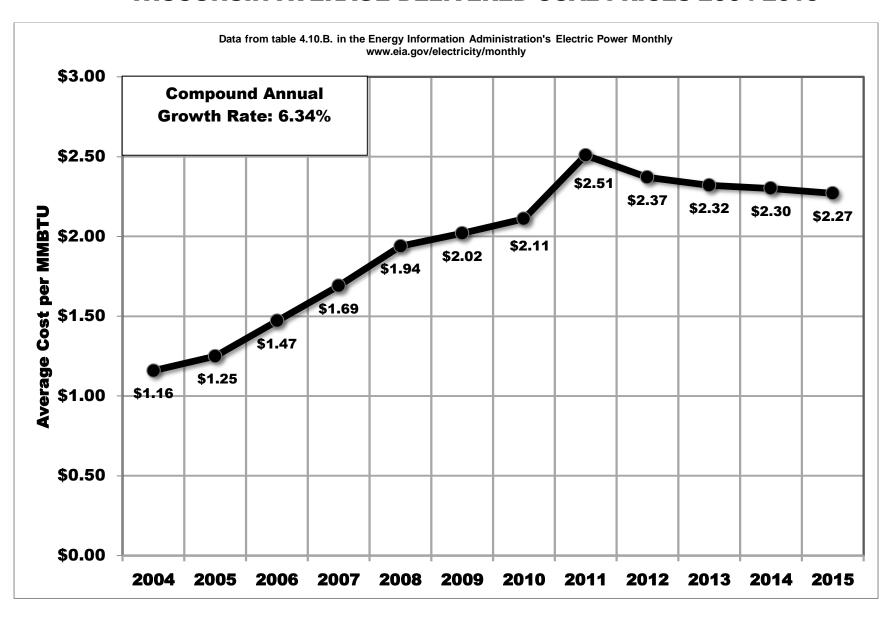
VIRGINIA AVERAGE DELIVERED COAL PRICES 2004-2015



WEST VIRGINIA AVERAGE DELIVERED COAL PRICES 2004-2015



WISCONSIN AVERAGE DELIVERED COAL PRICES 2004-2015



WYOMING AVERAGE DELIVERED COAL PRICES 2004-2015

