

Coal: Beginning the Long Goodbye?

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Due to a boom in production and low prices, natural gas now equals coal as the cost-effective fuel of choice for electricity generation. The shift to natural gas comes as many aging coal power plants are being retired. At the end of 2010, 73 percent of all coal-fired capacity was 30 years old or older, according to the Energy Information Administration (EIA).¹ Coal plants are also being shuttered due to increasingly stringent environmental regulations that make it difficult and costly to upgrade facilities and equipment.



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Also contributing to coal's decline is the increased efficiency of new combined-cycle natural gas power plants, where hot exhaust from gas turbines powers conventional steam engines. For example, Southern Company, a major electric power company, is reducing its use of coal and increasing its use of natural gas. Will this shift to natural gas continue — or is there a future for coal?

Fracking and the Rise of Natural Gas. Figure I shows the increase in natural gas capacity as coal has declined:²

- Over the last decade, net coal-fired electricity generation decreased 10 percent.
- Natural gas-fired generation increased 50 percent.

Over the past 10 years, hydraulic fracturing (or fracking) has significantly changed fossil fuel markets in the United States. The EIA reports that natural gas trapped in shale formations and other previously inaccessible gas is now available for extraction. Proven U.S. natural gas reserves have increased almost 80 percent since 1990, from 177 trillion cubic feet (TCF) to 317 TCF.³

New technology has increased oil and gas extraction employment 27.5 percent since 2008, whereas total nonfarm employment is down 3.4 percent.⁴ The fracking revolution in North Dakota, Texas, Pennsylvania, Oklahoma and Ohio benefits the U.S. economy, and consumers pay less for electricity and natural gas than they would otherwise.

As natural gas production rocketed from 0.39 TCF in 2000 to 4.80 TCF in 2010, prices tumbled to 2002 levels.⁵ New technology and productivity improvements increased natural gas supplies, but other factors affect its price. For instance, many oil and gas leases are held-by-production leaseholds, in which the company has a set period of time to start production and then extend their lease to cover the production period. These leases avoid the need to negotiate with landowners while wells are producing, but they encourage production even when prices

Coal: Beginning the Long Goodbye?

are so low that the oil and gas sells for less than costs. In addition, warm winters, such as the winter of 2011-2012, lower demand. When this occurs, inventories rise and natural gas prices plummet.

The Abundance of Coal. Despite the changing fossil fuel market, coal still dominates electric power production. The EIA notes that coal accounted for 42 percent of U.S. electricity generation in 2011.⁶

Coal will be an abundant resource for many years. The United States has 256 billion short tons of coal that are economically recoverable with current technology.⁷ According to EIA estimates, there could be up to 4 trillion short tons of coal in the United States, much of which will become recoverable as new techniques are discovered.⁸ By comparison, about a billion short tons of coal were consumed in 2011.⁹ In fact, the United States is a net exporter of coal, sending mostly metallurgical (or coking) coal used in steel production to Europe and Asia.

Volatility of Natural Gas Prices Compared to Coal. Though natural gas is cheap now, analysts say that prices will eventually rise to \$4 to \$5 per million British Thermal Units (a measure of the heat energy

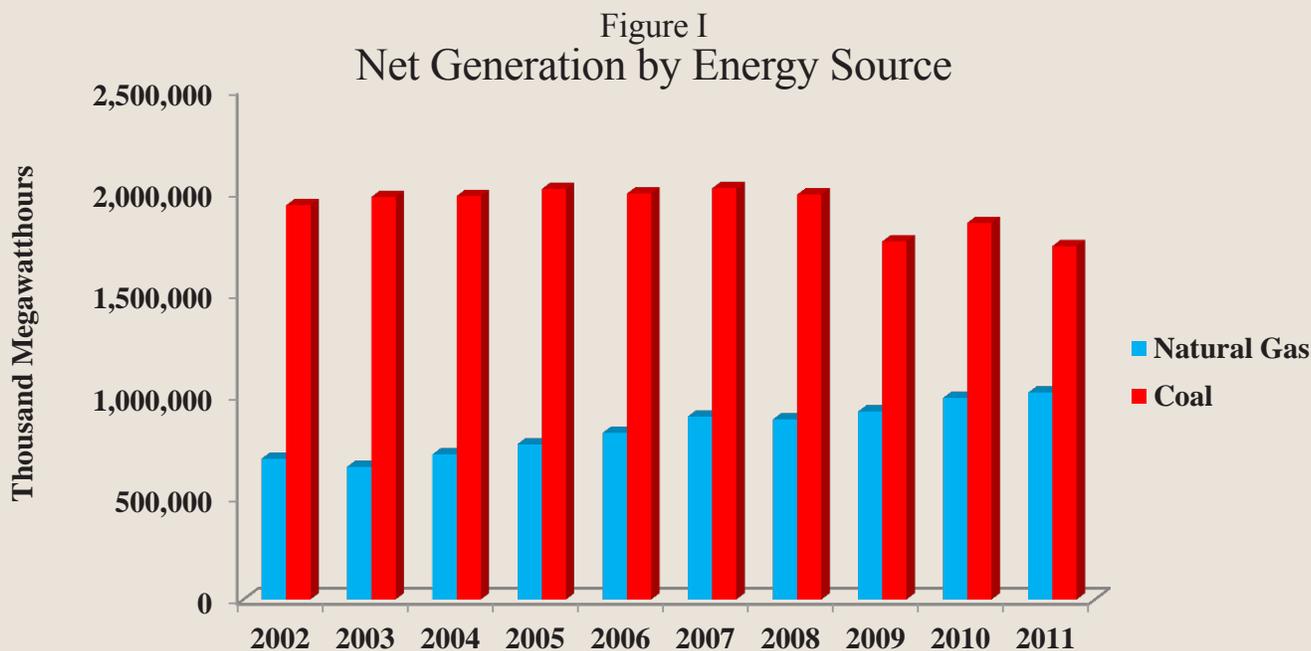
content of fossil fuels).¹⁰ Figure II shows how volatile natural gas prices are compared to coal:¹¹

- Natural gas prices rose from \$6.47 to \$13.42 per million BTUs in May 2005; by contrast, coal fell from \$2.44 to \$2.39 per million BTUs in October 2005.
- While natural gas prices rose 63 percent from September 2006 to February 2007 coal prices fell 10 percent.

Whereas most coal is used for electricity, demand for natural gas is affected by a variety of other uses. According to the EIA:¹²

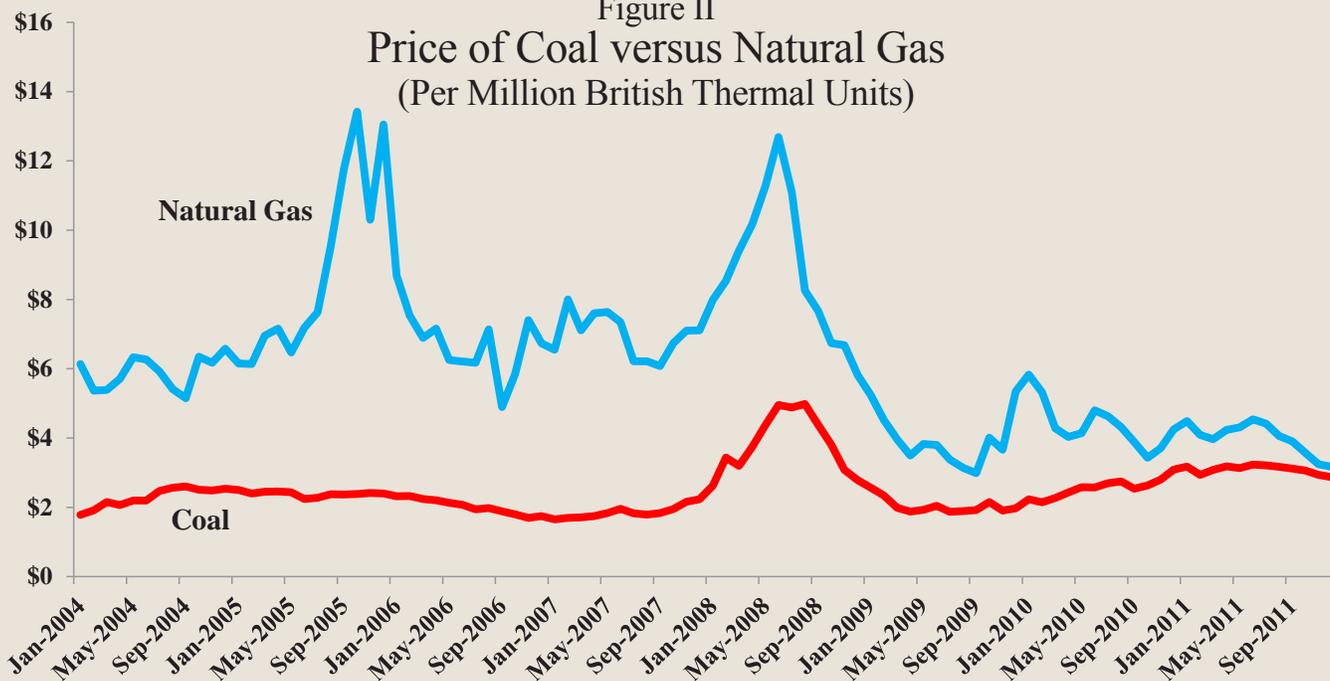
- Some 93 percent of coal is used for electricity.¹³
- About 31 percent of natural gas is used for electricity.
- Another 28 percent of natural gas is used as an industrial feedstock in the production of fertilizer and other chemicals.
- Nearly one-third of natural gas (32 percent) is used to heat homes and buildings.

Coal's relatively stable price compared to natural gas may soon tip the balance back toward increased coal use for electricity production. As natural gas prices



Source: Table 1.1 in *Electric Power Monthly*, U.S. Energy Information Agency 2002-2012.

Figure II
Price of Coal versus Natural Gas
(Per Million British Thermal Units)



Source: The New York Mercantile Exchange (NYMEX), “NYMEX Central Appalachian Coal Futures Near-Month Contract Final Settlement Price History,” December 2012. Available at http://www.eia.gov/coal/nymex/html/nymex_historical.html. And U.S. Energy Information Agency, “Henry Hub Gulf Coast Natural Gas Spot Price (Dollars/Mil. BTUs),” January 2013. Available at <http://www.eia.gov/dnav/ng/hist/rngwhhdM.htm>.

increasingly affect electric power prices, volatility in the gas market means that coal use will continue.

The Regulatory Threat to Coal. The long-term viability of coal is threatened by the massive regulatory burden imposed on coal power plants. Recently, the Environmental Protection Agency has made a number of clean air standards more stringent and has begun regulating CO₂ as a pollutant. Coal-fired power plants equipped to capture carbon emissions could meet these new standards, but the technology is prohibitively expensive. Furthermore, such plants are not yet technically feasible; thus, applications for permits to build new coal-fired generating plants have fallen. In addition, as the EPA has raised emissions standards, coal-fired power plants in various stages of approval or construction have been delayed by years beyond their expected completion dates.

New regulations could force about 40 gigawatts (40 million watts) of coal-fired electric power generating capacity — 12 percent of current coal-fired capacity — to shut down by 2020.¹⁴ When the natural gas glut

abates, some natural gas plants will shut down and others will pass the increase in fuel costs to consumers. A more nimble coal industry could increase production and moderate prices and price swings. However, due to the decline in coal-fired generating capacity and regulatory delay of new projects, the coal industry is slow to respond to prices. Instead, consumers will pay more for electricity.

Conclusion. The revolution in shale gas is undoubtedly a good development. Over the long term, natural gas’s multiple uses should result in both increased demand and higher prices. With existing coal reserves and technology, this growth would not necessarily result in higher overall energy prices. However, absent a change in the direction of public policy, the increasingly burdensome regulation of coal will rob consumers of the full benefits of relatively inexpensive and abundant natural gas and coal reserves.

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Endnotes

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