Energy Information Administration Statistics and Projections for U.S. Coal Supply and Demand:

U.S. Coal, Domestic and International Issues

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Introduction

U.S. coal production is second only to China's among world producers. Like China, the United States consumes most of its own production. The era of "King Coal," when profits were high and owners controlled the reserves, owned the town, and dominated the miners, coincided with the rapid industrialization and expansion of the United States following the Civil War and up through the 1920's. Following the rapid run-up in energy prices in the mid-1970's, domestic coal prices, until late 2000, had been held in check by numerous external forces: the influence of low oil prices (until 1999), environmental compliance costs, intense competition in an industry with extra productive capacity, competition from cleaner fuels (currently, natural gas), and dependence essentially on a single consuming sector to market its product. At the same time, exports of U.S. coal have declined, primarily due to the strong U.S. dollar and relatively long shipping distances to the growing coal markets in southeast Asia and the Pacific Rim.

Industry Climate Since the 1960's

Despite a tradition of self-sufficiency in the United States, many native resources and basic domestic industries, including raw steel production and the manufacture of durable products, incurred serious setbacks from foreign imports in the 1960's and 1970's. American industries have modernized and started an impressive comeback in the past two decades, in the face of an increasingly competitive global economy.

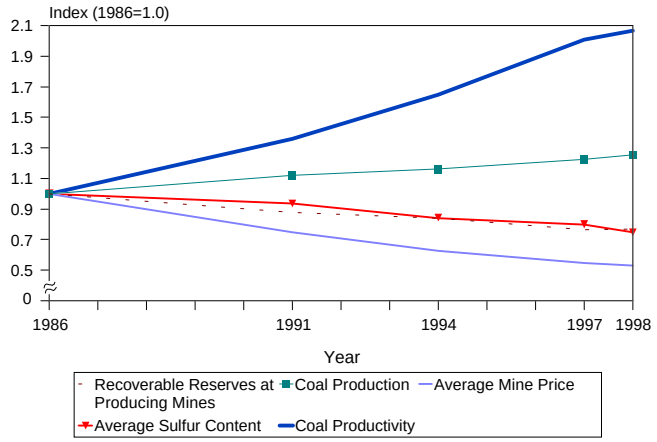
The United States has long been and still is self sufficient in coal. The U.S. coal industry has met with little serious foreign competition in domestic markets, but has had to endure a set of domestic conditions that put many companies out of business and concentrated the active reserves and productive capacity among fewer larger companies.

While demand for coal is steady and assured, coal prices are largely reactive to external forces. Coal prices are constrained indirectly by oil prices, pressured by the costs of environmental regulations, and undercut by the industry's own capacity to produce more coal than it sells. The dominant market for domestic coal is the electric power industry. For example, in 1999 coal consumed to generate electricity equated to 86 percent of U.S. production, mostly for baseload generation. In the 1990's, most new generating capacity built has been in smaller, less capital-intensive natural gas turbine generators, used primarily as peaking units. Once construction costs are sunk, coal remains the least-cost fuel for fossil steam plants, but average age of operating plants has increased steadily, as limited new coal-fired capacity came on line during the past decade.

The decline in demand for U.S. metallurgical coal since the 1960's resulted in closures of some metallurgical coal mines and led others to enter the market for premium low-sulfur steam coal meeting environmental emissions regulations. Clean air regulations encouraged other dislocations in the coal industry as the lead in production shifted from traditional Appalachian mining areas to multi-million-ton mines in the West. Because of extra productive capacity at the mines, competition remained heavy and producers made uncounted improvements to productivity to keep prices low, win contracts, and maintain cash flow. In recent years, the industry has produced historically high levels of coal while operating on probably its thinnest profit margins ever. Coal prices and supplies are now in a long-overdue adjustment, as will be discussed later.

Figure 1 summarizes the key trends in the U.S. coal industry since 1986. Coal production has increased at a moderate but steady rate of growth, based almost entirely on the heavy

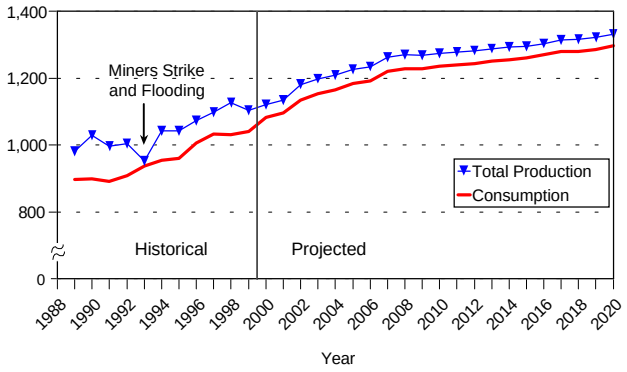
Figure 1. U.S. Coal Production, Productivity, Prices, Reserves, and Sulfur Content, 1986 through 1998



Note: Average mine prices are indexed to constant dollars. Average sulfur content is based on coal delivered to electric utilities, reported on Form FERC-423.

Source: Energy Information Administration, *Coal Industry Annual 1995,* DOE/EIA-0584(95) (Washington, DC, October 1996), and *Coal Industry Annual 1997* and *1998*, Tables 1, 25, 48, 80, and 106.

Figure 2. U.S. Total Coal Production and Consumption, 1989-2020, Historical and Projected Data



Sources: Energy Information Administration, *Quarterly Coal Report*, *Short Term Energy Outlook* file data, and *Annual Energy Outlook*.

Note: 2000 and 2001 data are based on *Short Term Energy Outlook* file data, earlier data are based on *Quarterly Coal Reports*, and later data are projections from *Annual Energy Outlook 2001*.

dependence of electric utilities on coal-fired plants for base-load generation. In 1998 and 1999, 56 percent of the net generation at electric utilities was fueled by coal,[1] which supplied the majority of baseload generation–the minimum electric power delivered on an around-the-clock basis. Figure 1 shows that as coal productivity has doubled, savings were applied to lower average minemouth coal prices, even as the quality of the coal improved in terms of sulfur content. Recoverable reserves at producing mines trended downward during the period since 1986. Mine operators showed little interest in maintaining leases and options on future reserves when return on investment was low. By releasing reserves, they freed capital that could be used for technology and equipment upgrades that translated into greater productivity in the near term.

Domestic Coal Supply Trends

Domestic coal consumption and production have been growing steadily over the past 25 years, and they continued to do so during the past decade (Figure 2). In 1989, domestic consumption equated to 91.4 per cent of U.S. coal production. By the end of 1999 the pattern had changed very little—94.3 percent of production (Table 1). Those percentages are characteristic of the U.S. coal consumption/production relationship. Between 1989 and 1999, consumption percentages vacillated between 87 and 98 percent, reflecting the impacts of strikes and labor disputes, severe weather (especially extreme heat, which taxes electricity generation), transportation disruptions, related consumer stocks drawdowns and rebuilds, and changes in export demand and imports. The pronounced decline in production in 1993 was primarily caused by the rolling United Mine Workers strikes in the East and Midwest over a 7-month period, concluding with transportation interruptions and soaked stockpiles due to severe and prolonged flooding in the Missouri and Mississippi River basins.

The latest long-term EIA projections (Table 1), which anticipate a 0.9 percent annual growth rate in coal production from 1999 to 2020, or a 20.6 percent increase over the period, were completed in December 2000. Those projections assume that electricity generation will continue to rely largely on existing coal-fired units for baseload, with increasing capacity utilization at existing coal units, and on natural gas turbine units for most new capacity. EIA projections factor in existing regulations and Federal and State policies. That is, the base case projections did not assume any of the proposed scenarios for ratification of the Kyoto Accords nor any future regulation of hazardous pollutants under the Clean Air Act Amendments of 1990, such as mercury or airborne particulates.

Prior to 1992, production data included only freshly mined coal and reprocessed anthracite coal refuse, associated with mines or preparation plants, and recovered for sale as a fuel. There had always been a small percentage (3 percent or less) of electricity generation that burned various kinds of waste fuels but in 1978 the rules for exploiting waste fuels, including coal waste piles and refuse, were changed under provisions of the Public Utility Regulatory Policies Act (PURPA). PURPA removed impediments and provided incentives for delivery of useable electric power through cogeneration, and also through

Table 1. U.S. Total Coal Production, Supply, and Consumption, 1989-2020, Historical and Projected Data
(Million Short Tons)

Year	New Production	Producer and Distributor Stocks	Consumer Stocks	Consumption	Waste Coal Supplied to IPPs	Waste Coal Synfuel	Total Production
1989	980.7	29.0	146.1	896.5	NA	NA	980.7
1990	1,029.1	33.4	168.2	899.4	NA	NA	1,029.1
1991	996.0	33.0	167.7	891.4	NA	NA	996.0
1992	997.5	34.0	163.7	907.8	6.0	NA	1,003.6
1993	945.4	25.3	120.5	936.5	6.4	NA	951.8
1994	1,033.5	33.2	136.1	954.0	7.9	NA	1,041.4
1995	1,033.0	34.4	134.6	960.4	8.5	NA	1,041.5
1996	1,063.9	28.6	123.0	1,006.7	8.8	NA	1,072.6
1997	1,089.9	34.0	106.4	1,033.2	8.1	NA	1,098.0
1998	1,117.5	36.5	128.1	1,031.6	9.0	NA	1,126.5
1999	1,100.4	39.5	143.5	1,043.6	8.4	1.2	1,110.0
2000	1,082.5	34.2	108.0	1,087.4	7.0	3.1	1,092.6
2001	1,122.4	34.9	112.6	1,085.4	7.4	3.1	1,132.9
2002	1,131.6	35.2	111.6	1,094.8	8.0	3.1	1,142.7
2003	--	--	--	1,153	--	--	1,198
2004	--	--	--	1,165	--	--	1,209
2005	--	--	--	1,183	--	--	1,226
2006	--	--	--	1,191	--	--	1,234
2007	--	--	--	1,220	--	--	1,262
2008	--	--	--	1,228	--	--	1,269
2009	--	--	--	1,228	--	--	1,268
2010	--	--	--	1,235	--	--	1,273
2011	--	--	--	1,240	--	--	1,277
2012	--	--	--	1,244	--	--	1,282
2013	--	--	--	1,251	--	--	1,288
2014	--	--	--	1,254	--	--	1,292
2015	--	--	--	1,261	--	--	1,294
2016	--	--	--	1,269	--	--	1,303
2017	--	--	--	1,279	--	--	1,313
2018	--	--	--	1,280	--	--	1,315
2019	--	--	--	1,286	--	--	1,321
2020	--	--	--	1,297	--	--	1,331

IPPs = independent power producers and cogeneration plants not accounted for in coke, other industrial, and commercial consuming sectors.
NA = Not available.
-- = Not applicable.
Note: 2000 through 2002 data are based on *Short Term Energy Outlook* file data, earlier data are based on *Quarterly Coal Reports*, and later data are projections from Annual Energy Outlook 2001.
Sources: Energy Information Administration, *Quarterly Coal Report*, *Short Term Energy Outlook* published and file data, and *Annual Energy Outlook 2001.*

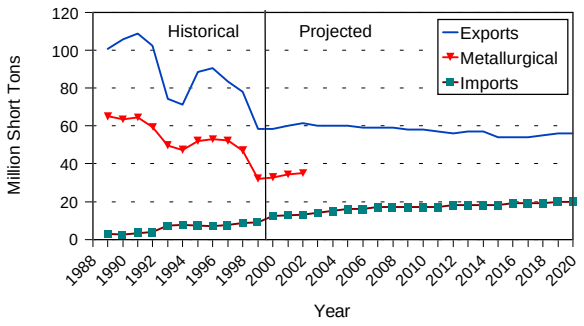
use of renewable and sustainable energy sources and consumption of bulk waste materials containing coal or other fuels. It took until 1992 to reestablish and validate data from generating facilities that process waste. Following years of litigation, agreements were reached that waste coal was not subject to coal mining regulations and reporting requirements. Confidential data protection procedures were adopted to protect the interests of the private operators running waste fuel reprocessing ventures. In 1992, the first year reliable data were successfully compiled, waste coal reprocessed and consumed to generate electric power represented 0.6 percent of total coal production (Table 1).

U.S. Coal Exports and Imports

Exports of U.S. coal (steam plus metallurgical) suffered large net losses during the past decade. Between 1991 and 1999, coal exports plunged by 46 percent, to 58.5 million short tons (mst) (Table 2). Exports in 1989 were in the midst of a 5-year growth period that peaked in 1991 at 109.0 million short tons (mst). The rapid decline in coal exports in 1993 and 1994 (Figure 3) was ascribed at the time to the effects of a severe recession in Europe, along with European protectionism, competition from other coal-exporting countries, and a 1-year decline in exports to Canada.[2] However, about one half of the companies affected by the 1993 UMWA strike were major eastern exporters of thermal and metallurgical coal. A second major decline in coal exports, from 1996 through 1999, was rooted in every major country importing U.S. coal with the exception of Canada, which remained steady or increased. By 1998, the U.S. ranking among coal-exporting countries had fallen to third, surpassed by Australia and South Africa. The EIA attributed the second steep decline of exports in the decade to a number of factors, including:

- In Europe, low natural gas prices and environmental considerations for steam coal
- Soft demand in Asia for steam and met coal due to the 1998 Asian recession
- In Asia, stronger competition from Australian exports due to new productivity gains at Australian mines and shipping cost advantages due to proximity
- In Asia, competition from ultra-clean Indonesian steam coal
- Competitive disadvantage for American producers because of exchange rates for strong U.S. dollars.[3], [4]

Figure 3. U.S. Coal Exports and Imports, 1989-2020, Historical and Projected Data



Source: Energy Information Administration, *Quarterly Coal Report*, *Short Term Energy Outlook* file data, and *Annual Energy Outlook 2001.*

Metallurgical coal exports represented 65 percent of U.S. exports in 1989, projected to decline to only 57 percent of the shrinking export total by the end of 2001 (Table 2).

Table 2. U.S. Coal Exports and Imports, 1989-2020, Historical and Projected Data
(Million Short Tons)

Year	Imports	Exports	Metallurgical	Steam
1989	2.9	100.8	65.1	35.7
1990	2.7	105.8	63.5	42.3
1991	3.4	109.0	64.6	44.3
1992	3.8	102.5	59.4	43.1
1993	7.3	74.5	49.7	24.9
1994	7.6	71.4	47.3	24.0
1995	7.2	88.5	52.1	36.5
1996	7.1	90.5	53.0	37.5
1997	7.5	83.5	52.2	31.4
1998	8.7	78.0	47.1	31.0
1999	9.1	58.5	32.1	26.3
2000	12.5	58.5	32.8	25.7
2001	12.8	60.1	34.3	25.8
2002	13	61.6	35.0	26.6
2003	14	60	--	--
2004	15	60	--	--
2005	16	60	--	--
2006	16	59	--	--
2007	17	59	--	--
2008	17	59	--	--
2009	17	58	--	--
2010	17	58	--	--
2011	17	57	--	--
2012	18	56	--	--
2013	18	57	--	--
2014	18	57	--	--
2015	18	54	--	--
2016	19	54	--	--
2017	19	54	--	--
2018	19	55	--	--
2019	20	56	--	--
2020	20	56	--	--

-- = Not applicable

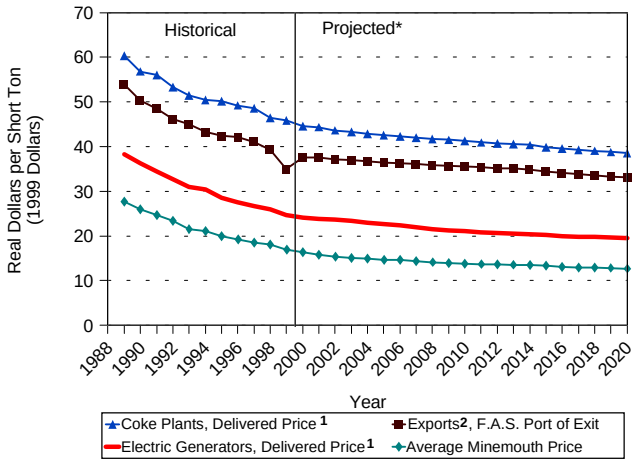
Note: 2000 and 2001 data are based on *Short Term Energy Outlook* file data, earlier data are based on *Quarterly Coal Reports*, and later data are projections from *Annual Energy Outlook 2001*, early release.

Sources: Energy Information Administration, *Quarterly Coal Report*, *Short Term Energy Outlook* published and file data, and *Annual Energy Outlook 2001.*

Coal Prices

U.S. coal prices, in inflation-adjusted dollars, peaked in 1975 shortly after the oil embargo crisis, and declined steadily for the next 25 years. Prices started to increase in November or December 2000. Figure 4 illustrates the most recent 10 years of declining prices and shows that EIA's long-range projections, released last December, assume a near flattening of all coal supply prices. The average minemouth prices actually reflect a 1.4 percent negative annual growth rate.[5] The average prices of coal delivered to electric generators go down by only 1.1 percent per year. This reflects the transportation cost factor, which is expected to add slightly to the bottom line prices paid as consumption of western coals continue to increase, adding to average transportation distances for steam coal.

Figure 4. Selected U.S. Coal Prices, Historical and Projected, 1989-2020



*Projected data begin with 2000 except for minemouth, which begin with 1999.

[1]Sectoral prices for 2000 and beyond are based on model results and may differ slightly from official EIA data reports. Prices are weighted by consumption tonnage; weighted average excludes residential/commercial prices and export free-alongside-ship (f.a.s.) prices.

[2]Export prices for 2000 and beyond are based on model results.

Note: Data for 2000 and subsequent years are projections from Annual Energy Outlook 2001.

Sources: Energy Information Administration, *Quarterly Coal Report* and *Annual Energy Outlook 2001*.

The projected delivered prices for coal delivered to coke plants are projected to decline at about 1.5 percent per year in constant dollars. No projections were ventured for metallurgical coal exports, but those prices have declined steadily in the most recent 11 years (Table 3). Downward pressure on U.S. met coal export prices have included aggressive export programs by Australian coal producers, proximity advantages for Australia for much of the Pacific Rim market, recession and monetary crises in Japan, Korea, Indonesia, and other Asian economies since 1998, and the relative strength of the U.S. dollar versus traders' currencies.

The flattened price projections also signal EIA's assumption that the competitive position for coal in the U.S. and world markets will remain relatively unchanged. That is–always there, with unused capacity always available, and always the lower-price fossil fuel, influenced by oil prices, which were also projected to stabilize after the year 2000 increases. As discussed more later, the current level of oil, natural gas, and coal prices are, at least for the short term, above the projections in Table 3 and Figure 4.

Supplies of Coke Made from Coal

The discussions of coke in this report are for coke made from coal and do not consider the uses and markets of petroleum coke. Petroleum coke is increasingly available and is being marketed at attractive prices to traditional consumers of steam coal, and in other industrial applications. Coke made from coal is called "coal coke" in this report or, usually, just "coke" and is assumed to include metallurgical coke made in ovens at iron or steel plants, merchant coke made for sale in the open market, and any foundry coke made for iron castings. EIA coal coke data are not sensitive to whether some processors add petcoke, anthracite fines, or other material to coke made largely from bituminous coal.

Domestic coke production decreased by 29 percent from1989 through 1999 (Table 4, Figure 5). This decrease may be smaller than expected considering the addition of new environmental costs for production of coke in the United States in the past 20 years.

Environmental regulation of coke plants in the 1980's led to closings of many domestic plants. The restrictions were intensified in 1990 when coke plants were identified in Title III of the Clean Air Act Amendments of 1990 as a major source of hazardous air pollutants (HAPS). 1991 was the last year that U.S. coke production came close to matching consumption. On average, since 1994 the demand for coke in the United States exceeded domestic production by 2.2 mst per year Table 5, Figure 6). During the same period, an average 1.2 mst of U.S. coke was exported. More than 3.3 mst of coke per year, on average, were imported between 1994 and 1999 to meet domestic demand, resulting in an average net inflow of 2.1 mst of coke per year (Table 5).

Corrections to Coke Imports and Exports

The imports and exports of coke cited above are corrected data that were revised in 1999 after EIA was notified by the American Iron and Steel Institute (AISI) that its data seriously understated coke imports.[6] The AISI could verify that the EIA

Table 3. Selected U.S. Coal Prices, 1989-2020, Historical and Projected Data

Year	Average Minemouth Price		Delivered Price[a]		Delivered Price[b]	Delivered Price[a]	Exports[b]	Exports (metallurgical)
	1999 dollars per short ton	1999 dollars per million Btu	Industrial (1999 dollars per short ton)	Coke Plants (1999 dollars per short ton)	Electric Generators (1999 dollars per short ton)	Electric Generators (1999 dollars per million Btu)	F.A.S. Price at U.S. Port of Exit (1999 dollars per short ton)	F.A.S. Price at U.S. Port of Exit (1999 dollars per short ton)
1989	27.71	NA	41.94	60.31	38.28	1.65	53.88	57.36
1990	25.90	NA	39.98	56.81	36.25	1.76	50.28	55.08
1991	24.62	NA	38.42	56.00	34.40	1.69	48.52	52.78
1992	23.41	NA	36.50	53.36	32.69	1.61	46.14	50.51
1993	21.55	NA	34.99	51.51	31.03	1.54	45.08	47.90
1994	21.04	NA	35.28	50.46	30.38	1.48	43.24	46.34
1995	19.96	NA	34.35	50.16	28.61	1.41	42.42	46.88
1996	19.24	NA	33.62	49.23	27.52	1.35	42.16	47.22
1997	18.51	NA	33.08	48.59	26.70	1.31	41.07	46.29
1998	18.02	0.85	31.91	46.44	26.00	1.27	39.31	44.96
1999	16.98	0.81	31.59	45.85	24.72	1.21	35.04	42.48
2000	16.33	0.79	31.01	44.59	24.16	1.20	37.56	--
2001	15.80	0.76	30.39	44.37	23.81	1.19	37.60	--
2002	15.37	0.75	30.12	43.65	23.64	1.18	37.17	--
2003	15.11	0.73	29.84	43.26	23.32	1.16	36.93	--
2004	14.94	0.72	29.70	42.90	23.03	1.15	36.64	--
2005	14.68	0.71	29.50	42.57	22.73	1.13	36.43	--
2006	14.63	0.71	29.28	42.28	22.45	1.12	36.21	--
2007	14.35	0.70	29.12	42.03	21.96	1.10	36.08	--
2008	14.12	0.69	28.83	41.74	21.57	1.08	35.84	--
2009	13.93	0.68	28.57	41.52	21.20	1.06	35.68	--
2010	13.83	0.68	28.40	41.25	21.04	1.05	35.53	--
2011	13.70	0.67	28.18	40.96	20.84	1.04	35.36	--
2012	13.62	0.67	28.02	40.67	20.69	1.04	35.19	--
2013	13.57	0.66	27.88	40.58	20.55	1.03	35.07	--
2014	13.47	0.66	27.66	40.37	20.38	1.02	34.86	--
2015	13.38	0.66	27.49	39.81	20.25	1.01	34.38	--
2016	13.09	0.64	27.28	39.55	20.02	1.01	34.09	--
2017	12.98	0.64	27.08	39.29	19.88	1.00	33.82	--
2018	12.94	0.64	26.91	39.05	19.74	1.00	33.58	--
2019	12.85	0.63	26.72	38.81	19.59	0.99	33.34	--
2020	12.70	0.63	26.48	38.57	19.45	0.98	33.09	--

[a]Sectoral prices for 1998 and beyond are based on model results and may differ slightly from official EIA data reports. Prices are weighted by consumption tonnage; weighted average excludes residential/commercial prices and export free-alongside-ship (f.a.s.) prices.

[b]Export prices for 2000 and beyond are based on model results.

NA = Not available.

– = Not applicable

Note: Data for 2000 and subsequent years and for 1999 minemouth price are projections from *Annual Energy Outlook 2001*.

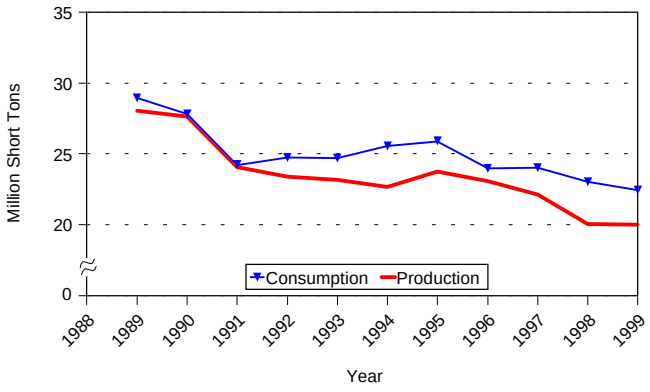
Sources: Energy Information Administration, *Quarterly Coal Report* and *Annual Energy Outlook 2001, Supplemental Data*, Tables 87, 88, 90.

Table 4. U.S. Coal Coke Production, Supply, and Consumption, 1989-2020, Historical and Projected Data
(Million Short Tons)

Year	Production	Producer and Distributor Stocks	Consumption	Excess Demand (consumption-production)
1989	28.045	1.919	28.935	0.890
1990	27.617	1.918	27.811	0.194
1991	24.046	2.107	24.216	0.170
1992	23.410	1.883	24.731	1.321
1993	23.182	1.461	24.697	1.515
1994	22.686	.936	25.563	2.877
1995	23.749	1.302	25.895	2.146
1996	23.075	1.323	23.974	0.899
1997	22.116	1.294	24.017	1.901
1998	20.041	.933	23.029	2.988
1999	20.016	.852	22.435	2.419
2000 (09/30)	NA	.981	NA	NA
Average excess demand, 1994-1999				2.205

Source: Energy Information Administration, *Quarterly Coal Report.*

Figure 5. U.S. Coal Coke Production and Consumption, 1988-1999



Source: Energy Information Administration, *Quarterly Coal Report.*

Table 5. U.S. Coal Coke Imports and Exports, 1989-1999
(Million Short Tons)

Year	Imports	Exports	Net Inflow
1989	2.311	1.085	1.226
1990	[a]0.765	0.572	0.193
1991	1.183	0.787	0.396
1992	2.098	0.696	1.402
1993	2.155	1.041	1.114
1994	3.338	0.986	2.352
1995	3.820	1.358	2.462
1996	2.542	1.622	0.920
1997	3.185	1.226	1.959
1998	3.834	1.129	2.705
1999	3.224	0.898	2.326
Average net inflow, 1994-1999			2.121

[a]Coke imports and exports for 1990 were not revised by EIA in 1999. It now is evident that 1990 Bureau of Customs statistics were also affected by the new Harmonized Tariff Schedule. U.S. International Trade Commission analysis of coke imports indicated 1.131 mst. in 1990 (see text).

Source: Energy Information Administration, *Quarterly Coal Report;* U.S. International Trade Commission, *Metallurgical Coke: Baseline Analysis of the U.S. Industry and Imports*.

data were too low because just two or three iron and steel producers from its membership reported importing coke in quantities that would exceed published EIA statistics. EIA's investigation found that the low count was based on a change at the Bureau of Customs in the interpretation of product codes used to classify metallurgical coke.

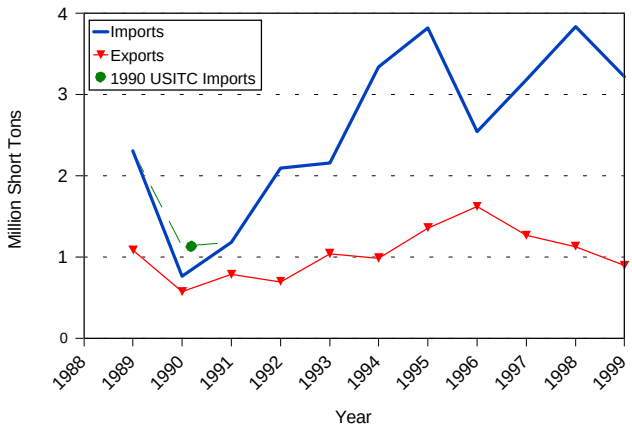
In short, it was found that the "missing" coke imports had entered the United States classified under Department of Commerce Commodity Code 2707.00.00.20, "Coke and Semicoke of Coal **Not** Commercially Suitable for Fuel" (emphasis added). Discussions with the American Coke and Coal Chemicals Institute determined that no one in its membership knew what was intended by the term "semicoke." Contact with the U.S. International Trade Commission (ITC)

determined that the commodity code above definitely was not appropriate as a classification for metallurgical coke.[7] In any event, EIA reevaluated all Customs import and export files for the 2704 coke category back to 1991, when it had been indicated the problem began. EIA included shipments in the 40,000 to 60,000 ton range and also factored in price ranges for coke reported under code ".20" during that period, including coke within the price ranges the Coke and Coal Chemicals Institute had tracked as typical of imports from Japan and China, shipped to furnace plants and merchant plants.[8]

The reevaluation of the Customs data resulted in increases in both the imports and exports of coal coke in the United States (Table 6). Between 1991 and 1997 the corrected imports of coke increased by an annual average of 1.121 mst, while coke exports increased by an annual average of 0.286 mst. In 1998, the confusing code (for coke, at least) was eliminated in the revised Harmonized Tariff Schedule of the United States.

Figure 6 shows the relationships of the revised, now official, EIA coke imports and exports data, with one caveat. The 1990 data appear also to have been affected by the troublesome interpretation of the code ".20" classification, and were not included in the 1999 revisions. EIA will investigate those data in the near future, but will have to obtain archive records from the Commerce Department. Meanwhile, Figure 6 includes an alternate value for 1990 coke import tons, based on, a 1994 study by the ITC. That study examined individual shipment records for coke imports and did determine a revised figure for 1990 imports that recognized the "apparent classification of metallurgical coke under Harmonized Tariff Schedule (HTS) subheadings not expected to contain metallurgical coke."[9] The revised data versus the original data illustrates the relative size of the net changes due to the revisions (Figure 7). The effect on import data was significant.

Figure 6. U.S. Coal Coke Imports and Exports, 1988-1999



Note: Alternate data for 1990 coke imports indicated by dashed line.
Source: Energy Information Administration, Quarterly Coal Report; U.S. International Trade Commission, *Metallurgical Coke: Baseline Analysis of the U.S. Industry and Imports*.

Transportation Costs

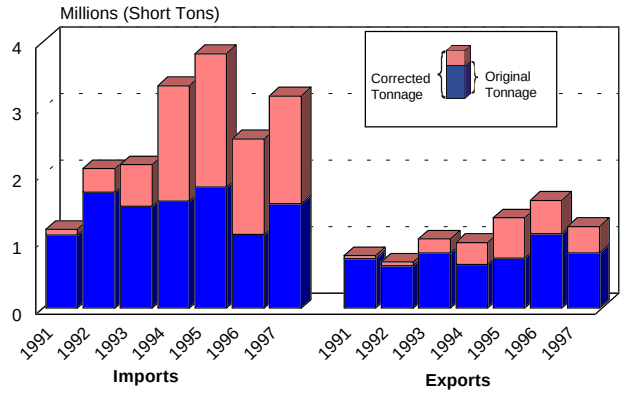
Transport costs can constitute a sizable part of the cost of coking coal or coke delivered to a plant, depending on it location and/or its distance from the import dock. EIA does not have access to transportation rate data for coal shipped to coke plants or for coke shipments, but a study recently completed on coal transportation costs for steam coal shipped by rail to electric utilities documents that the historical trend has been steadily downward for coal shipments by rail.[10] Table 7 offers some insight into rates of relevance for met coal consumers. The table shows the comparative rail costs for

Table 6. Revisions to U.S. Coke Import and Export Data, 1991-1997
(Short Tons)

	1991	1992	1993	1994	1995	1996	1997
Imports							
Original Tonnage	1,098,846	1,739,447	1,534,305	1,611,951	1,816,205	1,110,653	1,565,292
Corrected Tonnage	1,182,816	2,098,065	2,154,854	3,338,093	3,820,119	2,542,093	3,184,815
Exports							
Original Tonnage	740,241	642,181	835,204	660,340	749,597	1,121,358	832,439
Corrected Tonnage	787,330	696,185	1,040,772	986,149	1,357,978	1,622,310	1,226,048

Source: U.S. Department of Commerce, "Monthly Report IM 145" and "Monthly Report EM 545," revised using the Harmonized Tariff Schedule of the United States, of the Interstate Commerce Commission.

Figure 7. Revisions to U.S. Coke Import and Export Data, 1991-1997



Source: U.S. Department of Commerce, "Monthly Report IM 145" and "Monthly Report EM 545," revised using the Harmonized Tariff Schedule of the United States, of the Interstate Commerce Commission.

shipping low-sulfur coal to electric utilities between1988 and 1997 (the latest rate data available). The rates from Central Appalachia would be indicative of average medium- to high-volume rates from the domestic met coal origins. Large electric power plants may be able to negotiate better rates than some coke or met coal consumers, due to the large volumes shipped, more use of unit trains, and because many power plants supply their own, or leased, high-capacity coal cars.

The source report, the *Energy Policy Act Transportation Rate Study*, is available on EIA's website at: http://www.eia.doe.gov/cneaf/coal/ctrdb/ctrdb.html . It offers more detailed rate and origin-destination data. Also, the underlying Coal Transportation Rate Database is available for download from EIA. Much of the rate data is confidential, however, especially for the post-1995 data after utilities became concerned about protecting future competitive assets in anticipation of the deregulated environment. In view of this, EIA can sometimes answer requests to use the confidential data and compile aggregated rate summaries that protect utilities' confidentiality.

Recent Developments in Coal Supplies and Prices

Coal prices began to rise first in the East. With hindsight, mid-September 2000 is when the first persistent upward movement started. After months of flat prices in 2000–a few cents up, a few cents down–mid-September seems to be the time when multiple influences started to be felt at once. As a

Table 7. Low-Sulfur Coal Cost Variables for Contract Coal Shipments to Electric Utilities by Rail 1988, 1993, and 1997

Major Supply Region	Cost Variables (1996 dollars)	1988	1993	1997	Percent Change 1988 to 1997
Powder River Basin	Average Minemouth Price per ton	13.08	9.09	5.67	-56.7
	Average Transportation Rate per ton	19.65	14.40	12.70	-35.4
	Average Delivered Cost per ton	33.87	23.92	20.52	-39.4
	Average Transportation Rate in cents per MBtu	96.5	85.7	72.3	-25.1
	Average Delivered Cost in cents per MBtu	193.4	171.0	149.1	-22.9
Central Appalachia	Average Minemouth Price per ton	39.30	32.46	27.87	-29.1
	Average Transportation Rate per ton	16.63	12.05	9.96	-40.1
	Average Delivered Cost per ton	55.43	44.83	39.10	-29.5
	Average Transportation Rate in cents per MBtu	65.1	46.5	39.8	-47.7
	Average Delivered Cost in cents per MBtu	217.8	208.9	188.3	-27.4
Rockies	Average Minemouth Price per ton	31.41	22.87	18.50	-41.1
	Average Transportation Rate per ton	18.45	14.30	10.15	-45.0
	Average Delivered Cost per ton	48.82	37.52	29.34	-39.9
	Average Transportation Rate in cents per MBtu	82.2	34.0	51.9	-36.9
	Average Delivered Cost in cents per MBtu	217.1	158.1	164.7	-24.2

MBtu = Million Btu.

Notes: ● Low Sulfur = less than or equal to 0.6 pounds of sulfur per million Btu. ● Average delivered cost may not equal the sum of average minemouth price and average transportation rate because one or more of the values may be missing from some records, making different record counts for each variable.

Source: Energy Information Administration, Coal Transportation Rate Database.

result, coal buyers started to notice an unfamiliar sensation: they requested proposals for new supplies of Appalachian coal and found little response. Of the offers they did receive, some was for coal they normally did not consider. Perhaps they went into the market again and offered a bit higher price. This happened more each day, and the price rise had begun.

In Appalachia there were legitimate reasons why new offers of coal supplies were becoming hard to find. First, during the past 15 years the number of mines fell resolutely. There were 3,990 mines in Appalachia in 1986 and only 1,518 at the end of 1998. Final totals for 1999 and 2000 are not available, but still fewer mines are indicated. In recent years the loss of smaller mines was compensated for by increases in the size of existing mines, or ramping up unused capacity. That may not be as feasible now.

Which brings forward a second problem, the reported shortage of miners in Appalachia. With the robust economy of the past 6 years, many miners, laid off from unprofitable coal mines, have found easier, steadier, and/or more desirable work in other industries. With greater reliance on computerized mine systems and sophisticated operational technologies, the most valued miners are those with technical skills, and opportunities for their skills have been better rewarded in other fields during the booming economic growth. Some mine operators had reserves to mine but had been unable to attract the miners they need at the wages offered.

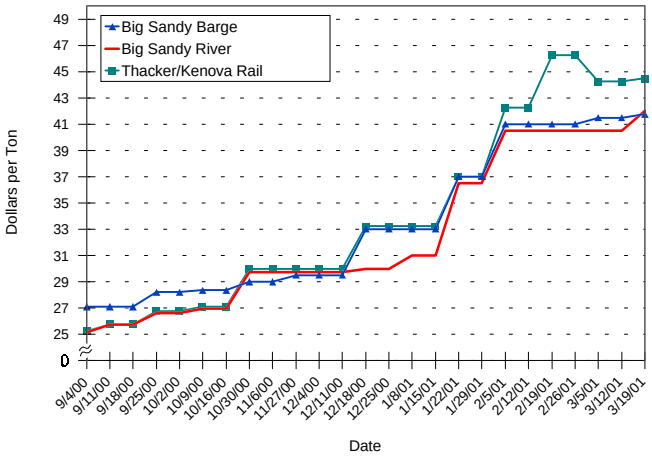
Another issue is the loss of mine capacity in West Virginia. Mountain top removal–the most efficient large-scale method of surface mining coal in Appalachia–was halted in West Virginia in 1998 by a law suit. The method entails controversial valley fill disposal of large volumes of blasted overburden. The result has been to halt mining at the affected mine as well as to virtually stop further new mine permitting until the environmental issues are resolved. Further, 2 years before this setback, the average ratio of reserves to production at existing mines was down to less than 10 years. It has not increased. Since 9-10 years is average remaining mine life, that means that many mines have less than that amount and are beginning to close due to reserve depletion. Others have been reported closing over the past several years due to "geologic problems," such problems as bad roof, faults, groundwater, coalbed wants due to channel fills, low coal seams, and so on. When coal prices are low, as they have been, there is no choice but to close a mine prematurely if it has just a few years left, because the costs to overcome the geologic problems cannot be recovered.

Before the California power crisis, EIA did note that natural gas prices were rising and projected that they would continue to do so through 2020. Because of the number of planned power plants already funded that will require natural gas, there is no doubt that demand will increase. On the other hand, within the past two months, plans to build several new coal-burning power plants have been announced. The rising costs of natural gas have given electricity producers a reason to reassess the attractiveness of coal as a fuel. At less than half the cost of natural gas per Btu, coal may be attracting more attention even with the larger up-front investments.

The biggest influence, however, may be the changing structure of the mining industry. The twenty largest coal producing companies now control more than 70 percent of production. Their advantage is that they wield the mega-capital needed to finance a large, efficient mining operation. The problem is, they have investors, and investors in coal mines have tired of earning less return on their investment than they could get with a passbook savings account. In short, mine companies have chosen not to invest additional money in start-up mines or to bring temporarily abandoned properties back on line until coal prices improve. With these signs of supply-side discipline, Wall Street analysts started to note that coal prices were long overdue for an adjustment and that coal mining companies that are willing to self-regulate their own production and margins could be good investments.

Figure 8 shows the spot coal prices for several market-standard Central Appalachian coals. Since December 11, 2000, for example, Big Sandy barge coal prices have increased by 42 percent. Thacker region rail coal prices in the spot market have increased by 48 percent. Most of the reason for the price increases, of course, are coal supplies being bid on by the electric power producers, and a big part of their supplies recently have originated in the Powder River Basin (PRB) of Wyoming and Montana. The mines in that region are, if anything, even more capital intensive because of their reliance on ever-larger, state-of-the-art earth moving, loading, and haulage equipment.

Figure 8. Central Appalachia Coal Prices, F.O.B. Mining District (12,500 Btu, 0.6 lbs S/MBtu)



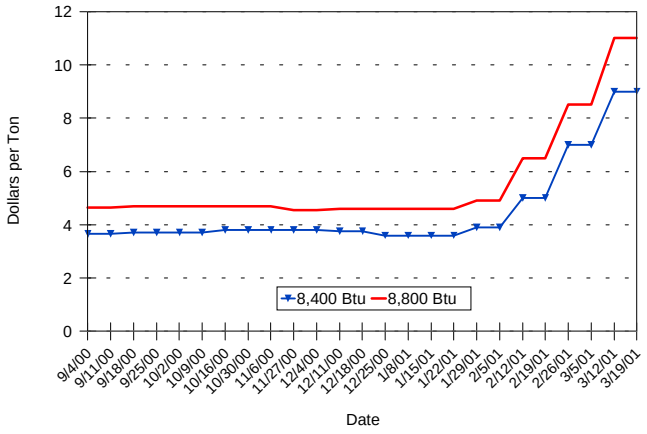
Source: Coal Outlook.

At $4.25 to $5.00 per ton f.o.b. mine prices, even economies of scale had not yielded attractive profits for the investors in these large western mines. Consequently, in late 2000 three companies in the PRB suspended operations at some of their less profitable pits in order to impose some market discipline for their product. There was a couple months' lag, but now the PRB spot coal prices have also begun to rise, with both grades of PRB coal more than doubling in price since February 5 (Figure 9).

Conclusion

The surge in coal prices will level out but will not return to the levels of last year, simply because industry investment in coal simply will not otherwise be there. Current spot coal prices do not necessarily set the level for contract prices, but they do raise the bar. There will be electric power coal supply contracts expiring throughout the rest of this year and next year, and those consumers will likely be willing to pay more for a reliable contract, or be more willing to enter into a risk-sharing arrangement with the producer in order to ensure fair coal prices that will still allow them to make a profit. Indirectly, even low-Btu PRB coal prices will have an impact on domestic met coal prices. Some electricity producers would prefer Central Appalachian coal over PRB coal, so there should be upward pressure exerted on any new met coal prices from that region. A possible means to mitigate the increases in coal prices may be careful negotiation of best possible delivery rates.

Figure 9. Powder River Basin Coal Prices, F.O.B. Mining District (0.4 lbs S/MBtu)



Source: Coal Outlook.

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[6] Bruce A. Steiner, Vice President, Environment and Energy, American Iron and Steel Institute, letter dated June 10, 1999, to John C. Geidl, Director, Office of Coal, Nuclear, Electric and Alternate Fuels, Energy Information Administration.

[7] Telephone communication, Mr. Eugene Rosengarden, Director, Office of Tariff Affairs and Trade Agreements, U.S. International Trade Commission, with Mr. Fred Freme, Energy Information Administration, Office of Coal Nuclear, Electric and Alternate Fuels, on August 5, 1999. Mr. Rosengarden felt that the ".20" classification may once have included a type of iron ore, or it may refer to a type of coke used to process sugar beets and in the rock wool industry.

[8] Telephone communication, Mr. David Saunder, President, American Coke and Coal Chemicals Institute, with Fred Freme, Energy Information Administration, on August 5, 1999.

[9] U.S. International Trade Commission, *Metallurgical Coke: Baseline Analysis of the U.S. Industry and Imports*, Publication 2745 (Washington DC, March 1994), Table 3-12.

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