U.S. Metallurgical Coal and Coke Supplies–Prices, Availability, and the Emerging Futures Markets

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Introduction

A year ago at the time of this conference,[*] domestic coal prices were well into a rapid climb that did not level off until mid-summer. The run-up in coal prices was unlike anything that had been seen since the 1973 Arab oil embargo, when coal prices shot up and then continued to rise until 1982.[1] The major difference between that perturbation in coal prices and the current one that began in late 2000 is that the aftereffects will not be long-lasting this time.

Coal Prices, Supplies, and Demand

Several significant coal supply factors have changed since 1973. One fact that is often overlooked is that prior to 1973, U.S. coal consumption was already growing at a healthy rate—8.5 percent over the previous 10 years—compared with 4.4 percent over the decade ending in 1999. In the 2 years following the oil embargo, however, major changes in U.S. Government policy strongly promoted the use of more coal and led to nearly 2 decades of research into alternative fuel technologies using coal. Perceptions were widespread that coal could eventually dominate both electricity generation and industrial consumption, as well as make inroads into vehicular consumption (as liquid synfuels) and possibly into natural gas heating and hydrocarbon feedstock applications (as synfuel gas).

The result was that coal suppliers assumed demand would increase above the already strong rate of increase. They rapidly acquired new coal reserves and expanded their productive capacity, even as many companies new to coal mining acquired coal properties and also joined the market. The difference this time is that by mid-year 2000, excessive levels of productive capacity had been mostly eliminated over 25 years of declining real coal prices, low company profits, bankruptcies, buyouts, and acquisitions. The coal industry of 2000 was not about to be fooled again. There has been no rush to increase mining capacity. In fact, the fewer, larger players in the industry are today more market-savvy and are willing to manage their assets. They will not hesitate to idle or

[*] This paper is scheduled for presentation at the Iron and Steel Society annual conference, March 10-13, 2002, in Nashville, TN.

shut down a less profitable mine and to withdraw production from the coal supply pool rather than sell coal at rates of return that may be lower than inflation.

The other major change is that coal is now perceived as being potentially subject to price volatility. This volatility results from the deregulation of commodities closely linked to coal—natural gas, railroads, and the ongoing deregulation of electricity providers. As a result, energy marketers now include coal in their over-the-counter and futures markets. Coal prices, however, have not undergone the extreme volatility that natural gas and electricity contracts have, as in the California electricity price problems of 2000-2001. For example, Figure 1 illustrates both the quiescent coal prices during most of 2000 and the doubling of some of those prices over 5 to 10 months.

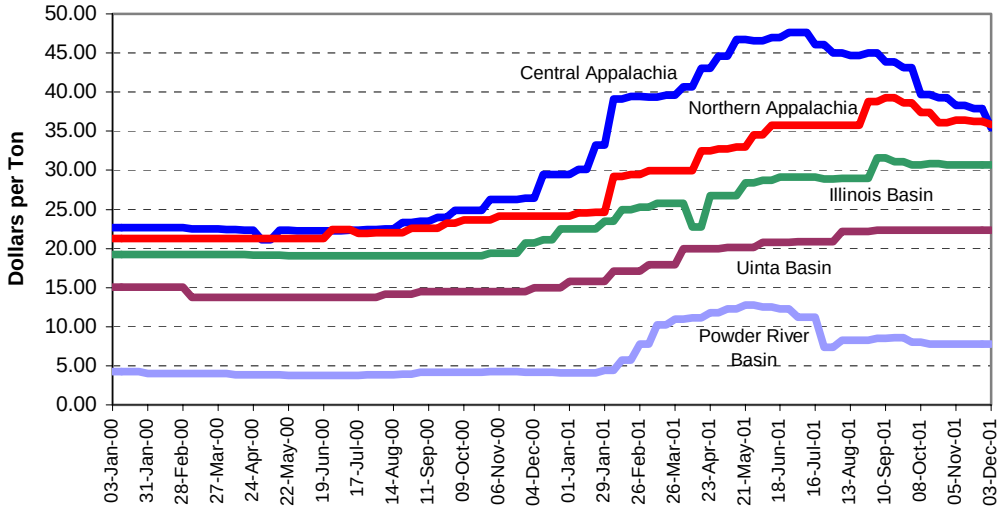

Figure 1. Average Biweekly Spot Coal Prices, 2000-2001

Source: Adapted from former *FTE Coal Outlook* and *Platt's Coal Outlook*

On a Btu basis, however, these changes were mild compared with the shocks experienced by many natural gas consumers. For that reason, coal was given a second look by electricity generators in 2001. As of October 2001, 49,447 megawatts of new coal-fired capacity had been announced. At least 34,000 megawatts of those announced were considered firm, and if built they would consume at least 176 million short tons of additional coal.[2] Although it is not certain ultimately whether all of this will be financed and built, in the 5 years from 1996 through 2000 only 5,056 megawatts of new coal-fired[3] capacity went into operation, so completion of even half of the announced plants would be a major turnaround.

What is more, both electricity generators and energy investors see coal as a potential hedge against the volatility in electricity and natural gas prices. In the past year, for example, the Energy Information Administration (EIA) has received a number of inquiries on Btu and price data for coal typical of contract and spot purchases for use in calculating spark spreads.[4]

The spot prices in Figure 1 should not be considered as indicative of average coal prices. Those prices were for short-term deliveries, usually for deliveries over 1.5 years or less. Since spot coal purchases—almost entirely for electricity generation—generally represent less than 20 percent of total deliveries, their effects are mitigated. The effects of changes in spot prices will phase in as existing contracts expire and as each new

contract is negotiated. The new contract prices will be most influenced by the then current spot prices. However, if the trend in spot prices has been downward, the new contract prices will generally be lower than spot.

The Central Appalachian spot prices in Figure 1 are for coal from which much of the premium Appalachian metallurgical coal is prepared. Still, they tend to be lower than average metallurgical coal prices, including that bought under longer-term contracts. Average coal prices, including metallurgical, have been trending downward slowly, but for the iron and steel industry that average continues to be about 35 percent above other industrial coal prices (Figure 2, Table I).

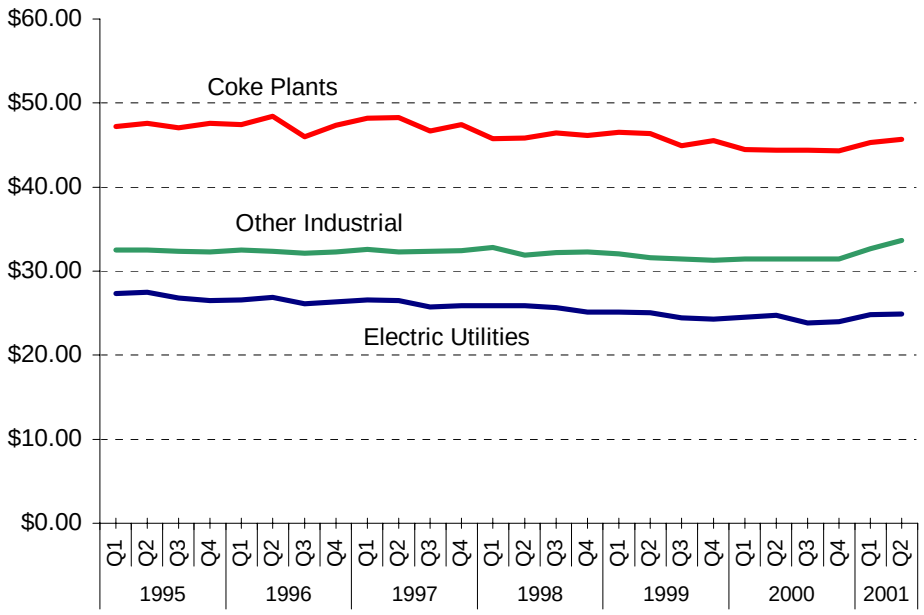

Figure 2. Average Quarterly U.S. Coal Prices

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

The coal most analogous to the metallurgical coal consumed at U.S. coke plants is U.S. metallurgical coal exports, and even in that case domestic consumers on average pay a higher price (Figure 3, Table II). This is possibly because coal for export is awarded a better rail rate to the port than is coal to domestic consumers. Considering that most metallurgical coal for export is shipped from Central Appalachia to Hampton or Newport News, Virginia—an average distance of roughly 500 miles—many U.S. coke plant operators may be paying either a higher rate per ton or a higher rate per ton-mile. Based on the data in Table II, the railroads received an average of $3.30 more per ton between January 1990 and June 1995 for metallurgical coal delivered to domestic coke plants than to deepwater ports.

Although there are too few coke plants in the Mountain and the South Atlantic Census Divisions to allow disclosure, it appears from Table III that customers in the East South Central Division (Mississippi, Alabama, Tennessee, and Kentucky) and the East North Central Division (Illinois, Indiana, Ohio, Michigan, and Wisconsin) pay an additional premium for their metallurgical coal shipments. Both regions pay more than a dollar per ton over the national average on their receipts.

Table I. Average Quarterly U.S. Coal Prices

Year	Quarter	Electric Utilities	Coke Plants	Other Industrial
1995	Q1	$27.35	$47.19	$32.51
	Q2	$27.46	$47.57	$32.52
	Q3	$26.79	$47.02	$32.36
	Q4	$26.47	$47.56	$32.32
1996	Q1	$26.54	$47.45	$32.51
	Q2	$26.89	$48.39	$32.39
	Q3	$26.10	$46.02	$32.12
	Q4	$26.31	$47.33	$32.28
1997	Q1	$26.54	$48.16	$32.60
	Q2	$26.49	$48.24	$32.29
	Q3	$25.72	$46.71	$32.33
	Q4	$25.92	$47.40	$32.40
1998	Q1	$25.90	$45.79	$32.83
	Q2	$25.92	$45.84	$31.93
	Q3	$25.66	$46.43	$32.18
	Q4	$25.09	$46.17	$32.28
1999	Q1	$25.15	$46.56	$32.06
	Q2	$25.03	$46.37	$31.62
	Q3	$24.45	$44.92	$31.44
	Q4	$24.28	$45.57	$31.28
2000	Q1	$24.52	$44.45	$31.47
	Q2	$24.77	$44.39	$31.47
	Q3	$23.83	$44.39	$31.48
	Q4	$23.99	$44.30	$31.42
2001	Q1	$24.81	$45.29	$32.64
	Q2	$24.93	$45.65	$33.69

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

Metallurgical Coal and Coke Markets

In general, coal markets in the United States are understandably attentive to the demands of the electricity generation market. In Figure 4, the recent historical and projected demand for coal at coke plants and for all coal exports is a consistently diminishing quantity according to EIA.[5] There are coal companies that supply these two markets, but the overall scale of electricity generation demand (not shown) predominates the current and future total coal demand. As a consequence, the electricity market will continue to take the vast majority of domestic coal production—both of traditional steam coal and of premium, low-sulfur bituminous "compliance coal" that comes largely from traditional met coal mining regions. Because of the quantities of coal and the magnitude of the contracts let, unless domestic met coal consumers succeed in forming more powerful purchasing blocks, electricity generators will continue to win lower prices for their coal deliveries. This applies even to coal qualifying as metallurgical grade.

The retail and general industry sector in Figure 4 includes any coal consumed at blast furnaces and foundries, which could not be shown separately. This sector, though relatively small, is projected to increase slightly after its projected low point in 2001.

The average price of U.S. coke has been increasing over the past 5 years, even as the average price for imported coke has decreased (Figure 3, Table II). This fact would seem to explain any decline in U.S. coke export quantities. For more than 10 years, however, the quantities of coke exports have been so small that gains or losses of one or two contracts are significant, and there are no clear patterns. Presumably, for some users, U.S. coke still offers qualities that match the requirements at their facilities.

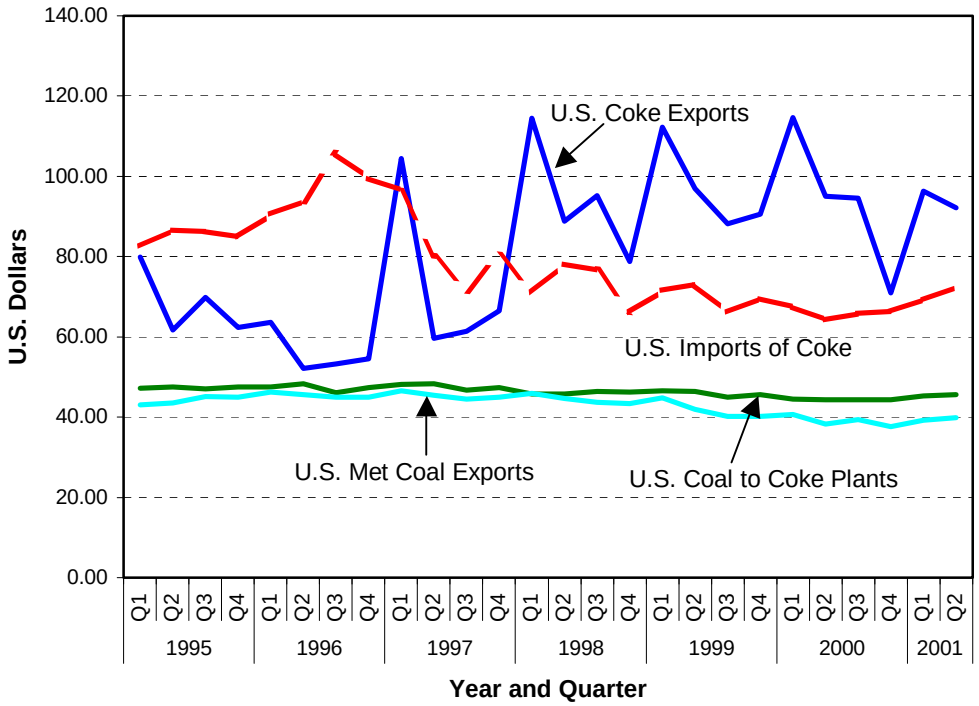

Figure 3. Prices of Metallurgical Coal and Coke by Disposition (Dollars per Short Ton)

Note: Prices for coal delivered to coke plants include all transportation; prices for imports include transportation to the port of entry, duties, and insurance costs (customs import value); exports include transportation to the port of departure (free alongside ship value) but not to overseas destination.
Sources: Energy Information Administration, Quarterly Coal Reports and U.S. Department of Commerce customs reports, EM 545 and IM 145.

Table II. Prices of Metallurgical Coal and Coke by Disposition
(Dollars per Short Ton)

Year	Quarter	U.S. Coal to Coke Plants	U.S. Met Coal Exports	U.S Coke Exports	U.S. Imports of Coke
1995	Q1	$47.19	$43.12	$79.90	$82.60
	Q2	$47.57	$43.61	$61.64	$86.56
	Q3	$47.02	$45.11	$69.84	$86.22
	Q4	$47.56	$44.97	$62.27	$85.02
1996	Q1	$47.45	$46.25	$63.70	$90.60
	Q2	$48.39	$45.61	$52.15	$93.79
	Q3	$46.02	$44.94	$53.33	$105.70
	Q4	$47.33	$44.89	$54.58	$99.51
1997	Q1	$48.16	$46.57	$104.39	$96.41
	Q2	$48.24	$45.46	$59.62	$80.04
	Q3	$46.71	$44.54	$61.47	$71.44
	Q4	$47.40	$44.94	$66.56	$80.44
1998	Q1	$45.79	$45.92	$114.56	$71.18
	Q2	$45.84	$44.63	$88.81	$78.07
	Q3	$46.43	$43.76	$95.15	$76.65
	Q4	$46.17	$43.31	$78.80	$66.20
1999	Q1	$46.56	$44.84	$112.29	$71.62
	Q2	$46.37	$41.87	$97.02	$73.09
	Q3	$44.92	$40.25	$88.12	$66.20
	Q4	$45.57	$40.16	$90.51	$69.59
2000	Q1	$44.45	$40.59	$114.70	$67.37
	Q2	$44.39	$38.20	$95.07	$64.26
	Q3	$44.39	$39.31	$94.63	$65.93
	Q4	$44.30	$37.64	$71.00	$66.35
2001	Q1	$45.29	$39.15	$96.23	$69.22
	Q2	$45.65	$39.82	$92.22	$72.47

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

Table III. Average Price of Coal Receipts at Coke Plants by Census Division
(Dollars per Short Ton)

Census Division	April – June 2001	January - March 2001	April - June 2000	Year to Date		
				2001	2000	Percent Change
Middle Atlantic Total	$43.03	$43.01	$42.72	$43.02	$42.80	0.5
East North Central Total	$46.76	$46.80	$45.89	$46.78	$45.73	2.3
South Atlantic Total	w	w	w	w	w	w
East South Central Total	$46.78	$45.38	$44.75	$46.02	$45.26	1.7
Mountain Total	w	w	w	w	w	w
U.S. Total	**$45.65**	**$45.29**	**$44.39**	**$45.46**	**$44.42**	**2.3**

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

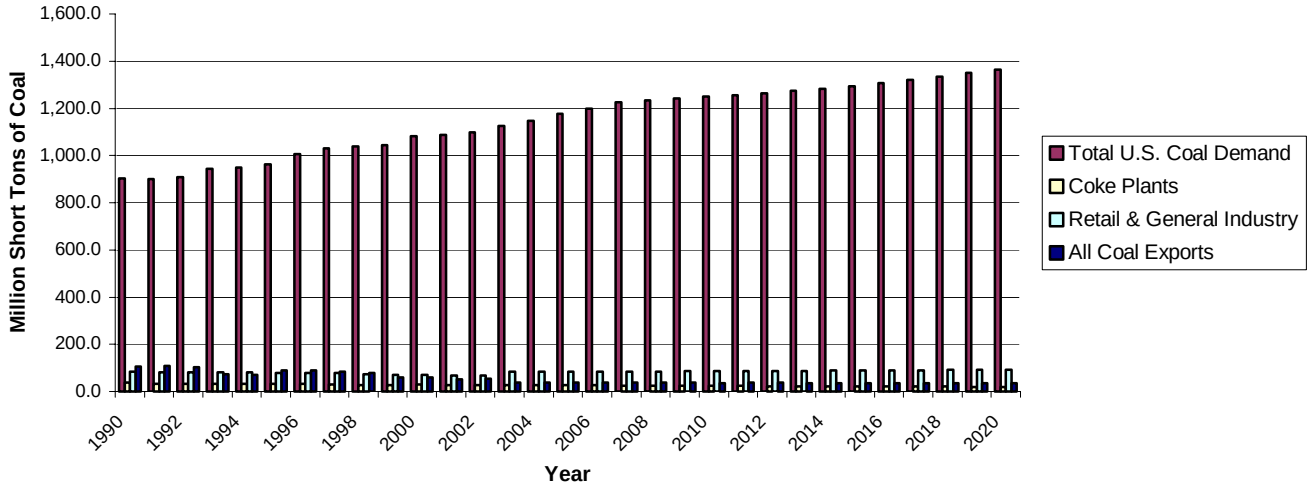

Figure 4. Coke Plants and Other Industries Are Minor Factors in Historical and Projected Coal Demand

Sources: Energy Information Administration, *Quarterly Coal Report, Short Term Energy Outlook,* and *Annual Energy Outlook.*
Note: Data for 2003 and subsequent years are projections from *Annual Energy Outlook 2002*, early release.

Figure 5 and Table IV document the sizable decline in U.S. metallurgical coal exports during the past 5 years—a 52 percent drop between the 3rd quarter of 1996 and the 2nd quarter of 2001. Recent reports predict a likely increase in metallurgical coal imports to the United States, primarily from the major exporter, Fording Incorporated of Canada. The data in Table IV indicate that as of the end of 2000, however, no significant increases of met coal imports were recorded. As Figure 5 clearly illustrates, the losses of export market for U.S. metallurgical coal did not correspond to any growth in imports of met coal. Instead, the minor decline in coal consumed at domestic coke plants is more likely related to increased use of pulverized coal injection at blast furnaces.

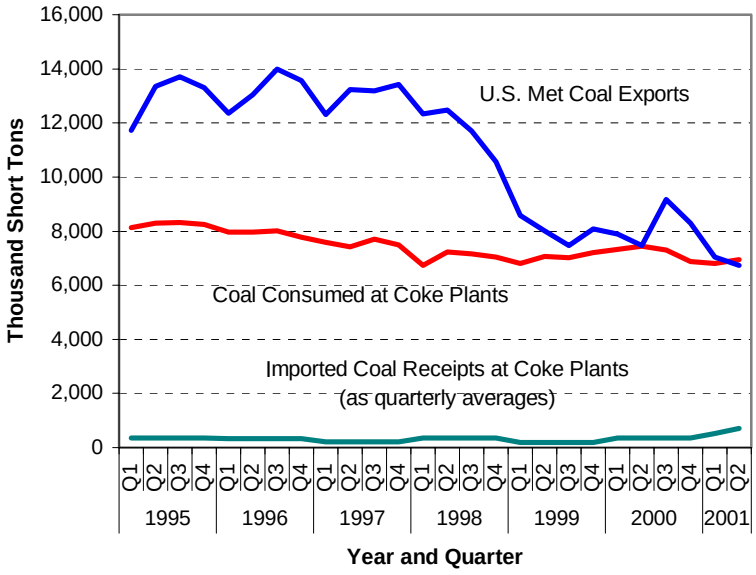

Figure 5. U.S. Met Coal Exports Plunge as Domestic Demand Holds

Source: Energy Information Administration, *Quarterly Coal Report* and *Coal Industry Annual*.

Table IV. U.S. Metallurgical Coal Disposition
(Thousand Short Tons)

Year	Quarter	Coal Consumed at Coke Plants	U.S. Met Coal Exports	Imported Coal Receipts at Coke Plants (as quarterly averages)	Imported Coal Receipts at Coke Plants (annual data)
1995	Q1	8,140	11,714	344	
	Q2	8,291	13,358	344	
	Q3	8,330	13,714	344	
	Q4	8,251	13,303	344	1,377
1996	Q1	7,958	12,349	328	
	Q2	7,965	13,050	328	
	Q3	8,016	13,988	328	
	Q4	7,767	13,563	328	1,313
1997	Q1	7,590	12,315	213	
	Q2	7,410	13,225	213	
	Q3	7,700	13,192	213	
	Q4	7,503	13,422	213	852
1998	Q1	6,735	12,341	348	
	Q2	7,239	12,488	348	
	Q3	7,172	11,706	348	
	Q4	7,042	10,559	348	1,392
1999	Q1	6,795	8,569	181	
	Q2	7,072	8,022	181	
	Q3	7,024	7,459	181	
	Q4	7,216	8,079	181	724
2000	Q1	7,322	7,887	347	
	Q2	7,445	7,479	347	
	Q3	7,295	9,171	347	
	Q4	6,877	8,289	347	1,390
2001	Q1	6,811	7,045		
	Q2	6,952	6,745		

Source: Energy Information Administration, *Quarterly Coal Report* and *Coal Industry Annual*.

Figure 6 shows that the production at blast furnaces has remained relatively steady during the period (declining slightly). Likewise has the supply of coke at blast furnaces (*receipts* of coke were used in Table V rather than consumption data because no data are collected on consumption of coke imports; therefore, receipts were used along with exports to estimate total supply).

More importantly, what effects can be discerned from the steadily increasing levels of iron and steel imports into the United States? Based on the fact that domestic coke supplies have remained constant and that net blast furnace production has been relatively steady since 1992, the obvious conclusion is that iron and steel imports have captured all the potential growth the domestic industry might have planned on. Given that the ability of any U.S. company to compete in iron production or steel products requires increasing efficiency—sometimes linked to larger-scale facilities—and demands adherence to stricter environmental requirements, the result has been the failures of smaller, less-efficient, and less well capitalized operations. The domestic output has remained steady as the survivors have serviced domestic demand. Meanwhile, the imports won the increases in demand of the growing U.S. economy during the 1990's.

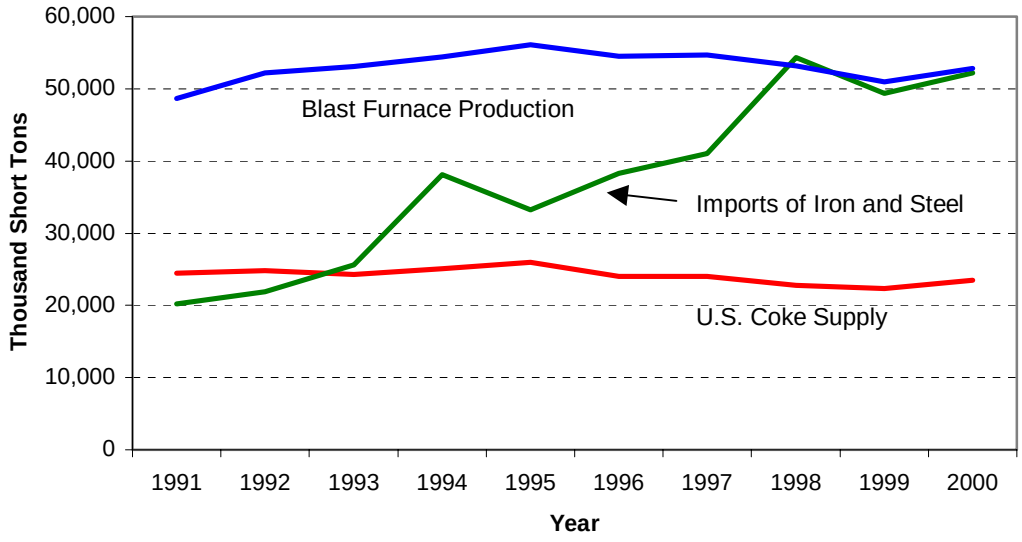

Figure 6. Iron and Steel Imports Capture Market Growth

Source: American Iron and Steel Institute, Annual Statistical Report, and Energy Information, *Quarterly Coal Report.*

Table V. Coke Supplies, Blast Furnace Production, and Iron and Steel Imports

Year	Imports of Iron and Steel (Thousand Net Tons)	Blast Furnace Production (Thousand Net Tons)	U.S. Coke Supply [a] (Thousand Tons)	U.S. Coke Production (Thousand Tons)	U.S Coke Exports (Thousand Tons)	U.S. Imports of Coke (Thousand Tons)
1991	20,237	48,637	24,442	24,046	787	1,183
1992	21,873	52,224	24,812	23,410	696	2,098
1993	25,644	53,082	24,275	23,182	1,062	2,155
1994	38,136	54,426	25,038	22,686	986	3,338
1995	33,244	56,097	25,941	23,479	1,358	3,820
1996	38,328	54,485	23,995	23,075	1,622	2,542
1997	41,048	54,679	23,989	22,116	1,266	3,139
1998	54,303	53,164	22,746	20,041	1,129	3,834
1999	49,346	51,002	22,342	20,016	898	3,224
2000	52,202	52,787	23,443	20,808	1,146	3,781

[a] Coke supply equals domestic coke production, minus coke exports, plus coke imports.

Source: American Iron and Steel Institute, *Annual Statistical Report*, and Energy Information Administration, *Quarterly Coal Report*.

Coal Futures Markets

The New York Mercantile Exchange (NYMEX) launched its coal futures market in July 2001. Its only commodity so far is Central Appalachian coal, priced for transfer at docks along specified stretches of the Ohio River or the Kanawha River in West Virginia. After a surge of open interest[6] and closed contracts in the first month after opening, transactions declined during the late summer. During that time it was widely felt that the NYMEX market was quoting unrealistically low prices, and few sellers were attracted. Figure 7 indicates the actual settlement prices for near-term contracts (no contracts are for delivery beyond 26 months). Figure 8 shows the actual number of contracts settled on each day of business. In recent weeks (i.e., during November 2001) an average of about 40 contracts were settled each day. The size of a standard contract is 1,550 short tons.

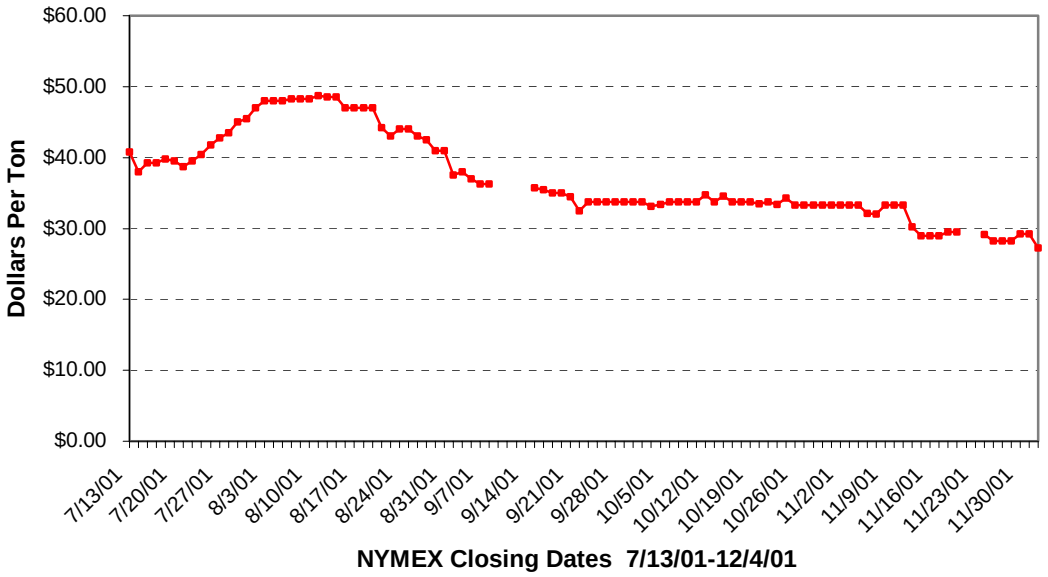

Figure 7. NYMEX Central Appalachian Coal Futures Near-Month Contract Final Settlement Price

As noted by the NYMEX, non-utility industrial coal users, such as steel mills, can use futures to lock in their own coal supply costs.[7] The future of coal prices may include additional spikes in reaction to extreme price fluctuations in the natural gas and electricity trading markets. This vehicle offers one option to lock in favorable prices—even for coal that could be resold—when longer-term contracts are not favorable.

In addition to the NYMEX futures, numerous over-the-counter markets are now trading on-line. It may be another year or so before some of these ventures merge or drop out, and the system settles on one or two sets of standards. Currently, these markets offer a wide variety of steam and "compliance" coals, the latter being of possible interest to iron and steel producers.

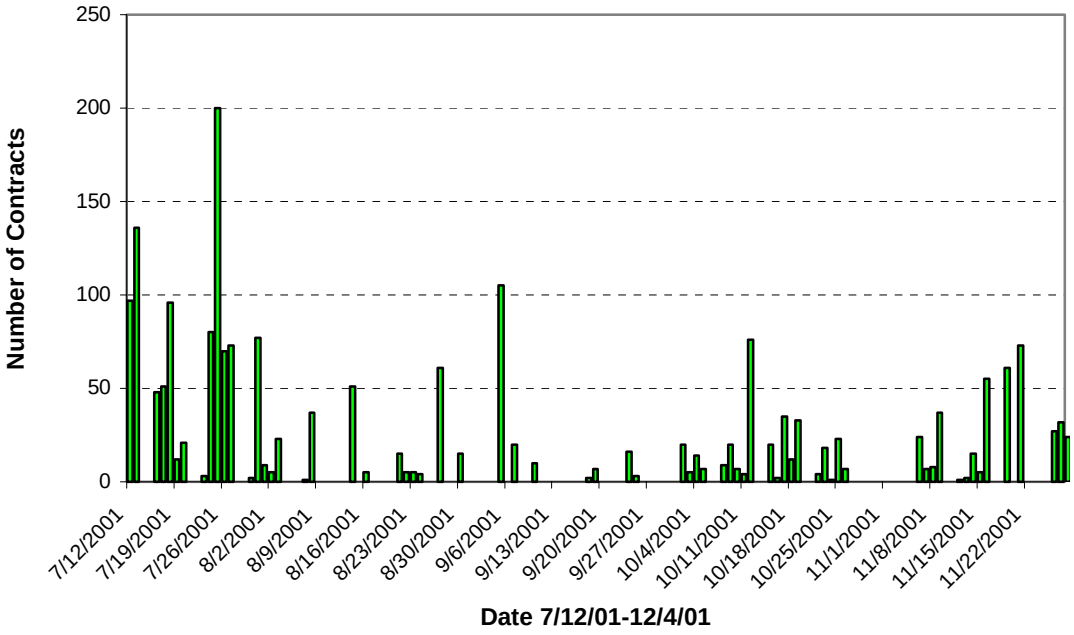

Figure 8. Daily Volume Central Appalachian Coal Futures Contracts

References

[1] Energy Information Administration, *Annual Energy Review 2000* (DOE/EIA-0384(2000)) (Washington, DC, August 2001), Table 7.8. When adjusted for inflation, the constant-dollar prices for coal peaked in 1975.

[2] RDI Consulting, *New Coal-Fired Generation: The Race Is On*, Conference Workshop *at* 24th Coal Marketing Days, September 24-25, 2001, Westin Convention Center (Pittsburgh, PA 2001). The RDI compilation is not analogous to the Energy Information Administration's (EIA) survey data for planned new coal-fired capacity. One reason is that the latest EIA survey is for planned new units (during the next 5 years), as of the end of calendar year 2000. It includes no part of 2001, when announcements of planned new generating units proliferated. Also, EIA capacity is expressed not in nameplate capacity but in net summer capability, which averages 5 to 6 percent smaller for coal-fired units. A more compelling reason, however, is that announcements usually represent the earliest, exploratory phase of project evaluation. Some announced capacity is later found to conflict with competing announced or planned units or to be economically unfeasible. Announcements may come months before any legal or financial commitments or the market and engineering studies needed before projects are generally considered planned or committed.

[3] Data are from Energy Information Administration, *Electric Power Annual 2000, Volume II* (DOE/EIA-0248(2000)/1), and prior 4 years' reports (Washington, DC August 2001), Table 4, and earlier versions.

[4] A spark spread is traditionally the price of electricity relative to the price of gas on the daily spot markets. Using assumptions as to the efficiency of a selected generating technology (e.g., how many million Btu of gas (or coal) is required per megawatt of electricity generated) allows comparison of the relative cost of purchasing the equivalent power in a particular electricity distribution region. The spark spread is sensitive to the Btu content of the fuel, the heat rate or efficiency of the generating technology, and the assumed wholesale prices of the fuel and the electricity.

[5] Energy Information Administration, *Annual Energy Outlook 2002*, Early Release (DOE-EIA-0383(2002) (Washington, DC, November 2001), Table 16.

[6] Open Interest is the number of open contracts of a given future or option contract. An open contract can be a long or short contract that has not been exercised, closed out, or allowed to expire. A futures contract always involves a buyer and a seller. Therefore, one unit of open interest always represents two people, a buyer and a seller. By itself, open interest only shows the liquidity of a specific contract or market, but combining volume analysis with open interest may provide subtle clues to the flow of money in and out of the market: rising volume and rising open interest confirm the direction of the current trend; falling volume and falling open interest signal that an end to the current trend may be imminent.

[7] New York Mercantile Exchange, "Central Appalachian Coal Futures," descriptive article on internet web site at http://www.nymex.com/markets/cont_all.cfm?CID=26&cont_name=info , December 2001.