



Directorate of  
Intelligence

**Confidential**

25X1

REGISTERED FILE COPY  
DO NOT GIVE OUT  
OR MARK ON

# The Changing International Coal Market: Trade Prospects and Energy Security Implications

25X1

An Intelligence Assessment

DOE review completed.

**Confidential**

GI 84-10156  
September 1984

Copy

442

**Page Denied**



Directorate of  
Intelligence

Confidential



25X1

# The Changing International Coal Market: Trade Prospects and Energy Security Implications



25X1

An Intelligence Assessment

25X1

This paper was prepared by [redacted] Office  
of Global Issues. Comments and queries are welcome  
and may be directed to the Chief, Strategic  
Resources Division, OGI, [redacted]

25X1

Confidential

GI 84-10156  
September 1984

Confidential

25X1

**The Changing International  
Coal Market: Trade  
Prospects and Energy  
Security Implications**

25X1

**Key Judgments**

*Information available  
as of 15 August 1984  
was used in this report.*

The international coal market is not developing as rapidly as most experts expected just two to three years ago. According to our analysis, Organization for Economic Cooperation and Development (OECD) coal consumption during the 1980s is likely to grow by only about one-third the amount government planners predicted in 1982. Although coal already can be delivered to Western Europe and Japan at about half the cost of oil or natural gas, slower-than-expected growth in electricity demand, declining oil prices, environmental concerns, and the high capital costs of switching to coal are major impediments to increased coal use.

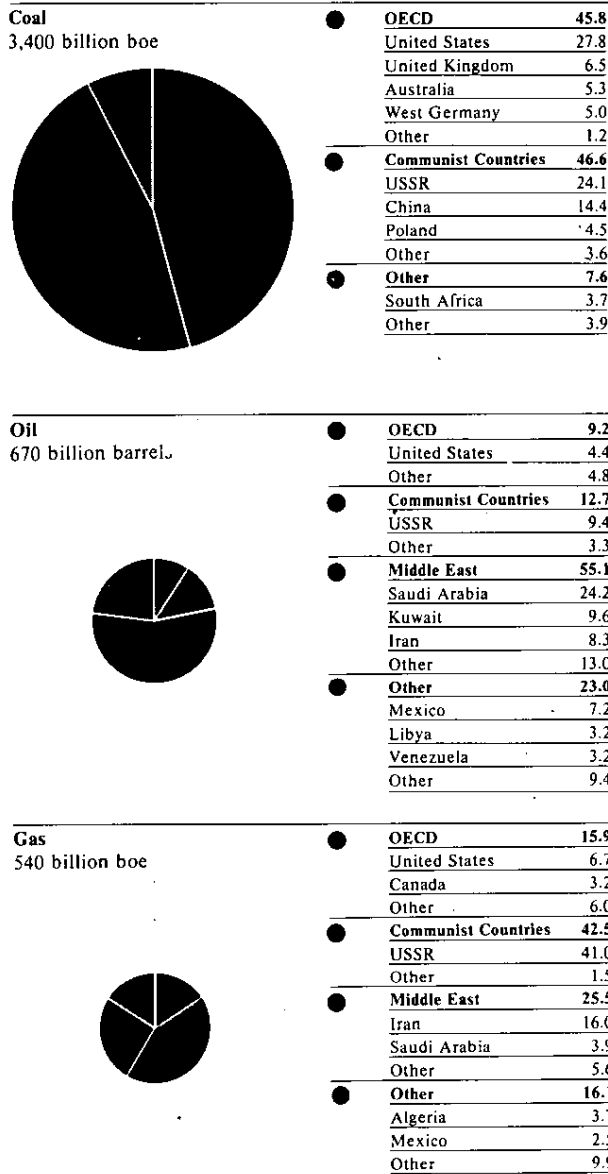
Prospects for substantially slower growth—particularly in Western Europe and Japan—have sharply diminished import requirements at a time when expansion programs in the major coal-exporting countries will result in significant additions to coal-export potential. This dim outlook for the international coal market has major trade and energy security implications:

- The United States will be hard pressed to increase coal exports during the 1980s.
- Lower-than-expected growth in coal use could result in greater oil consumption, increasing Western dependence on the volatile Persian Gulf region.
- Failure to switch to coal could lead to increased West European demand for gas and improve prospects for additional Soviet gas sales.
- Intense competition among coal suppliers in the next few years may also weaken the confidence needed to support the large-scale investment that will be required to cover the substantial growth in coal consumption expected during the 1990s.

Measures to expand OECD coal consumption during the remainder of this decade would require incentives to industry to offset the high capital costs of converting to coal in addition to research and development into methods to burn coal more effectively and cleanly to meet growing environmental concerns. With the United States accounting for more than one-fourth of world coal reserves and ample US productive and port capacity, increased foreign imports of US coal could enhance international energy security. Long-term contracts and equity investments by foreign purchasers in US coal reserves, however, would be required to reduce the cost of US coal and enhance the potential for US coal exports.

25X1

**Figure 1**  
**World Energy Reserves, 1983**



**Table 1**  
**OECD: Consumption of Solid Fuels <sup>a</sup>** *Million tons <sup>b</sup>*

	Actual		Projected (1990)		
	1973	1982	IEA <sup>c</sup>	IEA <sup>d</sup>	CIA
<b>Total</b>	<b>1,048.9</b>	<b>1,258.9</b>	<b>1,721.9</b>	<b>1,557.3</b>	<b>1,420.0</b>
<b>North America</b>	<b>533.0</b>	<b>686.0</b>	<b>902.3</b>	<b>904.5</b>	<b>810.5</b>
United States	510.0	641.0	847.5	849.0	755.0
Canada	23.0	45.0	54.8	55.5	55.5
<b>Western Europe</b>	<b>386.3</b>	<b>423.6</b>	<b>582.7</b>	<b>474.3</b>	<b>434.5</b>
West Germany	125.9	129.2	142.5	127.5	127.5
United Kingdom	118.6	101.0	110.3	97.5	97.5
France	40.0	45.0	50.0	25.0	25.0
Turkey	17.8	25.4	62.6	42.0	33.0
Italy	15.5	22.8	51.0	34.5	31.5
Spain	15.1	27.9	36.4	33.0	33.0
Belgium	17.6	17.0	22.5	18.0	16.0
Denmark	3.1	9.3	12.3	12.0	10.0
Austria	6.4	7.5	7.6	7.5	7.5
Netherlands	4.8	6.6	18.9	12.0	12.0
Greece	3.4	6.0	15.6	13.5	9.0
Ireland	2.4	3.2	7.6	6.0	6.0
Other	15.7	22.7	45.4	45.8	26.5
Japan	89.7	95.4	153.0	108.0	108.0
Australia	37.5	51.5	80.1	66.0	63.0
New Zealand	2.4	2.4	3.8	4.5	4.0

<sup>a</sup> Predominantly coal.  
<sup>b</sup> Million metric tons have been converted from million tons oil equivalent (mtoe) on the basis of 1 mtoe equals approximately 1.5 million tons of coal.  
<sup>c</sup> 1982 IEA estimate plus France and Finland.  
<sup>d</sup> 1984 IEA estimate plus France and Finland.

Confidential



25X1

### The Changing International Coal Market: Trade Prospects and Energy Security Implications



25X1

#### Introduction

Coal has played a major role in reducing OECD oil use and enhancing energy security. Since 1973, OECD coal consumption has increased by roughly 210 million tons—the equivalent of 2.8 million barrels per day oil equivalent (b/doe)<sup>1</sup>—and coal's share of total energy consumption has risen from 21 percent to 25 percent. This expansion in coal use is partially responsible for declining oil prices and the weak oil market outlook.



Given the size and geographic distribution of world energy reserves, coal offers great potential for meeting future OECD energy needs from indigenous sources:

- Recoverable world coal reserves are five times larger than those of oil and six times larger than those of gas.
- Nearly 50 percent of recoverable coal reserves are located in OECD nations, with the United States alone accounting for 28 percent of total world reserves. In contrast, more than two-thirds of proved world oil and gas reserves are located in Communist countries or the Middle East.

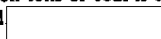
Sharply expanded coal use also has the potential to benefit the United States—historically the world's largest coal supplier. The surge in coal demand following the 1979 oil shock, combined with supply disruptions in Poland and Australia during 1980 and 1981, caused US coal exports to jump from 59 million tons in 1979 to 100 million tons in 1981. In 1982, US coal exports of 96 million tons contributed \$6 billion to the US balance of trade and provided more than 50,000 jobs in the coal-mining industry.



#### Changing Demand Outlook

Although OECD coal consumption will grow during the 1980s, current demand projections indicate a sharply diminished role for coal in meeting future

<sup>1</sup> One million tons of coal is approximately the oil equivalent of 13,400 b/d



energy needs. OECD governments have trimmed estimates of 1990 coal consumption by 165 million tons since 1982. Current OECD government estimates place 1990 total coal requirements at 1.5 billion tons—about 300 million tons above present consumption. We believe the increase will be only about 150 million tons:

- Our estimate of OECD electricity consumption in 1990 is 9 percent below the current OECD forecast, and electricity generation accounts for nearly two-thirds of OECD coal use. 25X1
- In the industrial sector, record-high-interest rates and lower oil prices have boosted capital costs and extended the payback period of fuel switching, thus dampening coal conversion efforts.
- Growth in coal use for synthetic fuels will be small because escalating capital costs, declining oil prices, and reduced government funding have led to many cancellations and delays in synfuel projects around the world. 25X1

25X1

*Western Europe.* Substantial growth in West European coal demand is failing to materialize. West European governments have already cut back projected 1990 coal demand by nearly 20 percent since 1982. We believe even these revised projections are overly optimistic. On the basis of the latest private-sector forecasts and our own analysis of key coal use sectors, we believe coal consumption will increase by only about 11 million tons between now and the end of the decade—less than one-third the increase predicted this year by West European governments. Coal consumption in nearly all countries will fall well short of expectations:

25X1

- Coal demand in France is likely to drop to 25-30 million tons by 1990 from 45 million tons currently.

25X1

Confidential

An aggressive nuclear power program is expected to cut electric utility coal use to less than half current levels. Reluctance by industrialists to convert to coal have dashed Paris's hopes for maintaining coal consumption at 45-50 million tons during the 1980s.

- Italian projections of 1990 coal use have fallen from 50 million tons to 34 million tons, and coal's share of total energy use has been cut from 18 percent to 14 percent. With only one-third of proposed coal-fired electric generating capacity now under construction, private-sector projections place 1990 coal consumption even lower. Further penetration of surplus gas supplies into electricity generation could hamper coal use even more.
- Danish electric power stations—which rely on coal for more than 90 percent of fuel use—are coming under increasing pressure to switch some facilities from coal to gas to dispose of huge surplus gas supplies from the government's North Sea gas project. A switch to gas could reduce projected 1990 coal use by 1-2 million tons.
- Coal use in West Germany and the United Kingdom—Western Europe's largest consumers—is now expected to decline slightly during the 1980s as a result of lower-than-expected growth in electricity demand and a strong commitment to the use of nuclear power for electricity generation. Government projections made in 1982 expected an increase of more than 20 million tons.



25X6

25X1

*Non-OECD.* Outside the OECD, the Far East will account for most of the growth in non-Communist coal consumption.  coal consumption in the Far East to grow from about 139 million tons in 1983 to nearly 200 million tons by 1990. Three nations which are heavily dependent upon imported oil, South Korea, Taiwan, and Hong

25X6

25X1

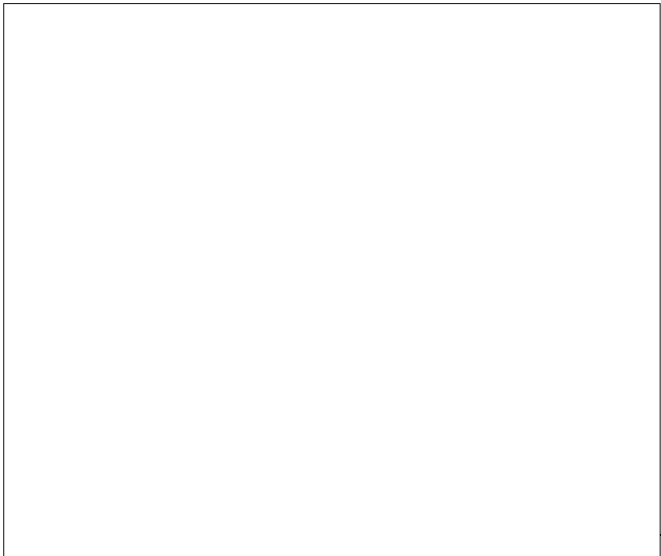
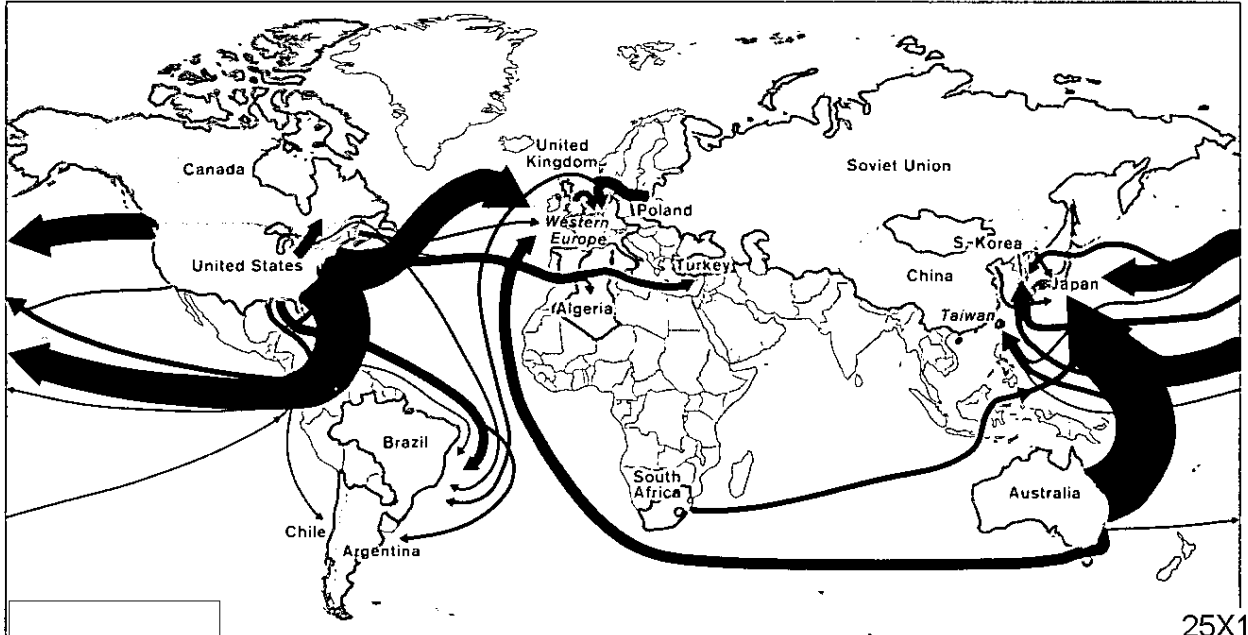


Figure 2  
Major Coal Movements, 1983

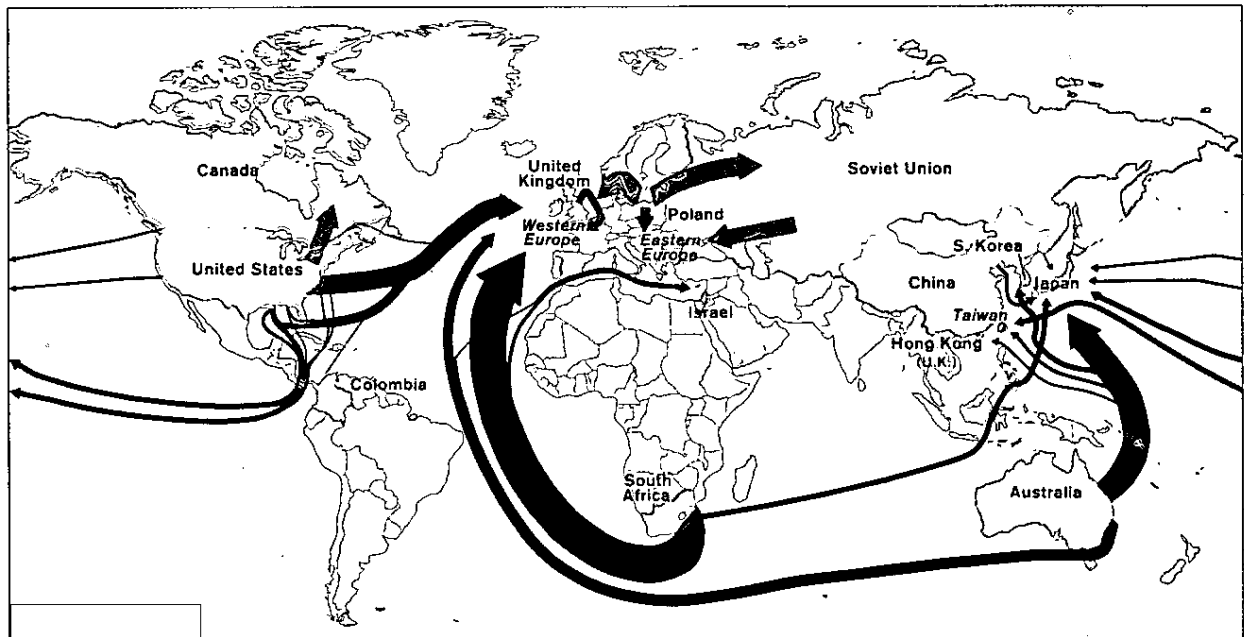
Metallurgical Coal



703173 (547564) 9-84

25X1

Steam Coal



703174 (547564) 9-84

25X1



**Table 2**  
**World Coal Trade**

*Million tons*

	1979	1981	1983 <sup>a</sup>	1990
<b>Total</b>	<b>228.8</b>	<b>270.8</b>	<b>259.5</b>	<b>326.0</b>
<b>Importers</b>				
Western Europe	97.5	113.6	97.8	123.0
Asia	70.0	98.3	98.2	130.0
Japan	57.9	78.4	74.7	90.0
North America	19.5	17.5	16.6	15.0
South America	6.3	5.2	6.3	11.0
Eastern Europe	32.5	32.5	33.8	34.0
Other	3.0	4.8	6.8	13.0
<b>Exporters</b>				
United States	59.9	102.0	70.4	63.0
Australia	40.4	51.0	59.6	80.0
Poland	41.3	15.0	35.2	40.0
South Africa	23.4	29.9	29.5	45.0
USSR	23.9	22.0	21.5	27.0
Canada	13.9	16.1	17.1	27.0
Colombia	0	0	0.3	16.0
Other	26.0	36.0	24.5	28.0

<sup>a</sup> Preliminary.

**Table 3**  
**World Steam Coal Trade**

*Million tons*

	1979	1981	1983 <sup>a</sup>	1990
<b>Total</b>	<b>101.5</b>	<b>130.1</b>	<b>127.1</b>	<b>178</b>
<b>Importers</b>				
Western Europe	57.0	72.3	62.4	82
Asia	8.8	22.4	27.2	52
Japan	2.3	12.5	15.2	27
Eastern Europe	20.5	20.4	22.8	22
North America	12.6	12.2	10.3	10
Other	2.6	2.8	4.4	12
<b>Exporters</b>				
United States	13.9	42.8	25.1	23
South Africa	21.4	27.2	26.0	43
Poland	32.9	12.5	27.1	31
Australia	5.7	10.2	18.3	31
USSR	13.1	12.0	11.5	11
Colombia	0	0	NEGL	16
Other	14.5	25.4	19.1	23

<sup>a</sup> Preliminary.

Kong, have several coal-fired power plants under construction or planned that will rely primarily upon imported steam coal supplies. Coal consumption in other less developed countries (LDCs) is likely to grow by about 25 million tons between now and the end of the decade, primarily as a result of the increased use of coal for electricity generation [redacted]

Although most of the increased demand will be met by developing domestic reserves, Egypt, Morocco, Mexico, and Brazil could be importing significant volumes of steam coal by 1990. [redacted]

**Constraints on Coal.** Several factors currently constrain increased coal demand. The acid rain controversy has heightened environmental concerns over expanded coal use. Although steam coal can be delivered to Western Europe and Japan at about half

the cost of oil or natural gas, capital costs for coal-fired equipment are generally two to four times as much as those for oil and gas, and the capital stock in the industrial sector is dominated by oil- and gas-fired boilers which will not need replacing until the 1990s. Moreover, declining oil prices have extended the payback periods of coal conversions. Indeed, expanded coal use since the 1979-80 oil price hikes is in part responsible for the recent decline in oil prices, and prospects for little or no oil price increases over the next several years have reduced the economic incentive for additional coal conversions. Because coal is a primary substitute for oil, significantly increased coal consumption outside the electricity generation sector is only likely to follow a sharp increase in oil prices. [redacted]

25X1

25X1

25X1

25X1

25X1

25X1

25X1

**Table 4** *Million tons*  
**World Metallurgical Coal Trade**

	1979	1981	1983 <sup>a</sup>	1990
<b>Total</b>	<b>127.3</b>	<b>141.8</b>	<b>132.4</b>	<b>148.0</b>
<b>Importers</b>				
Asia	61.2	75.9	71.0	78.0
Japan	55.6	65.8	59.5	63.0
Western Europe	40.5	41.3	35.4	41.0
Eastern Europe	12.0	12.1	11.0	12.0
South America	5.7	5.2	6.1	9.0
North America	6.9	5.3	6.3	5.0
Others	1.0	2.0	2.6	3.0
<b>Exporters</b>				
United States	46.0	59.3	45.3	40.0
Australia	34.7	40.8	41.3	49.0
Canada	12.5	13.9	14.8	20.0
USSR	10.8	10.0	10.0	16.0
Poland	8.4	2.5	8.1	9.0
Other	14.9	15.3	12.9	14.0

<sup>a</sup> Preliminary.

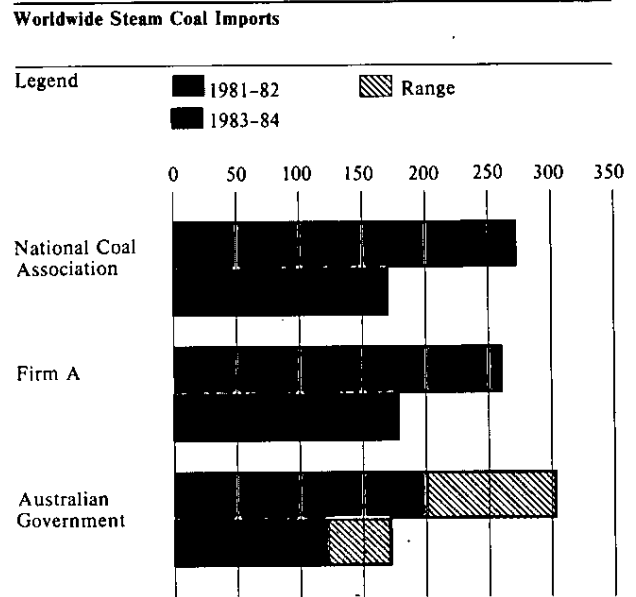
**Trade Prospects**

Because Western Europe and Japan account for the bulk of coal purchases, lowered coal demand projections in these regions have cut sharply into trade prospects. Coal imports by Japan are now expected to reach only 90 million tons in 1990, compared with 135 million tons estimated two years ago. In Western Europe, steam coal imports, once estimated at between 150-160 million tons by the end of the decade, will now probably reach only about half that level, according to our analysis. Altogether we expect international trade in coal to grow only from 260 million tons in 1983 to approximately 325 million tons in 1990—far below the forecasts of 450-500 million tons predicted by many analysts two to three years ago.

Coal export capacity during the 1980s will far exceed demand. Spurred by the boom in coal trade following the 1979-80 oil price hikes and optimistic demand

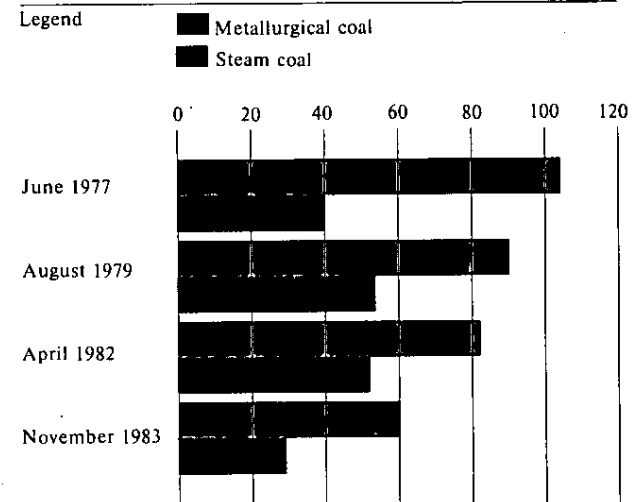
**Figure 3**  
**Changing Projections for Worldwide Steam Coal and Japanese Coal Imports, 1990**

Million metric tons Note change in scale



**Japanese Coal Imports<sup>a</sup>**

25X1

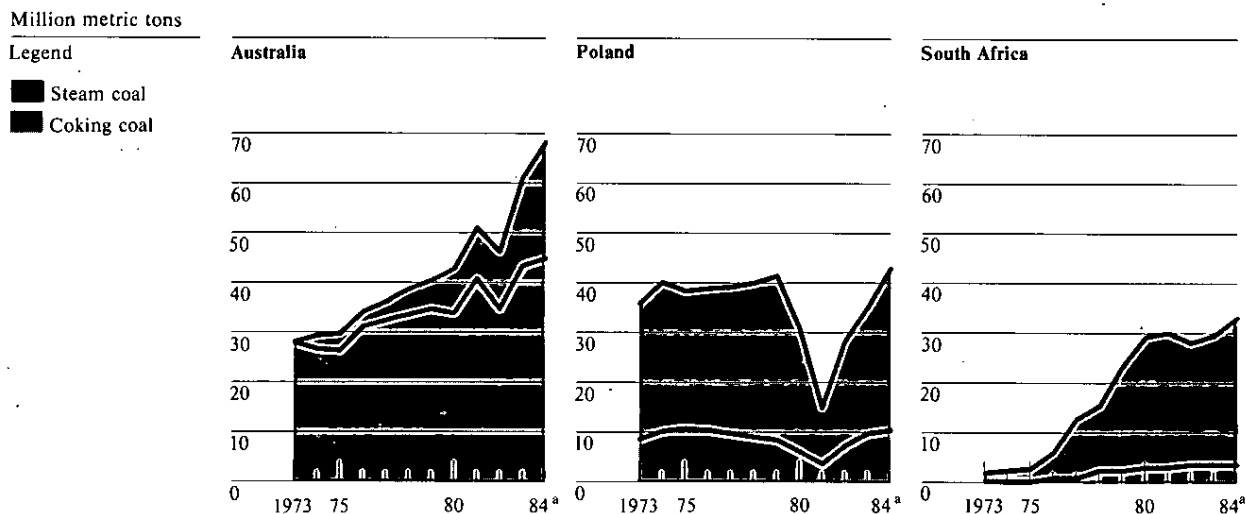


<sup>a</sup> Projections by Japan's Ministry of International Trade and Industry (MITI).

25X1

303674 (C00327) 9-84

**Figure 4**  
**Australia, Poland, and South Africa: Coal Exports, 1973-84**



<sup>a</sup> Estimated.

25X1

303675 (C00325) 9-84

projections, major coal-exporting nations initiated projects to sharply expand export capacity. We expect coal-export potential outside the United States to increase by more than 120 million tons between now and the end of the decade:

- Australia will have the capacity to increase exports by some 60 million tons by 1990.
- South Africa will add some 10 million tons to its export potential through upgrading rail and port facilities.
- Colombia entered the export market last year and will have the capacity to ship around 16 million tons by 1990.
- The USSR will increase its export potential by up to 6 million tons through a Japanese-Soviet coal venture.
- Canada and China will also increase their coal export capabilities, largely through Japanese-backed development projects.

With the bulk of this productive capacity dominated by capital-intensive surface mines, we expect foreign suppliers to be aggressive in marketing their output. Maximum output volume is critical because of the high front-end capital costs of such projects.

25X1

**Implications for Energy Markets**

Slower-than-expected growth in coal consumption and trade during the 1980s has important implications for a number of energy issues.

**US Exports.** Intense competition from foreign suppliers, combined with equity investments in foreign coal development projects, will limit the potential for coal exports from the United States—the world's high-cost or marginal supplier. Barring a foreign coal supply disruption or a sharp reduction in the cost of US coal, we believe US coal exports will approximate only 65



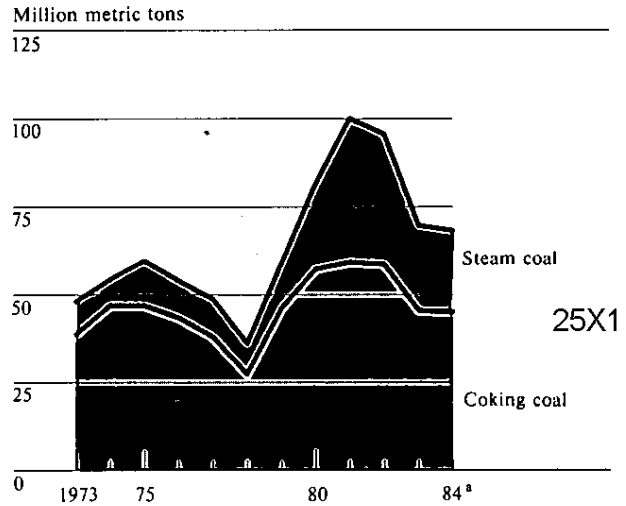
Figure 5. New coal development projects in Canada, Australia, and the USSR are slated to deliver roughly 20 million tons of coking coal to Japan in 1985.

million tons in 1990—below present levels and roughly one-third below recent projections by the National Coal Association and the Department of Energy. Slower growth in international coal trade largely accounts for our lower assessment. Under these conditions, as long as the United States is regarded as the swing supplier, there is only limited potential for increased coal exports. With substantial surplus productive and port capacity, however, the United States could benefit from a sudden surge in coal demand or shortfall in foreign supplies.

**Oil Security.**

lower-than-expected growth in coal use could result in greater oil consumption, increasing our dependence on the volatile Persian Gulf region and raising the potential for a rise in oil prices. Furthermore, based on coal's price advantage, we believe existing OECD capacity to consume coal will probably be almost fully utilized. Conversions to coal or construction of new coal-fired facilities could require as much as several years' leadtime. As a result, excess coal productive capacity will be of little use in mitigating the effects of an oil supply disruption.

Figure 6 United States: Coal Exports, 1973-84



<sup>a</sup> Estimated.

303676 (C00326) 9-84 25X1

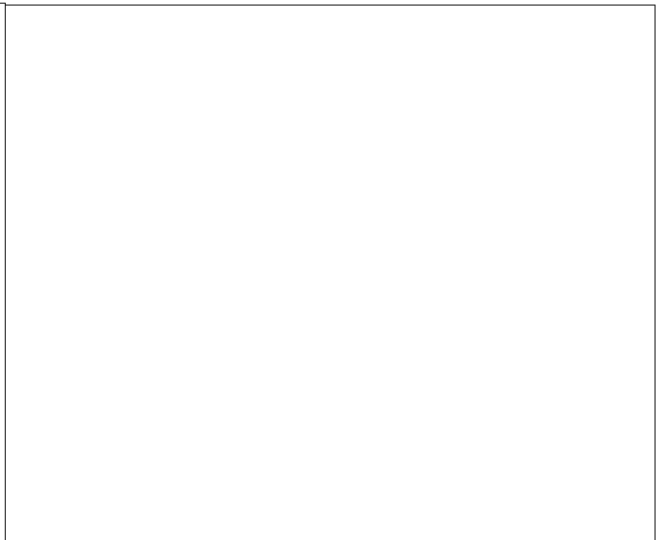
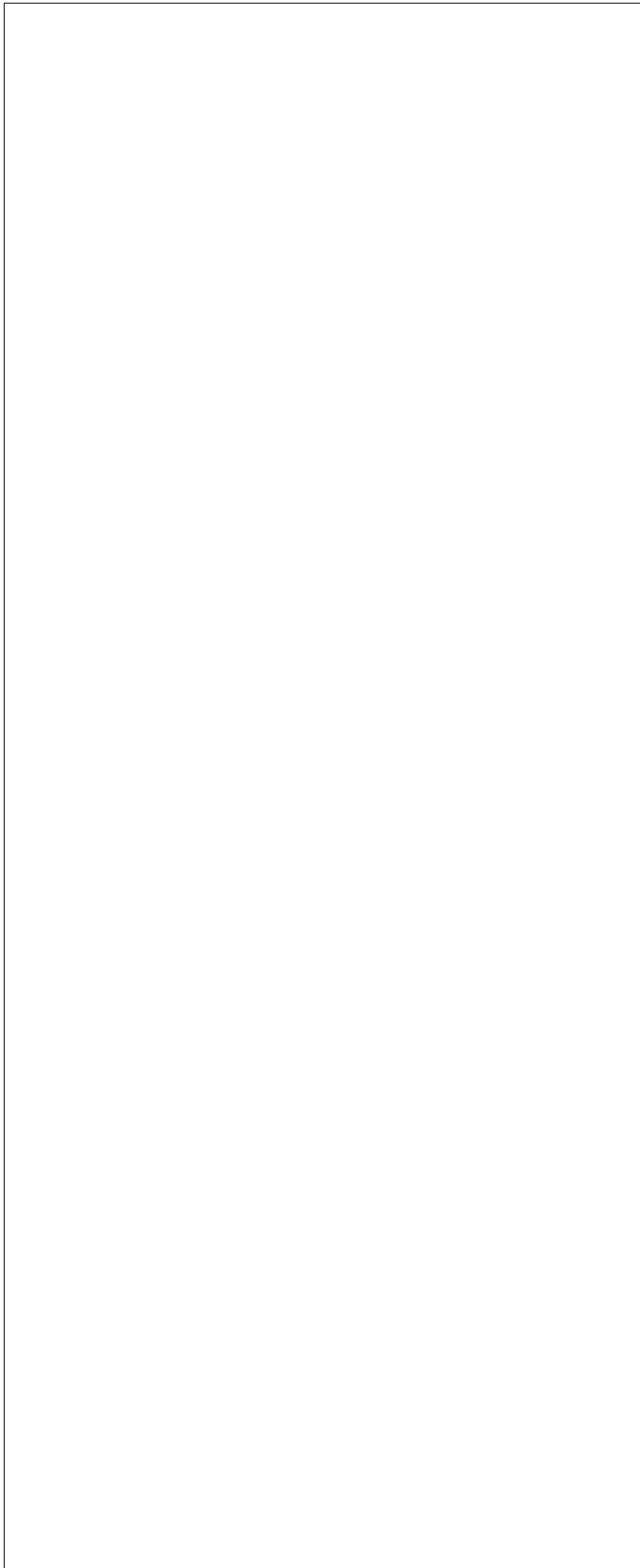
**West European Gas Security.** Failure to switch to coal, especially in the industrial sector, could require increased dependence on indigenous West European natural gas resources. Because of potential delays in developing North Sea gas deposits, diminished prospects for coal could further improve the likelihood for additional Soviet gas sales in the 1990s.

Although security concerns may not reemerge as a preeminent issue until the 1990s when the oil market tightens, failure to encourage coal use now could significantly restrict coal's future role in reducing OECD dependence on imported oil. Indeed, the current weakness of the international coal market, combined with lower expectations of future growth in trade during the 1980s, may not provide the necessary

25X1

25X1

**Page Denied**



confidence to sustain capital-intensive long-term investment in coal production and infrastructure facilities. Beyond 1990, most forecasts expect substantially more growth in coal consumption than during the 1980s as a result of a sharp slowdown in the growth of nuclear power and higher oil prices:

- West European coal demand is expected to increase by 60 million tons during the 1990s—roughly three times the growth in consumption during the remainder of the 1980s, [redacted] 25X1

- Tokyo expects coal consumption to increase by 56 million tons in the next decade, compared with an increase of 13 million tons between 1982-90. [redacted] 25X1

To meet expanded coal consumption in the next decade, [redacted] at least four new mines with 3-5 million tons of capacity per year will be required annually in the 1990s in the exporting countries. The environment in the coal industry over the next several years, however, will not be conducive to such investment because most producers will remain wary of overdevelopment. Some producers are currently selling coal at or below cost in a glutted market as a result of the earlier sharp expansion in productive capacity and present sluggish demand.

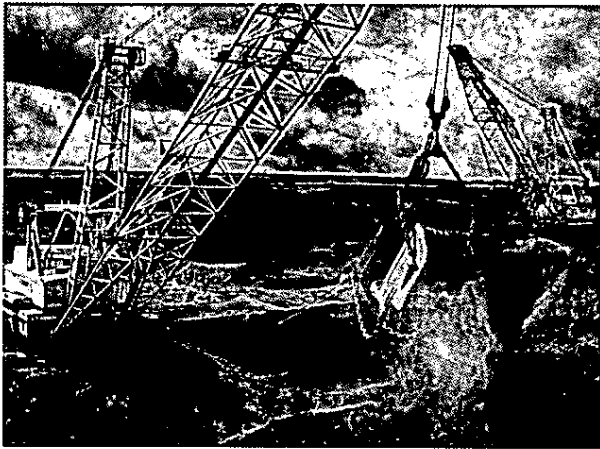


Figure 7. Capital-intensive surface mines are prone to price cutting in a weak market to retain volume. [redacted]

Although producers may continue to sell coal at or below marginal cost in an effort to cover high fixed costs, such practices will not generate the profits needed for large-scale investment in coal production and infrastructure to go ahead in a timely way. [redacted]

**Coal's Potential**

We believe coal has substantial potential to improve international energy security because of its ability to replace oil and natural gas—two fuels whose sources of supply have proved unreliable in some cases in recent years. Coal can be substituted for oil and gas in many areas of the industrial sector—the largest energy-consuming sector in the OECD—provided the economics of coal use can be made more attractive. Based on OECD estimates of potential consumption of 700 million tons of steam coal in the industrial sector by the year 2000, expanded industrial coal use could cut projected oil and gas requirements in industry by roughly 50 percent by the end of the century—saving nearly 7 million b/doe of oil and gas in OECD countries. In Western Europe, for example, more than half of the increase in gas use through the year 2000 is expected in the industrial sector, and we believe increased coal use could potentially supplant about one-fourth of projected industrial gas demand by the end of the century. [redacted]

To achieve enhanced coal use, OECD governments could take several steps, including:

- Providing incentives such as tax concessions or subsidies to industry to offset the high cost of converting facilities from oil and gas to coal.
- Promoting methods for the displacement of oil and gas by electricity and thus indirectly adding to coal use.
- Promoting research and development efforts and developing new technologies to burn coal more effectively and cleanly to meet growing environmental concerns. [redacted]

25X1

With the United States accounting for more than one-fourth of world coal reserves and ample US productive and port capacity, increased foreign imports of US coal could enhance international energy security. Measures to increase the potential for US coal exports, however, would require reducing the cost of US coal. According to a report prepared by the Department of Energy, the potential for price reductions on inland coal moving to export markets is substantial. Long-term contracts and equity investments would be necessary to realize maximum financial benefits for foreign purchasers:

25X1

- Long-term contracts encourage domestic companies to invest in cost-cutting facilities and equipment.
- Equity investments by purchasers support introduction of new technologies and infrastructure improvements while providing the buyer a direct return on investment. [redacted]

25X1

25X1

25X1

**Confidential**

11

11

**Confidential**