GOSPODARKA SUROWCAMI MINERALNYMI

Tom 18 2002 Zeszyt 4

ZBIGNIEW GRUDZIŃSKI*

World hard coal market

Key words

Hard coal, steam coal, coking coal, price indexes, coal deliveries

Abstract

The production of hard coal in the world in 2000 amounted to 3638.7 million tons, 27 million tons or 0.7% less than in the preceding year. The two prime main coal markets are the Asia-Pacific region and Europe. The imports of coal by the Asia-Pacific markets grew in 2000 by 10.5%, amounting to as much as 300 million tons. Beginning from 1980, the sea trade of the hard coal increased at the pace of some 8% annually, while the trade of the coking coal increased by 2.2%. The coal continues to occupy the top of the list of fuels for electrical energy generation. The power plants of the EU countries imported over 104 million tons in 2000. Also the growth of imports was reported, by 39% as compared with 1996 and by 45% in relation to 1991 data.

As reported by Coal Information 2001, the production of hard coal in the world in 2000 amounted to 3638.7 million tons, 27 million tons or 0.7% less than in the preceding year. This drop was chiefly due to the restructuring processes of the coal sector in China, France, Germany and Poland, but was also due to low prices of coal prevailing on the international markets at the end of the '90s, and even at the beginning of the year of 2000, which forced some producers to reduce the extraction level. However, over the period of the last 25 years, the production of coal has increased by 47%. The 10 world largest hard coal producers have been tabulated below (Table 1).

* Ph.D. Eng., Polish Academy of Sciences, Mineral and Energy Economy Research Institute, Kraków, Poland.

Reviewed by Ph.D. Eng. Urszula Lorenz

TABLE 1

The world largest hard coal producers in 2000

TABELA 1

Najwięksi producenci węgla kamiennego w roku 2000

Country	Production [mln Mg]
China	1 171
USA	899
India	310
Australia	238
South Africa	225
Russia	169
Poland	102
Ukraine	81
Indonesia	79
Kazakhstan	71

Source: www.wci-coal.com (World Coal Institute)

China has remained to be the world largest producer of hard coal for a number of years, but the production level was reduced in 2000 by as much as 67 million tons as a result of adjusting the production to the actual internal demand and the possibilities of selling the coal, including coal exports. Other countries, including Poland, reduced the production or even stopped extraction in the mines characteristic of the highest costs. The group of countries successively reducing the hard coal production includes the countries subsidizing their national mining industry, like Germany, France, Spain or Japan. This group was recently joined by the UK, where the mining industry, following the success of restructuring and reforms, started to bring profits, but due to low prices on the international markets, had to apply for the state aid in the form of subsidies in 2000.

The year of 2000 was also characteristic of the considerable drop of production of hard coal in the U.S. (by 16.9 million tons) and in Canada (by 27 million tons), the second dropping year in the U.S. and the third in Canada.

By contrast, the growth of production was reported in Russia (by 16.8 million tons), India (14.7 million tons), Kazakhstan (by 14.5 million tons), Australia (by 14.4 million tons) and Indonesia (by 6.6 million tons). Lower levels of growth were reported from Columbia (by 4.4 million tons), Venezuela (by 1.9 million tons), South Africa (by 1.8 million tons) and from Czech Republic (0.6 million tons).

In spite of the drop of the global production, the international trade of coal had faced the biggest increase of turnover expressed in terms of the natural units since 1978, and the largest percentage increase since 1995. The approximate value of hard coal turnover on the world markets in the year of 2000 amounted to 573 million tons, 53 million tons more than in 1999.

The international trade of hard coal in the recent years has been as presented in Table 2.

TABLE 2

Hard coal international trade [million tons]

TABELA 2

Międzynarodowy handel węglem kamiennym [mln ton]

Year	Steam coal	Coking coal	Total
1991	225	179	404
1996	294	194	488
2000	381	192	573

Source: International Energy Agency (according to www.wci-coal.com))

The two prime hard coal markets are the Asia-Pacific region, Europe and the Mediterranean Basin. The imports of hard coal into the Asia-Pacific region markets increased by 10.5% in the year of 2000, amounting to 300 million tons, while the imports to Europe and to African countries located on the Mediterranean Sea, and imports to the Middle East increased by 14.8 %, amounting to 226 million tons.

Since 1980, the steam coal sea trade has increased at the pace of 8% annually, while the coking coal sea trade has reported the growth of 2.2% per year. The development of the sea trade of coal has been presented in the specification provided in the Table 3.

For years, Australia has continued to be the biggest world hard coal exporter (187 million tons, the growth by 8.8%), while China reports the largest increase of exports volume, by 17.6 million tones, thereby occupying the fourth position on the list of the world largest hard coal exporters, before the U.S.. South Africa Republic, Columbia, Kazakhstan and Russia has also

TABLE 3

Hard coal sea trade [million tons]

TABELA 3

Morski handel węglem kamiennym [mln ton]

Year	Steam coal		Coking coal	
	Atlantic Ocean	Pacific Ocean	Atlantic Ocean	Pacific Ocean
1980	59	14	47	70
1990	93	87	70	95
1996	118	149	68	105
2000	150	193	68	111

Source: SSY Consultancy and Research (according to WCI Ecoal, vol. 40) significantly increased the exports volumes. Currently, Columbia occupies the sixth position on the list of the world largest hard coal exporters, thereby causing Canada to lose this position. The total exports of American hard coal in the year of 2000 continued to be at the same level as in the preceding year, while exports from Poland and Canada were reduced by 0.4 and 1.8 million tons, respectively.

The exports of steam coal increased more significantly than coking coal, and amounted to 381 million tons, out of which 348 million tons were transported by sea. By contrast, the exports of coking coal amounted to 192.4 million tons (including 180 million tones transported by sea)

Australia, with the production of 87.8 million tons of steam coal and South Africa, exporting 67.5 million tons, are the most important exporters, delivering respectively 23% and 18% of coal into the markets all over the world. The third position is occupied by China, which superseded Indonesia in 2000.

Australia is also the world largest exporter of coking coal (99 million tons), before the United States of America (28.4 million tons), with shares 51% and 15%, respectively, while the third position is occupied by Canada (27.2 million tones and 14% of the market share). Table 4 presents the leading exporters of hard coal in 2000, while Table 5 shows the leading importers of hard coal.

As reported by Coal Information 2001, the 10 world largest coal companies produced in 2000 more than 23% (i.e. about 852 million tons) of global hard coal production. The specification of the world largest coal companies is provided in Table 6.

The name of the countries provided should be treated only for information purposes, as these are the international concerns, controlling the production of coal in a number of countries exporting coal. For example, in South Africa, Billiton, Anglo (formerly known as Amcoal), Glencore and Sasol produce 87% of coal extracted in this country. In the U.S., Peabody, Arch,

TABLE 4

Leading exporters of hard coal in 2000 [million tons]

TABELA 4

Główni eksporterzy węgla w roku 2000 [mln ton]

Country	Steam coal	Coking coal
Australia	87.8	99.0
South Africa	67.5	2.5
Indonesia	48.1	8.7
China	48.2	6.9
USA	24.6	28.4
Columbia	34.0	0.5
Russia	27.0	7.3
Canada	4.6	27.2
Poland	18.0	5.8

Source: www.wci-coal.com (World Coal Institute)

TABLE 5

Leading importers of hard coal in 2000 [million tons]

TABELA 5

Główni importerzy węgla w roku 2000 [mln ton]

Country	Steam coal	Coking coal
Japan	80.6	64.7
South Korea	42.8	18.9
Taiwan	39.3	6.1
India	9.1	15.4
Great Britain	15.0	8.5
EU15 total *	122.0	45.0

* For the EU countries (EU 15), approximate data.
Source: : www.wci-coal.com (World Coal Institute)

TABLE 6

The world largest coal companies in 2000 [million tons]

TABELA 6

Największe kompanie węglowe w 2000 roku [mln ton]

Company	Production level	Exports
Peabody (USA)	176.1	10.5
Rio Tinto (UK)	132.0	25.4
Arch Coal (USA)	106.3	4.0
RAG (Germany)	97.0	7.0
Billiton (UK)	68.6	34.0
Anglo Coal (UK)	64.8	23.1
Consol (USA)	63.1	9.0
BHP (Australia)	54.1	35.0
Sasol Mining (South Africa)	50.9	3.5
Glencore (China)	39.1	31.0
Total	852.0	182.5

Source: Coal Information 2001

Rio Tinto, BHP, RAG and Consol control 51% of the production. By comparison, the 10 companies mentioned control 46% of coal production in Australia. The corresponding shares for Columbia, Venezuela and Indonesia amount to 41%, 31% and 25%. Following the biggest merger in the mining industry, i.e. the merger of BHP and Billiton, as a result of which a single organization under the name of BHP Billiton was established, this company occupies the leading position in the exports of coal in the world.

Figure 1 shows the comparison of the prices of steam coal on two coal main markets, i.e. on the European market and Asian market, according to the data of International Coal Report (ICR). The price indexes presented reflect the current situation with regard to the prices of coal. The prices provided are the CIF prices of coal, with calorific value of 6000 kcal/kg NAR. From September 99 to November 2000, the coal prices continued their dramatic increase, to achieve the maximum in November 2000. For the period of 13 months, the prices increased by 43%. The level achieved by the prices of the coal at the end of 2000 had been the biggest price level since 1991, i.e. since when the price index has been recognized and determined. Over the entire period, the prices changed almost identically on these markets, the prices in Asia being lower by some three USD per Mg. The price differences on these two markets chiefly arise from lower cost of coal transportation into the Asian markets as a result of lower distances between the coal suppliers and recipients.

The coal continues to occupy the top of the list of fuels for electricity. Although the share of coal in primary energy consumption reduced slightly, its significance in electricity production increased (38.1% in 1999 as compared with 36% reported in 1997).

The shares of individual sources of energy in the consumption of primary energy and electrical energy generation in 1999 have been presented in the specification provided in Table 7.

The countries where the electrical energy generation in 2000 was based mostly on hard and brown coal have been presented in Table 8.

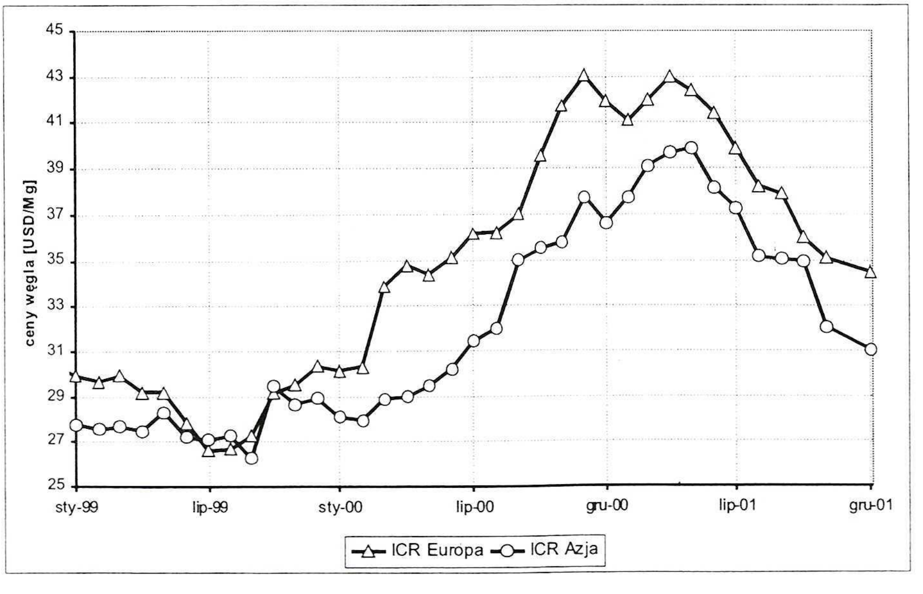

Fig. 1. Comparison of steam coal prices on the European and Asian markets
Source: Coal Week International, International Coal Report

Rys. 1. Porównanie cen węgla energetycznego na rynku europejskim i azjatyckim

TABLE 7

The shares of individual sources of energy in the consumption of primary energy and electrical energy generation in 1999

TABELA 7

Udziały poszczególnych źródeł energii w zużyciu energii pierwotnej oraz w wytwarzaniu energii elektrycznej w 1999 r.

Source	Primary energy consumption	Electrical energy generation
Coal	23.5%	38.1%
Crude oil	35.0%	8.5%
Natural gas	20.7%	17.1%
Nuclear energy	6.8%	17.2%
Water energy	2.3%	17.5%
Biomass and waste combustion	11.1%	
Other	0.6%*	1.6%**

* Other includes: geothermal energy, solar energy, energy of wind, etc.
** Other includes: solar, wind and geothermal energy, biomass and waste combustion.
Source: International Energy Agency Key World Statistics 2001 Addition (provided by Work Coal Institute, Ecoal, vol. 40)

TABLE 8

The share of coal in the electrical energy generation

TABELA 8

Udział węgla w produkcji energii elektrycznej

Country	%	Country	%	Country	%
Poland	96	Czech Republic	71	Denmark	52
South Africa	90	Greece	69	Germany	51
Australia	84	India	66	The Netherlands	42
China	80	USA	56	EU15	25

Source: BP, IEA, SSY& others — provided as per WCI Ecoal, vol. 40

Steam coal in the deliveries for use in power industry in the European Union

The consumption of primary energy in the EU countries in the year of 2000 amounted to 2.1 billion tce, out of which 14%, or 310 million tons originated from solid fuels, including brown coal.

The structure of consumption of primary energy per fuel kind was as follows [%]:
— crude oil and products — 41,
— natural gas — 24,
— nuclear energy — 15,
— hard coal — 11,
— brown coal — 3,
— other — 6.

Hard coal constituted some 238 million tce, out of which 152 million tce originated from imports, while 86 million tce from the EU extraction level. By comparison, the brown coal constituted some 72 million tce.

Assuming that no significant changes are expected to occur in the relations of prices of primary energy carriers, the production of hard coal in the EU countries will be as shown in the Table 9.

TABLE 9

The outlook for hard coal production in the EU countries [million Mg]

TABELA 9

Prognoza produkcji węgla kamiennego w Unii Europejskiej [mln Mg]

Country	2000	2010	2020
Germany	37	18	0
France	4	0	0
UK	30	20	10
Spain	15	8	0
Total	86	46	10

Source: Outlook for important coal consumption in the EU, World Coal, October 2001

The specification provided in table 9 covers the aggregated production of steam and coking coal, the extraction of coking coal in the EU countries being subject to treatment as the slight importance issue for the following reasons:

— Spain and the UK do not extract coking coal;

— the currently lower level of coking coal extraction in Germany and France will be further reduced following the global trend of coking coal production reduction;

— by 2005, France is expected to finish extraction, thereby only Germany, with extraction of a few million tons of coking coal, will continue the coking coal production (the mines of coking coal characteristic of the best quality parameters, located in the Rurh Basin are in the process of closing).

As mentioned before, the EU countries, occupying the share of 40%, are the second-largest, after East Asia (50%) region of imports of hard steam coal. The data regarding the imports volumes, suppliers and recipients are available going to the monitoring system, introduced in the year of 1977 (in the year of 1985, the decision was extended to the reguirements of providing the information also of the country of supplies origin), based upon the Directive of the European Commission (Directive No. 77/707/ECSC and No. 85/161/ECSC). The monitoring question covers the deliveries of coal for the purposes of power industry in the EU countries per quarter (The Market...).

Power plants the EU countries imported more than 104 million tons of coal from third countries in the year of 2000. Also the growth of imports was reported, by 39% as compared with 1996 and by 45% with relation to 1991 data. This growth was chiefly due to the reduction of extraction levels in the EU countries, as well as the increased demand for electrical energy.

The fluctuations with regard to demand for coal also arise from the changes of economic growth rate, the competition on the side of nuclear energy and hydraulic energy, weather conditions, and above all, the growing application of the gas in the power industry. All these factors exert pressure on the prices of coal on the international markets. The prices presented in Table 10 are the cif prices, free-at-frontier, and are average prices from short-term and long-term contracts.

Three countries are leading suppliers of steam coal for the purposes of EU power plants: South Africa, Columbia, and Poland. The deliveries of coal from these countries cover nearly 70% of demand for imported coal. At the beginning of the '90s, the U.S. was one of the leading

TABLE 10

Suppliers of steam coal for purposes of EU power plants [thousand tons per year]

TABELA 10

Dostawcy węgla energetycznego do elektrowni w UE [tys. ton/rok]

Exporter	1991	1996	2000
South Africa	15 378	23 970	37 928
Columbia	10 204	12 817	20 772
Poland	3 722	8 457	15 770
Indonesia	467	2 827	7 101
Former Soviet Union	2 007	1 548	6 803
Australia	9 774	2 369	5 483
USA	26 384	18 433	5 061
China	1 726	*	884
Venezuela	436	839	*
Other countries	1 712	3 468	4 344
Total	**71 810**	**74 728**	**104 146**
Prices [USD/tpu]	52.0	48.6	37.8
Q [MJ/kg]	26.6	25.8	25.5

* Deliveries from this country may be included in the "other countries" position.

coal suppliers, the exports of which satisfied over 36% of demand, alongside Australia reporting the 14% share. The U.S. have faced the considerable drop of exports, (into the EU) down to 5 million tons in 2000 since 1991. This is a result of the highest prices for this coal and the growing competition from new exporters (Indonesia, Venezuela, former Soviet Union) and also the growth of exports to the European markets by the traditional coal exporters (South Africa, Columbia). Australia, after the drop of exports prevailing until 1996 (3.2% of shares), continues to systematically increase the shares in the European markets, and has now exceeded the level of 5%.

Table 11 presents the importance of steam coal, consumed by power industry, broken down into individual EU countries. The biggest importers of coal in 2000 include Spain, the Netherlands, the UK and Germany. The deliveries of coal to these three countries cover more than 63% of the total imports. With relation to 1991 data, only four countries managed to reduce the level of imports, notably France (by 11%), Belgium (by 15%), Denmark (by 24%) and Italy (by 29%). By contrast, the imports of coal to Ireland maintain the same level, but the biggest growth of imports as compared with 1996 data could be seen with regard to Spain (by as much as 290%), Finland (by 130%), the UK (by 91%) and the Netherlands (by 68%). The EU countries that stopped imports of coal include Sweden, Luxembourg and Greece, the latter stopped coal imports in 1993. The changes to the coal imports volumes are strictly related to the changes

TABLE 11

The imports of steam coal from third parties countries to EU [thousand tons per year]

TABELA 11

Import węgla energetycznego z krajów trzecich do krajów UE [tys. ton/rok]

Importer	1991	1996	2000
Spain	5 292	6 407	20 664
The Netherlands	10 766	11 584	18 063
The UK	7 612	6 863	14 540
Germany	8 431	10 776	12 794
France	8 694	4 035	7 757
Italy	9 854	7 620	6 843
Denmark	11 833	12 549	6 463
Finland*		2 265	5 200
Portugal	2 984	4 996	4 604
Belgium	4 468	4 678	3 903
Ireland	1 876	2 212	2 038
Austria*		746	1 277
Total**	**71 810**	**74 728**	**104 146**

* Member of EU since 1995.

** Covers the imports to all EU countries.

to the extraction of the coal available domestically. The extraction in most EU countries has almost disappeared completely, with only four countries continuing coal production (Germany, the UK, Spain and France), but this will also be subject to reductions as shown in Table 9 (The Market ...).

When the electrical energy generation in the EU countries is considered, natural gas is the biggest competitor of coal, and wins this competition owing to ecological reasons. The factors that may have influence on the volume of imports of steam coal to Europe are expected to include the volume and the rate of drop of extraction of national resources, and the extent to which the coal can be replaced by gas and other energy carriers in the electricity energy generation.

Summary

1. The production of hard coal in the world in 2000 amounted to 3638.7 million tons, 27 million tons or 0.7% less than in the preceding year. However, for the period of 25 years, the production of coal increased by 47%.

2. In spite of the global production drop, the biggest increase of turnover since 1978 had occurred. The hard coal turnover volumes on the international markets in 2000 amounted to 573 million tons, 53 million tons more than in 1999.

3. The two main hard coal markets are the Asia-Pacific region and Europe and Mediterranean Basin. The EU countries, with steam coal imports share of 40% is the second largest importer, after East Asia (50%).

4. Since 1980, the sea trade of the hard coal increased at the pace of some 8% annually, while the trade of the coking coal increased by 2.2%.

5. The coal continues to occupy the top of the list of energy carriers for electrical energy generation. Although the share of coal reduced slightly, its significance as a fuel for electrical energy production increased (38.1% in 1999 as compared with 36% reported in 1997).

6. The consumption of primary energy in the EU countries in 2000 amounted to 2.1 billion tce, of which 14%, or 310 million tons, came from solid fuels, including brown coal.

7. The power plants of the EU countries imported over 104 million tons in 2000. Also the growth of imports was reported, by 39% as compared with 1996 and by 45% with relation to 1991 data.

When the electrical energy generation in the EU countries is considered, natural gas is the biggest competitor of coal, and wins this competition owing to ecological reasons. The factors that may have influence the volume of imports of steam coal to Europe are expected to include the volume of domestic production and the rate of drop of extraction of national resources, and the extent to which the coal can be replaced by gas and other energy carriers in the electrical energy generation.

REFERENCES

Coal Facts. World Coal Institute, October 2001.

Coal Information 2001 (with 2000 date), International Energy Agency.

Coal Week International, vol. 1999 – 2001. Wyd. Platts a Division of the Mc Graw Hill Companies.

Ecoal — the newsletter of the World Coal Institute, wol. 40 (December 2001 r.)

Grudziński Z., 2002 — Wskaźnik cen węgla energetycznego dla rynku europejskiego. XVI Konferencja z cyklu „Zagadnienia surowców energetycznych i energii w gospodarce krajowej". Zakopane, 6—9 października 2002. Sympozja i Konferencje nr 57, Wyd. IGSMiE PAN, Kraków, s. 267—277.

International Coal Report (ICR) — News and analysis of the coal industry worldwide, Issue 535—542, 2001; Issue 1999—2001. Wyd. Platts a Division of the Mc Graw Hill Companies.

Lorenz U., 2001 — Ceny węgla energetycznego w imporcie do krajów Unii Europejskiej oraz w hipotetycznym imporcie do Polski — porównanie parytetów importowych. Przegląd Górniczy nr 1, s. 17—25.

Lorenz U., 2001 — Węgiel energetyczny na rynkach międzynarodowych w latach 1995—1999. Konferencja Naukowa nt.: „Paliwa i energia dziś i jutro", Kraków 12—13 czerwca 2001, Wyd. IGSMiE PAN, s. 83—96.

Lorenz U., Grudziński Z., 2001 — Czynniki wpływające na ceny surowców energetycznych. Polityka Energetyczna t. 4, z. 2, Wyd. IGSMiE PAN, Kraków, s. 63—76.

Lorenz U., Ozga-Blaschke U., 2001 — Ceny węgla na rynkach międzynarodowych w latach 1995—2001. Przegląd Górniczy nr 10, Wyd. ZG SITG, Katowice, s. 34—40.

Mokrzycki E., 2001 — Ceny węgla energetycznego oferowanego w latach 1990—1999 w portach głównych eksporterów. Studia, Rozprawy, Monografie nr 87, Wyd. IGSMiE PAN, Kraków, 164 s.

Mokrzycki E., 2001 — Ceny węgla koksowego oferowanego w latach 1990—1999 w portach głównych eksporterów. Studia, Rozprawy, Monografie nr 94, Wyd. IGSMiE PAN, Kraków 2001, 133 s.

Ozga-Blaschke U., 2001 — Światowy rynek węgla koksowego w latach 1995—2000. Konferencja Naukowa nt.: „Paliwa i energia dziś i jutro", Kraków 12—13 czerwca 2001, Wyd. IGSMiE PAN, s. 97—106.

Ozga-Blaschke U., Nycz R., 2001 — Węgiel koksowy na rynkach międzynarodowych. Karbo nr 10/2001. Wydawnictwo Górnicze, Katowice 2001, s. 341—345.

The Market for Solid Fuels in the community in 2000 and the outlook for 2001. Report from the Commission of the European Communities, Bruksela, 19.12.2001, SEC(2001) 1605 final.

World Coal vol. 10 No.12, vol. 11 No1, wyd. Palladian Publications Ltd. UK.

ZBIGNIEW GRUDZIŃSKI

WĘGIEL KAMIENNY NA RYNKU ŚWIATOWYM

Słowa kluczowe

Węgiel kamienny, węgiel energetyczny, węgiel koksowy, wskaźniki cen, dostawy węgla

Streszczenie

Produkcja węgla kamiennego w świecie w 2000 roku wyniosła 3638,7 mln ton i była niższa niż w roku poprzednim o około 27 mln ton (0,7%). Dwa podstawowe rynki węgla kamiennego to region Azji i Pacyfiku oraz Europa. Import węgla na rynki Azji i Pacyfiku wzrósł w 2000 roku o 10,5% i osiągnął poziom 300 mln ton. Począwszy od roku 1980 morski handel węglem energetycznym wzrastał w tempie około 8% rocznie, a węglem koksowym — 2,2%. Węgiel w dalszym ciągu zajmuje czołowe miejsce wśród surowców do wytwarzania energii elektrycznej. Chociaż udział węgla w strukturze zużycia energii pierwotnej zmniejszył się nieco, to wzrosło jego znaczenie jako surowca do produkcji energii elektrycznej (38,1% w roku 1999 w stosunku do 36% w roku 1997). Elektrownic krajów Unii Europejskiej zaimportowały w 2000 roku ponad 104 mln ton węgla. Zanotowano wzrost importu o około 39% w stosunku do 1996 r. i około 45% w stosunku do roku 1991.