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Notice to members

Outline of the energy situation in Eastern Europe (CMEA countries)

(drawn up by the Directorate-General for Research)

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OUTLINE OF THE ENERGY SITUATION IN EASTERN EUROPE (CMEA COUNTRIES)

A. INTRODUCTION

This paper outlines the energy situation in Eastern Europe or, more specifically, in individual countries of the Council for Mutual Economic Assistance (CMEA), i.e. the USSR, the GDR, Hungary, Czechoslovakia and Poland.

In view of the short time available for the drafting of the paper and as obtaining the basic information was very time-consuming, the following overview has been kept very brief. Section B contains a short overview, a summary description of the electricity sector in the CMEA being given in view of the transfrontier nature of the grid and the similarity of trends in the CMEA countries. The energy situation in the aforementioned CMEA countries is then briefly described.

Most of the statistics contained in the annex have been obtained from the Federal Agency for Foreign Trade Information (BfAI) in Cologne, to which we are grateful for the speed and unbureaucratic way in which it forwarded a wide range of information. The following statements are also very largely based on information provided by the BfAI.

B. OUTLINE OF THE ENERGY SITUATION

I. GENERAL OVERVIEW

1. The energy situation in general

The energy sector in Eastern Europe, or the CMEA countries, is characterized by trade in energy (main suppliers: the USSR for oil and natural gas and Poland for hard coal) and an interconnected electricity supply system. The energy situation in the individual countries and their purchases and supplies are discussed in the following country descriptions.

Reference must be made at this stage, however, to the sometimes very strained energy situation in certain CMEA countries during peak consumption periods (winter, etc.), when output (open-cast brown coal mining, etc.) is also particularly low. The energy bottlenecks which then occur (e.g. in the GDR and Poland) have frequently resulted in very severe restrictions on production in the industrial sector or in drastic compulsory measures to reduce consumption by private households.

International comparisons are often based on the rule of thumb that per capita energy consumption is closely correlated with a country's "wealth" (however measured) or economic strength. This yardstick must on no account be applied in an assessment of the energy situation in the CMEA countries. The very high level of per capita energy consumption in the CMEA countries in relation their economic strength is in fact a clear sign of the inefficiency of economic planning in the CMEA countries.

2. Overview of the electricity sector in the CMEA

This lack of efficiency in the energy sector and the few clear efforts made to conserve energy are particularly apparent in the electricity sector. Power stations are outdated and pathetically inefficient. Energy losses occur in the grid on a scale that has been inconceivable in western coun-

tries for decades. This again shows what can happen when central economic planning leads to excessive concentration on production volumes, with too little account taken in the economic calculations of the consumption of resources needed for output.

These resources also include the environment. It would appear that the attitude towards the environment in the East is even more nonchalant, profligate and neglectful than in the western economic system. This is particularly apparent in the electricity sector, as the high levels of harmful emissions by hard- and brown-coal-fired power stations, for example, in Poland, Czechoslovakia and the GDR and the other CMEA countries demonstrate. This neglect of environmental aspects is partly due to the fact that the electricity industry is a particularly serious bottleneck in the Eastern Bloc.

The electricity sector is further unsettled by a continuing debate on the advantages and disadvantages of nuclear power, which began in Eastern Europe, as elsewhere, after the Chernobyl accident in 1986, although it has been heavily suppressed in some cases. It can nonetheless be said that - according to official statements at least - the electricity or energy sector in the CMEA countries is still depending on nuclear power to be an essential factor in the generation of electricity. True to Lenin's programmatic remark that[1] communism equals electrification and Soviet power, great efforts have been made in all the Socialist countries to electrify the economy. Although the supply of electricity, as of all other inputs, has always been strained, it did not seriously hamper production until the mid-1980s. From 1985 to 1987, however, the electricity supply situation in Eastern Europe (Bulgaria, GDR, Poland, Romania, Czechoslovakia and Hungary) became critical. Adverse effects on the economy were alleviated only through additional purchases from the Soviet Union and, in 1987, even from Austria. All the European CMEA countries (Eastern Europe and the Soviet Union) are planning to make great efforts to build new power station and especially nuclear power station capacities. At the same time, economic development (growth and structural change) is stimulating the growth of electricity consumption.

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1 For the following see Hubert Gabrisch, Die Elektrizitätswirtschaft des RGW bis zum Jahre 2020, in: Südosteuropa, Vol. 37, No. 5/1988, pp. 181-205.

A general assessment of the energy sector in the Eastern Bloc reveals[2] that power station capacity has risen more steeply than electricity production in all the European member countries of the CMEA except the GDR in the 1980s. Despite this, electricity supply in most CMEA countries has continued to be a constraint. Restrictions on electricity consumption have been imposed particularly in Romania, Bulgaria, Poland and even the GDR. Electricity production has been disrupted primarily because the older power stations are prone to break down and fuel supplies to the coal-fired power stations have frequently been interrupted. In an assessment of the supply bottlenecks, however, it should be borne in mind that, because of the system, demand for electricity is excessive in almost all the CMEA countries.

A clear picture of the development of the electricity sector in the CMEA is provided by the tables included in Section I of the Annex. They show that:

- Power station capacity has been significantly increased in all the CMEA countries in the last ten years (see Table I.1.).

- In the Eastern Bloc too, most countries are relying more heavily on nuclear power. Only Poland and Romania do not yet have nuclear power stations. In 1987 nuclear power accounted for between about 11% of the electricity generated in the USSR and the GDR and very high levels in Czechoslovakia (26%), Bulgaria (30%) and Hungary (36.9%) (see Table I.2.).

- Electricity production and electricity consumption have risen significantly in all the CMEA countries in recent years (see Tables I.3. and I.4.).

- Average per capita consumption in the CMEA (seven countries: Bulgaria, Czechoslovakia, GDR, Hungary, Poland, Romania and USSR) is approximately the same as in the European Community (EC 10), the CMEA average in 1983 being 5 460 kWh per capita compared with the Community (EC 10) average in 1987 of 5 480 kWh. The average elasticity of electricity in relation to

2 For the following see Die Stromwirtschaft im RGW: Trotz Kapazitätserweiterung bleibt Versorgung angespannt, in: DIW-Wochenbericht, No 36/1988, 8 September 1988, pp. 478-487.

national income[3] in the CMEA is also well above 1 (namely 1.1), whereas the average in the Community is well below 1 (see Table I.5.).

- Apart from the USSR and Poland, the CMEA countries are not completely self-sufficient in electricity. However, the level of self-sufficiency in the CMEA countries other than the USSR is relatively high (averaging 95%) (see Table I.6.). The smaller CMEA countries largely obtain their net imports of electricity from the USSR, a net exporter (see Table I.7.).

In an attempt at a medium-term forecast the essential features of the CMEA countries' electricity policies until the year 2000 can be described as follows[4]:

- A continued sharp rise in electricity consumption, by an annual average of 3% in the smaller CMEA countries.
- Priority given to nuclear energy. In the smaller CMEA countries nuclear power station capacity is to be increased from 10 000 MW today to 50 000 MW by the turn of the century. This is intended to meet 30 to 40% of demand.
- The utilization of indigenous resources, especially low-calory brown coal and non-conventional (renewable) energy sources, is to be stepped up. The use of heating oil to generate electricity, on the other hand, is to be restricted.

Considerable difficulties are likely to be encountered in the implementation of this concept. In particular, it is highly improbable that the plans for the expansion of nuclear energy will be implemented. In the USSR appropriate conclusions have already been drawn from the constant delays: the plans have been corrected downwards. Unlike the USSR, however, the smaller CMEA countries have very limited opportunities for constructing coal-fired power stations because the quality of their coal is steadily declining and production costs are rising. An added factor is the already

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3 average annual growth of gross domestic electricity consumption related to average annual growth of national income

4 See DIW-Wochenbericht No 36/1988, pp. 486 f.

serious emission problem, solving which will tie up considerable finar resources in the coming years. Furthermore, the power stations built in the 1950s and 1960s are in need of modernization (currently being undertaken in the GDR), or they must be closed down. Electricity supplies will therefore continue to be a constraint on economic development in the CMEA for the foreseeable future.

The GDR has already reacted to this situation and agreed to buy electricity from the Federal Republic. This example can be followed on a wide scale: in the foreseeable future the opportunities for East-West cooperation in the electricity sector should be seen not in the purchase of electricity from the CMEA but in supplies from the West. This might be linked to cooperation in the modernization of power stations.

In view of the high level of consumption in the CMEA, however, there is an urgent need for progress in electricity conservation. This presupposes increased material incentives to ensure the introduction of electricity-saving innovations. It may also be encouraged, however, by an expansion of East-West cooperation in this field. Closer direct relations between production plants in the CMEA countries and the West would facilitate cooperation. The success of the economic reforms that are planned or have begun in most CMEA countries will therefore also determine whether fresh impulses are provided for East-West cooperation in the electricity sector.

II. USSR[5]

1. General energy policy concept

The USSR pursues a policy of self-sufficiency in energy. To this end, it is relying primarily on nuclear energy for the future, despite the accident at Chernobyl in 1986.

5 For the following description see BfAI, UdSSR, Energiewirtschaft 1986, Cologne, February 1988.

The targets set in the Five-Year Plan for 1986-1990 are very ambitious. Primary energy production is to grow by an average of almost 4% p.a. High growth rates are envisaged for natural gas and hard coal production and particularly for the generation of nuclear energy.

This policy commits extensive capital resources to the energy sector. The fuel industries currently account for about a quarter of all investments, and this is due to rise until 1990.

In energy sector planning the underlying principle is still that the supply of energy must be adjusted to existing demand. Energy conservation is therefore gaining ground very slowly - so slowly in fact that it is hardly reflected in the statistics. Low energy prices, in some cases irrespective of consumption, encourage waste. Electricity is usually invoiced at a flat rate because virtually no meters have been installed to measure individual consumption.

2. Regional problems

There are regional as well as structural development problems with all fossil energy sources. The development of new reserves requires costly investment and the solution of numerous technical problems, since most are located in parts of the country where climatic conditions are severe and communications difficult. Output in the traditional production areas can be increased only if new and expensive technology is introduced. Development also entails high capital expenditure on the construction of transport facilities (pipelines, high-tension lines) from the sources of energy in the East and North of the country to the main centres of consumption in the Urals and the European part of the USSR. Long-term plans therefore exclude the location of further energy-intensive industries in the European industrial centres. Instead, they are to be installed, whenever possible, in the immediate vicinity of the energy reserves yet to be developed in Siberia, Kazakhstan and east of the Caspian Sea. The still growing demand for energy in the European part of the country is to be met with nuclear and hydroelectric power and with increasing supplies from the East and

North (e.g. through five new gas pipelines from Urengoy, to be joined by pipelines from Yamburg under the next Five-Year Plan, and ultra-high-tension lines from Eikibastus).

The aim of restructuring in the energy industry is to enable, firstly, such conventional energy sources as oil and gas to be conserved so that they can be used to meet the growing requirements of the petrochemical industry and as the largest earner of foreign exchange in trade with the West and other CMEA countries, and secondly, regional disparities to be overcome. At present, some 80% of conventional energy sources is produced east of the Urals, while 80% of the energy is consumed in the European part of the country.

The "Pricaspian oil and natural gas complex" regional programme with which a committee of experts headed by the economist Aganbegyan is pressing ahead has yet to be included in the annual plans of principal investments.

3. Trends

(a) Energy production

According to the Statistical Yearbook for 1986, the USSR produced a total of 2 293.1m tce of primary energy in 1986 (1 tce = 7 000 kcal), 90.3m tonnes or 4.1% more than in 1985 (2 202.8m tce). This growth rate is the highest so far in the 1980s. It easily exceeds both the annual rate of increase of 3.5% targeted in the 12th Five-Year Plan and the annual average of 2.5% achieved from 1981 to 1985 (see Table II in the Annex).

The question is, however, whether these official figures are not too high. The following factors indicate that the growth rate was lower than the official figure: the targets set for the construction and commissioning of new power station capacities in 1986 were not achieved. The Chernobyl reactor disaster, the failure to commission new nuclear power station units at Kalinin, Saporoshye and Rovno on schedule and the accident at the

Mingechaur power station in Azerbaijan (in late 1986) have resulted in numerous regional electricity supply bottlenecks. Not only the nuclear but also the hydroelectric power stations failed to meet the Plan targets for 1986. 1986 was to have been the first year in which these two types of power stations accounted for over 50% of total growth in electricity generation. This target was seen as an important qualitative change in the Soviet energy balance.

Despite the protestations that the nuclear programme will continue unabated even after Chernobyl, the plans for the expansion of the energy sector in 1986-1990 are hardly likely to endure for long. Although the Minister for Energy and Electrification, A.I. Mayorez, was still predicting at the 27th Congress of the Soviet Communist Party held in the spring of 1986 that gross power station output would be increased by 10 000 MW by the end of 1986, not more than 5 000 to 6 000 MW of capacity appears to have been added because of delays in construction work.

The credit side of the energy balance can therefore be summarized as follows: on the whole, the Soviet energy industry did better in 1986 than in the first half of the 1980s. Something of a 'Gorbachev effect' can be discerned in the mobilization of reserves, and especially in the significant increase in oil and hard coal production. The rate of growth in the production of primary energy, on the other hand, was - possibly well - below the official figures contained in the energy balance published in 1987, most of the problems being connected with the expansion of nuclear power and with the hydroelectric power stations.

(b) Domestic consumption

According to the Statistical Yearbook published in 1987, 1 910.4m tce of primary energy was consumed in the USSR in 1986. The same source reveals that consumption in 1985 amounted to 1 879.5m tonnes and that, at 30.9m tce (+ 1.64%), the increase in 1986 was extremely small (see Table II in the Annex).

III. GDR[6]

For reasons of political security the GDR began developing an energy supply system of its own in the early 1950s, despite the high costs involved. To this day almost a third of the capital resources available in the GDR's industry is spent on the energy sector. It is only since the early 1970s that imports of energy sources, principally from the USSR, have made an additional contribution to energy supplies. In view of the worldwide increase in the prices of energy raw materials in 1973/74, efforts to conserve energy were stepped up in the late 1970s, and a number of erroneous structural policy decisions taken earlier were corrected.

Since then, the GDR government has rediscovered domestic brown coal as the country's most important source of primary energy. The GDR is the world's largest producer of brown coal and has reserves which, at the current rate of production, will last into the next century. It operates numerous opencast mines, using a high level of technology, mainly in the Cottbus and Leipzig districts. The economic leadership thus accepts the serious destruction of the landscape and high recultivation costs involved.

A long way behind brown coal, mineral oil imported primarily from the USSR is the second most important energy source, ahead of natural gas, of which increasing quantities are being extracted from domestic sources. As it has been possible to achieve a significant reduction in the consumption of oil products in the GDR since the early 1980s, their export has developed into a major source of foreign exchange. The GDR does not need to pay hard currency for the oil it buys from the USSR and such other countries as Libya, Iraq and Iran. Either the bill is deferred - as in the case of Soviet supplies - as a transfer rouble credit, or the GDR can pay it in barter deals with goods of its own which could not otherwise be sold so easily on the world market. The GDR sells surpluses of oil products or crude oil on western markets for hard currencies.

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6 For the following comments see Wolfgang Stinglwagner, Die Energiewirtschaft der DDR, Unter Berücksichtigung internationaler Effizienzvergleiche, Bonn 1985, pp. III ff.

As it still does not have enough other exports with which to compete successfully on the world market, the GDR is averse to forgoing the hard currency revenue from this business even when oil prices are low. It probably amounts to between US$ 1 500m and 2 000m p.a. at present. The GDR currently consumes less than half of the 23m tonnes of oil it imports each year. The other half is re-exported. Oil now accounts for little more than 10% of primary energy consumption in the GDR. Nor is it likely to play a larger part in the country's energy supplies in the future, since every tonne that can be saved is used to earn foreign exchange.

The GDR is pinning great hopes on the expansion of its nuclear power capacities, which have been slow to grow in the past, but are to provide all the energy needed to cope with the increase in consumption from 1990 onwards. Knowledge of reactor safety and the pollution possibly caused by the GDR's nuclear power stations, which are all of Soviet design, has increased in recent years. As Soviet debates on pollution due to nuclear power stations have been reported in various of its media, it can be assumed that interest in this aspect is also growing in the GDR. With something of a time-lag compared with the western industrialized countries, work is also being done on the use of renewable energy sources (e.g. solar energy). On the whole, they will not, however, play any major part in the remaining years of this century.

Compared with other countries, per capita consumption of primary energy is extremely high in the GDR, although the rise in energy consumption, related to the growth of national income or national product, has not been any higher than in, say, the Federal Republic of Germany since 1970. The high level of energy consumption in the GDR is therefore due to developments initiated as long ago as the 1950s and 1960s. Until the early 1980s the GDR made a vain attempt to achieve an appreciable reduction in the waste of energy, which was more pronounced than in the western industrialized countries.

The available information on the structure of primary energy consumption in the GDR since 1980 is not completely reliable. It can be said for certain, however, that brown coal currently accounts for well over half of all primary energy consumed - far more than expected even in the late 1970s. At the same time, the part played by oil and hard coal in primary energy consumption has been greatly reduced. The rapid restructuring of primary energy production has had drastic effects, especially as nuclear energy has not made the contribution originally expected of it.

To provide commercial, government and private consumers with energy obtained from the available primary energy sources, large quantities of primary energy have to be converted and transported. The GDR has an extensive industrial complex for the processing of brown coal, in which briquettes, coke, gas, carbide and other energy sources are produced. The generation of electricity also plays a key role today in the conversion of primary energy into energy for use by the consumer. For the most part the GDR has therefore built large-capacity brown-coal-fired power stations, but they are less efficient than, for example, brown-coal-fired power stations in the Federal Republic of Germany. The large part played by brown-coal-fired power stations in the generation of electricity results in serious pollution. For the stabilization of electricity supplies at peak periods the GDR is integrated into the Eastern European grid, which is to supply electricity from Siberia to Western Europe in the future. Another well developed aspect of energy conversion and transmission in the GDR is the extensive system of district heating and waste heat utilization.

A comparison of the energy flow diagrams of the two Germanies reveals that far higher proportional losses occur between the conversion and transport of the primary energy and the supply of energy to the ultimate consumer in the GDR than in the Federal Republic of Germany. A comparison with other countries similarly shows that the losses incurred in the GDR in the supply of energy to the ultimate consumer are above the average. This lack of efficiency in the supply of energy is due not only to the use of outdated equipment but above all to the large proportion of solid fuels consumed as primary energy, the sharp rise in electricity generation and the small proportion of liquid and gaseous primary energy sources. In only a few

sectors does the GDR have favourable energy consumption structures cor with other countries. One such sector is transport. Some compensation for the losses occurring in the supply of energy to ultimate consumers is achieved in the final consumption of energy. As, for example, consumers in the Federal Republic are more extravagant in the use of the energy available than, in particular, private consumers in the GDR, the quantity of energy available to the ultimate consumer as a proportion of primary energy input is only slightly less than in the Federal Republic.

In the early 1980s the GDR has made a start on improving the efficiency of its energy sector. With only a negligible increase in the consumption of primary energy, it has achieved presentable growth rates in national income. If it is to ensure energy supplies in the coming decades, however, the GDR will have to take some drastic restructuring and modernization measures. There are strict limits to this rationalization strategy owing to the shortage of investable resources and the heavy commitment to brown coal. If the GDR's ambitious plans for the expansion of its nuclear energy base and for further energy savings cannot be implemented, the GDR is likely to face serious energy supply problems in the foreseeable future. It might then prove necessary to finance increased energy imports with the foreign exchange earned by other branches of industry.

IV. HUNGARY[7]

The Hungarian Government has largely transferred the objectives of its 1980 energy rationalization programme to the Five-Year Plan for 1986-1990.

Economy and the rational use of existing resources are still seen as the energy sector's main tasks. In addition, research and investment are to lead to the modernization of the product structure and to the spread of modern energy-saving technologies.

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7 For the following see BfAI, Ungarn, Energiewirtschaft 1986, Cologne 1988.

While energy consumption in 1984 rose by 4%, a higher rate than planned (very severe winter, upturn in industrial production), the 2.8% increase in 1985 was within the planned limits. In 1986 energy consumption even fell by 0.4%, largely as a result of savings by the public. It appears, however, that consumption rose again in 1987: 3% more energy was consumed in the first six months than in the corresponding period the previous year.

As Hungary's indigenous energy sources are limited and meet only about half of domestic requirements, it was again forced to import the other half (mostly from the Soviet Union). Alternative energy sources (biomass, solar energy, etc.) do not play a significant part in the energy balance.

The Government has set out its energy policy objectives in the Five-Year Plan for 1986-1990:

- restriction of the increase in national energy consumption to a maximum annual average of 1%, with electricity consumption to rise by not more than 3%; establishment of a less energy-intensive production and product structure so that a maximum of 0.4% more energy is needed for each 1% increase in national income;

- implementation of the programme for the rationalization of the energy sector, with particular emphasis on direct energy savings and the spread of energy-saving technologies;

- coal requirements (power stations, households) to be met as far as possible from domestic production by opening new pits; better organization of work, and modernization and efficient use of existing production equipment;

- annual production of 2m tonnes of oil and - through the development of new fields - of 7 000m m^3 of natural gas; increased efficiency of hydrocarbon production by using secondary and tertiary methods; use in power stations of indigenous natural gas, which has a lower calorific value; priority to be given to increasing gas supplies to the public;

- completion of the first construction phase and commencement of the second at the Paks nuclear power station; virtual doubling of electricity generated with nuclear power from 1985 to 1990; reconstruction of coal-fired power stations to increase their capacity and reduce pollution;

- continuation of Hungary's participation in the construction of the "Progress" natural gas pipeline, which is being laid as a joint investment of the CMEA countries; continuation of the hotly disputed Gabcikovo-Nagymaros barrage project, with environmental aspects generally taken into account.

This essentially amounts to the further pursuit of the objectives of the energy rationalization programme established in 1980 and the continuation of measures that have already begun, although a shift of emphasis can be detected: while the focus has hitherto been on the exchange of energy sources and organizational measures to conserve energy, greater importance is now to be attached to research and investment aimed at modernizing the product structure and technology. Accordingly, this programme is associated with two other point-of-main-effort programmes, one for the recycling of waste, the other for the conservation of materials. This is expected to result in significant energy savings as early as 1990.

No special measures are being taken to ensure security of supply.

Hungary participates in energy policy cooperation within the CMEA. It was represented at the World Energy Conference held in Munich in 1980 and at the UN Energy Conference in Nairobi in August 1981. It has an agreement, extended annually, with Austria on exchanges of electricity.

V. CZECHOSLOVAKIA[8]

Given its fairly low rate of growth in primary energy sources, Czechoslovakia has for some years been forced to adopt new approaches in its

8 For the following see Vereinigte Wirtschaftsdienste (VWD) of 16 March 1987.

energy sector. The proportion of the country's energy and fuel supplies accounted for by conventional solid fuels, traditionally high in Czechoslovakia, is to be reduced in the future.

The greatest hopes are pinned on the rapid development of nuclear energy. It is to enable the country to cope with the emerging energy shortage.

For fuel and energy supplies the following priorities have been set for the next few years: rapid development of nuclear energy, maintenance of coking coal output at approximately its current level, the progressive reduction of the part played by brown coal in the generation of electricity and increased use of brown coal for the supply of heat, widespread use of natural gas - largely imported from the Soviet Union - as a substitute for liquid fuels and as a raw material in the chemical industry, reduction of energy use and more rational consumption of the energy sources used, and increased effectiveness of investments in the energy sector.

While nuclear energy accounted for only 1.5% of all energy sources used in 1980, its share had risen to 3.6% by 1985 and is to be increased to 7.5% by 1990. An increase to 12% by 1995 and to 16.4% by the year 2000 is now expected.

The shift in the structure of electricity generation is even more conspicuous. In 1985 "conventional" thermal power stations provided 80.1%, hydroelectric power stations 5.3% and nuclear power stations 14.6% (1986: 21.1%) of all electricity generated in Czechoslovakia. In the year 2000 thermal power stations are to provide only 38.2%, hydroelectric power stations 8.5% and nuclear power stations 53.3%.

The Government expects this development to improve the environmental situation in the country. By reducing the coal-based production of electricity and heat, it intends to cut the emission of sulphur dioxide by 200 000 tonnes by 1990 and by 480 000 tonnes by 2000 compared with the level in 1985.

The construction of nuclear power stations has had absolute priority in Czechoslovakia's energy industry in recent years. At present, four VVER-440 units are in operation at the Jaslovska Bohunice nuclear power station and three units (at least one of the VVER-440 type) at the Dukovany nuclear power station. Another four VVER units are under construction at the Mohovce nuclear power station and are scheduled to go on stream between 1989 and 1992. Also under construction is the Temelin nuclear power station with four VVER-1000 units. The trial operation of the first unit at Temelin is to begin in 1992. The other units are due to be linked to the grid between 1994 and 1998. There are also plans for the construction of further nuclear power stations equipped with the VVER-1000 type reactor (the sites are not yet known). Czechoslovakia's total nuclear power station capacity is to be increased to 4 400 MW by 1990, to 7 280 MW by 1995 and to about 10 000 MW by 2000.

The accelerated expansion of nuclear energy is due not least to the limited opportunities Czechoslovakia has to use water as a source of energy. The theoretical annual output of hydroelectric energy is put at 28 000m kWh (converted to electricity).

In 1985 Czechoslovakia's hydroelectric power stations produced about 4 000m kWh. It is now cooperating with Hungary on the construction of the Gabcikovo-Nagymaros hydroelectric power station. Further pumped storage power stations are also to be constructed. This is not, however, expected to increase the supply of energy significantly.

VI. POLAND[9]

With the Polish economy continuing to grow, the general trend in the energy sector in 1986 was characterized by a further increase in energy consumption. Polish energy production is hardly likely to rise appreciably in the next few years. Major increases in energy imports are out of the question because of the country's large foreign debt. If it does not succeed in changing from its present extensive growth to intensive growth with more

9 For the following see BfAI, Polen, Energiewirtschaft 1986, Cologne 1988.

rational use of energy, energy bottlenecks could occur during the 1986-1990 Five-Year Plan period, casting doubt on the planned annual growth rate in national income of 3 to 3.5%.

In 1986 Poland was self-sufficient in hard and brown coal and in electricity. It had to import 57% of the natural gas it needed and almost all its oil requirements. The rationing of oil products continued. Hard coal exports, an important item for Poland's balance of trade, fell by 5% in 1986 because of increased domestic requirements. The energy sector is fully integrated into the state planning system. Energy prices are heavily subsidized with grants from the national budget.

The 1986-1990 Five-Year Plan provides for a modification of the national energy policy. Compared with past plans, investment in the energy sector is to be reduced, and savings in primary energy consumption of 9 to 11% of the present volume are to be achieved. The drastic price increases that have already been introduced or have yet to be made as part of Poland's economic reforms are to provide the necessary incentives in this respect. There are also plans to increase brown coal production.

It is estimated that at least 6m tonnes of oil needs to be imported each year. Additional imports would have to be paid for in convertible currencies.

Supplies of natural gas from the Soviet Union under long-term agreements will continue to grow in the next few years.

Hard coal production rose slightly in 1986. By 1995 it is to be increased to 195m tonnes. Thereafter a gradual decline is expected. Brown coal production reached the record level of 67.3m tonnes in 1986. It will continue to rise in the years to come.

Electricity generation grew by 2% to 140.3 GWh in 1986.

Poland's energy balance deficit rose to 127 000m zloty at current prices in 1986 (1985: 89 000m zloty). It will continue to rise in the next few years because of declining hard coal exports.

Domestic production as a proportion of total requirements

Domestic production of hard coal exceeded domestic consumption by 19%. Brown coal and electricity requirements were also met entirely from domestic production. Domestic production of natural gas (5 440m m^3) fell to 43.3% of total requirements in 1986. The 160 500 tonnes of oil produced in Poland in 1986 accounted for only just over 1% of consumption.

Other basic data

The energy sector is of prime importance in any assessment of Poland's economic situation. It is characterized by the following factors:

- The Polish economy uses far more energy than western industrialized countries.
- Despite growing energy requirements and large hard coal and coal reserves, an increase in domestic energy production is severely limited by the low level of investment in the energy sector in past years.
- Poland is heavily dependent on imports, especially from the Soviet Union, for supplies of natural gas and oil.
- Energy imports can hardly be increased because of Poland's large foreign debt. It must instead try to export as much hard coal as possible, even though domestic demand is rising.
- Much of the extensive pollution in Poland is due to the large part played by hard and brown coal in total energy consumption (serious SO_2 pollution, salinification of water).

Where energy imports are concerned, Poland is primarily interested in increasing the currently small quantities of oil and natural gas it receives under CMEA supply agreements and in expanding bilateral trade with oil-

exporting hard-currency countries so that it can import more crude oil under clearing agreements. Hard coal exports continue to be very important for Poland, although they fell again in 1986.

ANNEX: TABLES

TRANSLATION OF KEYWORDS USED IN THE TABLES

The tables have been obtained from German sources.

It has been impossible to translate the tables owing to a shortage of time and space. It is hoped, however, that with the help of the translations of the table headings and the following recurring keywords they will serve as a guide even to the non-German reader.

Keywords (in alphabetical order):

German	Translation
Aufkommen	production plus imports
Benzin	motor spirit
Braunkohle	brown coal
Brikett	briquette
Dieselöl	diesel oil
Einfuhr	imports
Elektrische Energie	electricity
Entstehungsseite	sources
Erdgas	natural gas
Erdöl	oil
Erdölderivate	oil derivatives
Gasöl	gas oil
Gesamtverbrauch	total consumption
Heizöl	heating oil
Heizwert	calorific value
Kernenergie	nuclear energy
Kohle	coal
Koks	coke
Insgesamt	total
Lieferungen	supplies
Lignite	lignite
Primärenergie	primary energy
Primärenergieträger	primary energy source
Primärenergieverbrauch	primary energy consumption
Primärstrom	primary electricity
Produktion	production
Steinkohle	hard coal
Strom	electricity
Stromerzeugung	electricity production
Stromproduktion	electricity production
Stromverbrauch	electricity consumption
Verwendungsseite	consumption
Wärmeenergie	thermal energy

TABLES I: GENERAL OVERVIEW; THE ENERGY SECTOR IN THE CMEA

TABLE I.1.: Trend in nuclear power station capacities in the European CMEA countries[1]

Land	1975	1980	1985	1986	1987[2])	1990[2])
			in MW			
Bulgarien	7 060	8 197	10 243	10 243	11 250	13 000
CSSR	12 975	15 635	19 664	20 371	20 800	22 000
DDR	16 211	19 837	21 944	22 059	22 600	24 400
Polen	19 527	24 769	29 089	29 802	30 500	32 500
Rumänien	11 577	16 109	19 576	20 500	21 500	28 500
Ungarn	3 921	4 842	5 805	6 244	6 700	6 800
RGW (6)	71 271	89 389	106 321	109 219	113 350	127 200
UdSSR	222 030	266 710	314 700	322 000	330 000	387 000
RGW (7)	293 301	356 099	421 021	431 219	443 350	514 200
			1980 = 100			
Bulgarien	86,1	100,0	125,0	125,0	137,2	158,6
CSSR	83,0	100,0	125,8	130,3	133,0	140,7
DDR	81,7	100,0	110,6	111,2	113,9	123,0
Polen	78,8	100,0	117,4	120,3	123,1	131,2
Rumänien	71,9	100,0	121,5	127,3	133,5	175,9
Ungarn	81,0	100,0	119,9	129,0	138,4	140,4
RGW (6)	79,7	100,0	118,9	122,2	126,8	142,3
UdSSR	83,2	100,0	118,0	120,7	123,7	145,1
RGW (7)	82,4	100,0	118,2	121,1	124,5	144,4

[1]) Höchstmögliche Leistung (entspricht etwa der installierten Leistung minus Eigenbedarf). — [2]) Geschätzt.
Quellen: UN: Annual Bulletin of Electric Energy Statistics for Europe; Datenbank RGW-Energie und Schätzungen des DIW.

Source: DIW-Wochenbericht, No 36/1988

TABLE I.2.: Significance of nuclear energy in the European CMEA countries

Land	Leistung in MW					Anteil an der Stromproduktion in vH				
	1980	1985	1986	1987	1990[1])	1980	1985	1986	1987[1])	1990[1])
Bulgarien	1 320	1 760	1 760	2 760	3 760	17,7	31,5	28,9	30,0	45,0
CSSR	880	2 200	3 080	3 520	4 400	6,2	14,6	21,1	26,0	28,0
DDR	1 830	1 830	1 830	1 830	3 150	12,0	11,2	9,5	11,0	15,0
Ungarn	–	880	1 320	1 760	1 760	–	24,2	26,5	36,9	35,0
RGW (4)	4 030	6 670	7 990	9 870	13 070	10,4	16,0	18,3	22,0	25,0
Polen	–	–	–	–	–	–	–	–	–	–
Rumänien	–	–	–	–	5 200	–	–	–	–	30,0
UdSSR	13 425	29 245	30 245	34 745	59 000	5,6	10,8	10,1	11,2	17,0

[1]) Geschätzt oder Plan. UdSSR: Revidierte Planung. Der Fünfjahresplan sieht für 1990 eine Erhöhung der Kernkraftwerksleistung auf 59 000 MW und eine Anteilssteigerung auf 21 vH vor.
Quelle: Datenbank RGW-Energie und Schätzungen des DIW.

Source: see Table I.1.

TABLE I.3.: Trend in electricity production in the European CMEA

Land	1975	1980	1985	1986	1987[1])	1990[2])
			In Mrd. kWh			
Bulgarien	25,2	34,6	41,6	41,9	43,5	51,0
CSSR	59,3	72,7	80,6	84,8	85,8	88,5
DDR	84,5	98,8	113,8	115,3	114,0	126,0
Polen	97,2	121,9	137,7	140,3	146,0	156,0
Rumänien	53,7	67,5	71,8	75,5	74,1	101,7
Ungarn	20,5	23,9	26,8	28,0	29,7	30,0
RGW (6)	340,4	419,6	472,4	485,8	493,0	553,2
UdSSR	1 038,6	1 293,9	1 544,1	1 598,9	1 665,0	1 860,0
RGW (7)	1 379,0	1 713,5	2 016,5	2 084,6	2 158,0	2 413,2
			1980 = 100			
Bulgarien	72,4	100,0	119,5	120,2	124,9	146,4
CSSR	81,5	100,0	110,9	116,6	118,0	121,7
DDR	85,5	100,0	115,2	116,7	115,4	127,5
Polen	79,7	100,0	113,0	115,1	119,8	128,0
Rumänien	79,6	100,0	106,4	111,9	109,7	150,7
Ungarn	85,7	100,0	112,2	117,5	124,4	125,6
RGW (6)	81,1	100,0	112,6	115,8	117,5	131,8
UdSSR	80,3	100,0	119,3	123,6	128,7	143,8
RGW (7)	80,5	100,0	117,7	121,7	125,9	140,8
			Wachstum in vH[3])			
Bulgarien	5,3	6,7	3,6	0,5	3,9	4,1
CSSR	5,6	4,2	2,1	5,1	1,2	1,9
DDR	4,5	3,2	2,9	1,3	- 1,1	2,1
Polen	8,5	4,6	2,5	1,9	4,1	2,5
Rumänien	8,9	4,7	1,3	5,1	- 2,0	7,2
Ungarn	7,1	3,1	2,3	4,7	5,9	2,3
RGW (6)	6,7	4,3	2,4	2,8	1,5	3,2
UdSSR	7,0	4,5	3,6	3,5	4,1	3,8
RGW (7)	6,9	4,4	3,3	3,4	3,5	3,7

[1]) Geschätzt. — [2]) Plan. — [3]) Gegenüber dem Vorjahr; 1975, 1980, 1985 und 1990: im Durchschnitt der Jahre 1971 bis 1975, 1976 bis 1980, 1981 bis 1985 und 1986 bis 1990.

Quellen: UN: Annual Bulletin of Electric Energy Statistics for Europe; Planerfüllungsberichte und Volkswirtschaftspläne der RGW-Länder; Datenbank RGW-Energie und Schätzungen des DIW.

Source: see Table I.1.

TABLE I.4.: Trend in electricity consumption in the European CMEA countries

Land	1975	1980	1985	1986	1987[2])
			In Mrd. kWh		
Bulgarien	28,9	38,7	46,1	45,8	47,1
CSSR	63,5	74,6	84,2	86,2	89,2
DDR	85,2	100,3	114,0	116,3*	117,3
Polen	96,7	121,6	135,6	140,3	146,2
Rumänien	51,2	67,9	75,1	78,8	78,9
Ungarn	24,6	31,3	37,6	38,6	40,3
RGW (6)	350,0	434,3	492,6	506,0	519,0
UdSSR	1 027,3	1 274,9	1 516,9	1 566,9	1 632,2
RGW (7)	1 377,3	1 709,2	2 009,2	2 072,9	2 151,2
			1980 = 100		
Bulgarien	74,6	100,0	119,3	118,5	121,8
CSSR	85,1	100,0	112,9	115,6	119,6
DDR	85,0	100,0	113,7	116,0	117,0
Polen	79,5	100,0	111,5	115,4	120,2
Rumänien	75,4	100,0	110,6	116,0	116,2
Ungarn	78,7	100,0	120,3	123,3	128,9
RGW (6)	80,6	100,0	113,4	116,5	119,5
UdSSR	80,6	100,0	119,0	122,9	128,0
RGW (7)	80,6	100,0	117,6	121,3	125,9
			Wachstum in vH[4])		
Bulgarien	6,3	6,0	3,6	-0,7	2,8
CSSR	5,5	3,3	2,5	2,5	3,4
DDR	4,6	3,3	2,6	2,0	0,9
Polen	6,4	4,7	2,2	3,5	4,2
Rumänien	9,4	5,8	2,0	4,9	0,1
Ungarn	6,5	4,9	3,8	2,5	4,5
RGW (6)	6,9	4,4	2,5	2,7	2,6
UdSSR	6,9	4,4	3,5	3,3	4,2
RGW (7)	6,9	4,4	3,3	3,2	3,8

[1]) Bruttoverbrauch. — [2]) Geschätzt. — [3]) Plan. — [4]) Gegenüber dem Vorjahr; 1975, 1980 und 1985: im Durchschnitt der Jahre 1971 bis 1975, 1976 bis 1980 und 1981 bis 1985.

Quellen: UN: Annual Bulletin of Electric Energy Statistics for Europe; Datenbank RGW-Energie und Schätzungen des DIW.

Source: see Table I.1.

TABLE I.5.: Indices of electricity consumption in the European CMEA countries

Land	Verbrauch je Einwohner[1] in kWh		Verbrauch je Einwohner[1] RGW (6) = 100		Elastizität zum Nationaleinkommen[2]			
	1980	1983[3]	1980	1987[3]	1975/70	1980/75	1985/80	1987/85
Bulgarien	4 360	5 230	110	113	1,0	1,0	1,0	0,7
CSSR	4 880	5 720	123	124	1,0	0,9	1,4	1,2
DDR	5 990	7 060	151	153	0,9	0,8	0,8	0,8
Polen	3 400	3 880	86	84	0,9	3,9	-[4]	0,7
Rumänien	3 060	3 450	77	75	0,8	0,8	0,5	0,5
Ungarn	2 920	3 800	74	82	1,0	1,7	2,9	3,1
RGW (6)	3 970	4 620	100	100	0,9	1,1	1,1	1,2
UdSSR	4 780	5 790	121	125	1,2	1,0	1,0	1,0
RGW (7)	4 540	5 460	115	118	1,1	1,1	1,1	1,1

[1]) Zum Vergleich: Bundesrepublik Deutschland 6 060 kWh (1980) bzw. 6 930 kWh (1987); EG (10) 4 770 kWh (1980) bzw. 5 480 kWh (1987). — [2]) Jahresdurchschnittlicher Zuwachs des Bruttoinlandsverbrauchs an Elektrizität bezogen auf den jahresdurchschnittlichen Zuwachs des produzierten Nationaleinkommens. — [3]) Geschätzt. — [4]) Angaben nicht sinnvoll, da das Nationaleinkommen im Unterschied zum Stromverbrauch zurückging.

Source: see Table I.1.

TABLE I.6.: Trade in electricity among the European CMEA countries in '000 kWh[1]

Land	1980			1986		
	Export	Import	Saldo	Export	Import	Saldo
Bulgarien	0,9	4,7	- 3,8	1,5	5,3	- 3,9
CSSR	5,3	7,2	- 2,0	8,6	10,1	- 1,4
DDR	3,7	4,2	- 0,5	3,8	4,9	- 1,1
Polen	4,3	4,2	0,2	7,8	7,8	0,0
Rumänien	0,0	0,5	- 0,4	-	3,3	- 3,3
Ungarn	2,8	10,2	- 7,4	1,5	11,9	- 10,4
RGW (6)	17,0	30,9	- 13,9	23,1	43,3	- 20,2
UdSSR	19,0	0,3	18,7	30,2	2,2	28,0
RGW (7)	36,0	31,2	4,8	53,3	45,5	7,8

[1]) Summendifferenzen infolge Rundungen.

Source: see Table I.1.

TABLE I.7.: Level of self-sufficiency in electricity in the European CMEA countries (production as percentage of consumption)

Land	1975	1980	1985	1986	1987[1])
Bulgarien	87,4	90,1	90,3	91,4	92,4
CSSR	93,4	97,5	95,8	96,3	96,2
DDR	99,2	98,2	99,9	99,1	97,2
Polen	100,5	100,2	101,6	100,0	99,9
Rumänien	104,9	99,4	95,6	95,8	93,8
Ungarn	83,2	76,4	71,3	72,7	73,7
RGW (6)	97,3	96,6	95,9	96,0	95,0
UdSSR	101,1	101,5	101,8	102,0	102,0
RGW (7)	100,1	100,3	100,4	100,6	100,3

[1]) Geschätzt.

Source: see Table I.1

TABLE II: USSR: PRIMARY ENERGY BALANCE

In the following table the data in the Statistical Yearbooks for 1985 and 1986 are compared to show the differences between them (in m tce).

	Daten des Stat. Jahrbuches für 1985		Daten des Stat. Jahrbuches für 1986	
	1985	1986	1985	1986
Entstehungsseite				
Restbestände am Jahresanfang	204,2	x	206,3	208,2
Produktion (Förderung) von Brennstoffen	2 137,3	x	2 073,1	2 165,7
Nutzung von Wasserkraft	26,4	x	69,8	70,3
Sonstiges Aufkommen	65,5	x	59,9	57,1
Import	31,8	x	30,8	34,9
Insgesamt	2 465,2	x	2 439,9	2 536,2
Verwendungsseite				
Verbrauch für:				
- Erzeugung von Strom, Wärmeenergie und Druckluft	867,4	x	908,2	929,1
- produktionstechnische u. sonstige Zwecke, inkl. Verluste	1 048,5	x	971,3	981,3
Verbrauch insges.	1 915,9	x	1 879,5	1 910,4
Export	350,2	x	352,2	396,0
Restbestände am Jahresende	199,1	x	208,2	229,8
Insgesamt	2 465,2	x	2 439,9	2 536,2

Anmerkung: Die Angaben über den Energieexport stimmen mit den entsprechenden Daten der amtlichen Außenhandelsstatistik nicht überein.

Source: BfAI

TABLE III: GDR

TABLE III.1.: Soviet supplies of energy raw materials and their share of GDR production plus imports, 1960-1985

	1960	1970	1975	1980	1985[1]
Sowjetische Lieferungen von					
Steinkohle[2] (Mio. t)	6,1	5,0	5,5	4,5	4,1
Erdöl (Mio. t)	1,8	9,2	15,1	19,0	17,5
Erdgas (Mrd. m³)	-	-	3,2	6,4	6,5
Anteil der sowjetischen Lieferungen am DDR-Aufkommen von					
Steinkohle (%)	57	44	58	45	61
Erdöl (%)	95	88	89	87	73
Erdgas (%)	-	-	55	66	55

[1] vorläufige Angaben [2] einschl. Anthrazit und Steinkohlenkoks
Quellen: Statistische Jahrbücher der DDR

TABLE III.2.: Brown coal production by leading producing countries, 1970-1984

	1970	1980	1984	1984
		Mio. t		kg pro Kopf der Bevölkerung
Welt	818,5	1004,7	1126,0	236
DDR	261,5	258,1	296,3	17776
UdSSR	144,7	159,9	152,3	554
Bundesrepublik Deutschland	107,8	129,9	126,7	2136
Tschechoslowakei	81,3	94,9	102,9	6654
USA	5,4	42,3	57,3	242
Jugoslawien	27,8	46,6	54,5	2375
Polen	32,8	36,9	50,4	1365

Quelle: Statistisches Taschenbuch der DDR

Table III.3.: Production of primary energy sources in the GDR, 1970-1985

	1970	1980	1983	1984	1985[1]
Braunkohle (Mio. t)	261,5	258,1	278,0	296,3	312
Steinkohle (Mio. t)	1,0	–	–	–	–
Erdöl[2] (1000 t)	200	54	60	60	60
Erdgas (Mrd. m³)	1,0	7,6	11,8	13,0	13,5
Primärstrom[3] (TWh)	1,7	13,5	13,9	13,5	14,5
davon aus Kernenergie (TWh)	0,5	11,9	12,2	11,7	12,7

[1] teilweise vorläufige Angaben [2] Schätzung [3] Strom aus Kernkraft und Laufwasserwerken

Source: Wolfgang Stinglwagner, Energiewirtschaft der DDR, GR 39 (1987), No 11, p. 37

TABLES V: HUNGARY

TABLE IV.1.: Production and imports of natural gas, oil and oil derivatives

Jahr	Erdgas (Mio. m³) Prod.	Erdgas (Mio. m³) Einfuhr	Erdöl (1 000 t) Prod.	Erdöl (1 000 t) Einfuhr	Benzin (1 000 t) Prod.	Heizöl (1 000 t) Prod.	Dieselöl (1 000 t) Prod.	Dieselöl (1 000 t) Einfuhr
1982	6 627	3 934	2 027	8 776	2 361	2 602	3 373	803
1983	6 497	4 071	2 004	8 864	2 371	2 528	3 143	555
1984	6 898	3 818	2 007	8 816	2 527	2 546	3 469	757
1985	7 441	4 009	2 012	7 253	2 664	2 548	3 285	764
1986	7 098	4 758	2 005	7 561	2 860	2 350	3 496	756

(Source: Statistisches Monatsheft, No 1987/1)

TABLE IV.2.: Production and imports of coal and electricity

Jahr	Heizwert der produzierten Kohle Mrd. kJ	Heizwert der produzierten Kohle kJ/kg	Produktion von Kohle 1 000 t	davon Steinkohle	davon Braunkohle	davon Lignit	Steinkohleeinfuhr 1 000 t	Produktion von elektr. Energie Mio. kWh
1982	291 368	11 173	26 079	3 039	14 754	8 268	1 997	24 523
1983	277 701	11 014	25 213	2 827	14 406	7 980	1 756	25 698
1984	275 472	10 998	25 047	2 573	14 448	8 026	1 610	26 293
1985	262 616	10 923	24 042	2 639	14 016	7 387	2 518	26 710
1986	252 508	10 918	23 128	2 324	13 821	6 983	2 317	27 986

(Source: Statistisches Monatsheft, No 1987/1)

Source: BfAI

TABLE IV.3.: Consumption of major energy sources in the Socialist sector of industry

(in Mrd. kJ)

Jahr/Bereich	Gesamt-verbrauch	darunter					
		Kohle u. Brikett	Koks	Benzin	Diesel-u. Gasöl	Heizöl	Erdgas
1982	493 483	19 276	52 690	40 288	20 305	25 825	109 356
1984	471 439	16 859	49 890	40 571	17 721	17 275	115 000
1985	445 045	13 108	50 286	36 805	13 511	9 477	121 204
1986	436 963	13 009	47 835	36 817	13 303	9 335	116 869
davon (1986):							
Bergbau	24 276	821	9	556	2 553	57	9 744
Energiewirtschaft	15 427	3	13	318	258	16	12
Hüttenwesen	129 903	3 417	45 530	128	1 045	4 452	29 719
Maschinenbau	33 488	277	1 041	850	2 718	284	6 081
Chemische Industrie	120 483	14	4	33 579	684	115	41 161
Baumaterialienindustrie	48 479	7 786	581	187	1 341	4 051	26 711
Schwerindustrie insgesamt	372 056	12 318	47 178	35 618	8 599	8 975	113 428
Leichtindustrie	26 703	182	69	403	786	81	931
Sonstige Industriezweige	1 567	114	8	94	145	-	135
Nahrungsmittelindustrie	36 637	395	580	702	3 773	279	2 375

(Source: Statistisches Jahrbuch 1986)

Source: BfAI

TABLE V: CZECHOSLOVAKIA: COAL AND OIL PRODUCTION

1 000 t

Erzeugnis	1980	1981	1983	1984	1985	1986
Steinkohle	28 201	27 513	26 915	26 421	26 223	25 658
Braunkohle 1)	92 529	93 096	98 878	101 084	98 633	99 131
Lignit	3 197	3 269	3 538	3 659	3 682	3 607
Erdöl	93	89	93	91	123	142

1) Bruttaförderung.

Source: Federal Statistical Office, Länderbericht, Tschechoslovakei 1988, Stuttgart and Maiz 1988

TABLE VI: POLAND: ENERGY CONSUMPTION

		1983	1984	1985	1986
Primärenergieverbrauch insgesamt	Mio. t SKE	162,6	168,4	175,1	178,9
Gesamtverbrauch:					
Erdöl	Mio. t	14,3	13,81	13,91	14,30
Erdgas	Mrd. cbm	11,48	12,09	11,90	12,54
Steinkohle	Mio. t	155,5	151,8	159,7	161,3
Braunkohle	Mio. t	42,4	50,6	57,7	67,3
Elektroenergie	Mrd. kWh	122,7	130,2	135,6	140,3

Source: BfAI