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SUB-COMMITTEE ON SOVIET ECONOMIC POLICY

THE ENERGY PROBLEMS IN THE COMMUNIST COUNTRIES

Note by the Chairman

At its meeting on 6th July, 1967, the Economic Directorate had undertaken to submit a synthesised report of all available information on the energy problems in the Communist countries. The attached draft has been prepared on the basis of the following documents as well as of some other information which became available to the Secretariat later:

- a note by the German delegation on the "long-term plans to meet the energy deficit in the European part of the USSR and the Ural", issued as AC/89-WP/204 with comments by the United Kingdom (AC/89-WP/204/1), and the United States (AC/89-WP/204/2).
- a note by the French delegation on oil and natural gas in the USSR issued as AC/89-WP/215, with comments by the United Kingdom (AC/204-WP/215/1), and Germany (AC/89-WP/215/2).
- a note by the German delegation on the "progress made by the USSR under the Seven Year Plan with the construction of power plants and the production of electric power", issued as AC/89-WP/184, with comments by the United States (AC/89-WP/184/1), France (AC/89-WP/184/2) and further information supplied by Germany (AC/89-WP/184/3).
- a note by the German delegation on the "Construction of nuclear energy plants in the European satellite countries", issued as AC/89-WP/209, with comments by the United Kingdom (AC/89-WP/209/1), the United States (AC/89-WP/209/2) and further comments by Germany (AC/89-WP/209/3).

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- a note by the German delegation on "The dependence of the Eastern European countries and of the Soviet-occupied Zone of Germany on the Soviet Union in the field of energy" issued as AC/89-WP/225.

2. This draft deals successively with the energy problems in the USSR and the dependence of the Eastern European countries on the Soviet Union in the field of energy. It will be placed on the Agenda of one of the next meetings of the Sub-Committee.

(Signed) A. VINCENT

I. THE ENERGY PROBLEM IN THE USSR

In spite of the large Soviet energy reserves, considerable difficulties and high costs are being encountered in their exploitation because of their location. Only 15% of the total reserves are in the European part and the Urals, where the expected requirements during the next few years will be about 75% of the thermal energy and 70% of the electrical energy needed by the USSR. The exploitation of these resources requires long-term planning, the main features of which are already beginning to emerge. Moreover, labour problems in Siberia are significant and will contribute to rising costs and increasing capital investment requirements. Technical and logistical difficulties will be even more significant in creating delays in the development and transport of energy resources. The country's energy production rose from 660 million coal equivalent tons in 1959 to 969 million coal equivalent tons in 1965(1).

2. It has been estimated that during the next fifteen years the energy requirements in the European part of the USSR and the Urals are likely to double. They will continue to be met largely by coal and oil; natural gas is probably to play an increasing part; on the other hand, atomic energy at present represents a very small share of the total installed capacity and no important change is anticipated through 1970.

The Soviet Energy Production

	unit	1966		1970
		actual	planned	planned
oil	million tons	265	264	350
natural gas	milliard cu.m	145.5	148	225-240
coal	million tons	585	598	670
electrical energy	milliard KWh	545	560.5	800-810

1. Oil and Natural Gas

3. The USSR is making a special effort to utilise its oil and natural gas resources, whose importance for the country's economy is rapidly increasing; both are gaining in

(1) This total is divided up as follows:

oil:	347.3 million coal equivalent tons
natural gas:	151.3 million coal equivalent tons
coal:	415.9 million coal equivalent tons
Miscellaneous:	54.5 million coal equivalent tons

the Soviet energy balance at the expense of coal and in 1967 should represent 56% of the energy used in the USSR; this share is to rise to more than 60% in 1972. In the United States over 70% of the total energy comes from oil and natural gas.

Oil

4. Oil reserves - which are in any case sufficient to meet the planned increase in production - are nevertheless difficult to assess with any accuracy: the USSR appears to calculate its figures on a different basis from the West and prospection has not yet taken place in all the promising areas. There does not seem to be very recent estimates available regarding oil reserves; according to a study made in 1962 by the OECD Special Committee on oil, such reserves amounted to about 4.5 milliard cu.m. This, however, is a very conservative figure and represents probably an understatement. Production increased from 10.6 million tons in 1900 to 147.8 million tons in 1960 and 265 million tons in 1966, whereas in the United States the global output reached 410 million tons in 1966; according to the plans announced last October, this figure is expected to rise to 350 million tons in 1970, which means a 7.4% annual increase. At present, oil is the second most important fuel after coal, its rating on the Soviet fuel balance being between 34% and 36%. According to recent evaluations, Soviet oil production rose from 21.746 million tons in 1946 to 265.000 million in 1966, thus increasing twelvefold in twenty years, whereas world oil production rose from 353.354 million tons to 1.373.500 million during the same period, a fourfold increase.

5. The main producing area is the Urals-Volga oilfield<sup>(1)</sup> which provided in 1966 about 70% of the global output; coming next in importance is the Azerbaidjan, which supplied 8.9% of the total. The balance was produced by relatively modest oilfields, located mainly in North Caucasus (9% of total output), Turkmenistan (4%) and the Ukraine (3.5%). New oilfields are being opened up: in Byelorussia which should be producing 10 million tons in 1970 and - much more important - in Western Siberia, which have been known of only since 1960 and began operating so recently that their output is not yet significant. However, as early as 1970, the Siberian oilfields are expected to be the most important in the USSR, and it is hoped that production by 1980 will reach 200-250 million tons per year. Among the new oilfields those at Mangyshlak (on the Eastern shore of the Caspian Sea), which began producing in 1964, are expected to have an output of 15 to 20 million tons by 1970; in view of the deposits located here, this is the fourth largest oil producing area in the USSR.

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(1) from Perm to Saratov and the Volgograd region.

6. The refining capacity (about 225 million tons, according to Western estimates, at the end of 1965) is adequate to meet the country's requirements and is expected to remain so in future years. The present five-year plan calls for a production of 265 or even 285 million tons of refined oil by 1970, which requires a refining capacity of 310 to 350 million tons of crude oil. It provides for scarcely any new refineries and proposes instead that existing installations should be extended and modernized. The USSR considers it more profitable to export crude oil than refined products; the latter are moreover difficult to sell since they are sometimes of a low standard.

7. From 1st July, 1967, within the framework of the current economic reforms, the average wholesale prices for crude oil have been doubled to reflect the costs and the difference in quality. As there should not be any corresponding changes in the general price level of petroleum products, this reform implies a reduction in the turnover tax as well as in profit margins of the refineries, transport and distribution. It seems that this cost-consciousness may also be reflected in the export prices.

8. Oil is an important source of foreign exchange for the USSR; in 1966 Soviet exports of crude oil and petroleum products exceeded 73 million tons. In value they now rank second among the exports of the Soviet Union after machinery and equipment and account for about 12 of all foreign trade deliveries. Liquid fuel holds first place among Soviet exports to Western countries. Furthermore, the USSR supplies the Eastern European countries (apart from Rumania, which is self-sufficient) with almost all the crude oil they need (25.463.000 tons in 1966).

9. Transport seems to be the main problem for the development of the Soviet oil industry. At the end of 1965 the USSR possessed 29,700 kms of large diameter oil pipelines, which is less than was called for in the Seven-Year Plan (31.800 km.)(1) as the Soviet Union gave priority to gas pipelines. This policy will be continued under the 1966-70 five-year plan, for it is proposed to build only 12,000 kms. of oil pipelines during this period. According to the annual ton/kilometre figures, in 1966 railways and pipelines carried 46% each of the total output of oil and refined products. The Soviet pipeline network comprises two major itineraries: the so-called "Friendship Line" which carries crude oil from the Urals-Volga fields to Western Russia, Poland, the Soviet occupied Zone of Germany, Czechoslovakia and Hungary, and the Trans-Siberian pipeline from Ufa to Irkutsk; it is proposed to extend the latter to Nakhodka on the Pacific and negotiations with the Idemitsu Kosan company are scheduled to begin next spring. The Soviets have made it repeatedly clear that they require Japanese co-operation and markets before undertaking it.

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(1) See AC/127-D/225

Natural Gas

10. The USSR has huge reserves of natural gas, which probably places her second in the world after the United States; but the expansion of natural gas production is a recent development; total output rose from only 6.2 milliard cu.m. in 1950 to 47.2 milliard cu.m. in 1960 and 145.5 milliard cu.m. in 1966, the Soviet Union ranking second in the world immediately after the United States. Probably as a result of the inadequacy of the transport network, however, this production has not progressed as quickly as planned; the target for 1970 has been reduced from 310-335 milliard cu.m. to 225-240 milliard cu.m., implying an annual average increase of 12.5% between 1966 and 1970. Natural gas, which accounted for 15.8% of the total fuel output in 1965, is expected to rise to 21% in 1970.

11. In 1965 the non-European regions of the USSR were supplying 15.3% of Soviet natural gas; this figure is expected to increase to 40% by 1970. The most numerous and promising borings are being carried out in Siberia, where at least five times as much natural gas as in all the other regions combined has been found. It remains to be seen if these will be successfully exploited, as production and transportation costs for these new fields are expected to be substantially higher than for the old ones.

12. The Soviet Zone is already exporting natural gas to Poland, and a gas pipeline between the USSR and Czechoslovakia has been inaugurated in July 1967. Talks are in progress with a view to building a pipeline to Italy via Austria and consideration is being given to a line between the USSR and Finland. The USSR is also taking an interest in foreign natural gas; a gas pipeline has been built between Afghanistan and Uzbekistan, and construction has to start in 1967 on another between Iran and the Caucasus.

13. At the end of 1966, the Soviet large diameter (19" and above) gas pipeline network had a length of 47,000 km. and could carry more than 1,000 milliard cu.m. One of the most notable of the initiatives currently under way is the "Central Asia-Centre" pipeline which links the enormous deposits in Turkmenistan and Kazakhstan with Moscow and is being extended as far as Leningrad. The major project in the present Five-Year Plan is for a gas line to link Novyi Port (Western Siberia) with Leningrad and Minsk. Another pipeline to be called the "Southern Line" will later carry gas from the Tyumen area to the Urals and then on to Gorki and Moscow. All these pipelines will be interconnected to provide a single system.

2. Coal

14. The total coal production in the USSR is planned to increase from 585 million tons in 1966 to about 670 million in 1970. By the end of 1980, the Soviets originally envisaged an annual output of 1200 million tons; this figure was later on reduced to 1 milliard. The enormous resources of coal in the USSR are located at great distances from the major energy consuming areas in the western part of the country and much of the coal is of very low quality. Although the production costs in the Donez basin are relatively high, this coal is cheaper for consumption in the industrial areas of Western Russia than Kuznetsk and Pechora coal because of the transport costs.

15. At present lignite represents about 14% of total coal output; it is, however, of particular importance for some regions of the USSR. In Central Siberia the lignite mining districts of Kansk-Achinsk (Itat) are to be developed to reach an annual capacity of 30 million tons in 1970 and 100 million in 1980, while the lignite districts of Ekibastus in Central Asia are to reach 300 million tons annually by 1980. The lignite will be mainly used in the thermal power stations of Kansk-Achinsk having a capacity of 50-60 million kW and Ekibastus having 15-16 million kW output. Some lignite output costs for open-pit mining are relatively low, which accounts for the attention paid to this field. However, Soviet data on costs often is ambiguous as no clear distinction is made between actual costs of production and projected costs based on modern equipment and technology not yet being used. The low cost of open-pit mining is based on the use of large specialised equipment that is still in the design stage. An additional assumption made on the cost of generating electric power from eastern coal-fields is that technology will be developed to use these low quality coals.

Electric Power

16. The shortfall in primary energy supplies in 1966 in turn affected the electricity generating industry, where production at 545 milliard kWh was about 3% below the level stipulated in the plan; at the same time, the corresponding figure was 1248 milliard kWh in the United States. By 1970, electric power production in the USSR is to be increased to 800 milliard kWh which is less than initially envisaged in the five-year plan.

17. In 1965, out of a global output of 506.709.000 kWh, thermal energy accounted for 425.278.000 kWh, hydraulic energy for 81.432.000 kWh and atomic energy for 0,9 - 1 million kWh. The total capacity of Soviet power stations reached 123 million kW at the end of 1966. During the

planning period 1959-1965 priority had been given to the building of steam generating stations on the basis of standardisation, which was something new in power plant construction and which will enable savings in capital costs and in the construction time.

18. The International Staff has very little information about atomic energy since 1965; it is hoped that delegations may be able to provide data on more recent developments. It would seem that at the end of 1964 the capacity of atomic power stations - according to Soviet sources - was approximately 1 million kW, divided up as follows:

Obninsk (Kalouga region)	- capacity =	0.005 million kW		
Novo Voronesh (1st slice)	- "	= 0.21	"	"
Bielojarsk in the Urals (1st slice)	- "	= 0.1	"	"
Melekess (in the Volga region)	- "	= 0.07	"	"
Western Siberia (1st slice)	- "	= 0.6	"	"
	total		0.985 million kW	

Given the considerable effort in the field of nuclear armaments, this figure is probably much too low and does not include electricity used for military industries.

19. Several types of mobile atomic energy stations with an installed capacity of 500, 1000 and 1500 kW, have been developed. Despite some discussion in 1965 of proposals for constructing "several tens of thousands of megawatts of nuclear power plants in the European part of the USSR by 1980", it is doubtful if such capacity will be installed by that time.

20. The USSR is also developing tidal power and geothermal generating stations. The first tidal power one with a capacity of 1,000 kW has started operating in 1966 near Murmansk. The largest of the trial steam generating stations (5,000 kW), in Southern Kamtchatka, has started production on an experimental basis in March 1965.

21. In view of the enormous distances which separate the power plants from the consumer centres in the Soviet Union, the extension of the high-voltage supply network is of prime importance. At the end of 1965 a high voltage network with a total length of 306,800 km. was in existence. The most important results of the construction of high voltage lines are the creation of an integrated power system in the European part of the USSR so that it is possible to interconnect power plants totalling an installed capacity of over 40 million KW, and the establishment of inter-connection facilities with the power systems of Poland, Hungary, Rumania, Bulgaria and Czechoslovakia. Two direct lines of 1.5 million volts are to be constructed to transport the electric power from Central Asia to the consumption areas.



Work on the first one from Ekibastus to the European part of the USSR, a distance of 2,500 kms. is to begin during the 1966-1970 period; the first section of this line is planned to go into operation during 1971-1973 with completion of the entire line scheduled for 1975. The second direct current line from Itat to Chelyabinsk in the Urals, a distance of about 2,000 kms. will be built some time after the first one is completed (1976-1980). However, the problem of transporting electrical energy on such lines over such great distances is still technically unsolved; experts are expecting difficulties for the power supply of Western Russia in 1971-1975 if the solution of their problem should encounter delays.

### General Outlook

22. In order to meet the increasing requirements of the European part of the USSR and the Urals, emphasis is laid on the energy resources to be developed in the Asiatic regions. These reserves are extensive but high costs and construction delays are counteracting their rapid development. It is therefore expected that an energy shortage will be felt west of the Urals in the early 1970s. Solution of the problem lies less in technical development than in improving the social environment of Siberia.

## II. THE DEPENDENCE OF THE EASTERN EUROPEAN COUNTRIES ON THE SOVIET UNION IN THE FIELD OF ENERGY (1)

23. There is clear evidence of steadily growing ties in the energy sector between the Soviet Union and the Eastern European countries. Some details are given below by main sources of energy (2).

### Oil

24. In 1965, the Soviet Union accounted for 96% of the mineral oil imports (crude oil and petroleum products) of the European countries (excluding their mutual mineral oil trade and also excluding Rumania, which is self-sufficient) and for 55% of their mineral oil availabilities (3), as compared with 82% and 13% respectively in 1955. During this ten-year period imports of mineral oils from the Soviet Union rose by 875% which crude oil increased by 900% and petroleum products by 667%.

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- (1) In this draft, the term "Eastern European countries" includes Bulgaria, Czechoslovakia, Hungary, Poland, Rumania and the Soviet occupied Zone of Germany.  
(2) See AC/89-WP/225.  
(3) Availabilities : indigenous production + imports.

25. At present Poland and Czechoslovakia import natural gas from the Soviet Union; for the former these purchases accounted for 16% of its natural gas availabilities in 1965. Including the proposed rise in Poland's imports, the Eastern European countries will only import about 3,000 cu.m. of natural gas compared with a planned indigenous production of 36,000 million cu.m. Although Poland and Czechoslovakia would thus each be dependent in the future on the Soviet Union for 50% of their availabilities, no particularly strong ties between the other European countries as a whole and the Soviet Union are to be expected by 1970 in the natural gas sector.

#### Coal

26. Imports of coal by the Eastern European countries (without their mutual coal trade) consist only of hard coal (including anthracite) and coke. In 1965 the Soviet Union accounted for 95% of imports and for 10% of total availabilities of these fuels, as compared with 71% and 3% respectively in 1955. While total imports of these countries from the Soviet Union rose by 182% from 1955 to 1965, the imports of solid fuel increased by 332%, of which hard coal rose by 477% and coke by 80%.

#### Electrical Energy

27. In 1965 the share of the Soviet Union in the total imports of electrical energy into the Eastern European area amounted to 73%, whereas it was 0 in 1955. Its share in total availabilities amounted, however, only to 1%. Under the existing plans, this share is to be considerably increased by 1970 and will rise for Hungary and Bulgaria to as much as 14 and 13% of respective availabilities. Czechoslovakia and presumably also Rumania, whose territory will be crossed by the 220 KV line under construction as well as by the planned 400 KV line connecting Bulgaria to the Soviet Union, will be likely to import more power from the Soviet Union than before once these lines have been completed. By 1970, imports of electrical energy from the Soviet Union into the Eastern European countries may increase five-fold. The central transformer station for the deliveries of electrical energy from the Soviet Union is located at MUKATSHEVO near the Three-Country Corner (Czechoslovakia/Hungary/Rumania). This centre distributed 90% of the Soviet electricity exports to the Communist countries in 1965.

#### Nuclear Energy

28. Limitations on the possibilities of meeting expanding requirements for power from conventional sources of energy, and the availability of uranium in Eastern Europe, have turned the attention of planners to nuclear

plants has been carried out only after considerably delay, probably due to technical backwardness, lack of investment capital, and half-hearted assistance given by the USSR. At the end of 1966 only one nuclear energy plant had started operating in Eastern Europe (it was located in the Soviet Occupied Zone of Germany); a second one is under construction in Czechoslovakia; all the other countries are still in the planning stage.

29. The following table shows the situation in detail :

Nuclear Energy Capacities (1000 kW) of the Eastern European Countries (1)

	End of 1966 in operation	under construction	Planned 1970	Total by 1975	Capacity 1980
Bulgaria	-	-	-	800	1,600 <sup>+</sup>
CSSR	-	150	150	1,250	2,500
Soviet Zone of Germany	70	-	79	280 <sup>+</sup> or 490	2,000
Poland	-	10 <sup>++</sup>	10	320	1,100
Rumania	-	-	-	500- 600	1,000- 1,200 <sup>+</sup>
Hungary	-	-	-	400	800
Yugoslavia	-	-	-	300	800
Total	70	160	300	4,870	10,800

+ Estimated planning  
++ Nuclear energy test plant

30. The long time required for construction of the two first power stations is attributable to slow deliveries from the USSR and in the case of the CSSR power reactor to the complexity of design and the lack of technical know-how of the Czechoslovak industries

31. All Eastern European countries possess uranium ore deposits; however, they are still unable to produce metallic uranium. Moreover, none of these countries has any facilities for uranium enrichment or the regeneration of irradiated combustion elements. They all depend on the assistance of the

(1) See Table I in AC/89-WP/209 as amended by AC/89-WP/209/2

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USSR or of Western countries in this field. According to information submitted by the United Kingdom delegation, it seems that Czechoslovakia now has a pilot plant for producing fuel elements, which will start operating in 1967 or 1968; some delegations, however, have expressed doubts that the USSR could accept the construction of such a plant as it would be in opposition with her policy aiming at maintaining, by means of contractually agreed fuel deliveries, permanent control over nuclear power plants in Eastern European countries built with Soviet assistance.

32. During 1966, the USSR signed agreements with Bulgaria and Hungary on the construction of the first nuclear energy plants in these countries : a station with an installed electric power capacity of 800.000 kW scheduled to be in operation by 1974 in Bulgaria and another one in Hungary, consisting of two 400.000 kW units, the first of which will be in operation in 1975. There are some indications that Rumania might buy a natural uranium fueled reactor, but at this stage no further information is yet available on such a project. Rumania has asked American and Western European firms to submit offers for a nuclear energy plant, it is not known whether similar negotiations are taking place with the USSR. No information is available so far on the other projected plants for Czechoslovakia (although it seems that an offer has been made by the USSR), and Poland.

33. Nuclear plans undoubtedly reflect a good deal of wishful thinking and there is hardly a chance that they will be even remotely fulfilled. Most Eastern European countries have so far failed to provide in due time the investment funds for their conventional power stations. The construction cost of an atomic energy plant is on average twice as high as that of a conventional energy plant of the same capacity, at least in the Communist countries. The pace of nuclear power plant development in Eastern Europe will depend to a large extent on the degree of Soviet assistance.

#### General Outlook

34. While the USSR's general share in imports of the Eastern European area as a whole - with major variations between the individual countries - rose in terms of value from 33% in 1955 to 35% in 1965, its share in the imports of energy (converted into hard coal units) increased from 77% to 96% during the same period. Although the Soviet Union's contribution to the energy availabilities of the area is rather small, with the notable exception of oil, it is nevertheless for many countries of great and even vital importance. As the economic ties which are established for deliveries of such a nature must necessarily be based on long-term agreements, it appears from the available information that Eastern European countries will rely

increasingly on the Soviet exports of energy until 1970. As a result, the growth of energy imports by the Eastern European countries from the Soviet Union will be far above the average growth of their general imports from the USSR.

35. In recent years, in spite of a general tendency to develop their imports from the West, the Eastern European countries have become considerably more dependent on the Soviet Union in the field of energy while simultaneously increasing their flexibility by trying to diversify their foreign trade. This has been shown by the establishment of pipelines for oil and gas, the interlinking of electricity networks and Soviet deliveries of large scale units of power station equipment. Due to the present pattern of energy exchanges within COMECON, there is a dependence of the Eastern European countries on the USSR and consequently a strong economic lever for the latter.

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