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ECONOMIC COMMITTEE

CMEA: THE OIL SITUATION 1975-1985

Note by the Secretary

The attached note, prepared by the United Kingdom Delegation is circulated to the members of the Committee as a useful background information paper.

(Signed) M. van den BULCKE

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This document includes: 3 Annexes

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CMEA: THE OIL SITUATION 1975-1985

Note by the UK Delegation

INTRODUCTION

1. In recent years there have been signs of a basic change in the energy situation of the members of the Council for Mutual Economic Assistance (CMEA)(1). Although as a group it remains a net energy exporter this has been achieved primarily as a result of rising Soviet exports, all other member countries with the exception of Romania having become net importers. This rising import dependency in the non-Soviet CMEA has resulted not only from the rapid rise in energy consumption which has outstripped domestic production but also from a shift in the primary energy balance away from solid fuels towards oil and natural gas (it is worth noting however that solid fuels continue to play a more significant part in the CMEA energy balance than in the developed West).

2. The increasing need for oil at first caused few problems, production of oil in the USSR being adequate to meet not only her own needs and the greater part of the import requirements of her CMEA partners, but to supply growing quantities of oil to the West. Now, however, falling Soviet oil production growth rates and uncertainties about the long-term prospects for the industry are giving rise to anxiety about the energy balance of the USSR itself and possible repercussions of any oil shortage on the CMEA as a whole.

PRODUCTION

A. USSR(2)

1976-1980

3. In the current plan period, despite technical problems, rising output from the oilfields of West Siberia, Komi and to a lesser extent Kazakhstan (including Mangyshlak) and the Caucasus should not only compensate for the decline in the older fields of the Volga-Urals and North Caucasus basin but should also enable production to reach at least 620 million tons in 1980. This represents an average annual growth rate of only 5% in this period as compared with the 6.7% p.a. achieved during the last plan (1971-1975). The

(1) USSR, Bulgaria, Czechoslovakia, GDR, Hungary, Poland Romania, Cuba, Mongolia. For ease of comparison Cuba included in CMEA throughout paper, although she did not join until 1972.

(2) See Annex I for field by field analysis.

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achievement of even this lower growth rate will not prove easy but the Soviet authorities are taking steps to overcome the problems hampering production, in particular shortages of specialised equipment such as submersible pumps, quality drill pipe and chemical reagents for secondary recovery. Indeed it is noteworthy that Soviet officials have shown little concern at their ability to get at least within striking distance of their 1980 plan target of 640 million tons.

1980-1985

4. Beyond 1980 prospects are less favourable. It is thought unlikely that any major new producing regions either on or offshore will come into operation before the late 1980s and therefore production in the 1980-1985 period will continue to rely on the ones outlined above. However, it is believed that sufficient reserves will remain in these areas, either in existing fields or in new areas in close proximity to them, to enable production to increase, albeit at a much reduced rate. This will depend however on the use of more sophisticated methods of secondary and tertiary recovery, as indicated by the USSR's current negotiations for gaslift technology for West Siberia, and may well lead to a substantial rundown of proven reserves. Extensive exploration will therefore be necessary in this period in order to discover new fields for exploitation in the 1985-1995 period. It is estimated that at the reduced growth rate total oil production would still reach a minimum of some 650 million tons in 1985.

OTHER CMEA

5. With the exception of Romania, the other CMEA member countries are only poorly endowed with oil and rely heavily on imports to meet their needs for this fuel. Even in Romania production is now apparently reaching a peak at some 15 million t.p.a. and in 1976 Romania joined the others as a net oil importer for the first time. Considerable effort is being devoted to exploration throughout the non-Soviet CMEA but it seems unlikely that total production will exceed 18-20 million tons in either 1980 or 1985.

Projected CMEA Oil Production - Million tons

	1965	1970	1975	1980	1985
USSR	243	353	491	620-640	650-700
Other CMEA	15	16	17	18	20
CMEA Total	258	369	508	638-658	670-720

REQUIREMENTS

Soviet Internal Requirements

6. The prospect of falling production growth rates, together with the desire to maintain an exportable oil surplus has awakened the Soviet authorities to the need to curb the expansion of oil consumption. Considerable emphasis is now being placed on oil saving measures including a revival in the use of coal and other solid fuels in power generation, thus releasing oil for more efficient uses elsewhere. During the current plan apparent oil consumption (production less net exports) is expected to rise by an annual average of under 5% to reach 470-480 million tons in 1980, substantially less than the 7.4% average of 1965-1975. After 1980 much will depend on the rate of production achieved, any shortfall in output increasing the incentive to economise. However, the degree to which further savings can be made will be limited. In the absence of alternative energy supplies a serious shortfall in oil production would restrict the general level of energy consumption which in its turn would affect economic growth.

7. Efforts to curb waste and to increase the efficiency with which oil is utilised will continue but it appears unlikely that the growth in oil consumption could be reduced below some 4% p.a. in the 1980-1985 period. Any relaxation in conservation measures however will result in total Soviet internal oil demand rising above the 570 million tons here projected for 1985, perhaps towards the 600 million tons mark.

Other CMEA internal requirements

8. All the other members of CMEA rely, to a greater or lesser extent on imported oil, and this dependence is rising. Whilst the USSR was willing to meet nearly all of their import needs this caused comparatively little concern. Soviet oil, made available for soft currencies and at a concessionary price, cushioned these countries against developments in the world market. Now, however, the USSR has informed her CMEA partners that she is no longer willing to meet in full their rising import needs and that they must seek additional supplies elsewhere. Faced by this prospect, rigorous attempts to save oil are being made throughout the smaller CMEA countries. As in the USSR attention is being focussed on the revitalisation of the coal industry and, in the large term, the development of nuclear power. However, the degree of substitution possible in the 1975 to 1985 period is limited and it is estimated that oil consumption in the non-Soviet CMEA will continue to expand from some 87 million tons in 1975, to around 115 million tons in 1980 and may reach a possible 160 million tons in 1985.

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CMEA Apparent Oil Demand million tons

	1965	1970	1975	1980	1985
USSR	180	262	368	470	570
Other CMEA	35	60	87	115	160
CMEA TOTAL	215	322	455	585	730

TRADE

USSR

Imports

9. From the figures given so far it can be seen that the USSR is expected to continue to produce considerable quantities of oil in excess of her own internal requirements, and will remain a net oil exporter throughout the period under review.

10. Purchases of oil by the USSR are expected to increase from 7.5 million tons of oil in 1975 to 15 million tons in 1980, and a possible 30 million tons in 1985, with virtually all such supplies continuing to go, as at present, on Soviet account to third parties. It remains possible however that the USSR might physically import oil for logistic reasons. The USSR can be expected to seek to obtain the additional supplies as far as it is possible for soft currency, by conducting barter trade agreements, or as repayment for economic or military aid. However, it is believed that the scope for such agreements is limited and the USSR is therefore likely to have to purchase at least a percentage of the additional supplies for hard currency.

Exports

1976-1980

11. It is estimated that gross Soviet exports of crude oil and oil products will increase from 130 million tons in 1975 to nearer 165-185 million tons in 1980 depending on the level of production achieved. Net oil exports will therefore rise from 123 million tons to 150-170 million tons in that period.

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12. In 1980 the CMEA countries (including Cuba and Mongolia) are expected to receive some 88 million tons of Soviet oil including deliveries on Soviet account, the other Communist countries a further 7 million tons, thus leaving 70-90 million tons for the Free World. Exports to hard currency markets might then account for 55-75 million tons.

1980-1985

13. Oil exports are expected to peak in the 1980 to 1985 period, as production growth rates fall still further. Gross Soviet oil exports in 1985 could however total 110 to 160 million tons and net exports 80-130 million tons. If it is assumed that deliveries to the CMEA (whether of Soviet oil or oil on Soviet account) are held constant at some 88 million tons, and assuming that the other Communist countries receive the reduced quantity of 5 million tons, then exports to the Free World could fall to 17 to 67 million tons in 1985.

Projected Soviet Oil Exports - million tons

	1970	1975	1980	1985
Production	353	491	620-640	650-700
Imports	4.6	7.5	15	30
Consumption	261.8	368.1	470	570
Exports of which to	95.8	130.4	165-185	110-160
- CMEA	46.5	71.7	88	88
- other Communist	3.9	6.0	7.0	5.0
- Free World (hard currency)	45.4	52.7	70-90	17-67

Other CMEA

14. From the figures outlined earlier it will be apparent that despite their efforts to curb consumption the non-Soviet members of CMEA face a rising demand for oil imports, an increasing percentage of which they will have to obtain from the Free World.

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Oil Balance of non-Soviet CMEA - million tons

	1970	1975	1980	1985
Production	16	17	18	20
Consumption	59	90	116	160
Exports	10	14	13	10
Imports of which from	53	87	111	150
- USSR	46.5	72	88	88
- Other	6.5	15	23	62
Net Imports	43	73	98	140

15. The financing of these imports will cause severe problems for the economies of these countries, which are already experiencing balance of payments problems and in most cases already have substantial levels of indebtedness to the West. The increased purchases of Western oil by the non-Soviet CMEA countries will by 1985 exceed the net exports of the USSR to the West. Thus whilst in 1975 the CMEA as a whole was a net exporter of oil, by 1985 it will have become a substantial net importer, having to compete for oil in the world market.

Estimated overall CMEA oil balance - million tons(1)

	1965	1970	1975	1980	1985
Production	258	369	508	638	670
Consumption	215	322	458	586	730
Exports	73	105	144.5	178	120
Imports	30	58	94.5	126	180
Net position +surplus -deficit	+43	+4	+50	+52	-60

(1) Assuming that Soviet oil production reaches the lower of the two figures projected.

REPERCUSSIONS ON THE ENERGY BALANCE

16. During the last 15 years oil consumption has risen steadily in all the CMEA countries(1) and has tended to increase its share in total primary energy consumption. Despite efforts to curb the growth of oil consumption and to re-emphasise the use of coal this trend is expected to continue and it is thought likely that by 1985 oil may have become the major single source of primary energy in the CMEA.

CMEA Primary energy consumption - %

	1960	1965	1970	1975	1980	1985
Coal and Coke	67.7	57.4	48.8	42.1	38.7	34.9
Oil	23.2	26.2	31.0	34.8	35.7	37.5
Natural Gas	8.3	15.3	19.0	22.0	23.9	25.6
Primary Electricity	0.8	1.1	1.2	1.1	1.7	2.0

17. The CMEA as a whole is a net exporter of energy and is expected to remain so until at least 1985, albeit by a greatly reduced quantity. This favourable position is due almost entirely to the membership of the energy rich USSR whose exports of oil and natural gas to non-members more than compensate for the necessary imports of her CMEA partners. In the long-term there are ambitious plans for the development of nuclear power, but these are unlikely to make any major impact until the mid-1990s and beyond.

IMPLICATIONS FOR THE ECONOMY

18. There is a close correlation in the USSR between the growth of GNP and energy consumption. The following equation has been evolved for energy demand on the basis of data for the 1960-1975 period:

$$\text{Energy demand} = 0.98997 \left[\frac{\text{SGNP}(2) + 19,1003}{0.3435} \right] + 11.1395$$

(1) For details see Annexes II and III

(2) GNP at 1970 constant prices smoothed by use of appropriate equation.

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In the following table arbitrary rates of growth have been applied to GNP from 1975, and the values of the GNP determined have been placed in the above equation to derive a value for energy demand in Standard Fuel Equivalent (SFE).

	GNP (billion roubles 1970 prices) 4% average annual growth	Energy demand (SFE million tons)	GNP (billion roubles 1970 prices) 4% average annual growth to 1980: 2.5% a year 1981-1985	Energy (SFE million tons)
1976	480,908	1,452,168	480,908	1,451,837
1980	562,594	1,687,587	562,594	1,686,983
1985	684,482	2,038,870	636,523	1,900,651

19. On the estimates presented in this report, we believe that the USSR will have available for consumption in 1985 energy amounting to 2,073 million tons SFE. (Annex II, Table 2). It would seem therefore that energy will not act as a constraint on economic growth up to an average annual increase in GNP of 4% a year in real terms up to 1985. The table in paragraph 18 above also shows, however, that any marginal disruption of energy supplies, say up to 7%, could have a severe effect on GNP growth. On present evidence, we consider that problems in the agricultural sector (e.g. more than the average bad harvests) and in the crucial area of labour and capital productivity will be more important constraints on economic growth than the availability of energy. It is arguable in fact that if GNP growth falls to an average of 3% a year in 1981-1985, due to the agricultural and factor productivity constraints, the Soviet Union might have a somewhat greater exportable energy surplus than we have presented(1) in this report.

(1) See Annex II

PROSPECTS FOR SOVIET OIL PRODUCTION TO 1985

1. 1976-1980

In the current plan, despite production difficulties, rising output from West Siberia, Arctic Komi and to a lesser extent Kazakhstan and the Caucasus should not only compensate for the decline in the older fields of the Volga-Urals and North Caucasus basins but should enable production to reach at best the plan target of 640 million tons [12.8 m bpd] and at worst 620 million tons [12.4 m bpd].

2. 1980-1985

Beyond 1980 prospects are less favourable, but production is expected to continue to increase in the regions mentioned above and this, together with major efforts to stem the decline elsewhere, should result in total oil production rising by some 1% to 1.7% p.a.

It is not thought likely that any major new producing oil region will come into operation during this period, although efforts to prepare such fields for exploitation in the 1985-1995 period will intensify.

PROSPECTS BY REGION

3. VOLGA-URALS

Production from the Volga-Urals oil region peaked in 1975 and it is thought improbable that this decline can be arrested, despite increased extraction from the Perm and Udmurt fields and the massive use of secondary and tertiary recovery techniques.

(a) Bashkir

Production during the 1970-1976 period remained roughly constant at 40 million tons per annum. At best this situation should continue until 1980 with the continued use of enhanced recovery techniques helping to stem the decline at the older deposits, whilst efforts to discover new small fields continue. Drilling depths are increasing in the hope of striking deeper oil horizons in the 4,000-7,000 million region. However, Soviet technology is somewhat deficient in this respect and it seems unlikely that major finds will result in the period up to 1985. It is thought that at best output in 1985 will be 15% below that of 1975.

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(b) Kuybyshev

These fields have been declining steadily for some time despite increased recovery rates and continued exploration. The rate of decline is likely to accelerate as diminishing returns set in and by 1980 output is likely to be of the order of 28 million tons. After 1980 the fall in output may begin to level out and production in 1985 could be around 25-26 million tons.

(c) Perm

Unlike either Bashkir or Kuybyshev production at Perm is experiencing slow but sustained growth. Exploration is being extended into the north of the oblast and new improved techniques are facilitating the working of previously neglected deposits of viscous crudes. If production expands according to plan output should reach 28 million tons in 1980 and some 30 million tons in 1985. At worst figures of 25 million tons for 1980 and 27 million tons for 1985 appear feasible.

(d) Orenburg

Exploration is continuing and new finds are frequently announced but these are small and of limited potential. However, it is thought that output will continue to rise, albeit slowly, and at worst will plateau at the 13 million tons p.a. mark.

(e) Udmurtia

Production from Udmurtia has been rising steadily in recent years but from a low base. Deep drilling is now in progress throughout the USSR and extraction rates should increase to over 6 million tons in 1980 and 7 million in 1985.

(f) Tataria

For long the major oil producing region of the Union, the Tataria province is now in steady decline. Output peaked in 1975 then fell by an initial 2% in 1976. The rate of decline is thought likely to increase throughout 1976-1980 and by 1980 production could be as low as 86 million tons. If this is the case it should then be possible to hold production at this level for several years, but a further small decline could occur.

(g) Lower Volga

Despite improved means of production, increased efficiency and increased drilling depths, it seems unlikely that a decline in production can be averted. By 1980 output may have fallen to 6 million tons and a further fall to 5 million by 1985 is not unlikely.

It is noted that according to our "best case" estimates output from the Volga-Urals fields in 1980 should be of the order of 207 million tons, 32% of national output. This compares with a Soviet estimate that by 1980 these fields would be responsible for 31.5% of the total.

4. NORTH CAUCASUS

With the sudden and drastic decline at the Grozny fields of Chechen-Ingush the total output for the region has been seriously depressed. Efforts are continuing to stem the decline (attention is once again being paid to the oil potential of the paleozoic strata) and are apparently proving moderately successful. Nevertheless, it is thought that production will at best remain roughly stable through 1985.

(a) Chechen-Ingush

Production at the Grozny fields peaked in the late 1960s and despite all efforts has declined rapidly since then to half its earlier level. Attempts to revitalise production by deep drilling to over 5,000 million are in hand and it is hoped to extend this to over 7,000 million to tap paleozoic strata. These efforts are unlikely however to do more than stabilise output.

(b) Dagestan

Drilling continues both on and offshore where the shallow waters of the Caspian are being tapped by directional drilling. Increased secondary recovery methods may hold production at 0.5 million t.p.a. from 1980 to 1985.

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(c) Krasnodar

Now drilling to depths in excess of 5,000 m. Some new fields have been reported but nothing of significance. Output is expected to continue at the 5.0-5.5 m t.p.a. level.

(d) Stavropol

At present efforts continue to try and locate new oil deposits in the deep triassic and upper cretaceous sediments [Mesozoic] and it is also planned to drill below salt domes to test paleozoic. However the complex geological nature of the area presents difficulties and there is little hope of growth in the next ten years.

5. CAUCASUS

The recent decline in oil production in the Caucasus should come to an end in the next few years as offshore oil in the Caspian becomes increasingly important and new onshore fields are tied in in Georgia. Even given a fairly disappointing growth in the offshore sector [Kaspmorneft has consistently underfulfilled plan] it seems probable that output could grow to 20 million tons by 1980 and to 25-28 million by 1985.

(a) Azerbaijan

Onshore production is currently stagnating despite new discoveries and the renewed working [using steam injection] of some heavy crudes. Offshore the potential is good but progress is proving disappointing. At present the USSR operates 4 mobile rigs in the Caspian, two of which are capable of working in only very shallow water depths. A further Soviet built jack-up is due to be launched shortly and a French built dynamically positioned drill ship to be delivered by the end of the year. By 1980 offshore production should reach 14 million tons and total output 18 million. By 1985 the figures should be nearer 20 million tons offshore and 4 million tons onshore.

(b) Georgia

Drilling activities in Georgia are continuing and new deposits have been discovered in the Tbilisi region and the Klkhidskaya lowlands. The main reservoir so far discovered is of Middle Eocene age and is at relatively shallow depth but in West Georgia oil has been struck at depth from late Miocene strata.

Production is expanding steadily, but from a low base and should reach 2 million tons in 1980 and 3-4 million tons in 1985.

6. WEST EUROPEAN RUSSIA

Despite a decline in some traditional fields, new deposits have now been discovered in both the Ukraine and Belorussia and the general prognosis for the region is for slowly rising rates of extraction up to 1985.

(a) Belorussia

Deeper drilling has discovered new oil fields in the Marmavichi and Borsuki regions and these are due to be tied in during 1977 with a resultant growth in output. Three other deposits have now been proved up and await connection by 1980 and there is considered to be a good possibility that further finds will be made. These new fields should not only halt the downward trend of recent years but should result in modest growth to 8 million tons in 1980 and 10 million in 1985.

(b) Ukraine

Extensive exploration is currently taking place in the Carpathian foredeep of West Ukraine. Promising results have been obtained from depths of 4,000-5,000 m and plans are in hand to tap the potentially rich 7,000 m horizon. The Lvov, Skole and Ivano-Frankovsk regions have all reported promising strikes and yields should increase as these come on stream.

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The Donetsk-Dnepr depression is also receiving renewed attention and efforts are being concentrated on the devonian, permian and upper and lower carboniferous strata. A well at Krasnokutsk near Kharkov went into operation in 1976 and a large group of bores are due to be sunk in the adjacent areas by 1980. Production from the Crimean fields is in decline, despite efforts to locate new structures both onshore and offshore in the shallow waters of the Sea of Azov. So far the main potential appears to be for gas but further exploration will have to await the provision of sophisticated mobile rigs and ancilliary equipment capable of operation in the deeper waters of the Black Sea proper. In total production should decline slightly to reach about 10 million tons by 1980, but should then remain constant for at least the 1980-1985 period.

7. KOMI

The devonian reefs of Komi are considered to have a high oil bearing potential and already the Usinsk and Vuzeyskoye fields are yielding annually increasing quantities of oil. A further, albeit smaller, deposit at Savinoborskoye is now being linked in together with two adjacent fields. Silurian oil has been discovered at Sredno-Makorikhinskoye and efforts are also being made to reactivate the mining of heavy crudes at Yarega.

The potential of the area is generally thought to be very high, with a possible extension of the oil bearing formations under the Barents and Kara seas to the North. However, the technical difficulties of operating in the arctic zone are tremendous and long lead times are expected before the area reaches its optimum production rate. Despite this the necessary infrastructure is being installed and output should be able to reach the planned 25 million tons in 1980. After 1980 production growth is less certain but a 1985 level of 30 million tons is not impossible to visualise.

8. BALTIC

Production of oil from the Baltic regions of Latvia, Lithuania and Kaliningrad is of fairly recent date and levels are extremely small. However, recent discoveries in Kaliningrad have given rise to optimism and output is rising slowly but steadily. The exploration programme is now being extended to the offshore zone and oil was struck in the shallow bay of Kurskiy. However the oil bearing potential at the Southern Baltic Continental Shelf is not thought to be great.

Production from the Baltic region should rise slightly to 2 million tons in 1980 and to nearer 3 million tons by 1985.

9. KAZAKHSTAN

Despite the peaking of production at Emba in 1975 and the somewhat slow development of the Mangyshlak oil deposits the potential for the area is good. Output should reach 25 million tons in 1980, and given a satisfactory solution to the problems currently inhibiting the Mangyshlak development should rise to 33-40 million tons by 1985. A new oil region has been discovered on the Buzachi Peninsula and the Soviet authorities hope to begin production here shortly. In particular 5 deposits have been located close to the Mangyshlak-Kuybyshev pipeline and should come into operation within the next 5 years.

(a) Emba

The older oil fields are now being revitalised using improved enhanced recovery techniques and this together with the discovery of new multi-strata deposits should enable production to be held at the 4 million tons p.a. level until the Buzachi deposits are brought into production.

(b) Mangyshlak

This region has very good long term potential with ultimate production rates of 50-80 million t.p.a. having been quoted. However, the oil is heavily waxed and its extraction raises many technical problems not encountered elsewhere. Once these are resolved production could rise sharply as the necessary infrastructure has now been installed. Production should reach 22 million tons by 1980 and could increase to 35 million tons by 1985.

10. WEST SIBERIA

Since 1970 the rapidly developing West Siberian oil-fields have not only compensated for the falling output in European Russian but have accounted for an estimated 75% plus of the total growth in Soviet output. In the next five years it is predicted that these fields will account for over 90% of the increase in output and by 1980, with total output of over 300 million tons, will produce half the national output of oil. Beyond 1980 much will depend on the depletion policy adopted. At the present time it is estimated that proven reserves in the area are adequate to enable output under a Western style conservation programme

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to reach at least 325 million tons in 1985. It is possible that technical problems may depress this figure. The USSR is known to be concerned that the policy of water flooding commonly used throughout the USSR causes problems as the water cut increases. They are therefore seeking Western technology including a comprehensive gas injection system for the Tyumen fields in order to improve prospects.

(a) Tyumen

The Tyumen oblast contains vast reserves of mesozoic oil. At present operations are centred in the South where the major Samotlor field itself is said to contain over 14 billion barrels of proved and probable reserves. Production at this field is expanding rapidly and is now due to reach its optimum level of 120 million t.p.a. in 1978 and to maintain this for several years. Other smaller fields such as Federovskoye and Kholmogorskoye provide useful incremental quantities of oil although the Shaim and Ust Balyk fields are now apparently in decline. Although no field of the size of Samotlor has been discovered new strikes are constantly reported and major deposits are thought to exist in the yet unexploited Salym region. Ultimate output from this area may reach 60-80 million t.p.a.

Widescale exploration is now taking place not only in the vicinity of existing fields but also in the North of the oblast where oil strikes have been made between and beneath the natural gas deposits. Fairly extensive deposits of highly viscous oil have been found at Russkoye near the river Taz and the Megion oil directorate is carrying out intensive studies throughout the arctic zone.

(b) Omsk

Exploration in the Omsk oblast has resulted in oil strikes in both the upper jurassic and paleozoic strata. These finds are yet to be evaluated but it is thought probable that commercial exploration could begin by 1985.

(c) Tomsk

Oil has been produced from the paleozoic strata in the Urmanskoye region and a new field on the Vasyugan deposit is now being tied in. By 1980 a further 3 fields should be in operation thus raising output to 10 million t.p.a.

(d) Novosibirsk

Paleozoic oil has been proved to exist at Malaya Icha and mesozoic oil at Verkhnyaya-Tarka fairly close to the existing pipeline and requiring only a relatively modest capital outlay for its exploitation. In addition in the South of the area mesozoic oil has been discovered close to the trans-Siberian railway.

(e) Kurgan

Deep drilling is taking place at Katevo to depths of over 4,000 m. No finds have yet resulted but efforts are continuing.

11. CENTRAL ASIA

With the exception of Turkmenia, the Central Asian republics have only limited potential for oil. Indeed production in Uzbekistan, Tadzhikistan and Kirghizia has peaked and is now declining, and despite reported finds in the vicinity of the region's rich gas fields it seems unlikely that this trend can be reversed.

The outlook for Turkmenia however is more hopeful, particularly in the longer term. At present, the Kotur Tepe field accounts for half the republic's output, but well pressures are falling despite gas injection and output is in decline. However, exploration has revealed what are described as "unprecedentedly rich" deposits of oil at the Banka Lam fields and output from here, together with increased extraction at the Chelenkensky and Okarem fields may boost output in the 1980-1985 period. It is estimated therefore that in 1980 output from the region as a whole should total some 15-16 million tons but by 1985 could be as high as 18 million tons.

12. FAR EAST

At present the only producing oil wells in the Far Eastern USSR lie on the island of Sakhalin in the East Siberian anticlinorium. The oldest producing field, the Okha, is now in decline despite the intensive use of water and steam injection. New finds have been made at Mangi and it is hoped that these will help to stem the decline in output and that by 1980 production may reach 3 million tons. Explorations are now extending into the offshore zone with the first well due to be spudded this year. However even if a commercial strike is made quickly it is unlikely that more than token quantities could be produced before the late 1980s.

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Exploration is also taking place at Kamchatka where the geological conditions are favourable. Geophysical surveys have been carried out in the most promising areas and some exploratory drilling has taken place but no commercial finds have yet been made. Traces of oil have also been found in Magadan but once again there have been no commercial finds.

13. EAST SIBERIA

As yet there is no commercial oil production in East Siberia. Although vast reserves are expected to exist in the area its remoteness from the existing centres of consumption and the resultant high cost of any development here have hitherto mitigated against any serious programmes of exploration. Now however, with the decline in reserves in the West, interest in the area is growing. However it seems unlikely that, given the long lead times in oil development, it could contribute more than small quantities of oil much before 1990.

(a) Krasnoyarsk Kray

Krasnoyarsk Kray is believed to contain some 45% of the potential oil reserves of East Siberia. The construction of the Baikal-Amur Magistrale railway is likely to lead to the intensification of prospecting activities. The Balakhnaya rise with its rich deposits of cambrian sediments is thought to be particularly promising. Traces of oil have so far been found along the river Yenisey at Počkamennaya Tunguska in the Evenki National Okrug, at Ust Yenisey and Yuzhno-Tigynskaya, the latter two finds being in paleozoic strata. Any commercial finds in these areas could be linked in to the existing pipeline at Krasnoyarsk.

(b) Yakutia

Most of the effort in Yakutia is currently going to the developing natural gas industry. However, oil has been found by wildcats in Priverkhoyenskaya and the Anabaro-Lenskiy regions. Oil has been found in the Upper Vilyuy basin and at several locations in the North Lena valley.

Table 1. USSR: PROJECTED OIL OUTPUT BY REGION tons million

	1970	1975	1976	1980		1985		
				Max	Min	Max	Min	
VOLGA-URALS								
Bashkir	40.7	40.0	40.0	40	36	35	32	
Kuybyshev	34.9	33.8	33.0	28	28	26	25	
Perm	16.1	22.5	23.0	28	25	30	27	
Orenburg	7.4	12.0	12.7	13	13	15	13	
Udmurt	0.5	3.0	4.0	6.5	6	7.5	7	
Lower Volga / Saratov	7.0	7.0	7.0	6.0	6	6	5	
Tataria	100.4	103.7	102.0	86	86	86	83	
Sub-total	206.5	222.0	221.0	207.5	200.0	205.5	192.0	
NORTH CAUCASUS								
Chechen Ingush	20.3	20.0		8	8	10	8	
Krasnodar	5.5	5.5	6.0	5.5	5.5	5.5	5	
Stavropol	6.4	7.0	7.0	7.0	7.0	6.5	6.0	
Dagestan	2.2	1.2	1.0	0.5	0.5	0.5	0.5	
Sub-total	34.9	33.7		21	21	22.5	19.5	
CAUCASUS								
Azerbaijan	20.2	17.2	16.5	18	18	24	22	
Georgia	0.02		0.9	2	2	4	3	
Sub-total	20.22		17.4	20	20	28	25	
WEST EUROPEAN RUSSIA								
Belorussia	4.2	8.2	6.2	8	8	10	10	
Ukraine	13.9	12.8	11.6	10	10	10	8	
Sub-total	18.1	21.0	17.8	18	18	20	18	
KOMI								
Komi	5.6	6.0	8.35	25	15	30	25	
WEST SIBERIA								
Tyumen	28.0	141.3		300		310		
Tomsk	3.4	6.5		10		15		
Other))))	
Sub-total	31.4	147.8	181.7	310	300	325 -350	310	
KAZAKHSTAN								
Mangyshlak	10.4	20.0	19.5	22	22	36	30	
Other	2.8	3.9	3.8	4	3.5	4	3	
Sub-total	13.2	23.9	23.3	26	25.5	40	33	
CENTRAL ASIA								
Turkmenia	14.5	15.5	14.8	14.5	14	17	15	
Uzbekistan	1.8	1.4	1.3	1	0.6	0.9	0.4	
Kirghizia	0.3	0.2	0.2	0.2	0.15	0.1	0.05	
Tadzhikistan	0.2	0.3	0.3	0.3	0.25	0.25	0.2	
Sub-total	16.8	17.4	16.6	16	15	18.25	15.65	
FAR EAST								
Sakhalin	2.5	2.5	2.5	3	2.5	3	2.5	
Other						1	-	
Sub-total	2.5	2.5	2.5	3	2.5	4	2.5	
BALFIC								
Kaliningrad		0.3	0.6	1	1	2	1.5	
Other		1.0	1.0	1	1	1	1	
Sub-total		1.3	1.6	2	2	3	2.5	
EAST SIBERIA								
	-	-	-	-	-	3	1	
OTHER AREAS NOT DEFINED								
	3.8		7.8				4	
GRAND TOTAL								
	353.0	491	520	648	619	700 -725	648	

PROSPECTS FOR THE SOVIET ENERGY BALANCE

1. INTRODUCTION

A series of articles in Soviet press has underlined the attempts being made to bring the growth of energy consumption in line with the now diminishing production growth rates. The USSR is a major net exporter of energy and will remain so at least until the latter years of the century. In the past the growth of production was adequate to meet not only the growing demands of the domestic economy and the bulk of the import needs of the other members of the Council for Mutual Economic Assistance (CMEA) but also to provide growing quantities for export to the West. The Soviet authorities are now aware that their energy reserves, although substantial, are not inexhaustible. Production growth rates are falling as the most accessible deposits of coal, oil and gas in the West of the country are depleted and greater reliance must be placed on the development of reserves in remote and inhospitable areas in Siberia, the Arctic North and Central Asia.

In 1973 the USSR informed the CMEA members that it was no longer willing to meet in full their rising demands for oil and took steps also to increase the price of such supplies. Measures are now being taken to restrain the growth of energy consumption, and in particular of oil consumption at home and to increase the efficiency of its utilisation.

2. PRIMARY ENERGY CONSUMPTION

Annual figures for energy consumption appear in the Soviet Statistical Handbook in a table entitled "the Balance of Fuel-Energy Resources". (See Table 1). These figures are believed to include certain elements of secondary fuels (e.g. refinery and coal gas) and synthetic fuels usually excluded from a study of the primary energy balance. However they do provide a useful guide to Soviet energy consumption and reveal trends very similar to those produced from a MOD UK study of apparent primary energy consumption calculated on the basis of production less net exports. (See Table 2 and below).

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Annual growth rates - Soviet energy production and consumption

	Annual percentage growth						
	1960-5 [average]	1965-70 [average]	1971	1972	1973	1974	1975
Production							
Soviet	6.7	4.7	4.9	5.1	4.9	5.5	5.9
MOD UK Est	7.4	5.2	5.2	4.9	5.1	5.5	6.3
Consumption							
Soviet	5.8	4.5	5.3	6.2	4.6	4.4	5.3
MOD UK Est	6.6	5.0	5.2	6.0	4.9	4.6	5.5

From these figures it is apparent that in most years production has expanded faster than consumption; the two years when this was not the case, 1971 and 1972 being followed by two years of sharp restraint. In 1975 however consumption again accelerated and given the less favourable long-term prospects for production and the need to maintain exports the USSR was again forced to apply controls in 1976 and 1977. Thus it is now estimated that during the Tenth Plan, 1976 to 1980 consumption will grow by an average of some 4.4% p.a. and production by 4.7% p.a.

3. CHANGES IN THE FUEL BALANCE

Whilst, in general, production growth has exceeded that of consumption the position alters if individual fuels are studied. (See Table 3). In the past oil and natural gas have contributed the bulk of the increase in both energy production and consumption, and thus the share of hydrocarbons in the energy balance has increased steadily.

	Structure of Soviet Primary Energy Consumption %							
	1960	1965	1970	1971	1972	1973	1974	1975
Coal and Coke	53.2	43.2	36.9	36.0	34.9	34.0	33.2	32.3
Oil	28.0	30.7	34.8	35.2	36.2	37.2	38.1	38.2
Natural Gas	8.9	17.9	21.9	22.7	22.8	23.1	23.7	24.5
Primary Electricity	1.0	1.2	1.4	1.4	1.3	1.2	1.3	1.2
Other(1)	8.9	6.9	5.0	4.7	4.8	4.5	3.7	3.8

(1) Comprising peat, shale and firewood

In 1960 therefore oil and gas accounted for 37% of Soviet energy consumption but by 1975 this figure had risen to over 62%. The share of solid fuels fell from 62% to 36% in the same period. Considerable emphasis has been given in recent Soviet statements to the need to use "locally derived" fuels (i.e. coal, shale, peat) rather than to rely always on the import of high value fuels, normally oil and gas, from other regions. In general efforts are being made to reverse the trend for the decline in the use of solid fuels to enable oil and gas to be directed to more efficient and productive uses, as in the petrochemical industry. In the Tenth Plan mention was made of the intention of changing the fuel base of certain existing power stations from oil to coal whilst numerous new power complexes are to be established to utilise the supplies of cheap, but relatively low calorific value, brown coal and lignite. Thus, according to our estimates, the consumption of coal will rise by an average of 3% p.a. during the current plan, the highest rise of recent years, and that of oil by only 4.5-5.0%. By 1980 therefore although the share of coal in total consumption will have fallen, it is still expected to stand at close to 30% whilst that of oil may have levelled out at around 38-39%. Natural gas is continuing to increase its share of the total which is expected to be around 26% by 1980 and may well replace oil as the largest single source of energy by 1990.

Table 1

BALANCE OF FUEL-ENERGY RESOURCES - million tons SFE(1)

	1960	1965	1970	1971	1972	1973	1974	1975
TOTAL RESOURCES	836.5	1121.5	1399.8	1474.5	1556.5	1636.6	1747.1	1850.7
FUEL PRODUCTION	692.8	966.6	1221.8	1284.9	1353.8	1420.6	1497.1	1590.3
HYDRO-ELECTRIC POWER	6.3	10.0	15.3	15.5	15.1	15.0	16.2	15.5
IMPORTS	(2) 10.7	9.1	14.1	23.4	35.3	44.1	31.3	35.1
OTHER RESOURCES	32.7	35.5	36.5	35.8	35.8	38.1	41.1	41.0
STOCKS / START OF YEAR	94.0	100.3	112.1	114.9	116.5	118.8	161.4	168.8
TOTAL DISTRIBUTION	836.5	1121.5	1399.8	1474.5	1556.5	1636.6	1747.1	1850.7
CONSUMPTION / including transport and storage loss	678.0	897.8	1117.9	1177.5	1250.1	1307.3	1364.2	1436.1
EXPORTS	59.8	116.7	167.0	180.5	187.6	205.7	214.1	237.7
STOCKS / END YEAR	98.7	107.0	114.9	116.5	118.8	123.6	168.8	176.9

(1) Standard fuel equivalent 1 ton SFE 7,000 Kilocalories

(2) Not defined may include nuclear power, certain secondary fuels such as coke and oven gas, furnace gas. May also include natural liquids, synthetic fuels, etc.

Source Soviet statistical handbook 1976

Table 2

PRIMARY ENERGY BALANCE - million tons SFE

	1960	1965	1970	1971	1972	1973	1974	1975	1980	1985
TOTAL RESOURCES	666.4	947.7	1230.2	1301.6	1372.4	1449.1	1513.7	1611.7	2058.3	2414.3
FUEL PRODUCTION	650.0	929.4	1198.2	1260.4	1323.2	1391.0	1466.0	1560.2	1975.0	2273.4
- COAL	330.3	375.3	409.1	419.7	429.3	439.2	449.1	460.3	525.8	574.9
- OIL	211.4	346.4	502.5	537.3	572.6	613.5	656.3	701.8	886.6	929.5
- NAT GAS	54.4	149.8	233.5	250.6	264.6	282.4	311.4	345.7	517.6	714.0
- PEAT	20.4	17.0	17.7	16.7	21.2	20.2	13.9	16.9)	
- SHALE	4.8	7.4	8.8	9.5	9.9	10.6	11.3	11.7) 45.0	55.0
- FIREWOOD	28.7	33.5	26.6	26.6	25.7	25.1	24.0	23.8)	
HYDRO ELECTRIC POWER	6.3	10.0	15.3	15.5	15.1	15.0	16.2	15.5	23.5	27.7
NUCLEAR POWER	0.0	0.2	0.4	0.6	1.0	1.4	2.2	2.7	9.5	19.5
IMPORTS	10.1	8.1	16.3	25.1	33.0	41.7	29.3	33.3	50.3	93.7
- coal & coke	4.1	5.6	5.8	6.8	7.6	7.9	7.7	8.0	12.5	15.0
- oil*	6.0	2.5	6.3	8.6	12.2	20.2	7.4	10.5	21.5	43.0
- nat gas	-	-	4.2	9.7	13.2	13.6	14.2	14.8	16.3	35.7
- electric power	-	-	-	-	-	-	-	-	-	-
EXPORTS	59.1	112.9	163.5	179.5	182.7	201.4	208.2	234.3	331.4	340.8
- coal & coke	11.5	20.0	21.8	22.4	22.1	22.5	23.5	23.1	22.7	25.1
- oil*	47.3	92.2	137.1	150.8	153.6	169.6	166.7	186.7	236.4	156.0
- nat gas	0.3	0.5	3.9	5.4	6.1	8.1	16.7	23.1	69.6	154.7
- electric power	-	0.2	0.7	0.9	0.9	1.2	1.3	1.4	2.7	5.0
APPARENT CONSUMPTION	607.3	834.8	1066.7	1122.1	1189.7	1247.7	1305.5	1377.4	1726.9	2073.5
- coal & coke	322.9	360.9	393.1	404.1	414.8	424.6	433.3	445.2	515.6	564.8
- oil	170.1	256.7	371.7	395.1	431.2	464.1	497.0	525.6	671.7	816.5
- nat gas	54.1	149.3	233.8	254.9	271.7	287.9	308.9	337.4	464.3	595.0
- primary power	6.3	10.0	15.0	15.2	15.2	15.2	17.1	16.8	30.3	42.2
- peat	20.4	17.0	17.7	16.7	21.2	20.2	13.9	16.9)	
- shale	4.8	7.4	8.8	9.5	9.9	10.6	11.3	11.7) 45.0	55.0
- firewood	28.7	33.5	26.6	26.6	25.7	25.1	24.0	23.8)	

* crude oil and energy oil products ie/ excludes lubes, greases etc.

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Table 3

Annual growth rates in energy consumption by source %

	1960-65	1965-70	1971	1972	1973	1974	1975
Coal & coke	2.2	1.7	2.8	2.6	2.4	2.1	2.7
Oil	8.6	7.7	6.3	9.1	7.6	7.1	5.8
Natural Gas	22.5	9.3	9.0	6.6	6.0	7.3	9.2
Primary electricity	10.8	8.4	1.3	NIL	NIL	12.5	-1.8
Other	1.5	-1.6	-0.6	+7.6	-1.6	-12.0	+6.5
Total	6.6	5.0	5.2	6.0	4.9	4.6	5.5

Annual growth rates in primary energy production by source %

	1960-65	1965-70	1971	1972	1973	1974	1975
Coal	2.6	1.7	2.6	2.3	2.3	2.3	2.5
Oil	10.4	7.7	6.9	6.6	7.1	7.0	6.9
Natural Gas	22.0	9.3	5.6	5.6	6.7	10.3	11.0
Primary electricity	10.1	9.0	2.5	NIL	1.9	12.2	-1.1
Other	1.5	-1.6	-0.6	7.6	-1.6	-12.0	6.5
Total	7.4	5.2	5.2	4.9	5.1	5.5	6.3

PROSPECTS FOR THE ENERGY BALANCE OF THE NON-SOVIET COUNTRIES
OF THE CMEA(1)

1. INTRODUCTION

The last fifteen years have seen a basic change in the energy situation of the non-Soviet members of CMEA. As a group they have moved from the position of a small net exporter of energy to that of a major net importer. This has partly resulted from the rapid rise in energy consumption which has outstripped domestic production and partly from the shift in the energy balance towards oil and natural gas at the expense of solid fuels. Whilst the USSR was prepared to meet the bulk of the CMEA's import requirements this caused comparatively few problems. Now however, these countries are faced with the need to import growing quantities of non-Soviet oil, at high prices and for hard currency. Today, therefore, calls for energy conservation are being made in all the states. Efforts are being increased to curb waste, to increase the efficiency with which energy resources are utilised, and to make optimum use of relatively scarce domestic resources of fuel and power.

Figure 1

Net imports of energy as percentage total consumption

	1960	1965	1970	1975
BULGARIA	7.9	30.7	51.2	64.4
CZECHOSLOVAKIA	2.5	14.1	20.0	30.2
GDR	6.7	9.8	15.3	19.5
HUNGARY	19.4	18.9	31.3	41.5
POLAND	-	-	-	-
ROMANIA	-	-	-	2.0
CUBA	98.9	98.7	97.3	97.8
MONGOLIA	43.9	42.9	28.5	33.5
NON-SOVIET CMEA	-	4.4	12.5	18.4

(1) Bulgaria, CSSR, GDR, Hungary, Poland, Romania, Cuba Mongolia.

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However, in spite of these efforts there seems to be little likelihood of any immediate improvement in the energy situation. The dependence on oil and natural gas, and hence of imports will continue to rise although at a slower rate and the non-Soviet CMEA countries will be faced by increasingly severe problems as they seek to obtain and pay for rising quantities of non-Soviet supplies.

2. PRIMARY ENERGY CONSUMPTION

Although certain CMEA members publish periodic tables of energy consumption these are neither comprehensive nor strictly comparable. However, it is possible to calculate apparent consumption on the basis of production plus net imports for each of the major forms of primary energy(1). No figures, however, exist for the minor fuels of firewood, peat and shale. However, consumption of these fuels is very small and they are therefore excluded from this study.

Energy consumption per caput varies greatly between the countries, the lowest rates being found as would be expected in the less developed economies of Cuba and Mongolia and the highest in the GDR and Czechoslovakia.

Figure 2

Energy consumption per caput

	1960	1965	1970	1975
BULGARIA	1.09	2.14	3.55	4.39
CZECHOSLOVAKIA	3.54	4.49	5.16	5.89
GDR	6.54	7.58	8.36	9.06
HUNGARY	1.86	2.35	2.90	3.42
POLAND	2.17	2.62	3.41	4.12
ROMANIA	1.37	2.01	2.91	3.56
CUBA	0.89	0.87	1.04	1.18
MONGOLIA	0.59	0.76	1.03	1.22
NON-SOVIET CMEA	2.71	3.32	4.05	4.64
USSR	2.81	3.59	4.37	5.39
TOTAL CMEA	2.78	3.51	4.27	5.15

(1) See Table 1

With the exception of Poland and Romania, the countries of the Soviet bloc are poorly endowed with energy resources. In general, coal has formed the basis of their indigenous energy industries, but even here reserves are small and consist primarily of the less valuable brown coal and lignite, and high calorific bituminous coal is in short supply. Poland is fortunate in possessing fairly extensive hard coal deposits and today is the only country to be a net exporter of energy; her exports of coal in calorific terms more than matching the necessary imports of oil and natural gas. In the case of Romania, the indigenous energy resource base is dominated by oil and gas. However, production of both is now at a peak and in 1975 Romania became a net energy importer for the first time, when necessary imports of crude oil and coal exceeded exports of oil products.

Energy consumption has risen rapidly in the last decade and at rates far in excess of production.

Figure 3

Average annual growth rates energy production
and consumption. %.

	BULGARIA	CSSR	GDR	HUNGARY	POLAND	ROMANIA	CUBA	MON GOLIA	TOTAL AREA
PRODUCTION									
1960-65	9.0	2.9	2.1	5.2	4.1	6.4	17.0	8.4	3.7
1966-70	3.8	1.6	0.7	1.4	4.6	6.1	20.0	14.2	2.9
1971-75	-1.5	0.6	0.3	0.5	4.1	3.8	NIL	5.1	2.0
CONSUMPTION									
1960-65	15.0	5.5	2.8	5.1	5.1	8.6	2.0	8.1	5.0
1966-70	11.5	3.0	2.0	4.7	6.1	9.1	5.6	9.2	4.7
1971-75	4.8	3.4	1.3	3.8	4.8	5.1	4.3	6.6	3.5

As a result by 1975 the non-Soviet CMEA had net imports of the order of 100 million tons SFE. This can be compared with the USSR which had net exports in that year of 231 million tons. According to the Five-Year Plans of the bloc countries, primary energy consumption will continue to rise by at least 3.5% p.a. throughout the 1976-1980 period. This is however largely dependent on the ability of these countries to acquire planned imports of oil and natural gas and any shortfall here would result in a drastic curtailment of consumption.

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By 1980, therefore, the area is expected to be in receipt of net imports of over 160 million tons SFE, but the CMEA as a whole (including the USSR) will have net exports of over 115 million tons SFE.

Figure 4

Net energy position of the CMEA - m tons SFE

	1970		1975		1980	
	NS	CMEA	NS	CMEA	NS	CMEA
PRODUCTION	400.8	1614.7	444.0	2022.4	500.5	2463.5
CONSUMPTION	458.15	1524.85	544.3	1921.7	664.0	2346.1
EXPORTS	47.15	210.65	60.4	294.7	63.0	394.0
IMPORTS	104.5	120.8	160.7	194.0	226.5	276.6
NET POSITION	-57.35	+89.85	-100.3	+100.7	-163.5	+117.4

3. STRUCTURE OF ENERGY BALANCE

The importance of oil and natural gas has increased steadily in recent years(1). In 1960 they accounted for just under 14% of energy consumption in the non-Soviet CMEA but by 1975 this had risen to almost 36%, (the share of coal falling from 86% to 63% in the same period). This rapid rise now appears to be at an end but despite this by 1980 hydrocarbons are expected to provide almost 40% of all primary energy consumed in the area. In the long term, nuclear power will be of significant importance but there is little likelihood of it providing more than marginal quantities until at least 1985 and beyond. In the interim the countries have little choice but to continue as at present, seeking to obtain the maximum benefit from the limited resources they possess, relaying on the USSR to provide the bulk of their needs and obtaining the balance in the West on the best terms they can negotiate.

4. PROSPECTS FOR 1980-1985

Beyond 1980 the picture becomes even less clear as much will depend on the degree of success with which the non-Soviet CMEA solves the energy problems currently facing it. However, despite the considerable efforts now being made to discover new resources of fossil fuels it seems unlikely that there will be any great improvement in the resource base. Indeed,

(1) See Tables 2 and 3.

new finds will be needed simply to compensate for the gradual exhaustion of existing deposits. It seems, therefore, that output of such fuels will increase only marginally but that there will be a slow growth in hydro-electric and nuclear power generation.

Similarly it appears unlikely that it will be possible to reduce significantly the growth rate of consumption without adverse effects on economic growth, although attempts to curb waste and increase the efficiency of energy utilisation will continue. If the overall growth rate of consumption is held to 3.5% p.a. and production increases by 1% p.a., the area's gross import requirements will rise to 325 million tons SFE by 1985, more than double the figure for 1975. Given gross exports in that year of 60 million tons SFE, net imports will then account for over a third of the area's total primary energy consumption. The USSR, however, should increase its exports of primary energy and thus in 1985 the CMEA as a whole is expected to retain its position as a net exporter, but by the reduced quantity of under 20 million tons SFE. No significant changes can be expected in the structure of the energy balance in this timescale as nuclear power is not expected to make much impact until the 1990s. It is thought, therefore, that by 1985 hydrocarbons will have again increased their share of total energy consumption in the non-Soviet CMEA to around 46% whilst that of coal will have fallen to 53% and that this position should remain roughly stable for several years. (See Table 3).

Figure 5

CMEA Projected Energy Trade

	NS. CMEA		USSR		CMEA	
	1980	1985	1980	1985	1980	1985
OIL mt.						
imports	111	150	15	30	126	180
exports	13	10	165	110	178	120
GAS Bm³						
imports	30	50	13.5	30	43.5	80
exports	0.2	0.4	58.5	130	58.7	130.4
COAL AND COKE mt.						
imports	35	45	15	20	50	65
exports	59	61	30	35	89	96
POWER BkWh						
imports	25	41	-	-	25	41
exports	6.5	8.1	22	40	28.5	48.1

Table 1. PRIMARY ENERGY BALANCE (million tons SFE)

	BULGARIA				CZECHOSLOVAKIA			
	1960	1965	1970	1975	1960	1965	1970	1975
FUEL PRODUCTION								
- coal	7.41	11.51	13.38	12.72	45.24	52.77	57.15	59.36
- oil	0.29	0.33	0.48	0.17	0.20	0.27	0.29	0.20
- natural gas	-	0.09	0.56	0.13	1.72	1.15	1.43	1.11
- other								
HYDRO ELECTRIC POWER	0.23	0.25	0.26	0.30	0.31	0.55	0.45	0.47
NUCLEAR POWER	-	-	-	0.31	-	-	-	0.02
TOTAL	7.93	12.18	14.68	13.63	47.47	54.74	59.32	61.16
IMPORTS								
- coal	0.31	2.11	3.92	4.84	1.72	3.26	3.25	3.72
- oil	0.52	3.39	11.89	17.96	3.23	8.72	15.64	24.25
- natural gas	-	-	-	1.41	-	-	1.63	4.54
- power	neg	neg	0.02	0.05	0.06	0.17	0.49	0.57
TOTAL	0.83	5.50	15.83	24.71	5.01	12.15	21.01	33.08
EXPORTS								
- coal	0.04	-	-	neg	3.42	1.65	4.95	5.47
- oil	0.11	0.09	0.22	neg	0.32	1.46	1.41	1.11
- natural gas	-	-	-	-	0.01	0.02	0.10	0.05
- power	-	neg	0.03	neg	0.09	0.08	0.07	0.07
TOTAL	0.15	0.09	0.25	neg	3.84	3.21	6.26	6.70
CONSUMPTION								
- coal	7.68	13.63	17.30	17.56	43.54	54.38	55.45	57.61
- oil	0.70	3.63	12.15	18.13	3.11	7.53	14.79	23.34
- natural gas	-	0.09	0.56	1.54	1.71	1.13	2.96	5.60
- power	0.23	0.25	0.25	1.11	0.28	0.64	0.87	0.99
- other								
TOTAL	8.61	17.60	30.26	38.34	48.64	63.68	74.07	87.54

Table 1. PRIMARY ENERGY BALANCE (million tons SFE) (cont)

	GDR				HUNGARY			
	1960	1965	1970	1975	1960	1965	1970	1975
FUEL PRODUCTION								
- coal	104.66	116.18	119.06	112.35	12.79	15.42	13.73	12.09
- oil	neg	neg	0.09	0.29	1.74	2.58	2.77	2.87
- natural gas	0.03	0.16	1.46	9.52	0.41	1.32	4.13	6.16
- other								
HYDRO ELECTRIC POWER	0.10	0.10	0.15	0.14	0.01	0.01	0.01	0.01
NUCLEAR POWER	-	-	0.06	0.34	-	-	-	-
TOTAL	104.79	116.44	120.82	122.64	14.95	19.33	20.64	21.13
IMPORTS								
- coal	8.12	9.68	10.47	9.56	1.98	1.91	2.56	2.26
- oil	3.76	8.18	14.94	21.50	2.13	3.60	7.68	13.47
- natural gas	0.15	0.04	0.19	3.93	0.22	0.24	0.24	0.96
- power	0.01	0.06	0.15	0.17	0.07	0.17	0.50	0.52
TOTAL	12.04	17.96	25.75	35.26	4.40	5.92	10.98	17.21
EXPORTS								
- coal	2.88	2.71	2.72	1.16	0.27	0.86	0.04	0.06
- oil	1.53	2.52	1.97	4.26	0.48	0.51	1.43	1.98
- natural gas	neg	0.03	0.08	0.04	-	-	neg	neg
- power	0.06	0.05	0.10	0.09	neg	0.01	0.08	0.12
TOTAL	4.47	5.31	3.87	5.55	0.75	1.38	1.55	2.16
CONSUMPTION								
- coal	109.90	123.15	127.81	120.75	14.50	16.47	16.25	14.29
- oil	2.23	5.66	13.06	17.63	3.39	5.67	9.02	14.36
- natural gas	0.18	0.17	1.57	13.41	0.63	1.56	4.37	7.12
- power	0.05	0.11	0.26	0.56	0.08	0.17	0.43	0.41
- other								
TOTAL	112.36	129.09	142.70	152.35	18.60	23.87	30.07	36.18

Table 1. PRIMARY ENERGY BALANCE (million tons SFE) (cont)

	POLAND				ROMANIA			
	1960	1965	1970	1975	1960	1965	1970	1975
FUEL PRODUCTION								
- coal	78.89	95.70	115.41	141.32	4.89	7.08	12.50	15.66
- oil	0.28	0.48	0.61	0.79	16.45	17.98	19.13	20.86
- natural gas	0.65	1.64	6.17	7.10	12.29	20.77	29.79	36.89
- other								
HYDRO ELECTRIC POWER	0.08	0.11	0.23	0.31	0.05	0.12	0.34	1.07
NUCLEAR POWER	-	-	-	-	-	-	-	-
TOTAL	79.90	97.93	122.42	149.52	33.68	45.95	61.76	74.48
IMPORTS								
- coal	0.57	0.89	0.78	0.81	0.89	1.35	2.82	4.04
- oil	1.02	4.66	13.67	23.73	-	-	3.28	7.27
- natural gas	0.29	0.45	1.19	2.99	-	-	-	-
- power	0.07	0.03	0.05	0.05	-	0.03	neg	0.06
TOTAL	1.95	6.03	15.69	27.55	0.89	1.38	6.10	11.37
EXPORTS								
- coal	16.91	19.56	24.54	32.02	-	-	-	-
- oil	0.33	1.54	1.97	4.02	8.97	8.72	8.06	9.26
- natural gas	0.02	0.02	0.07	-	0.24	0.24	0.24	0.23
- power	0.03	0.07	0.05	0.11	-	0.07	0.29	0.36
TOTAL	17.29	21.19	26.63	36.15	9.21	9.03	8.59	9.85
CONSUMPTION								
- coal	62.55	77.03	91.65	110.11	5.78	8.43	15.32	19.70
- oil	0.97	3.60	12.31	20.50	7.48	9.26	14.35	18.87
- natural gas	0.92	2.07	7.29	10.09	12.05	20.53	29.55	36.66
- power	0.12	0.07	0.23	0.25	0.05	0.08	0.05	0.77
- other								
TOTAL	64.56	82.77	111.48	140.95	25.36	38.30	59.27	76.00

Table 1. PRIMARY ENERGY BALANCE (million tons SFE) (cont)

	CUBA				MONGOLIA			
	1960	1965	1970	1975	1960	1965	1970	1975
FUEL PRODUCTION								
- coal	-	-	-	-	0.28	0.46	0.93	1.19
- oil	0.02	0.08	0.23	0.21	0.04	0.02	neg	neg.
- natural gas	0.02	-	-	0.02	-	-	-	-
- other								
HYDRO ELECTRIC POWER	neg	0.01	0.01	0.01	-	-	-	-
NUCLEAR POWER	-	-	-	-	-	-	-	-
TOTAL	0.04	0.09	0.24	0.24	0.32	0.48	0.93	1.19
IMPORTS								
- coal	0.06	0.12	0.12	0.15	0.05	0.08	neg	neg
- oil	6.42	6.63	8.64	10.72	0.20	0.28	0.37	0.60
- natural gas	-	-	-	-	-	-	-	-
- power	-	-	-	-	-	-	-	-
TOTAL	6.48	6.75	8.76	10.87	0.25	0.36	0.37	0.60
EXPORTS								
- coal	-	-	-	-	-	-	-	-
- oil	0.25	neg	-	-	-	-	-	-
- natural gas	-	-	-	-	-	-	-	-
- power	-	-	-	-	-	-	-	-
TOTAL	0.25	neg	-	-	-	-	-	-
CONSUMPTION								
- coal	0.06	0.12	0.12	0.15	0.33	0.54	0.93	1.19
- oil	6.19	6.71	8.87	10.93	0.24	0.30	0.37	0.60
- natural gas	0.02	-	-	0.02	-	-	-	-
- power	-	0.01	0.01	0.01	-	-	-	-
- other								
TOTAL	6.27	6.84	9.00	11.11	0.57	0.84	1.30	1.79

ble 1. PRIMARY ENERGY BALANCE (million tons SFE) (cont)

	NS CMEA				CMEA			
	1960	1965	1970	1975	1960	1965	1970	1975
FUEL PRODUCTION								
- coal	254.16	299.12	332.16	354.69	584.46	674.42	741.26	814.99
- oil	19.02	21.74	23.60	25.39	230.42	368.14	526.10	727.19
- natural gas	15.12	25.13	43.54	60.93	69.62	174.93	277.04	406.63
HYDRO ELECTRIC POWER	0.78	1.15	1.45	2.31	7.08	11.15	16.75	17.81
NUCLEAR POWER	-	-	0.06	0.67	0.00	0.20	0.46	3.37
OTHER*					53.90	57.90	83.10	52.40
TOTAL	289.08	347.14	400.81	443.99	945.38	1286.74	1614.71	2022.39
IMPORTS								
- coal & coke	13.70	19.40	23.92	25.38	17.80	25.00	29.72	33.38
- oil	17.28	35.46	76.11	119.60	23.28	37.96	82.41	130.10
- natural gas	0.66	0.73	3.25	13.83	0.66	0.73	7.45	28.63
- power	0.21	0.46	1.21	1.87	0.21	0.46	1.21	1.87
OTHER*								
TOTAL	31.85	56.05	104.49	160.68	41.95	64.15	120.79	193.98
EXPORTS								
- coal & coke	23.52	24.78	31.25	31.71	35.02	44.78	53.05	61.81
- oil	11.99	14.84	14.79	20.63	59.29	107.04	151.89	207.33
- natural gas	0.27	0.31	0.49	0.32	0.57	0.81	4.39	23.42
- power	0.18	0.28	0.62	0.75	0.18	0.48	1.32	2.15
OTHER*								
TOTAL	35.96	40.21	47.15	60.41	95.06	153.11	210.65	294.71
APPARENT CONSUMPTION								
- coal & coke	244.34	293.74	324.83	341.36	567.24	654.64	717.93	786.56
- oil	24.31	42.36	84.92	124.36	194.41	299.06	456.62	649.96
- natural gas	15.51	25.55	46.30	74.44	69.61	174.85	280.10	411.84
- primary power	0.81	1.33	2.10	4.10	7.11	11.33	17.10	20.90
OTHER*					53.90	57.90	53.10	52.40
TOTAL	284.97	362.98	458.15	544.26	892.27	1197.78	1524.85	1921.66

* Figures only available for USSR

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ANNEX III to
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Table 2. STRUCTURE OF PRIMARY ENERGY CONSUMPTION %

	COAL	OIL	NATURAL GAS	PRIMARY POWER
BULGARIA				
1960	89.2	8.1	-	2.7
1965	77.4	20.6	0.5	1.5
1970	57.2	40.2	1.9	0.7
1975	45.8	47.3	4.0	2.9
1980	39.5	41.5	13.6	5.4
CSSR				
1960	89.5	6.4	3.5	0.6
1965	85.4	11.8	1.8	1.0
1970	74.9	20.0	4.0	1.1
1975	65.8	26.7	6.4	1.1
1980	62.0	27.1	9.1	1.8
GDR				
1960	97.8	2.0	0.2	neg
1965	95.4	4.4	0.1	0.1
1970	89.6	9.2	1.1	0.1
1975	79.3	11.6	8.8	0.3
1980	71.9	17.5	9.6	1.0
HUNGARY				
1960	78.0	18.2	3.4	0.4
1965	69.0	23.8	6.5	0.7
1970	54.0	30.0	14.5	1.5
1975	39.4	39.6	19.6	1.4
1980	31.1	40.8	26.1	2.0
POLAND				
1960	96.9	1.5	1.4	0.2
1965	93.1	4.3	2.5	0.1
1970	82.2	11.0	6.5	0.3
1975	78.1	14.5	7.2	0.2
1980	78.3	18.4	8.8	0.5
ROMANIA				
1960	22.8	29.5	47.5	0.2
1965	22.0	24.2	53.6	0.2
1970	25.8	24.2	49.9	0.1
1975	25.9	24.8	48.2	1.1
1980	34.6	26.5	37.9	1.0
CUBA				
1960	1.0	98.7	0.3	-
1965	0.8	98.1	-	0.1
1970	1.3	98.6	-	0.1
1975	1.4	98.4	0.1	0.1
1980	1.3	98.7	-	-
MONGOLIA				
1960	57.9	42.1	-	-
1965	64.3	35.7	-	-
1970	71.5	28.5	-	-
1975	66.5	33.5	-	-
1980	73.7	26.3	-	-

Table 3. NON-SOVIET CMEA ENERGY BALANCE %

PRODUCTION	1960	1965	1970	1975	1980	1985
COAL AND COKE	87.9	86.2	82.9	79.9	81.1	80.8
OIL	6.6	6.3	5.9	5.7	5.2	5.0
NATURAL GAS	5.2	7.2	10.9	13.7	12.3	12.4
PRIMARY ELECTRICITY	0.3	0.3	0.3	0.7	1.4	1.8
CONSUMPTION						
COAL AND COKE	85.7	80.9	70.9	62.7	58.9	52.6
OIL	8.5	11.7	18.5	22.8	25.1	29.9
NATURAL GAS	5.4	7.0	10.1	13.7	14.6	15.8
PRIMARY ELECTRICITY	0.4	0.4	0.5	0.8	1.4	1.7