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ECONOMIC COMMITTEE

USSR: NATURAL GAS PROSPECTS

Note by the United Kingdom Delegation

PART I. SUMMARY

This paper examines the Soviet Union's prospects for natural gas production and trade up to 1985.

2. The Soviet Union, the world's second largest producer after the United States, produced 236 billion cubic metres (m<sup>3</sup>) of natural gas in 1973. Her official plan target is for 300-320 billion m<sup>3</sup> in 1975 and she has quoted a provisional target of 550-600 billion m<sup>3</sup> for 1980. The industry's record of plan fulfilment is however poor. Moreover we consider it unlikely that schemes under discussion with the Americans and Japanese to exploit Siberian resources will be operative by 1980. Our own estimates are that 1975 production will reach 280 billion m<sup>3</sup> (an increase of 40 per cent over 1970) and by 1980 it may reach 380 billion m<sup>3</sup>. (Paragraphs 2-9.)

3. The industry's difficulties with plan fulfilment are partly generated by Soviet inability to co-ordinate gasfield development with the development of support facilities. Large diameter pipe has been imported from the West to keep the pipeline construction programme from falling too far behind schedule; but exploitation of deposits in Arctic conditions presents special problems. Exploitation of the large but sulphurous Orenburg gas deposit has required the import of French treatment plant. (Paragraphs 10-13.)

4. Gas consumption must be deduced from available production and trade data. We believe that during the remainder of this decade consumption will grow at about 5-6 per cent annually and will amount to 350 billion m<sup>3</sup> in 1980. (Paragraphs 14-15.)

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5. Though currently a net importer of a small volume of gas from Iran and Afghanistan in return for economic and/or military aid, the USSR will by 1975 be a net exporter of about 10 billion m<sup>3</sup>. By 1980 we expect net exports to have risen to about 30 billion m<sup>3</sup> of which Eastern Europe will receive 60 per cent and Western Europe the remainder. Beyond 1980 it is difficult to predict the volume of trade as much will depend on whether projects to increase imports from Iran or export Siberian and Far Eastern gas in liquid form to the United States and Japan are implemented. If they are, then net exports could reach 50-80 billion m<sup>3</sup> by the mid-1980s. Gas exports to the West will not make a significant contribution to convertible currency earnings until the 1980s, when credits financing Soviet imports of large diameter pipe from the West in the early 1970s have been repaid in gas. We estimate from existing export commitments that convertible currency earnings will reach \$110 million in 1980 and rise to almost \$300 million by 1985. These estimates, however, assume no increase in original contract prices nor do they include the effects of any future gas deals with the United States and Japan. (Paragraphs 16-27.)

Conclusion

6. We expect Soviet natural gas production to continue to rise at a fairly rapid rate into the 1980s, with the USSR moving from being a net importer of natural gas to become a net exporter by 1975, though convertible currency earnings are not expected to be significant until the 1980s. We consider it unlikely that projects to develop Siberian and Far Eastern gas deposits jointly with the United States and Japan will be in operation by 1980. (Paragraph 28.)

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PART II. MAIN REPORT

The object of this paper is to examine the Soviet Union's prospects for natural gas production and trade in the period up to 1985. There is little information, however, on which to base predictions beyond 1980.

**Introduction**

2. The present position of natural gas as a major source of Soviet primary energy is due to the discovery and rapid development of vast new deposits during the last 25 years. Natural gas production increased from 5.8 billion cubic metres (m<sup>3</sup>) in 1950 to 236 billion m<sup>3</sup> in 1973 and the USSR is now the world's second largest producer after the United States. (In 1972 natural gas production totalled 648 billion m<sup>3</sup> in the United States, 26.5 billion m<sup>3</sup> in the United Kingdom and 95 billion m<sup>3</sup> in the EEC.)<sup>(1)</sup> The share of natural gas in Soviet primary energy production rose from 2.3 per cent in 1950 when peat, shale and firewood together provided a greater source of energy, to about 20 per cent in 1972. (In that year oil provided 40 per cent and coal 36 per cent of primary energy production.)

3. However, in spite of this achievement and in contrast to the coal and oil industries, the Soviet gas industry has a singularly poor record of plan fulfilment. The difficulties of exploiting gas deposits, however rich, have proved rather greater, besides being less familiar, than with oil exploitation.

4. The bulk of current production (about 60 per cent in 1970) comes from gasfields in the Ukraine, North Caucasus and Volga-Urals (see map and Appendix 2) which are favourably located near to the main consuming regions. As with oil and coal, however, over 70 per cent of known gas deposits lie to the east of the Urals in Central Asia, Siberia and the Far East. A high proportion of these deposits are in north-west Siberia in regions of permafrost and severe climatic conditions. The 1960s saw initial development of these remoter areas and the first Soviet efforts to cope with the problems which they pose.

5. Until the late 1960s the USSR had no history of trade in natural gas, though she is currently a net importer of modest amounts. Trade began in 1967 when gas was imported from Afghanistan in repayment for economic aid, followed in 1970 by imports of Iranian gas in part repayment for military and economic debt. 1967 also saw the start of Soviet gas exports from the Ukraine to Eastern Europe. Czechoslovakia and Poland are currently the main CMEA recipients, whilst branch lines from the main "Brotherhood" pipeline now deliver gas to Austria, East and West Germany.

**Gas reserves**

6. In contrast to the oil industry, figures for Soviet gas reserves are published and the USSR participates in discussion on reserves in the Economic Commission for Europe (ECE). Few Western experts doubt that Soviet territory contains extensive natural gas reserves; the problem for the Russians is to assess them adequately enough to provide a basis for credible production plans. As in the case of oil this means a wider and better drilling programme and a more efficient processing of data. The most recent reserve figures given to the ECE refer to

<sup>(1)</sup> Throughout this report the term "billion" is used to express a thousand million and "trillion" a thousand billion, i.e.  $1 \times 10^9$  and  $1 \times 10^{12}$ . One thousand million cubic metres of gas is approximately equivalent to 0.86 million tons of oil.

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reserves as of 1 January, 1972, and put "proven and probable" reserves at 22 trillion m<sup>3</sup>. (At present production rates this would last almost 100 years.) By way of comparison United Kingdom proven and probable reserves at the same time were 0.8 trillion m<sup>3</sup> and EEC proven reserves about 2.5 trillion m<sup>3</sup>. Appendix 3 gives an older Soviet breakdown of "proven, semi-proven and probable" reserves by region for 1966 and 1971. The growing importance of reserves east of the Urals is clearly evident.

**Production**

7. The 1971-75 Five-year Plan directives laid down that natural gas production was to rise 50-60 per cent above 1970 output to reach 300-320 billion m<sup>3</sup> by 1975. The plan intends that increased production should be achieved in European Russia, whilst greater emphasis is placed on tapping the more accessible reserves of Central Asia, Orenburg and West Siberia, discovered in the 1960s. Considerable production increases are planned for Orenburg, Komi, Turkmenia and Tyumen (see Map and Appendix 2). Other targets include construction of 30,000 km of new gas pipelines including important new, large-diameter arteries to the Central Region from Tyumen, Orenburg and Central Asia.

8. By the end of 1973 it was clear that output was falling below the levels needed to attain the Five-year Plan targets. Production has risen only 19 per cent above 1970 during the three years; the 1974 target has been reduced to about 257 billion m<sup>3</sup>, and the 1975 target now appears to be out of reach. We estimate that by 1975 production will have reached about 280 billion m<sup>3</sup>, a 7 per cent shortfall on the lower end of the original plan. Nevertheless it would represent an increase of some 40 per cent over 1970 (see Table 1), and this is no mean achievement given the scale of operation involved.

TABLE 1. USSR: GAS PRODUCTION 1971-75

	1970	1971	1972	1973	1974	(billion m <sup>3</sup> ) 1975
Original Plan ... ..	—	211	229	250	280	300-320
Planned absolute increase ...	—	13	18	21	30	20-40
Production ... ..	198	212	221	236	—	—
Increased achieved ... ..	—	14	9	15	—	—
Revised target... ..	—	—	—	238	257	280*
Increase required ... ..	—	—	—	—	21	23

\* Estimated production.

9. No official targets for gas production in 1980 have yet been announced, though provisional targets of 550-600 billion m<sup>3</sup> (based on the assumption that plans for 1975 would be fulfilled) now appear to be beyond reach. It is doubtful whether output will rise much more than a further 35-40 per cent by 1980 and we estimate an output in that year of about 380 billion m<sup>3</sup>. We consider it unlikely that schemes under discussion with the Americans and Japanese to exploit Siberian gas resources will have come into operation by 1980. Any of these schemes which are successfully implemented will contribute to output in the 1980s and may be reflected in the official targets for 1985.

**Problems facing the gas industry**

10. More than any other type of fuel natural gas requires specialised transport. Because of the quantities and the long distances involved in taking Soviet gas to its consumers, pipelines are the only viable means of transport. (In contrast quite large quantities of oil can, in the absence of pipelines, be moved

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by road, rail or waterways.) European Russia, the largest Soviet consumer of gas, as of energy in general, has for some years provided most of the gas for its own use. It is vital therefore that European supplies should be augmented with gas from the remoter producers such as Central Asia and Siberia. In addition, besides providing for growing local requirements, West Siberia must increase the flow of gas to the Urals whilst the Central Asian producers must supply Kazakhstan. In each case the limiting factor is the rate of increase of pipeline capacity. Soviet inability to co-ordinate gasfield development with delivery and laying of the world's largest gas pipelines and the installation of adequate compressor power and gas treatment facilities has been and remains the main cause of the shortfalls on gas production targets.

11. The Russians have laid great emphasis on the construction of large diameter trunk gas pipelines in recent years and have even begun experiments with pipe as large as 2.5 metres diameter (around twice what is generally considered large). However, the domestic steel industry has failed to meet the gas industry's demands for good quality large diameter pipe. In order to prevent the pipeline construction programme falling too far behind schedule, the Soviet Union has consequently been forced to import large diameter pipe from the West, most of it under agreements which provide for repayment in gas deliveries to the supplier of the pipe. (See Appendix 4.)

12. There are certain other serious problems. Equipment for operating in Arctic conditions is in short supply, the planning and laying of large diameter pipelines over long distances pose various problems, including those of design, the effect of extreme temperatures and wind, pipeline protection, valve reliability, heating and compressor station design. Gas transmission in a climate where the gas is apt to condense, freeze and block the flow of pipelines confronts the industry with considerable technical difficulties.

13. Different problems occur with the Orenburg gas deposit which, though favourably located west of the Urals, is rich in sulphur which must be removed before the gas is transported to consumers. With little experience of such gases, the Russians have been forced to import plant and expertise from abroad (France) to provide the necessary treatment facilities at Orenburg. Construction of the complex, which will enable large-scale gas production to begin, is already behind schedule and it is unlikely that anything more than the first stage, with an annual capacity of 15 billion m<sup>3</sup> (commissioned in February 1974) will be operating by 1975.

#### Domestic consumption

14. As with many other products the Soviet Union does not publish details of gas consumption on a regular basis. Apparent consumption must therefore be deduced from available production and trade data. Table 2 sets out our consumption estimates for the period up to 1980. During 1966-70 consumption is estimated to have grown at the same rate as output, by about 9 per cent per annum, the small net import having little effect. During the early 1970s the rate of production has declined and the forecast output of 280 billion m<sup>3</sup> in 1975 implies an average growth of about 7 per cent per annum. If rising exports are allowed for this will leave an estimated 270 billion m<sup>3</sup> for consumption in 1975, which implies an average annual growth rate of just over 6 per cent a year during the 1971-75 period. We expect that the rate of increase in domestic consumption during the next Five-year Plan (1976-80) will again decline, that exports will continue to rise, and that total gas consumption in 1980 will be in the region of 350 billion m<sup>3</sup>.

TABLE 2. USSR: APPARENT DOMESTIC CONSUMPTION OF NATURAL GAS  
(Estimates)

	1960	1965	1970	1971	1972	1973	1975	1980
Production ...	47	129	198	212	221	236	280	380
Imports ...	—	—	3.6	8.1	11.0	12.5	13.5	13.5
Exports ...	—	—	3.3	4.6	5.1	6.2	23.4-24.4	42.9-43.9
Apparent domestic consumption (1)	47	129	198.3	215.5	226.9	242.3	270.1-271.1	349.6-350.6
Percentage increase in five years ...	—	174.4	53.7	—	—	—	35.0	30.0
Annual percentage increase ...		22.3 (2)	9.0 (2)	7.6	5.3	6.7	6.2 (2)	5.4 (2)

(1) No allowance is made for losses between production and consumption.

(2) Average for five years ending that year.

15. In contrast to oil, where all details of consumption are officially secret, some Soviet technical journals do occasionally give a break-down of gas consumption by major consumer. The most recent details refer to 1971 and the percentage figures given have been related to our 1971 consumption estimate and are shown in Appendix 5. Industry as expected accounted for the bulk of consumption, some 83 per cent, power stations being the largest single consumer followed by the metallurgical and chemical sectors. In comparison, domestic and communal needs are relatively small, only 13 per cent of the total.

#### Trade

16. Though currently a net importer, the Soviet Union will by 1975 be a net exporter of about 10 billion m<sup>3</sup> natural gas. By 1980 we expect net exports to have risen to about 30 billion m<sup>3</sup>. Beyond 1980 it is difficult to predict the volume of imports or exports and much will depend upon whether schemes to export Siberian and Far Eastern gas to the West are implemented. If they are, net exports of gas by the mid-'80s could be as high as 50-80 billion m<sup>3</sup>.

#### Imports (see Appendix 6)

17. In 1967 Afghanistan agreed to supply the USSR with 57.7 billion m<sup>3</sup> of gas, worth \$300 million, during 1967-85 as repayment for economic aid. Delivery of the gas by pipeline to Dushanbe in Tadzhikistan (for local consumption in Central Asia) began in late 1967 and was to reach the maximum annual rate of 3.5 billion m<sup>3</sup> in 1973. Deliveries are to continue at this level until 1985. In the same year an agreement was signed with Iran for delivery of gas (in part payment for military and economic aid) from the South Iranian gasfield to the Caucasus region of the USSR from 1970 until 1985. Deliveries commenced in 1970 and should reach the planned annual volume of 10 billion m<sup>3</sup> in 1975 and continue at that level until 1985. 1973 gas imports from these two sources are estimated at 12.5 billion m<sup>3</sup> and from 1975 to 1985 will continue at an annual rate of 13.5 m<sup>3</sup>.

18. It is possible but by no means yet certain, that a second agreement with Iran may lead to a doubling of Iranian imports during the 1980s. A protocol signed between the two nations in October 1973 included an agreement in principle for increased deliveries of Iranian gas to the USSR and its onward transmission to West Germany via Czechoslovakia. It is probable that a switch deal is intended; Iranian gas going to the USSR whilst an equal volume of Soviet gas is pumped to West Germany. Though no quantities have been mentioned

officially; we understand from Press reports that a further 10 billion m<sup>3</sup> per annum could be involved. The scheme may be in operation by 1980 and in this event Soviet gas imports would rise to 23.5 billion m<sup>3</sup>

19. It must be stressed, however, that although the USSR is currently a net importer, imports account for only 5 per cent of total Soviet domestic consumption. Should the second Iranian pipeline scheme go ahead, then by 1980 imports would still only account for 7 per cent of domestic gas consumption. The gas is also consumed locally, in Central Asia and the Caucasus, away from the strategically important industrial areas of the Soviet Union.

**Exports (see Appendix 6)**

20. Under existing agreements with CMEA partners and Western Europe, the Soviet Union is committed to exports of 23.4-24.4 billion m<sup>3</sup> of natural gas in 1975. Delays in completion and technical problems associated with the operation of new pipelines may result in deliveries being slightly below commitments in that year. Exports to other Communist countries should amount to 12.5-13.5 billion m<sup>3</sup>, with all European CMEA partners, excepting Rumania, receiving gas, mainly through the "Brotherhood" pipeline. Bulgaria will receive her gas direct from the USSR through a pipeline that will cross Rumanian territory whilst Poland receives hers direct from the West Ukrainian gasfields. In Western Europe, Austria, Italy, West Germany and Finland will be receiving almost 11 billion m<sup>3</sup> of Soviet gas in 1975, all under agreements which run on until the early 1990s.

21. Looking ahead to 1980, existing agreements commit the Soviet Union to gas exports of 43-44 billion m<sup>3</sup>, almost double the 1975 level. Again, just over half will go to Eastern Europe whilst in the West, France will have joined the list of customers in 1976. (It is possible, should current discussions lead to some agreement, that Sweden will also import Soviet gas by 1980.) Beyond 1980 we expect gas exports to be maintained at the 1980 level at least, but it is probable that the volume of gas involved in exports to CMEA and Western Europe will increase as a consequence of new or renegotiated agreements and, as paragraphs 23-26 explain, there may also be exports to the United States and Japan.

22. Unlike oil, which has for long been a major convertible currency earner for the USSR,<sup>(3)</sup> gas exports to the West will not make any significant contribution to these earnings until the early 1980s. Until then, gas deliveries to Western Europe will repay Western credits (totalling \$1.25 billion) used to finance Soviet purchases of large diameter pipes from the West during 1968-75 for the expansion of the Soviet oil and gas pipeline networks. We estimate from existing commitments and allowing for repayments (principal and interest) but not for any increases in the original contract gas prices, that Soviet convertible currency earnings will rise from \$40 million in 1976 to \$110 million in 1980 and will almost reach \$300 million in 1985. Any rises in gas prices would substantially increase the levels of these earnings.

23. A further significant increase in the volume of exports in the 1980s could result if schemes to export Siberian gas to the United States and Japan are implemented. The signature in June and July 1973 of statements of intent by two consortia of American companies, was the first indication of serious American

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<sup>(3)</sup> Convertible currency earnings from oil in 1972 amounted to about \$550 million.

interest in the development of natural gas resources in Tyumen Oblast and Yakutia. The first statement with Occidental Petroleum Corporation, El Paso Natural Gas and Bechtel Corporation involves exploitation and delivery of Yakutsk natural gas to the West Coast of America over a 25-year period. Credits of \$2 billion are envisaged for financing a 2,000-mile long pipeline to Nakhodka and construction of a gas liquefaction plant, whilst a further \$2 billion will be required for construction of a fleet of 20 cryogenic tankers to transport the gas across the Pacific. A joint American-Japanese agreement followed soon after, concerning credits of \$120-\$150 million to the USSR to finance geophysical surveys in Yakutia (planned to commence in November 1974) in order to confirm the volume of gas reserves in Yakutia. The Americans and Japanese maintain that reserves of 1 trillion m<sup>3</sup> must be proven if the scheme which ultimately involves an annual production of 30 billion m<sup>3</sup> is to go ahead. It is not clear how production would be shared between the three countries, some reports favouring a 2:1 ratio between the United States and Japan, whilst the Russians are believed to prefer equal sharing between the three.

24. The second statement of intent, signed by a consortium comprising Tenneco Corporation, Texas Eastern Transmission and Brown and Root, concerns a project (known as "The North Star") to exploit the Urengoy gas deposits of north Tyumen Oblast for export to the American East Coast, again for a period of 25 years. The gas (20 billion m<sup>3</sup> annually is quoted) is to be piped over 1,500 miles to Murmansk where it will be liquefied and subsequently shipped to the United States. Again extensive credits will be required to pay for the pipeline, liquefaction plant and another fleet of tankers. (Foreign exchange costs for this project have been put at \$3.7 billion.)

25. Substantial obstacles have still to be overcome before either project can be put into motion. Agreement is still outstanding on some of the more important commercial aspects of these schemes, including questions of prices and credit terms and ownership of the tanker fleets. The very large credits required must mean American official involvement at some stage; and the Congressional difficulties over the Trade Reform Bill (the Vannick amendment) might affect the availability and terms of credit. Above all the Russians have still to convince the Americans and Japanese that sufficient gas exists to make the projects feasible. Should one or both the schemes be implemented in the early 1980s, then by 1985 Soviet gas exports could be increased by a further 20-50 billion m<sup>3</sup> per annum. Assuming exports to CMEA partners and Western Europe remain at the 1980 level, this could mean net exports by 1985 of 50-80 billion m<sup>3</sup>.

26. A third project, discussed intermittently for some years by the Russians and Japanese concerns Sakhalin Island, for some years a small producer of oil and gas. Current interest centres on offshore development and a joint Soviet-Japanese memorandum requires the Japanese to cover up to half the exploration and development costs, to supply an offshore drilling rig and to furnish credit for the project in return for gas (2-3 billion m<sup>3</sup> annually has been quoted). To date there has been no evidence of any firm agreement on credits or financing, nor any indication that the rig has been delivered. There have, however, recently been some indications that the Russians view offshore exploration round Sakhalin more favourably than exploring offshore Arctic waters, and may be interested in wider Western participation.

27. These assessments of gas production, consumption and exports have been made in the light of our present data on Soviet energy policy and plans. It is conceivable that the Soviet Union could wish to alter her plans and for instance

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introduce a crash expansion programme to enable her to benefit more fully from world energy shortages. The technical and market factors determining the extent to which it would be possible for her to do this and the relative advantages of choosing the oil or gas industry as a target for expansion, are however complex and call for separate analysis.

#### Conclusions

28. Despite the problems facing the industry, we expect Soviet production of natural gas to continue to rise at a fairly rapid rate into the 1980s, with Central Asian and Siberian deposits accounting for an increasing share of total production. At the same time the Soviet Union will move from being a net importer of natural gas to become a net exporter by 1975 and we estimate that by 1980 over 10 per cent of gas production will be exported to Western and Eastern Europe. Gas will not be a significant convertible currency earner until the 1980s when credits financing the import of pipe from the West in the early 1970s are repaid. We consider it unlikely that projects to develop Siberian and Far Eastern gas deposits in conjunction with the Americans and Japanese will be operating before 1980, but should any of the schemes be implemented, we would expect their contribution to output to be reflected in the official production targets for 1985.

NATO,  
1110 Brussels.

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APPENDIX 1

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USSR: GAS PRODUCTION

Year	Production (billion m <sup>3</sup> )	Absolute increase (billion m <sup>3</sup> )	Percentage increase other previous year	Percentage increase over five-years	United States production (billion m <sup>3</sup> )
1950 ... ..	5.8	—	—	—	—
1955 ... ..	9.0	—	—	—	—
1960 ... ..	47.0	38.0	—	422.2	360
1961 ... ..	60.9	13.9	29.5	—	375
1962 ... ..	75.2	14.3	23.4	—	393
1963 ... ..	91.5	16.3	21.6	—	417
1964 ... ..	110.0	18.5	20.2	—	436
1965 ... ..	129.0	19.0	17.2	174.4	454
1966 ... ..	145.0	16.0	12.4	—	487
1967 ... ..	159.0	14.0	9.6	—	514
1968 ... ..	171.0	12.0	7.5	—	547
1969 ... ..	183.0	12.0	7.0	—	586
1970 ... ..	200.0	17.0	9.2	55.0	621
1971 ... ..	212.0	12.0	6.0	—	636
1972 ... ..	221.0	9.0	4.2	—	648
1973 ... ..	236.0	15.0	6.7	—	n.a.
1974 Plan ...	257.0	21.0	8.8	—	—
1975 (estimated)	280	23.0	8.0	40.0	—
1980 (estimated)	380	—	—	35-40	—

n.a. = not available.

In 1972 the United Kingdom produced 26.5 billion m<sup>3</sup> whilst the EEC (mainly the Netherlands, West Germany, France and Italy) produced 95 billion m<sup>3</sup>.

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APPENDIX 2

## USSR: NATURAL GAS PRODUCTION BY MAJOR REGIONS

(billion m<sup>3</sup>)

	1960		1965		1970		1971		1972		1973		1975		1980	
	Production	Per cent	Production	Per cent	Production	Per cent	Production	Per cent	Production	Per cent	Production	Per cent	Production	Per cent	Production	Per cent
Total ... ..	47.0	100.0	129.0	100.0	200.0	100.0	212.0	100.0	221.0	100.0	236.0	100.0	300-320	—	550-600	—
of which from																
Ukraine ...	14.3	30.4	39.4	30.5	60.9	30.4	64.7	30.5	67.2	30.4	68.2	28.9	62.0	19-21	n.a.	—
Central Asia ...	0.7	1.4	17.9	13.8	46.0	23.0	51.3	24.1	55.9	25.2	66.6	28.2	80-100	27-31	120-130	21
Volga-Urals ...	n.a.	—	15.4	11.9	12.7*	6.3*	n.a.	—	n.a.	—	n.a.	—	n.a.	—	n.a.	—
North Caucasus	n.a.	—	44.7	34.6	39.7*	19.8	n.a.	—	n.a.	—	n.a.	—	n.a.	—	n.a.	—
Caucasus ...	5.8	12.3	6.2	4.8	5.5	2.7	5.8	2.7	6.9	3.1	8.4	3.6	n.a.	—	n.a.	—
Kazakhstan ...	neg.	—	neg.	—	2.1	1.0	2.7	1.2	3.5	1.5	4.8	2.0	7.0	2	n.a.	—
Komi ...	n.a.	—	0.6	0.4	6.2	3.1	n.a.	—	12.8	5.7	n.a.	—	16.1	5	n.a.	—
West Siberia ...	—	—	—	—	13.6*	6.8	n.a.	—	n.a.	—	n.a.	—	50	15.17	150-170	27-28
East Siberia and Far East	—	—	0.6	0.4	2.8*	1.4	n.a.	—	n.a.	—	n.a.	—	13.8	3-4	n.a.	—

\* Estimate...

n.a. = Not available.

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APPENDIX 3

USSR: NATURAL GAS RESERVES BY REGION IN  
SELECTED YEARS

(billion m<sup>3</sup>)

	<i>Region</i>	<i>As of 1 January, 1966</i>	<i>As of 1 January, 1971</i>
USSR	...	3,556	15,782
of which European Russia	...	1,803	3,042
Komi ASSR	...	38	464
Ukraine SSR	...	655	823
North Caucasus	...	755	602
Volga-Urals	...	250	279
Orenburg Oblast	...	25	799
East of the Urals	...	1,763	12,508
West Siberia	...	400	9,752
Uzbek SSR	...	667	789
Turkmen SSR	...	376	1,386

Source: Development of the Oil Resources of Western Siberia, Moscow 1972.

USSR: NATURAL GAS AGREEMENTS WITH WESTERN EUROPE

Year	Country	Goods or pipeline to be supplied	Value of pipe (million \$)	Period of Soviet gas delivery	Total volume of gas involved (billion m <sup>3</sup> )	Maximum annual volume of gas deliveries (billion m <sup>3</sup> )	Other information
1963	Austria	To supply 400,000 tons 48 ins. diameter pipe and 120,000 tons 40 ins. diameter pipe	115	1968-90	30	1.5	Gas delivered at \$14-15.8 per 1,000 m <sup>3</sup>
1973	Austria		—	1974-90	8.5	0.5	Additional agreement, value of gas \$38 per 1,000 m <sup>3</sup>
1969	Italy	To supply 1 million tons 56 ins. diameter pipe in 1972-74	200	1974-90	100-120	6.0	Agreement with Italsider
1970	West Germany	To supply 1.2 million tons 56 ins. diameter pipe in 1970-72	333	1974-93	52	3.0	Agreement with Mannesman
1972	West Germany	To supply 2.5 million tons pipe by 1975	373	1980-93	56	4.0	Additional agreement with Mannesman
1971	Finland	To supply 60,000-70,000 tons pipe annually	n.a.	1974-93	26	1.4	
1971	France	n.a.	233	1976-95	50	2.5	

n.a. = not available.

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APPENDIX 5

USSR: 1971 ESTIMATED GAS CONSUMPTION BY SECTOR

								<i>Per cent(*)</i>	<i>Billion m<sup>3</sup></i>
Total...	...	...	...	...	...	...	...	100	215.5
of which:									
Power stations	...	...	...	...	...	...	...	27	58.2
Chemicals and metallurgy	...	...	...	...	...	...	...	22	47.4
Other industry	...	...	...	...	...	...	...	34	73.3
Communal and everyday	...	...	...	...	...	...	...	13	28.0
Other	...	...	...	...	...	...	...	4	8.6

\* *Source: Ekonomicheskaya Gazeta, 8 February, 1973.*

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USSR: NATURAL GAS IMPORTS  
(million m<sup>3</sup>)

	1967	1968	1969	1970	1971	1972	Planned		
							1973	1975	1980
Afghanistan ...	206.7	1,500	2,030	2,591	2,513	2,849	3,500	3,500	3,500
Iran ...	—	—	—	965	5,623	8,197	9,000*	10,000	10,000
<b>Total ...</b>	<b>206.7</b>	<b>1,500</b>	<b>2,030</b>	<b>3,556</b>	<b>8,136</b>	<b>11,046</b>	<b>12,500*</b>	<b>13,500</b>	<b>13,500</b>

\* Estimate.

Source: Soviet Trade Returns 1967-72.

USSR: NATURAL GAS EXPORTS

	1968	1969	1970	1971	1972	(million m <sup>3</sup> ) Planned		
						1973	1975	1980
<b>Total ...</b>	<b>1,729</b>	<b>2,665</b>	<b>3,299</b>	<b>4,555</b>	<b>5,075</b>	<b>6,200(3)</b>	<b>23,435-24,435</b>	<b>42,800-43,800</b>
of which to CMEA ...	—	1,883	2,343	3,127	3,437	4,000(3)	12,500-13,500	24,000-25,000
Bulgaria ...	—	—	—	—	—	—	3,000	5,000
Czechoslovakia ...	587	889	1,341	1,639	1,937	2,000(3)	3,000-4,000	6,000
East Germany ...	—	—	—	—	—	500(3)	3,000	6,000
Hungary ...	—	—	—	—	—	—	1,500	2,000-3,000
Poland ...	1,000	994	1,002	1,488	1,500	1,500(3)	2,000	5,000
to Western Europe ...	142	782	956	1,423	1,633	2,200(3)	10,935	18,800
Austria ...	142	782	956	1,428	1,633	1,700(3)	2,000	2,000
Italy ...	—	—	—	—	—	—	(6,000)(1)	6,000
West Germany ...	—	—	—	—	—	500	2,000(3)	7,000
Finland ...	—	—	—	—	—	(467)(1)	935	1,300
France ...	—	—	—	—	—	—	(2,500)(2)	2,500

(1) To begin in 1974.      (2) To begin in 1976.      (3) Estimate.

Source: Soviet Trade Returns 1968-72.

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