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INTELLIGENCE REPORT

THE QUESTION OF A FUEL SHORTAGE
IN THE USSR

DIRECTORATE OF INTELLIGENCE

Office of Research and Reports

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FOREWORD

Continued growth in the export of oil from the USSR to other Communist countries and to non-Communist countries, coupled with failure of the coal and natural gas industries to perform at levels originally established by the Seven Year Plan (1959-65), has led to speculation that the USSR may be encountering problems in the supply of fuel. Such speculation was reinforced by statements of Chairman Kosygin and other leading officials at the December 1964 session of the Supreme Soviet.

This report was undertaken to determine whether a fuel shortage has in fact developed in the USSR. Problems associated with the orderly development of supply and demand for fuel in the USSR are discussed. Future trends in energy supply are analyzed, and implications for the economy are noted.

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THE QUESTION OF A FUEL SHORTAGE IN THE USSR*

Summary and Conclusions

In spite of recent statements by Chairman Kosygin and other Soviet officials that difficulties exist in supplying the USSR with fuel, no convincing evidence exists of serious fuel shortages.** During the Seven Year Plan period (1959-65), there has been -- with minor exceptions -- no cutback in industrial activity attributable to fuel shortages, no evidence of rationing, no rise in the normal level of consumer grumbles, and no letdown in international marketing of fuels. Supplies of fuel generally have kept pace with the increase in overall economic activity. Furthermore, current planning for the new Five Year Plan (1966-70) can proceed on the assumption that adequate fuel supplies will be forthcoming over the next few years.

What, then, is the cause of the official concern with fuel supplies? First, the USSR in recent years has tried to shift its primary energy*** balance away from coal toward oil and natural gas. Coal, which supplied 59 percent of total primary energy in 1958, was to supply only 43 percent in 1965. Responsible officials, because they overestimated the potential contribution of oil and gas to the national supply of fuel, arbitrarily reduced investment in the coal industry, halted construction of new mines, and disbanded a number of construction organizations. Moreover, consumers have not always been able to meet the time schedule for large-scale conversion of combustion facilities from coal to gas or oil.

Second, the pressing need for foreign exchange has led to rapid increases in exports of coal and oil. Thus, export of coal increased in spite of lagging output, and the expected reduction in the demand for coal was delayed. Oil exports have made sharp inroads into domestic supply, representing almost 25 percent of domestic production in 1964. Nevertheless, two favorable factors have helped offset these adverse conditions: (1) output of crude oil has continued to exceed the annual plan and (2) technological advances unexpectedly increased the efficiency with which fuels were used in some industries.

Third, the greatest growth in demand for fuels has been in the European USSR and the Urals, whereas the major new deposits of coal, crude

* The estimates and conclusions in this report represent the best judgment of this Office as of 1 August 1965.

** For a discussion of the various meanings of the term shortage, see p. 6, below.

*** The term primary energy as used in this report includes coal, crude oil, natural gas, peat, shale, and fuelwood, but excludes hydroelectric power and nuclear energy.

oil, and natural gas are located in Central Asia and Western Siberia. Consequently, consumers have become increasingly dependent on more distant sources of supply. Soviet planners have been only partly successful in pushing the rapid development of large pipelines to get the fuel to consumers.

Fourth, these major shifts in the Soviet fuel balance and the pattern of consumption and production have been superimposed on other problems chronic to the fuel industry. Among these longstanding problems are (1) the difficulty in meeting the large seasonal peaks in demand, (2) the inability to plan accurately for changes in the efficiency with which fuels are used, and (3) the conflict between efforts to increase rapidly the output of fuels and efforts to raise the quality of output and to maximize the long-run yield of oilfields and coal seams.

The net result of this complex of forces has been -- not serious general shortages of fuel -- but spot shortages in certain geographical locations, at certain times of the year, and in certain industries. Because the Soviet economy is run as close as possible to capacity and because it relies heavily on commands from the center to get things done, spot shortages of this kind occur again and again in all kinds of supplies as well as fuels -- that is, the economy is at a disadvantage in achieving the fine adjustments that are normal in a Western "market economy."

Although, as noted, the production of crude oil continues to exceed the annual plan, these above-plan quantities are not sufficient to offset shortfalls in coal and natural gas. As a result, the total production of primary energy in 1965 will fall short of the original goal for that year by an estimated 4 percent. It is unlikely that this shortfall will engender any hardship for the economy. Continued growth in efficiency in consumption and -- perhaps just as important -- a general slowdown in the rate of economic expansion and a more accurate appraisal of the energy needs of the economy, as the plan unfolds, have permitted the economy to function with inputs of fuel below the amounts originally planned.

The same general forces affecting fuel supplies will be at work in the new Five Year Plan. The concern shown by the leadership is likely to be reflected in (1) a partial rehabilitation of the status of coal, (2) a continued effort to press forward with large-diameter pipelines for oil and gas (the planners will have to move fuel to the consumer; they are not likely to be able to move consumers to the fuel because of vested interests in the industrial bureaucracy), and (3) a renewed effort to achieve balance within the domestic economy and between domestic and foreign requirements and hence to eliminate the most serious spot shortages. Total production in 1970 of major fuels -- coal, crude oil, and natural gas -- is now scheduled to be about 1.3 billion metric tons (mt) of standard fuel equivalent,* or 9 percent less than originally scheduled.

* Standard fuel has a calorific value of 7,000 kilocalories per kilogram.

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This revised plan, however, still represents an average annual increase of about 6 percent and fits in with the generally reduced growth trends in the economy as a whole. In summary, there is no reason to suppose that supplies of fuels over the next 5 years will constitute an appreciable constraint on economic growth in the USSR.

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I. Background

A. Official Concern with Shortages

In his speech before the Supreme Soviet on 9 December 1964, Chairman Kosygin drew attention to problems of fuel supply in the USSR by noting, 1/*

... in recent years there has been certain difficulty in supplying the country with fuel. This has occurred because the tasks of the Seven Year Plan for the extraction of coal and gas are not being met, while the major fuel-consuming branches -- heavy metallurgy, electric power, and rail transport -- are developing according to plan.

He also observed that, despite the broad measures to be undertaken in 1965 to increase the supply of fuel and to add to the capability to move fuel to consuming centers, "the demand for fuel (in that year) will be satisfied with still some strain." The use of the term strain in the context of discussion of the fuel balance is not without precedent. The fuel situation in the USSR in the postwar period until the mid-1950's was generally regarded as "strained," but in these years the USSR was working coal mines 359 days a year, compared with 300 days at present, and was a net importer of fuel. 2/

Other speakers at the same session of the Supreme Soviet, representing vested interests within the fuels industry, provided more details about the problem. Each underscored fuel distribution difficulties and shortages of a wide variety of equipment and material, and each outlined steps to be taken during the next several years to mitigate the imbalance in fuel supplies. For example, the Chairman of the State Fuels Committee, N.V. Melnikov, admitted to a current "shortage" of coal and the need to take steps to prevent a "strain" on coal in 1965 and a possible "shortage" in 1966, placing the blame in part on planners for giving insufficient attention to the coal industry. 3/

A.K. Kortunov, Chairman of the State Production Committee for the Gas Industry, stressed that in the European portion of the USSR the supply of fuel remained "strained," particularly in the case of gas. 4/ Kortunov described a most ambitious gas pipeline construction program designed to facilitate the movement of large quantities of gas from Central Asia to Moscow and the surrounding area, a distance of more than 3,000 kilometers (km). In a slightly different approach, A.V. Sidorenko, Chairman of the State Committee for Geology, noted that alleviation of the "strain" in the fuel balance will depend in considerable part on the achievement of drilling plans for oil and gas, and he criticized oil-field equipment manufacturers for their inability to keep pace with

* For serially numbered source references, see the Appendix.

the growing demands -- both in quality and quantity -- of the petroleum industry. 5/ Finally, O.I. Ivashchenko, Chairman of the Economic Commission, Council of Nationalities, plugged for an increase in the supply of fuel for use by households. 6/

Following the close of the Supreme Soviet session, the Soviet press launched a drive calling for greater economy in the use of fuels, including electric power. Admonishment to conserve fuel is a familiar thing in the USSR and cannot be expected to exert any significant influence on levels of consumption (see the accompanying cartoons, Figure 1).

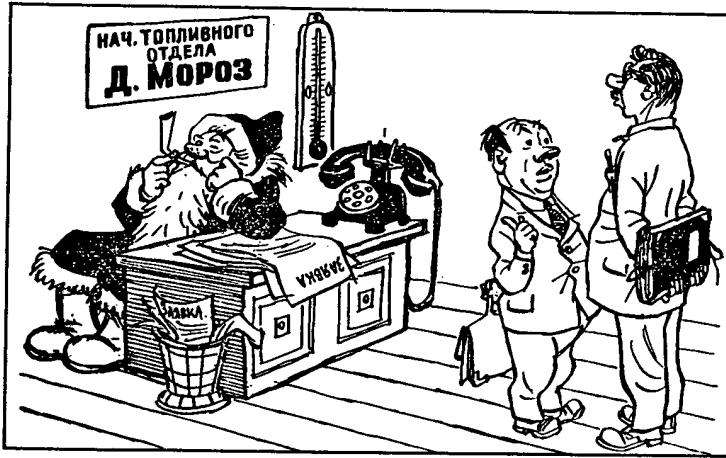
B. Various Meanings of the Term "Shortage"

The term shortage has a different connotation in a market economy like the US than in a command economy like the USSR. In both cases a shortage of fuels would have to be distinguished as to time period, as follows: (1) the immediate time period -- that is, the period in which supplies are limited to those already produced and already transported to consuming areas; (2) the short-run time period -- that is, the period in which supplies may be increased by applying more labor to existing wells and mines or by transporting quantities from distant stockpiles or foreign sources; and (3) the long-run time period -- that is, the period in which new productive capacity (wells and mines) and equipment can be built and put into operation to augment supplies. For the USSR, immediate shortages are illustrated by seasonal shortages, transportation delays, and waste of inventories at hand; short-run problems are those connected with annual plans -- for example, the failure of a new pipeline to be completed on schedule or a delay in completing the conversion of an electric power station from the burning of coal to the burning of natural gas; and long-run problems are those connected with 5-year and 7-year plans -- for example, the injudicious halting of the construction program for new coal mines or the failure to locate new industrial capacity near new sources of fuel supply.

In addition to the time dimension of shortages, there is the geographical: whether, for instance, shortages are local, regional, or national and whether shortages are to be explained by transportation difficulties and/or the locational pattern of consumer industries rather than by the available supplies of fuels themselves.

Finally, there is an institutional dimension to shortages, particularly in the USSR, where price adjustments are not normally available to alleviate shortages. Moreover, the USSR is a taut economy, its capacity typically being worked to the limit, and at any one time most goods are in short supply. There is no general slack to be taken up in emergencies -- for example, those caused by bad weather or by crash demands from consumers. When shortages are the common thing, it is necessary to distinguish those that matter (in the sense that they hamper production) from those that do not. In the USSR a shortage of spare parts for agricultural machinery or a shortage of large-diameter pipe to move oil and

FIGURE 1. THROUGH THE EYES OF THE MAGAZINE KROKODIL THE SOVIET CITIZEN IS GIVEN A SATIRICAL LOOK AT CURRENT LIFE. THE OPPORTUNITY TO POKE FUN AT CERTAIN CAUSES OF THE PURPORTED FUEL PROBLEM IN THE USSR HAS NOT BEEN OVERLOOKED.



ONE SEEMINGLY INSURMOUNTABLE TASK IS TO CONVINCE RESPONSIBLE AUTHORITIES TO BUILD UP SUPPLIES OF FUEL IN THE SUMMER TIME RATHER THAN WAITING UNTIL WINTER. THE SIGN OVER THE DESK READS "CHIEF OF THE FUEL BRANCH, GRANDFATHER FROST."

QUESTION: AND WHO IS THAT IN OUR OFFICE ?

ANSWER: THAT IS A NEW BRANCH. IT OPERATES ONLY IN THE WINTER.



SUPPORT OF THE MANY AND VARIOUS CONSERVATION PROGRAMS URGED BY THE GOVERNMENT OFTEN IS LIMITED TO LIP SERVICE.

QUESTION: WHY HAVE ALL THE CHAIRMEN ARRIVED ON SKIS ?

ANSWER: WELL, TODAY THERE IS A MEETING ON THE SAVING OF FUEL.

gas does matter, but a shortage of private automobiles hardly matters at all. It is necessary to assess the degree and importance of shortages. How big is the gap between what is needed and what is available? How enduring? To what extent may the gap be made up by substitute products? How serious would the loss of some of the final product be?

Shortages are not always to be measured in terms of the amount by which production falls short of plans. Plans for the consumption of fuels over a 5-year period are notoriously inexact and speculative. For example, unpredictable changes in the international political climate or in the need for scarce foreign currencies may change the need for exports of fuels. Also, consuming industries may fail to achieve planned economies in the use of fuels, or they may be more successful than anticipated. Annual plans for the consumption of fuels are more likely to reflect actual needs than long-term plans, but even here unanticipated events are apt to change the needs for various fuels. Thus shortages of fuels become a practical matter, not of differences between plan and performance, but of differences between what is needed here and now on a pragmatic basis and what is actually available here and now.

II. Growth in the Supply of Energy

A. Total Primary Energy

The production of primary energy in the USSR during 1959-64 increased at an average annual rate of 6.8 percent, to 913 million mt of standard fuel (see Table 1). Roughly 85 percent of the growth in production of primary energy during 1959-64 was provided by crude oil and natural gas. Indigenous availability of minor sources of primary energy -- peat, shale, and fuelwood -- was approximately the same in 1964 as it had been in 1958. Relative stagnation in the output of coal, coupled with above-plan output of crude oil and sustained high rates of growth in the extraction of natural gas (see Figure 2), resulted in a more rapid displacement of coal in the early years of the Seven Year Plan than had been foreseen originally. By the close of the plan in 1965, however, it is probable that crude oil and natural gas taken together will account for virtually the same share of primary energy production as had originally been scheduled (51.3 percent). Above-plan performance in the production of crude oil will offset below-plan output of coal and natural gas.

If the USSR continues to match previous performance in the over-fulfillment of annual production goals for crude oil and natural gas and if output of coal continues to increase as it has in the last 2 years, then indigenous production of primary energy may reach 975 million mt by the end of 1965. Such a level of output would be about 4 percent less than the level -- 1,016 million mt -- originally called for. That estimated output of primary energy in 1965 will be 4 percent less than originally planned, however, does not imply any hardship for the economy. Because of greater efficiencies in consumption and because of a general slowdown

Table 1

USSR: Production of Primary Energy a/
Selected Years, 1955-65

Year	Million Metric Tons of Standard Fuel <u>b/</u>	Percent of Total		
		Coal	Crude Oil	Natural Gas
1955	479.9	64.8	21.1	2.4
1958	616.4	58.8	26.3	5.5
1959	659.4	56.1	28.1	6.4
1960	692.8	53.9	30.5	7.9
1961	732.7	50.5	32.4	9.7
1962	778.6	48.8	34.2	10.9
1963	847.1	45.9	34.8	12.4
1964	913 <u>c/</u>	44.5 <u>d/</u>	35.0 <u>d/</u>	13.9 <u>d/</u>
1965 original plan <u>e/</u>	1,016	43.4	33.8	17.5
1965 revised annual plan	930 <u>f/</u>	43.9 <u>g/</u>	37.2 <u>g/</u>	15.8 <u>g/</u>
1965 estimate	975	43.1	35.6	15.6

a. Including coal, crude oil, natural gas, peat, shale, and fuelwood but excluding hydroelectric and nuclear energy. Data are from source 7/ unless otherwise indicated.

b. Standard fuel has a calorific value of 7,000 kilocalories per kilogram.

c. Estimated.

d. 8/. Conversion from natural units to units of standard fuel, based on the following rates:

Coal -- 1 metric ton (mt) equals 0.733 mt of standard fuel.

Crude oil -- 1 mt equals 1.43 mt of standard fuel.

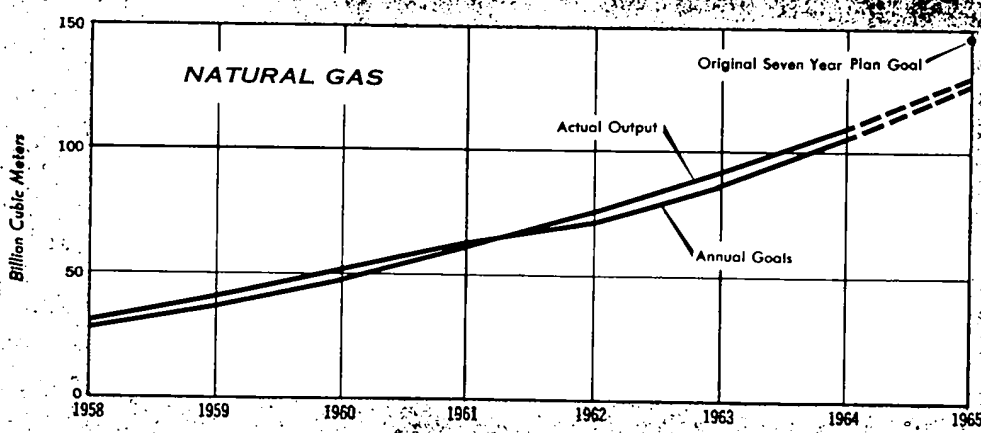
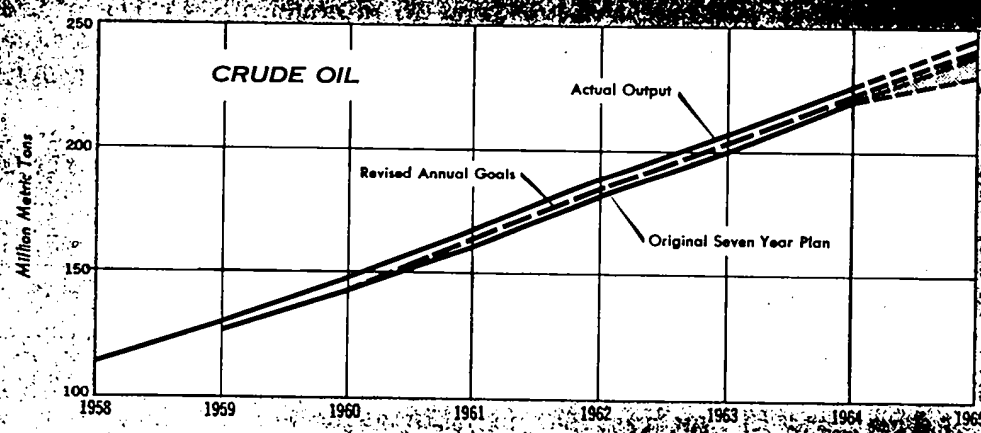
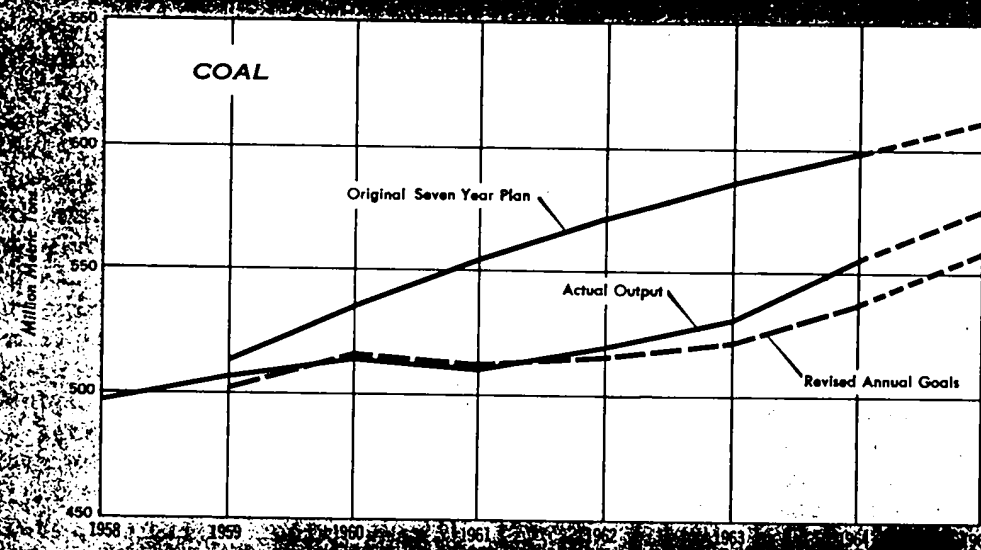
Natural gas -- 1,000 cubic meters equals 1.17 mt of standard fuel.

e. 9/

f. Based on source 10/.

g. Data are from source 11/ and have been converted to standard fuel using 1964 conversion factors.

USSR: Trends in the Output of Coal, Crude Oil and Natural Gas, 1958-65



in growth of fuel-consuming branches of industry, the demand for fuel has been less than originally anticipated.*

B. Coal

Output of coal has been well below the annual levels necessary for achievement of the original 1965 goal. This supports, at least in part, the reasoning of Kosygin that fuel difficulties had arisen because the production of coal had been falling short of output levels established by the Seven Year Plan, while the major consumers continued to develop along planned lines. Indeed, after 4 years of the Seven Year Plan period had passed, extraction of coal had increased by only 4 percent -- or by about 20 million mt -- compared with 15 percent under the guidelines of the Seven Year Plan. For comparison, in 1958, the last year prior to initiation of the Seven Year Plan, a growth of almost 33 million mt was achieved. Little conscious effort was made during 1959-62 to raise levels of production through planning sizable increments in output. On the contrary, as illustrated in Table 2, annual plans, each substantially revised downward from the Seven Year Plan control levels,** called for only modest growth in output. Moreover, in 1 year -- 1961 -- the planned production of coal was actually less than the level achieved in the preceding year.

It is unlikely that Soviet officials knowingly would accept annual plans for production of coal which would not provide for output in quantities sufficient to sustain priority economic activities. Barring any unpublicized difficulties which would have restricted the growth in output to levels less than those needed to meet the growth in demand, it must be assumed that annual output plans have been realistic in terms of capability and only slightly less realistic in terms of requirements. The absence of complaints from major consumers of coal (for example, electric power stations) with regard to inadequacies in the supply of fuel lends strong support to this belief. Complaints by consumers have been concerned with inadequacies in quality rather than quantity.

* A. Korobov, Deputy Chairman of Gosplan, has noted on several occasions that, because of progressive shifts in the production and in the consumption of fuel -- especially in industry and in transport -- the demand for fuel in 1965 will be satisfied with a somewhat lower volume of fuel than was called for by the Seven Year Plan. 12/

** A comparison of revised annual output goals with actual production indicates that generally these revised goals have been met and, at least in 1963 and 1964, overfulfilled sharply. In these 2 years a total of 27 million mt of coal was produced in excess of the planned amounts. Moreover, it is estimated that the 1965 Plan, which calls for a modest growth of only 5 million mt in output, not only will be met but that output may exceed plan by as much as 10 million to 15 million mt. The above-plan coal apparently has been used to support additional demands resulting from above-plan performance in the major consuming sectors of the economy, to build up reserves and stockpiles, and to enlarge sales of coal.

Table 2

USSR: Production of Coal
1958-65

Million Metric Tons				
Year	Annual Production Under Original Seven Year Plan <u>a/</u>	Revised Annual Plan	Actual Production <u>b/</u>	Difference Between Actual Production and Original Seven Year Plan
1958			496.1	
1959	512.5	500.5 <u>c/</u>	506.6	-5.9
1960	536.3	515.2 <u>d/</u>	513.2	-23.1
1961	554.6	511.7 <u>e/</u>	510.5	-44.1
1962	571.5	516.4 <u>f/</u>	517.4	-54.1
1963	586.4	522 <u>g/</u>	531.7	-54.7
1964	599.8	537 <u>h/</u>	554 <u>i/</u>	-45.8
1965	612 <u>j/</u>	559 <u>k/</u>	575 <u>c/</u>	-37 <u>c/</u>

- a. 13/
- b. 14/ unless otherwise indicated.
- c. Estimated.
- d. 15/
- e. 16/
- f. 17/
- g. 18/
- h. 19/
- i. 20/
- j. The upper end of the range of 600 million to 612 million mt forecast for the year.
- k. 21/

Attempts by Soviet officials to explain why and how the coal industry failed to develop to the levels called for by the Seven Year Plan have been less than satisfactory.* It is apparent that responsible officials overestimated the contribution of oil and gas to the national supply of fuel. In their eagerness to adhere to the Party line which

* One writer used the following rationale in attempting to explain why certain officials disregarded the planned expansion of the coal industry. 22/ In the early years of the Seven Year Plan the extraction of natural gas expanded quite rapidly. At the same time, certain major industrial enterprises -- consumers of high-quality coal -- had not yet been converted to the utilization of natural gas. The gas was then diverted to electric power stations where anthracite fines were being burned as a fuel. Because these fines [footnote continued on p. 11]

supported priority expansion of production of crude oil and natural gas, they shunted the coal industry aside. Capital investment was reduced sharply, construction activities designed to add new mine capacity were cut back drastically, and a number of specialized mine-construction organizations were liquidated. As a result, actual commissioning of new coal mines during 1959-64 provided additional capacity rated at only 50 million mt of coal per year, whereas the original Seven Year Plan had called for the commissioning of 196 million mt of annual output capacity during these years.

The regional pattern of extraction of coal in the USSR has changed only slightly in recent years, with output in the eastern regions (including the Urals) increasing from 46.7 percent of the total in 1958 to 49.5 percent in 1963. Historically the bulk of the coal produced has been consumed in the western regions, and thus long, expensive, and time-consuming rail hauls to the consumer have been necessary. Until major consumers of coal can be established in the eastern regions, preferably in Siberia, the problem of regional imbalance in coal supply and demand will continue to prevail.

C. Crude Oil

Crude oil is the only form of primary energy for which the annual production goals established by the Seven Year Plan have been met and exceeded. As shown in Table 3, annual production consistently has exceeded planned goals, which, in turn, for the 4-year period 1961-64 have represented upward revisions from the Seven Year Plan. By the close of 1964, cumulative production since 1958 in excess of the original plan totaled about 26 million mt. It is estimated that above-plan performance will continue through 1965 and that output in that year probably will slightly exceed the plan. Nevertheless, these continued high rates of growth in production of crude oil apparently were sustained by certain production practices which, although enabling oilfield managers to meet plans, ultimately proved to be injurious to the industry. From the initial period of operation the reservoir pressure of Soviet oilfields had been kept at high levels by means of a very broad program of waterflooding. Taking advantage of high underground pressures, the oilfield manager had been able to increase output simply by opening the valve on the production line. Continued reliance on this practice, coupled with

were not appropriate for use as a boiler fuel or for use in meeting communal and household requirements for fuel, they began to accumulate at the mine-head: during 1959-62, such accumulation increased from 4.7 million mt to 22.3 million mt. This increase in reserves gave the false but widely held impression that coal was a surplus fuel being replaced by more progressive and more effective fuels -- natural gas and residual fuel oil. As a result, no significant development of the coal industry was sought by the responsible planners.

subsequent shortfalls in providing for increases in waterflooding, has resulted in sharp declines in reservoir pressure. In turn, the drop in reservoir pressure has reduced (and in some instances halted) the flow of oil from previously free-flowing wells. In addition, drilling has lagged sharply, and expansion of the capacity to produce crude oil has suffered accordingly. Finally, most of the major discoveries of crude oil in recent years have been in very remote areas, where industrial and transport development generally are absent and where climatic conditions are extreme. Soviet planners, after taking all these factors into consideration, in the 1964-65 Plan called for reduced rates of growth in output of crude oil (the absolute increment of 16 million mt scheduled for 1964 was the lowest since 1958) in an attempt to find a more balanced approach which would be reasonable in both the short term and the long run.

Table 3

USSR: Production of Crude Oil
1958-65

Million Metric Tons

Year	Annual Production Under Original Seven Year Plan <u>a/</u>	Revised Annual Plan <u>a/</u>	Actual Production <u>b/</u>
1958			113.2
1959	128	128	129.6
1960	144	144	147.9
1961	161	164	166.1
1962	181	185	186.2
1963	200	205	206.1
1964	220 <u>c/</u>	222	224 <u>d/</u>
1965	230 to 240	242 <u>e/</u>	243 <u>c/</u>

- a. 23/ unless otherwise indicated.
- b. 24/ unless otherwise indicated.
- c. Estimated.
- d. 25/
- e. 26/

Output of crude oil has been sufficient, with only minor exceptions, to meet continually growing domestic and export demands. Net exports of crude oil and petroleum products to both Communist countries* and non-Communist countries have increased from 13.8 million mt in 1958 to an estimated 53 million mt in 1964. Domestic demand increased

* Including the USSR, Bulgaria, Czechoslovakia, East Germany, Hungary, Poland, Rumania, Communist China, Cuba, Yugoslavia, North Korea, and North Vietnam.

during the same period from 88 million mt to 151 million mt. The relationship between domestic consumption of oil and the weighted output of the major consuming sectors -- agriculture, transport, and industry -- has remained practically constant throughout the entire period. There have been no major complaints from either the domestic consumer or the foreign purchaser to the effect that supplies of petroleum were inadequate or that trade contracts were not being met. Such complaints would be the most probable indicator of an oil shortage. Because oil per se was not singled out by any of the speakers before the Supreme Soviet, it seems reasonable to assume, in the absence of evidence to the contrary, that production of crude oil has been sufficient to meet the requirements of the economy functioning within the framework of current annual plans.*

D. Natural Gas

The natural gas industry generally has been a source of disappointment for Soviet planners. Encouraged by a number of discoveries of very large deposits of natural gas in the mid-1950's which appeared adequate to support sustained growth in production for a number of years, officials laid out grandiose plans for the industry. These plans so far have not been realized, largely because (1) the availability of gas-consuming equipment has not kept pace with the expansion of the potential for gas production and (2) inadequate compressors on existing gas pipelines have precluded operation of the lines at full or planned capacity. Until more realistic annual output goals -- in terms of capability to transport and to consume -- were introduced in 1962 (see Table 4), the gas industry had been characterized by continual failure to meet planned goals. Beginning in that year, less ambitious growth was scheduled, with the result that output has been able to exceed plan consistently. With the completion in 1963 of the 40-inch gas pipeline from Bukhara, in Uzbek SSR, to the Ural industrial region, a very substantial addition to the capability to move gas was realized. As a result, extraction of gas in 1964 jumped by almost 19 billion cubic meters (cu m), an increase of 21 percent. Nevertheless, improvements in the means to deliver gas and in the means to consume it have come about too late to permit achievement of the original 1965 production goal of about 148 billion cu m. The revised goal for this year calls for an output of about 127 billion cu m, or 14 percent less than originally scheduled, and it is likely that this level will be exceeded by 1 to 2 percent.

The major problem currently confronting the Soviet gas industry -- one which is unlikely to be resolved quickly -- is the growing disproportion between indigenous regional supply and demand for gas. The leading

* Recent complaints of the failure of the USSR to honor its oil export commitments during the first quarter of 1965 indicate only an immediate shortage of fuel in the USSR. The growth in output of crude oil during the first quarter of 1965 dipped slightly in comparison with the growth achieved in the preceding year. As a result, supplies of crude oil (and therefore of petroleum products) were tight, and difficulties were encountered in meeting both domestic and foreign commitments.

Table 4

USSR: Production of Natural Gas a/
1958-65

Billion Cubic Meters			
Year	Annual Plan <u>b/</u>	Actual Production <u>c/</u>	Difference Between Actual Production and Annual Plan
1958	30.0	28.1	-1.1
1959	39.2	35.4	-3.8
1960	51.4	45.3	-6.1
1961	61.3	59.0	-2.3
1962	70.5	73.5	3.0
1963	85.8 <u>d/</u>	89.8	4.0
1964	107.6 <u>e/</u>	108.5 <u>f/</u>	0.9
1965 original plan	148.2		
1965 revised annual plan	126.6 <u>e/</u>	130 <u>f/</u>	

a. Including both nonassociated and associated natural gas (natural gas produced in association with crude oil).

b. 27/ unless otherwise indicated.

c. 28/ unless otherwise indicated.

d. 29/

e. 30/

f. Estimated.

consumers of gas are located in the Moscow industrial area and in the Urals. For the most part these consumers have been created as a result of the conversion to gas of factories, electric power stations, institutions, and households which previously were using less efficient and more expensive solid and liquid fuels. In addition, Soviet planners have shown a predilection in most areas to construct new energy-intensive industries in areas of established industrial development rather than to locate such consumers near sources of energy supply, which at least for gas are found in areas distinguished by remoteness, extreme climate, and lack of any form of development. To satisfy these new consumers the USSR has had to carry out a very expensive program for the construction of long-distance gas pipelines. Gas for the Moscow area, for example, is imported from three principal areas: the North Caucasus, 1,300 km to the south; the Shebelinka deposits in the eastern

Ukraine, 850 km to the south; and Dashava in the western Ukraine, a distance of 1,300 km. Gas for the Urals currently is provided by the Bukhara deposits in Uzbek SSR, and movement of the quantities of gas required has called for the construction of two parallel 40-inch lines, each about 2,000 km in length.

Apparently, future growth in delivery of gas to the Urals and to the Moscow area, to a large degree, will have to be provided by the exploitation of gasfields other than those currently under development. Those major fields currently in production lack the potential for any further significant growth in output. Such new fields are available (in Turkmen SSR and West Siberia, for example) but are located in areas quite remote from the major gas-consuming centers.* Thus the geographical separation of the consumer from his sources of supply of gas is the principal cause for whatever problems have arisen in the supply of gas to consumers in timely and adequate quantities.

E. Other

The minor forms of primary energy in the USSR include peat, shale, and fuelwood. Their total production fluctuated somewhat during 1959-64, reflecting to a degree the influence of inclement weather on the mining of peat. Output of these fuels in 1964 approximated the 1958 level, a much higher level than had been anticipated because of greater use of fuelwood in rural areas. These fuels were scheduled to contribute 5.3 percent of total primary energy availability in the USSR in 1965, compared with 9.4 percent in 1958, but it is likely that use of wood as a fuel will continue to exceed plan.

III. Apportionment of Supply and Its Implications

Stimulated by the continued and growing need to increase its earnings of foreign exchange, the USSR has been exporting proportionately larger shares of its domestic supplies of coal and oil.** Accordingly, the relative share of domestic supply available for the home market has been reduced from year to year. Analysis of recently acquired information has revealed that such exports were running at levels well above those originally scheduled for the Seven Year Plan. 31/ Indeed, the net export of coal and coke during these years was to have declined from 1.8 percent

* To meet the growing requirements for natural gas in the Moscow industrial area, the USSR in 1965 is to begin installation of a 3,375-km gas pipeline leading from newly discovered deposits in Uzbek SSR and Turkmen SSR. Initial plans call for the construction of two parallel lines, each 40 inches in diameter, capable of delivering 21 billion cu m of gas annually.

** Only insignificant quantities of natural gas -- less than 0.3 percent of output in 1963 -- are exported, all to Poland. Within the next several years, about 1 billion cu m annually are to be exported to Czechoslovakia on completion of a pipeline now under construction between the Dashava deposits in the western Ukraine and Bratislava.

of production in 1958 to less than 1 percent by 1965. In actuality, by 1964 exports of coal represented an estimated 4.5 percent of production.

Although exports of oil* were to have increased during 1958-65, the increase was to have been very gradual, from 12.7 percent of production in 1958 to about 13.9 percent by 1965. In terms of actual exports, that level originally planned for 1965 -- about 33 million mt of crude oil equivalent -- was achieved in 1960. By 1964, when net exports reached an estimated 55 million mt of crude oil equivalent, the USSR was exporting almost 25 percent of its indigenous supply of oil. (Exports of coal and oil in relation to production during 1958-64 are noted in Table 5.)

It is unlikely that the supply of coal has been so tight that the indicated increase in exports to 4.5 percent of production would cause any limitations in the quantities set aside for domestic consumption. Therefore, increasingly larger shares (about 14 percent in 1964) of the absolute annual growth in production of coal are being directed toward exports for the purpose of earning additional foreign exchange.

The very rapid rate of growth in exports of oil possibly could cause rather severe restrictions on consumption and even shortages in selected petroleum products. In fact, restrictions were placed on consumption of oil in 1962, and shortages of selected petroleum products have developed in recent years, but these short-run shortages can be traced to causes not linked with any chronic difficulties in the supply of oil. Temporary restrictions on domestic consumption were rather the result of sudden requirements for exports -- notably to Cuba -- which could not have been anticipated in planning.

In June 1962, Soviet planners were forced to call for a 2-percent reduction in domestic oil consumption so that export requirements could be met. 32/ The politically necessary but unexpected burden of supplying Cuba with about 4 million mt of oil in 1961 had placed harsh requirements on the Soviet petroleum industry, and deliveries were made possible only through a combination of reductions in inventories and in supplies to domestic consumers. Allocation of the supply of oil in 1962 was designed to restore depleted inventories and to make up for those local shortages of fuel which had persisted throughout the preceding year. Apparently the allocations to domestic consumers were quite liberal, for consumption began to exceed established norms. As a result, and to protect the Soviet image as a reliable international trader in oil, the cutback in domestic consumption was deemed mandatory.

Because Soviet marketing activities in oil in recent years have attracted considerable publicity, the USSR has been very careful to preserve its image as a reliable trader. It has long recognized that failure to live up to trade commitments in oil would jeopardize its trading

* For this and subsequent calculations, exports of petroleum products are expressed in terms of crude oil equivalent (1 mt of crude oil equals 0.92 mt of petroleum products).

Table 5

USSR: Net Exports of Selected Fuels
as a Percentage of Domestic Production
1958-64

<u>Year</u>	<u>Coal and Coke</u> ^{a/}	<u>Crude Oil and Petroleum Products</u> ^{b/}
1958	1.8	12.7
1959	1.9	16.8
1960	2.1	20.2
1961	2.8	23.4
1962	3.7	23.6
1963	4.1	24.3
1964 ^{c/}	4.5	24.8

- a. ^{33/}unless otherwise indicated. Coke has been converted into raw run-of-mine equivalent by multiplying exports of coke by 1.7, a factor which is presumed to account for weight losses in producing coke from raw run-of-mine coal.
- b. ^{34/} unless otherwise indicated. Exports of petroleum products are expressed in terms of crude oil equivalent (1 metric ton [mt] of crude oil is assumed to equal 0.92 mt of petroleum products).
- c. Estimated.

position with respect to other goods and commodities and therefore has been careful not to become overextended in oil contracts, either in quantity or in quality.

Conversely, the development of the economy in an orderly fashion depends on adequate supplies of fuel, especially oil, and it is unlikely that export commitments will be so expanded in the future as to jeopardize domestic development. The long-run program (through 1970) for expansion of production of crude oil probably will be fulfilled with only moderate difficulty. This program will be adequate to satisfy domestic requirements growing at rates comparable to those of the recent past and also to permit modest increases in exports.

IV. Is There a Shortage?

The USSR is not faced with a chronic national shortage* of coal, crude oil, or natural gas. Neither is there evidence to indicate

* The term shortage has no significance without reference to time. A chronic national fuel shortage is [footnote continued on p. 18]

that during the Seven Year Plan economic activity has been curtailed or cut back because of deficiencies in fuel supply. It is believed that Soviet officials -- perhaps of necessity -- have overdramatized the seriousness of the problems of fuel supply insofar as these problems were related to the time period prior to 1965. Such overdramatization was required to insure that those problems which do exist are properly recognized and that measures are taken to reduce their long-run impact on the economy.

The public airing of fuel problems by ranking Soviet officials at the Supreme Soviet in December 1964 laid the groundwork for further, more detailed discussions of such problems by experts who are concerned with the daily routine of fuel supply and distribution. In a very broad propaganda effort, mounted by the Soviet press subsequent to the Supreme Soviet meeting, these experts in essence agreed on the following:

1. Responsible officials have overestimated the contribution that crude oil and natural gas were to make to the total fuel supply.

2. Because of this overestimation, planned expansion of the coal industry arbitrarily was cut back.

3. There is a growing disproportion between fuel requirements and indigenous supply in the European USSR and in the Urals. Moreover, new sources of fuel supply are located at quite a distance from the major consuming centers.

4. Consumers should be alert to new ways of reducing consumption of fuel. However, the need to conserve has been related more to good business practice and has been tied only slightly to purported shortages of fuel.

5. The solution to whatever fuel problems exist is to be found in the accelerated expansion of that sector of the fuels industry which the speaker represented.

Just as important, perhaps, as what these experts said is what they did not say. No consumer complaints were aired, no instances of actual shortages of fuel were cited, and no evidence was given which would relate any slowdown in industrial activity to inadequate fuel supplies.

Only in the coal industry have additional measures had to be taken to insure that demand in general was met. These measures for the most part have consisted of a heavy withdrawal from stocks -- more than 18 million mt -- during 1963-64, to the extent that stockpiles of coal

defined as that situation which would exist if domestic requirements could be met only by increasing output at increasing cost or by cessation of exports, either singly or in combination. A short-run fuel shortage exists if domestic supply can be increased in the short run (for example, within an annual planning period) only at increasing costs (for example, increasing the number of hours in the workday and the number of days of operation of the mine). An immediate fuel shortage exists if available supplies are not adequate to meet immediate needs, which would call for some form of rationing.

at the beginning of 1965 were less than those available in 1959. This action may be regarded as a short-run adjustment possibly precipitated, at least in part, by a desire to increase exports.

There have been periodic reports of local shortages of petroleum fuels and lubricants in the USSR. In particular, diesel fuel and residual fuel oil have been in tight supply -- that is, production has been inadequate, in quantity and/or quality, to meet all requirements. It is probable, however, that much of the difficulty in supplying the economy with these fuels could be removed if exports were cut back to lower levels. Nevertheless, both diesel fuel and residual fuel oil are readily and profitably marketed in Scandinavia and Northern Europe, and such a cutback is not anticipated. Generally, shortages of fuels and lubricants are more local in nature and are caused by transportation difficulties, lack of adequate storage facilities, and/or peak demands during the harvest and winter seasons. In a country such as the USSR, where consumers and sources of supply of fuel are often separated by great distances and where reliable transport systems are not always available, transportation breakdowns and subsequent local fuel shortages can be expected to continue, but such shortages are not symptomatic of nationwide fuel problems.

Reports of local shortages of fuels and lubricants were conspicuous by their general absence during 1964. Moreover, the Soviet technical press was eager to point out that no difficulty was encountered in that year in supplying the tractor and automotive park with fuels and lubricants during the peak periods of sowing and of harvesting. 35/

V. Probable Future Trends in Energy Supply

During the past 18 months the USSR has reappraised the direction of future expansion of the major forms of primary energy. Reappraisal of production goals for crude oil and natural gas apparently was easy to make -- revised goals for these fuels for 1970 were published in January 1964.* 36/ Plans for the growth of both fuels through 1970 were reduced -- crude oil by 5 to 10 percent and natural gas by 16 to 20 percent.

For coal, however, reappraisal has been much more difficult. Despite the relatively poor performance of the industry during the first 4 years of the Seven Year Plan, officials were not yet ready to discard coal as the major single source of energy in the USSR. Based on the implied support given the coal industry at the December 1964 session of the Supreme Soviet and on subsequent press discussions, it became clear that no significant cutback in the industry would be made. The revised goal for production of coal in 1970 was announced in March 1965, and the new goal -- 670 million mt -- more nearly approximated the original level of output planned for 1970 than did the revised goals for crude oil or natural gas. 37/ (The reductions made in the 1970 levels of output for coal, crude oil, and natural gas are presented in Table 6.)

* It is possible that the Five Year Plan (1966-70) may embody further, but probably insignificant, changes in these goals.

Table 6

USSR: Reappraisal of 1970 Plan for Production of Coal, Crude Oil, and Natural Gas

Million Metric Tons of Standard Fuel ^{a/}

Source of Energy	Original Plan ^{b/}	Revised Plan	Difference Between Original and Revised Plans	
			Amount	Percent
Coal	501 to 511	489 ^{c/}	12 to 22	2 to 4
Crude oil	558	500 to 529 ^{d/}	29 to 58	5 to 10
Natural gas	363 to 380	304 ^{d/}	59 to 76	16 to 20
Total	<u>1,422 to 1,449</u>	<u>1,293 to 1,322</u>	<u>100 to 156</u>	<u>9 ^{e/}</u>

a. Standard fuel has a calorific value of 7,000 kilocalories per kilogram.

b. ^{38/}. These goals called for the extraction of 686 million to 700 million metric tons (mt) of coal, 390 million mt of crude oil, and 310 billion to 325 billion cubic meters (cu m) of gas. Conversion to units of standard fuel was at the following rates: coal, 1 mt equals 0.73 mt of standard fuel; crude oil, 1 mt equals 1.43 mt of standard fuel; and natural gas, 1,000 cu m equals 1.17 mt of standard fuel.

c. ^{39/}

d. ^{40/}

e. Based on the midpoint of the original and revised goals.

On balance, the revised 1970 goals, if met, imply a 9-percent reduction in the indigenous fuel supply when compared with the original goals for that year. When it is recognized that the original 1970 goals were released in November 1961 at the 20th Party Congress as part of a Twenty Year Plan carrying through 1980, the indicated downward adjustment does not seem very significant. On the assumption that similar adjustments have been made in estimated demand for fuel in 1970, it is likely that the reduction in fuel supplies will have little detrimental impact on the economy as a whole.*

* Recently derived estimates ^{41/} of the capability of the USSR to export petroleum in 1970 reflect the revised goal for output of crude oil in that year. These estimates indicate that by 1970 the USSR may have between 79 million and 107 million mt of oil for export. For comparison, it is estimated that such deliveries in 1964 approximated 55 million mt.

The central problem for Soviet planners, assuming that the revised goals are achieved and that these goals represent a reasonable approximation of demand, lies with the growing regional imbalances in demand and supply.* As stated very clearly by A. Petrosyants, Chairman of the State Committee for Atomic Energy, "the USSR is not threatened by a shortage of fuel, but the reserves (and therefore production) of coal, crude oil, and natural gas are not evenly distributed throughout its vast territory." 44/ The issue very quickly becomes a struggle among vested interests. Local officials in areas of new discoveries of coal, crude oil, and natural gas quite rightly see an opportunity for stimulation of economic growth through the establishment of new energy-intensive industries close to sources of fuel supply. Conversely, officials in areas where industry has a historic base -- in and around Moscow and in the Urals, for example -- argue for the expansion of existing facilities and the construction of new industry in locales of established labor supply where transportation and markets are readily available and where construction time and costs would be lower.

The scope of the natural gas and oil pipeline program outlined for the coming years implies that the responsible authorities have decided to enlarge transportation facilities for the movement of large quantities of oil and gas into the European USSR. In addition to the very ambitious gas pipeline system planned to move Central Asian gas to the Moscow area, pipelines have been planned to carry West Siberian gas

* There are very few countries which have not been faced with this problem at one time or another. The US has had to overcome rather severe regional imbalances in fuel demand and supply. The Atlantic Northeast and the Midwest are the principal consumers of energy, using between them perhaps as much as two-thirds of the entire requirements of the country. 42/ Although these areas include significant coal deposits, their actual production of energy fills only about half their needs. The deficit is made up primarily by the movement of crude oil and natural gas from the Gulf Coast area and from imports. The West Coast also is an energy-deficit area, with oil and natural gas from adjacent surplus areas and imports making good the balance.

Regional imbalances in the crude oil demand and supply in the US are amply illustrated by the following tabulation 43/:

Area	Million Metric Tons per Year		Indigenous Supply as a Percent of Demand
	Indigenous Supply	Demand	
Atlantic Coast	1.6	62.4	2.6
Gulf Coast	233	67.4	345.7
Midwest	65.2	127	51.3

both to the Urals industrial region and to Moscow. Plans for oil pipeline construction are more vague, but the severe climate and terrain associated with the most recent major crude oil discoveries in West Siberia and the Mangyshlak Peninsula of Kazakh SSR in themselves appear to have served as adequate arguments against the development of indigneous demand, at least for the subsequent plan period.

Also, authorities have taken steps to avert further decline in the relative importance of the coal industry. The Deputy Chairman of the State Fuels Committee, A.S. Kuzmich, recently asserted that coal will remain the basic source of fuel in the USSR for a long time, 45/ which the 1970 goal for extraction affirms, although the relative share of coal in the primary energy balance will continue to decline. Capital investment in the coal industry is to increase by 14 percent in 1965 alone, 46/ a measure designed to lay the groundwork for future large increases in output. Having been given the backing of ranking government officials, it is anticipated that the coal industry will fare much better in the coming years than during the early part of the Seven Year Plan.

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