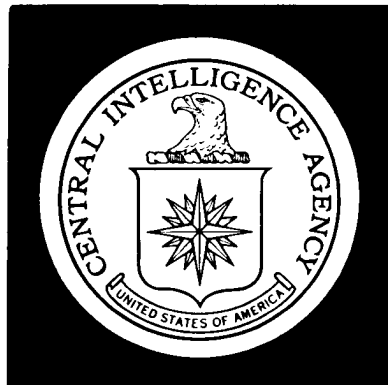


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DIRECTORATE OF
INTELLIGENCE

Intelligence Memorandum

*Soviet Goals For Fuels And Power During 1971-75:
Optimism And Realism Combined*

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CENTRAL INTELLIGENCE AGENCY
Directorate of Intelligence
May 1971

INTELLIGENCE MEMORANDUM

SOVIET GOALS FOR FUELS AND POWER DURING 1971-75: OPTIMISM AND REALISM COMBINED

Introduction

1. The recently published draft directives of the Ninth Soviet Five-Year Plan for 1971-75 and subsequent discussions of the plan at the 24th Party Congress in Moscow indicate a continued high priority for production of fuels and power. Although there is a lack of detailed data in the directives, the targets for oil and gas production appear to be very ambitious while those for the output of coal and electric power are more realistic. This memorandum examines the goals for the fuels and power industries for 1971-75 and estimates the likelihood of their attainment.

Discussion

Goals for 1971-75

2. Except for coal, the average annual rates of growth in production planned for the next five years are lower than those achieved during 1966-70. However, the annual quantitative increases in output planned for 1971-75 are the largest in the postwar period for crude oil, natural gas, and electric power, as well as for production of primary energy. The targets for production of fuels and power in the USSR in 1975 and the implied output of primary energy from fossil fuels in that year are shown in Table 1. For purposes of comparison the reported output in 1970 and the rates of growth in production attained during 1966-70 have also been included.

Note: This memorandum was prepared by the Office of Economic Research.

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Table 1
Soviet Fuels and Power: Output in 1970 and Goals for 1975

| | Crude Oil <u>a/</u> (Million Metric Tons) | Natural Gas <u>b/</u> (Billion Cubic Meters) | Coal (Million Metric Tons) | Electric Power (Billion Kilowatt Hours) | Primary Energy <u>c/</u> (Million Tons of Standard Fuel <u>d/</u>) |
|--|---|--|----------------------------------|---|---|
| 1970 production | 353 | 200 | 624 | 740 | 1,254 |
| Annual average increase during 1966-70 | 22 | 14 | 9 | 47 | 57 |
| 1975 plan goal | 480-500 | 300-320 | 685-695 | 1,030-1,070 | 1,600 <u>e/</u> |
| Annual average increase planned during 1971-75 | 25-29 | 20-24 | 12-14 | 58-66 | 69 <u>e/</u> |
| | Average Annual Growth (Percent) | | | | |
| 1966-70 actual | 7.8 | 9.1 | 1.6 | 7.9 | 5.3 |
| 1971-75 planned | 6.3-7.2 | 8.4-9.8 | 1.9-2.2 | 6.8-7.7 | 5.0 <u>e/</u> |

a. Including output of gas condensate, which amounted to almost 4 million tons in 1970 and may reach 9-10 million tons in 1975.

b. Including small volumes (less than 2 billion cubic meters per year) of shale gas and manufactured gas from coal.

c. Excluding hydroelectric power and nuclear energy.

d. One ton of standard fuel equals 7 million kilocalories.

e. Based on the midpoints of the ranges of plan goals.

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Possibilities for Plan Fulfillment

Petroleum Industry

3. The announced Soviet goals for production of crude oil and natural gas and for construction of pipelines during 1971-75 appear to be quite ambitious. Their achievement will depend on success in exploring and developing petroleum resources and on extensive expansion of the oil and gas pipeline system in permafrost regions of West Siberia and of the far north where such work will be difficult and costly. Lack of modern equipment and technology from domestic sources could seriously impede such development. The key to fulfillment, however, lies in large-scale imports of Western technology and equipment, along with substantially increased investment from domestic sources.

Crude Oil

4. The new plan calls for production of 480-500 million tons of crude oil in 1975, 1/ somewhat more than the level of production in the United States in 1970. This goal is 30 million tons higher than the 450-470 million tons announced in October 1967 by V.D. Shashin, Minister of the Oil Industry, and 30-50 million tons higher than his subsequent announcement, in early 1969, that production in 1975 would be about 450 million tons. Apparently, expectations of increased output from oilfields in West Siberia and from the Mangyshlak Peninsula in western Kazakhstan have prompted the higher production forecast. At the recent 24th Party Congress, Kosygin indicated that 75% of all growth in crude oil production during the five-year plan period will come from these two areas. There are no details available, however, to indicate the planned allocations of capital to be made in these areas, but substantial investment will be required if the new goals are to be achieved.

5. The annual increment in oil production, if the plan is to be fulfilled, will have to average 25-29 million tons, some 15%-30% more than the record 22 million tons a year achieved during the past five years. Attainment of the production targets in the West Siberian oilfields will tax Soviet capabilities severely and will require that these fields be developed almost twice as fast as those in the Urals-Volga region, the major producing area in recent years. Such rapid forcing of production in the new fields quite possibly could lead to lower total recovery of reserves, as has happened in the Urals-Volga, thereby jeopardizing future production. The technology

1. In view of recent disclosures that gas condensate is included in Soviet data on total production of crude oil, it is likely that the planned goal also includes the output of gas condensate.

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and equipment to work in permafrost, extremes of climate, and difficult terrain are not currently available. The need for transportation and communication systems and for automated producing, transfer, and storage equipment and the necessity to drill more wells to greater depths probably will occasion extensive Soviet purchases of Western equipment and technology.

6. Soviet oil experts visiting in the West have indicated that fulfillment of future exploration and drilling plans will depend on acquisition of considerable amounts of Western (primarily US) equipment and technology, and in recent months Soviet efforts to obtain Western exploration and drilling equipment have increased noticeably. Until recently, however, unilateral US export controls on much of the modern geophysical and oilfield equipment and technical data have been an obstacle to significant increase in Soviet imports.

7. Improper development of the Mangyshlak oilfields during the last few years has resulted in loss of reserves, with subsequent reduction in the anticipated recovery of oil. Most of the crude oil produced there is highly paraffinic (viscous) and must be transported at temperatures above 90°F. Nevertheless, plans call for increased production from these fields, to a level of 25 million tons in 1975, from 10 million tons in 1970. The USSR has built a 1,700-kilometer pipeline (with heating stations every 70 kilometers) from Mangyshlak to the refinery at Kuybyshev where this crude oil can be blended with those from Urals-Volga fields before processing. To increase the movement of Mangyshlak crude oil through this pipeline without investing in additional pumping or heating units, the USSR recently placed an order with a US oil company for a sizable quantity of a newly developed additive that facilitates pipelining of waxy, high-pour-point crude oils.

8. No information on plans for drilling are available from the draft directives. However, a recent Soviet technical journal announced that total drilling during 1971-75 is to increase by 30% above the amount achieved during 1966-70. There is considerable variation in the reporting by the Soviet press of the actual amount of drilling achieved during the past five years so that the total drilling figure for the future is a question mark. The planned increase in drilling would be a logical step to assure attainment of the production goals, but much of the success is predicated on improving technology and increasing efficiency in the use of labor and equipment. This task may be difficult to carry out, especially in West Siberia where, according to information in a recent issue of *Sovetskaya Rossiya*, drilling is to be doubled with no increase in the number of drilling rigs or in crews. In the past five-year plan periods, there have been chronic shortfalls in the drilling effort, and the problems confronting drillers have now become more difficult.

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9. The plan also provides for a substantial increase in the delivery of crude oil from the USSR to the Communist countries of Eastern Europe, but no mention is made of the expected level of exports to the West. Kosygin announced that 243 million tons of oil are to be shipped to Eastern Europe during 1971-75, compared with a total of 138 million tons during 1966-70. The 243 million tons of crude oil would have a value of some 3.6 billion rubles (\$4 billion), assuming an f.o.b. price of about 15 rubles per ton (the average in recent years), and constitute about 11% of planned total output of Soviet crude oil during the period. During the last five years, about 9% of Soviet production of crude oil, with a total value of some 2 billion rubles (US \$2.3 billion), was exported to Eastern Europe.

10. The USSR probably will strive to supply most of the oil needed by Eastern Europe during the next five years. During 1971-75 the Friendship crude oil pipeline system from the USSR is to be paralleled, giving it the capacity to deliver at least 50 million tons per year by 1973-74. By 1975, Soviet oil is expected to account for at least two-thirds of Eastern Europe's crude oil supply (almost 90%, excluding Romania), compared with about 63% at the present time. In view of the Soviet need for hard currency, every effort probably will be made to maintain oil exports to the Free World, at least at current levels, as oil is the largest single earner of foreign exchange.

11. In the refining sector of the oil industry, plans call for the amount of crude oil processed and the output of petroleum products in 1975 to increase by 50% above the level in 1970, and for the quality of oil products to be improved by expanding the capacity of secondary processing facilities. Fulfillment of these goals will depend on Soviet ability to reduce considerably the time required to plan and build refineries and to bring operating refineries up to design capacity. The plans call for starting, completing, or modernizing 16 refineries throughout the USSR. Efforts are being made to build new refineries with larger capacities in major consuming areas. Based on the past record of poor achievement in refinery construction, it is doubtful that all of the projects specified will be completed on time. However, the output of products should be adequate to meet the needs for domestic consumption and for export.

Natural Gas

12. Plans for natural gas production have not been fulfilled during the past decade because of shortages of line pipe and ancillary equipment to build the necessary pipelines and because the requisite producing and consuming equipment was lacking. Production of gas in 1970 was reported

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at 200 billion cubic meters, 2/ considerably below the original goal of 225-240 billion cubic meters. The plan for 1975 provides for an output of 300-320 billion cubic meters, which will require an average annual increase of 8.4%-9.8%, compared with a 9.1% annual rate achieved during 1966-70. The annual increment in output during 1971-75 will have to average 20-24 billion cubic meters, about 40%-70% more than the average of 14 billion cubic meters per year attained during the last five years.

13. Unless significant improvements occur in the overall operation of the gas industry, the production goal will be difficult, if not impossible, to reach. In 1969, about 12 billion cubic meters of associated gas produced at oilfields were flared (lost); the volume of gas flared has increased from 7 billion cubic meters in 1965, and probably will continue to rise until the necessary processing equipment is installed in the fields. Approximately half of the increase in output during 1971-75 will have to come from deposits in West Siberia, especially from the large Medvezhye field. Development of these gas deposits will require the solution of technical problems similar to, and in some cases more serious than, those facing the exploitation of oil deposits in the region. In addition, the gas industry will be competing with the oil industry for drilling and pipeline transport resources.

14. According to Kosygin, exports of Soviet natural gas to Eastern Europe will total 33 billion cubic meters during 1971-75 compared with 8 billion cubic meters delivered during 1966-70. Such deliveries can be made only if the pipelines planned or under construction are completed on schedule. The major gas pipeline network, which will lead from the USSR to both West and East European countries through Czechoslovakia, is under construction and should be ready for gas exports to begin in 1973. Total deliveries of gas to Eastern Europe in 1975 -- about 11 billion cubic meters -- would amount to only about 3.5% of planned natural output in the USSR in that year. The total value of Soviet gas exports to Eastern Europe during 1971-75 would approximate 460 million rubles (\$510 million). In addition, contracts have been signed with West European countries for delivery during 1971-75 of about 26 billion cubic meters of Soviet gas, valued at some \$300 million.

Pipeline Construction

15. During 1971-75, about 57,000 kilometers of pipelines are to be built: 30,000 kilometers for natural gas transport and 27,000 for movement of crude oil and petroleum products. This target will require the

2. *Including less than 2 billion cubic meters of shale gas and manufactured gas (from coal).*

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construction of 21,000 kilometers more than was laid during 1966-70, or an average of more than 11,000 kilometers per year, compared with about 7,000 kilometers annually during 1966-70. The magnitude of this effort is considerable when compared with the fact that, during 1971-74 in the entire Free World, about 48,000 kilometers of oil and gas pipelines are to be built at an estimated cost of \$7.4 billion.

16. The success of the goal for natural gas production depends primarily on completion of the gas pipeline network. Most of the new construction will be long-distance, large-diameter (48-inch and 56-inch) pipelines from West Siberia and Central Asia to the industrial region in the European part of the USSR. New techniques and equipment will be required to build these large-diameter lines over permafrost regions and other difficult terrain. Problems experienced in such construction to date have delayed progress on several major projects.

17. Construction of the planned oil pipeline network to move oil westward and eastward from West Siberia, and to parallel the Friendship crude oil system to Eastern Europe, is a sizable undertaking. To build 27,000 kilometers of oil pipelines will call for more than 2-1/2 times the amount laid during the past five years. The combined requirement for pipe for both oil and gas networks is approximately 16 million tons. This quantity of large-diameter pipe is at least 6 million tons more than currently can be produced in the USSR plus the amount now known to be scheduled for import during the five-year period. Fulfillment of the pipeline construction goals, therefore, will entail a sizable expansion of domestic pipe manufacturing facilities and/or much greater imports of large-diameter pipe from the Free World.

Long-Range Prospects for Production of Petroleum

18. Soviet experts have reasoned that deep drilling in the northern Tyumen and the lower Ob River regions below two or three presently explored structures offers the greatest opportunity to find large amounts of petroleum. In taking this short-term risk to find large deposits quickly, they are bypassing at least 100 structures in potentially productive and more accessible areas in the Tomsk oblast and in southern Tyumen. If large deposits are not discovered, prospects for production in the long run will be reduced because the buildup in proved reserves may not be adequate to provide the large increases in production anticipated. On the other hand, if the present strategy is successful and if the investment including modern equipment and technology is provided from domestic sources and imports, long-range production goals probably can be attained.

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Coal Industry

19. The draft directives of the new plan call for the gross output of coal to reach 685-695 million tons in 1975, accompanied by a 40% increase in the productivity of labor during the five-year period. Major emphasis is to be placed on the development of strip mining; about one-third of all coal produced in 1975 is to come from strip mining. The planned increases in annual production by 1975 compared with 1970 are almost 30% for strip-mined coal and 4% for deep-mined coal, whereas total output of coal from all sources is to rise by about 11%.

20. The planned goals for the coal industry appear to be feasible and more realistic than those of the previous five-year period. To reach the production target will require an average increase of only about 13 million tons per year, which is less than the average of 15 million tons attained during 1969-70. A 40% increase in labor productivity during 1971-75 (compared with only a 17% rise during 1966-70) will entail an average annual growth of about 7%, somewhat more than the largest gains in labor productivity attained in recent years: 5.3% in 1969 and about 5% in 1970. A major effort will be made, however, to increase the share of total output of strip-mined coal from about 25% in 1970 to some 30% in 1975. This would facilitate the planned increase in labor productivity, as labor productivity in strip mines is now at least six times that in underground mines.

21. The original goals of the Eighth Five-Year Plan (1966-70) for the coal industry were, on the whole, not attained. Instead of a gross output of 670 million tons planned for 1970 (about 16% more than in 1965), only 624 million tons were mined. The output from strip mines was about 25% of the national total, rather than the 29% planned. This shortfall contributed to failure to achieve the goal for an increase of 5.1% annually in labor productivity; the actual rise was only 3.2% per year.

Electric Power Industry

22. The goal to increase electric power production to a range of 1.03-1.07 trillion kilowatt-hours (kwh) in 1975 is a more modest, and probably more attainable, plan than was presented earlier. In August 1968 the Deputy Minister of Power and Electrification stated that electric power output in 1975 would be 1.265 trillion kwh. The goal for power output in the five-year period just completed was reduced twice from the original plan presented in 1966. In 1970, electric power production was 740 billion kwh, about 46% greater than in 1965 and a level achieved by an average annual increase of almost 8%. The total planned increase in electric power production during 1971-75 is about 39%-45%, with an average annual increase of 6.8% to 7.7%.

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23. The new goal for installed electric generating capacity is considerably lower than those announced during the past two years. In 1969 a plan was presented that called for a total of 94 million kw of new capacity during 1971-75, and in 1970 the goal was reduced to 80 million kw of new capacity. The new draft directives now provide for installation of only 65-67 million kw, requiring an average increase of 13-13.4 million kw per year. Such annual increases in new capacity appear reasonable in view of the reported gross addition of 12 million kw in 1969 and 12.2 million kw in 1970. The new plan also calls for the addition of 6-8 million kw at nuclear powerplants during the five-year period. This plan is in keeping with the Soviet program of steadily adding units of larger size, based on reactors of proved design, while continuing to develop reactors of more advanced types. Plants already under construction will account for most of the new nuclear capacity.

24. At the Party Congress, Kosygin announced that the USSR would supply 42 billion kwh of electric power to Eastern Europe during 1971-75, compared with 14 billion kwh transmitted during 1966-70. Based on 1968-69 trade prices of about 10 rubles per 1,000 kwh, the value of the Soviet power to be sold to Eastern Europe would approximate 420 million rubles (\$470 million). The electric power from the USSR will be transmitted via the integrated power network "Peace," which connects the Soviet Union with most of the East European countries. This quantity of power, although a very small share of total Soviet production could help to relieve power shortages that have plagued Eastern Europe for years, especially in the winter months and during periods of peak consumption.

Primary Energy

25. Plans call for the share of oil and gas in the production of primary energy to increase to a level of 67% in 1975, from 51% in 1965 and 59% in 1970 (see Table 2). Although the goal for production of coal is reasonable, the oil and gas targets may not be reached. If so, the share of oil and gas in total energy production may be lower than planned and the total energy supply may be somewhat smaller than the projected 1.6 trillion tons of standard fuel. The average annual rate of increase in output of primary energy during 1971-75 is planned to be about 5%, compared with a slightly higher annual rate during the previous five years. However, in quantitative terms the projected annual increase in energy production is to average almost 70 million tons of standard fuel through 1975, compared with less than 60 million per year during 1966-70. By comparison, production of primary energy in the United States in 1969 -- from coal, crude oil, and natural gas -- totaled about 1.9 trillion tons of standard fuel, of which oil and gas accounted for about 73%. The annual rate of growth in production of primary energy in the United States averaged about 4% during 1966-69.

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Table 2
Production of Primary Energy in the USSR

Quantity in Million Tons of Standard Fuel ^{a/}

| Source | 1965 | | 1970 | | 1975 Plan | |
|-------------|----------|------------------|------------------|------------------|-------------------|------------------|
| | Quantity | Percent of Total | Quantity | Percent of Total | Quantity | Percent of Total |
| Crude oil | 346.4 | 36 | 505 | 40 | 700 ^{b/} | 44 |
| Natural gas | 149.8 | 15 | 238 | 19 | 369 ^{b/} | 23 |
| Subtotal | | 51 | | 59 | | 67 |
| Coal | 412.5 | 43 | 451 | 36 | 496 ^{b/} | 31 |
| Peat | 17.0 | 2 | | | | |
| Shale | 7.4 | 1 | 60 ^{c/} | 5 | 35 ^{c/} | 2 |
| Fuelwood | 33.5 | 3 | | | | |
| Total | 966.6 | 100 | 1,254 | 100 | 1,600 | 100 |

- a. One ton of standard fuel equals 7 million kilocalories.
 b. Based on the midpoint of the range of planned production.
 c. Estimated; no data available.

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Conclusions

26. The new Soviet Five-Year Plan for the fuels and power industries provides for realistic rates of growth in the production of coal and electric power. On the other hand, the goals for production of crude oil and natural gas and for construction of oil and gas pipelines may be difficult to attain.

27. The USSR is the second largest producer of oil and gas in the world. If the goal for production of crude oil in 1975 is achieved, the USSR will surpass the present level of production in the United States. Achievement of the 1975 targets for production of 480-500 million tons of crude oil and 300-320 billion cubic meters of natural gas, however, will require sizable allocations of investment for equipment and technology to develop deposits in the permafrost regions of West Siberia and in the desert regions of western Kazakhstan. There is, in fact, some question whether the goals can be reached without considerable acquisition of Western technology and equipment, especially for exploring and drilling in the difficult conditions of West Siberia.

28. The annual quantitative increases in production for both oil and gas are to be considerably higher than previous records and will require an expansion of the pipeline system that will strain Soviet construction capabilities. Plans call for laying 57,000 kilometers of oil and gas pipelines during 1971-75, about 60% more than was built during the past five years. Most of these will be long-distance, large-diameter (48-inch and 56-inch) lines, and a large share will be built in West Siberia, where progress in construction has suffered numerous delays because of the lack of experience in laying lines in the swamps and permafrost areas of the region. Meeting the goal for pipeline construction will require about 16 million tons of large-diameter pipe, at least 6 million tons more than the current capacity of Soviet pipe mills coupled with the amount currently planned for import during the five-year period. It would appear that large additional amounts of such pipe will have to be purchased from Western suppliers.

29. There are indications that Soviet efforts to increase imports of Western equipment are on the upswing. Substantial orders have been made for US computerized seismic equipment which will improve exploration work, and additional requests for large-diameter line pipe have been made in Western Europe. If this trend continues and if major oil and gas deposits can be developed in the northern regions of West Siberia, the probability of attaining production goals during the next decade will be greatly increased.

30. The goal to raise electric power output from 740 billion kwh in 1970 to a range of 1.03-1.07 trillion kwh in 1975 provides for an increase

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of about 7% annually, a somewhat lower rate than was attained during the past five years. Fulfillment of the plan for installing 65-67 million kw of generating capacity during 1971-75 will require annual increases that are only slightly larger than were achieved in 1969 and 1970. The planned addition of 6-8 million kw of capacity at nuclear plants is feasible, as most of this capacity is now under construction.

31. Production of coal in 1975 is to be about 11% more than in 1970, requiring an average annual increase of only 2% during the plan period. With greater increases in the output of strip-mined coal during the next five years, both the output goal and the planned 40% increase in labor productivity are within reason. Despite the planned increase in output, the share of coal in the production of primary energy may decline from the 1970 level of 36% to about 31% in 1975, if the oil and gas goals are reached and the combined share of these fuels reaches the planned level of 67%.

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