

SIGNIFICANT DEVELOPMENTS  
IN THE FUELS AND POWER INDUSTRIES OF THE USSR  
IN 1961



July 1962

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SIGNIFICANT DEVELOPMENTS IN THE FUELS AND POWER INDUSTRIES  
OF THE USSR IN 1961

Summary and Conclusions

The estimated production of primary energy in the USSR in 1961 increased 6.4 percent above production in 1960 and reached about 763 million metric tons\* of standard fuel.\*\* Greater production of crude oil and natural gas accounted for most of the increase, and their combined share represented more than 40 percent of the total output of primary energy in 1961 compared with only about 37 percent in 1960. The share of coal declined to about 49 percent of the energy produced in 1961 compared with 52 percent in 1960, but coal continued to be the principal source of energy.

All goals for production of energy in 1961 were achieved with the exception of those for coal and natural gas. The goal for producing 511.7 million tons of coal was underfulfilled by nearly 2 million tons as production declined to 510 million tons, an amount more than 3 million tons below the level of production in 1960. The USSR produced 59 billion cubic meters (cu m) of natural gas in 1961 -- about 14 billion cu m more than were produced in 1960 and about 4 percent below the plan of 61.4 billion cu m. Production of crude oil reached 166 million tons -- 2 million tons above the plan and 18 million tons above production in 1960. The generation of electric power reached the planned level of 327 billion kilowatt-hours (kwh), an increase of about 35 billion kwh above production in 1960, in spite of the fact that the plan for installing new generating capacity was underfulfilled for the fourth consecutive year. The other less important sources of energy -- peat, oil shale, fuelwood, and hydroelectric power -- represented about 11 percent of the total primary energy, about the same share as in 1960, and in absolute quantities only hydroelectric power showed a significant change, increasing from an estimated production of 23.9 million tons of standard fuel in 1960 to 26.7 million tons in 1961.

The most significant fact concerning the fuels and power industries of the USSR in 1961, as shown in Table 1,\*\*\* was the continuation of an earlier pattern of development in which the share of oil and gas in the

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\* Tonnages are given in metric tons throughout this report.

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

\*\*\* Table 1 follows on p. 2.

Table 1

Estimated Production of Primary Energy in the USSR, by Source of Energy a/  
1958-61 and 1965

Source of Energy	1958		1959		1960		1961 <u>b/</u>		1965	
	Million Metric Tons of Standard Fuel <u>c/</u>	Percent of Total	Million Metric Tons of Standard Fuel <u>c/</u>	Percent of Total	Million Metric Tons of Standard Fuel <u>c/</u>	Percent of Total	Million Metric Tons of Standard Fuel <u>c/</u>	Percent of Total	Million Metric Tons of Standard Fuel <u>c/</u>	Percent of Total
Coal	362.1	56.7	370.0	54.3	373.1	52.1	372.3	48.8	423.8 <u>d/</u>	39.6
Crude oil	161.9	25.3	185.3	27.2	211.4	29.5	237.4	31.1	379.0 <u>e/</u>	35.5
Natural gas	33.9	5.3	42.5	6.2	54.4	7.6	70.8	9.3	162.0 <u>f/</u>	15.2
Peat	21.1	3.3	23.0	3.4	20.4	2.8	21.7	2.8	27.0 <u>g/</u>	2.5
Shale	4.5	0.7	4.6	0.7	4.8	0.7	5.0	0.7	7.5 <u>g/</u>	0.7
Fuelwood	32.9	5.2	34.0	5.0	28.7	4.0	28.7	3.8	25.7 <u>g/</u>	2.4
Hydroelectric power <u>h/</u>	22.3	3.5	21.8	3.2	23.9	3.3	26.7	3.5	41.0	3.8
Nuclear electric power <u>h/</u>	Negl.	Negl.	Negl.	Negl.	Negl.	Negl.	Negl.	Negl.	3.0	0.3
Total	<u>638.7</u>	<u>100.0</u>	<u>681.2</u>	<u>100.0</u>	<u>716.7</u>	<u>100.0</u>	<u>762.6</u>	<u>100.0</u>	<u>1,069.0</u>	<u>100.0</u>

a. Unless otherwise indicated, data are based on source 1/. (For serially numbered source references, see the Appendix.)

b. Estimated on the basis of data in source 2/.

c. The term standard fuel refers to a measure adopted by Soviet authorities for the purpose of comparing fuels on the basis of their calorific values. Standard fuel is defined as having a calorific value of 7,000 kilocalories per kilogram.

d. Computed on the basis of an estimated production of 565 million metric tons in 1965. The plan is 600 million to 612 million metric tons.

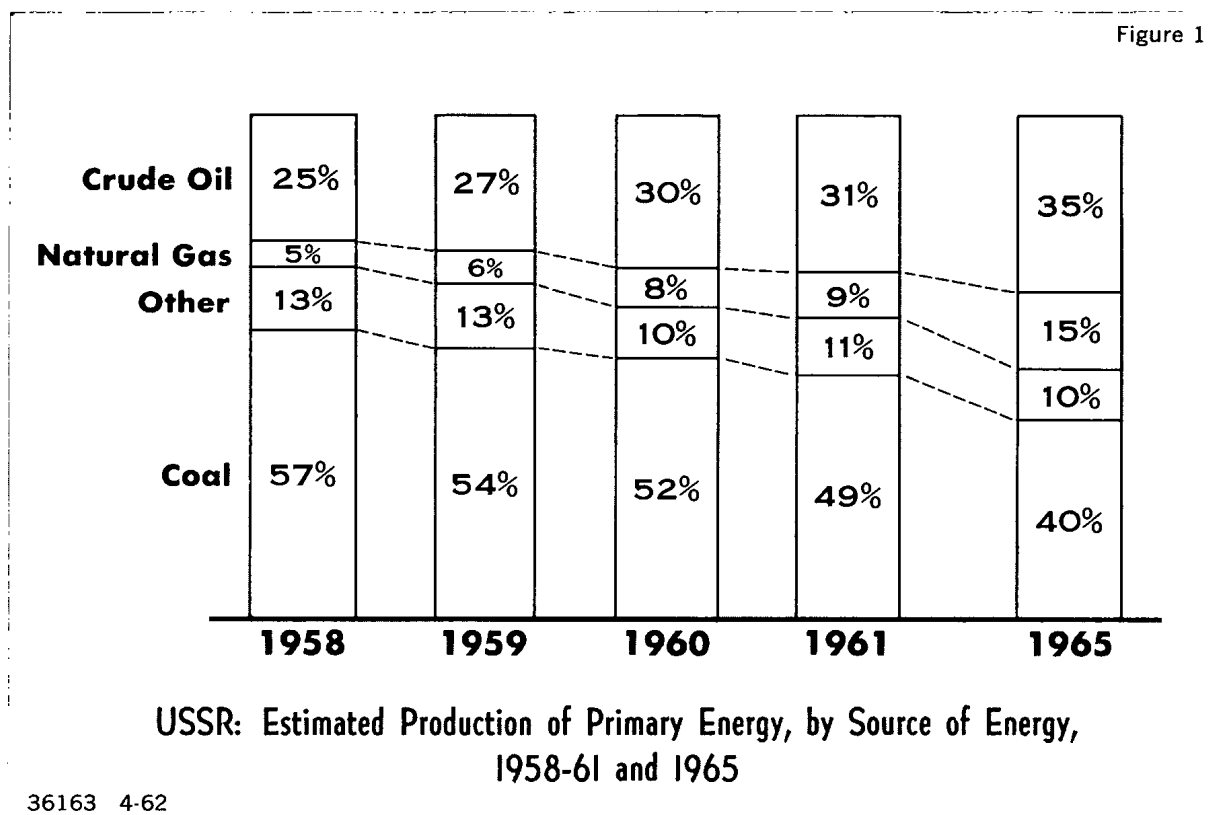
e. Computed on the basis of an estimated production of 265 million metric tons in 1965. The plan is 240 million metric tons.

f. Computed on the basis of an estimated production of 135 billion cubic meters in 1965. The plan is 148.3 billion cubic meters.

g. 3/

h. Estimated.

total production of primary energy has been increasing as the share of coal has declined (see Figure 1). Perhaps the most important aspect of



the continuing pattern of development was the increase in Soviet oil exports. Compared with 1960, net oil exports to the Free World increased by 28 percent and are estimated to have reached 25.6 million tons in 1961. Oil has been the major export item in Soviet trade agreements with many industrialized Western countries, and the expansion of such exports to these countries enhances Soviet capabilities to buy industrial equipment and supplies, including tankers, large-diameter steel pipe, and pipeline equipment needed to expand and improve the transportation system associated with the Soviet oil export program. The USSR continued to improve its trade relations with less developed countries in part by offering to exchange oil for local commodities for which no world market is readily available, by reducing oil prices, and by accepting payment for oil in soft currencies.

The gas industry continued to be plagued by a shortage of compressor equipment for pipelines, by inadequate city distribution systems, and by a lack of gas-consuming equipment, all of which contributed to the underfulfillment of the plan for production of gas.



Approximately 7,800 kilometers (km) of oil and gas pipelines were completed for use in 1961 compared with only about 5,000 km in 1960. It is estimated that 3,600 km were trunk oil pipelines and the remaining 4,200 km were transmission gas pipelines. The oil pipeline construction effort was concentrated on the Brody-to-Uzhgorod section of the "Pipeline of Friendship" being constructed between Kuybyshev and the European Satellites, the crude oil line to Irkutsk, the product line to Chita, and the crude oil line to Leningrad. The gas pipeline construction effort appears to have been concentrated on the second line from Shebelinka to Dnepropetrovsk and the initial lines from Serpukhov to Noginsk and from Gor'kiy to Cherepovets.

Over-all developments in the coal industry probably were a disappointment to the USSR. Inadequate additions to capacity undoubtedly contributed to failure to fulfill the plan for production of coal. Very little progress was made in hydraulic mining, and the costs of producing coal showed only a slight decline from the 1960 levels. As yet, costs in the Seven Year Plan have not been reduced below the costs of production of 1958.

Although no new petroleum refineries were commissioned for use in 1961, it is estimated that refining capacity in the USSR increased to 168.2 million tons and processed 143 million tons of crude oil charge. The percentage yields of light products continued to decrease relative to the percentage increase in heavy diesel fuel and fuel oils. This trend toward less emphasis on light products reflects both domestic demand patterns and also limited secondary refining facilities. A continuation of this trend may permit the USSR to reduce the time required for constructing refineries by permitting concentration on less complex refineries.

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I. Crude Oil and Natural GasA. Production1. Crude Oil

Production of crude oil in the USSR in 1961 reached 166 million tons, 2 million tons above plan and 18 million tons, or 12 percent, above production in 1960. <sup>4/</sup> In 1962, production of crude oil reportedly will increase more than 19 million tons, <sup>5/</sup> which indicates a goal of more than 185 million tons. However, in the light of past performance, it is estimated that the goal for production of crude oil for 1962 may be overfulfilled and that production may reach about 188 million tons.

Soviet successes in overfulfilling annual plans for production of crude oil in the past form the basis for estimating a significant overfulfillment of the goal of producing 240 million tons of crude oil in 1965. It is estimated that the 1965 goal for production of crude oil may be overfulfilled by as much as 25 million tons and that production may reach 265 million tons, a level that can be achieved by an average annual increase slightly in excess of 12 percent. The estimated production of crude oil in the USSR in 1955, 1958-62, and 1965 is given in Table 2.

Table 2

Estimated Production of Crude Oil in the USSR <sup>a/</sup>  
1955, 1958-62, and 1965

Million Metric Tons	
<u>Year</u>	<u>Amount</u>
1955	70.8
1958	113.2
1959	129.6
1960	147.9
1961	166 <sup>b/</sup>
1962	188 <sup>c/</sup>
1965	265 <sup>c/</sup>

a. Unless otherwise indicated, data are from source <sup>6/</sup>.

b. <sup>7/</sup>

c. Estimated.

The much-publicized discoveries of crude oil at Zhetybay on the Mangyshlak Peninsula in western Kazakhstan and at Shaim and Meigion in the western Siberian lowlands are not yet making any significant contributions to the national output. Development of production in these regions will be particularly important in increasing production of crude oil after 1970.

The volume of exploratory and developmental drilling for crude oil and natural gas in 1961 was 8.7 million meters (m) -- 0.3 million m below the goal for total drilling, 9 million m. The shortfall resulted largely from a failure to meet the plan for exploratory drilling. Total exploratory and developmental drilling for crude oil and natural gas in the USSR during 1959-61 and plans for 1960-62 and 1965 are as follows:

<u>Year</u>	<u>Thousand Meters</u>
1959	7,148
1960 Plan	8,124
1960	7,715
1961 Plan	9,000
1961	8,700
1962 Plan <u>8/</u>	9,300
1965 Plan	16,042

It is extremely doubtful if the USSR can achieve the 1965 Plan for drilling. To the extent that the underfulfillment is in exploratory drilling, as expected, it will not have an adverse effect on production of oil at least through 1965. Exploitation of fields now defined probably would permit achievement of the goals. Moreover, the USSR has been able to increase the productivity of existing wells substantially by an extensive pressure maintenance program.

## 2. Natural Gas

Production of natural gas in the USSR in 1961 amounted to 59 billion cu m, falling short of the planned 61.4 billion cu m by about 4 percent. 9/ The USSR is planning an increase in production of gas of only about 11.5 billion cu m in 1962. 10/ This figure represents the smallest planned annual increase in production of gas during the Seven Year Plan and may allow the natural gas industry to overfulfill its production goal for the first time. Anything short of a major overfulfillment of the goal of about 70.4 billion cu m in 1962, or a significant shift in priorities during 1963-65, would indicate that the

1965 goal for producing 148.3 billion cu m of natural gas is unattainable. It is estimated that production of natural gas in the USSR in 1965 may be about 10 percent below plan and may reach only about 135 billion cu m. The estimated production of natural and manufactured gas in the USSR in 1955, 1958-62, and 1965 is given in Table 3.

Table 3

Estimated Production of Natural and Manufactured Gas in the USSR a/  
1955, 1958-61, and Plans for 1962 and 1965

Billion Cubic Meters				
<u>Year</u>	<u>Total</u>		<u>Natural Gas</u>	<u>Manufactured Gas <u>b/</u></u>
	<u>Plan</u>	<u>Actual</u>		
1955	N.A.	10.356	8.981	1.375
1958	31.2	29.892	28.084	1.808
1959	41.1	37.267	35.391	1.876
1960	53.3	47.214	45.303	1.911
1961	63.2	60.9	59	1.9 <u>c/</u>
1962	72.4	72.4	70.4 <u>c/</u>	2.0 <u>c/</u>
1965 <u>c/</u>	150	137	135	2

a. Unless otherwise indicated, data are from source 11/.

b. From shale and the underground gasification of coal.

c. Estimated.

Although there has been no official indication of a reduction in the plan for gas extraction in 1965, certain regional shifts in extraction for that year have been announced. These announced revisions called for increases of 3.3 billion cu m in Uzbek SSR and 4.5 billion cu m in the Ukrainian SSR, 12/ compensating for a reduction in the planned extraction of natural gas primarily in the Urals-Volga area. These regional shifts reflect the geographic pattern of success achieved in making additions to proved reserves during 1959-60.

The principal reasons for failure to achieve plans for production of natural gas continue to be shortcomings in transmission and consumption. Although the gas transmission lines constructed and commissioned for use during 1959-61 probably were more than adequate to transport the planned increases in production of gas during the

period, the theoretical throughput capacities were not being achieved, either because compressors were not available or because potential consumers were not prepared. In 1961, as in 1960, gas turbine compressors were in short supply. Although the substitution of electric drive compressors has partially alleviated the problem, the construction of electric power transmission facilities paralleling the gas lines has not developed at planned rates. 13/

In the first half of 1961, lack of consuming equipment led to an underfulfillment of 1 billion cu m in the plan for production of natural gas at the Shebelinka field in the eastern Ukraine. Except for this lack of consumer preparation, the Shebelinka field would have fulfilled the plan. The Khar'kov Sovnarkhoz officials responsible for the region were particularly perturbed when the field organizations were criticized for not fulfilling the plan, and, in replying to this criticism, the Chairman of the Khar'khov Sovnarkhoz stated that there was no one brave enough to petition the Council of Ministers, USSR, to reduce the plan for production of natural gas in the Shebelinka area. 14/

#### B. Refining of Crude Oil

It is estimated that the USSR had a yield of 131.6 million tons of refined products in 1961, 12 million tons (or 10 percent) above 1960. 15/ The percentage yield of light products and lubricant stocks continued to decrease, but there continued to be an increase in the relative output of heavy diesel and residual fuels. Present demand patterns developing in the USSR do not reflect very substantial requirements for high-octane gasoline. The USSR is attempting to shape the domestic demand for petroleum products to compensate for the relative scarcity of secondary refining facilities. The yield of gasoline, kerosine, and light diesel fuel declined from 50.4 percent in 1960 to 48.8 percent in 1961, and concomitantly the yield of residuals increased from 33.6 to 35.0 percent. Proportionally smaller yields of light products will result in improvements in quality and may permit future construction of less complex refineries to be accomplished in a relatively short period of time. The estimated yields of principal petroleum products in the USSR during 1958-61 and 1965 are given in Table 4.\*

It is believed that the quality of refined products improved in 1961 primarily as a result of the rehabilitation, modernization, and better use of existing refineries and, to a lesser extent, as the result of the installation of new catalytic refining capacity. 16/ The average octane rating of gasoline increased and the sulfur content of light diesel fuel decreased. It is also significant that the freezing point of winter-grade light diesel fuel was lowered -- possibly as a result of blending with low-grade gasoline. 17/

\* Table 4 follows on p. 9.

Table 4

Estimated Yield of Principal Petroleum Products in the USSR, by Type of Product  
1958-61 and 1965

Product	1958		1959		1960		1961		1965	
	Million Metric Tons	Percent of Total	Million Metric Tons	Percent of Total	Million Metric Tons	Percent of Total	Million Metric Tons	Percent of Total	Million Metric Tons	Percent of Total
Distillates										
Light products										
Gasoline	22.5	21.6	24.1	20.8	26.0	20.0	27.6	19.3	35.4	16.5
Kerosine	12.5	12.0	13.8	11.9	15.3	11.8	16.7	11.7	24.0	11.2
Light diesel fuel	21.2	20.4	22.6	19.5	24.2	18.6	25.5	17.8	31.8	14.9
Subtotal	56.2	54.0	60.5	52.2	65.5	50.4	69.8	48.8	91.2	42.6
Heavy diesel fuel	3.5	3.4	4.2	3.6	4.9	3.8	5.9	4.1	11.2	5.2
Total distillates	<u>59.7</u>	<u>57.4</u>	<u>64.7</u>	<u>55.8</u>	<u>70.4</u>	<u>54.2</u>	<u>75.7</u>	<u>52.9</u>	<u>102.4</u>	<u>47.8</u>
Lubricant base oils	4.6	4.4	5.0	4.3	5.5	4.2	5.9	4.1	7.9	3.7
Residuals and other products	<u>31.4</u>	<u>30.2</u>	<u>37.0</u>	<u>31.9</u>	<u>43.7</u>	<u>33.6</u>	<u>50.0</u>	<u>35.0</u>	<u>86.7</u>	<u>40.5</u>
Total output of petroleum products	<u>95.7</u>	<u>92.0</u>	<u>106.7</u>	<u>92.0</u>	<u>119.6</u>	<u>92.0</u>	<u>131.6</u>	<u>92.0</u>	<u>197.0</u>	<u>92.0</u>
Gas and loss	<u>8.3</u>	<u>8.0</u>	<u>9.3</u>	<u>8.0</u>	<u>10.4</u>	<u>8.0</u>	<u>11.4</u>	<u>8.0</u>	<u>17.0</u>	<u>8.0</u>
Grand total	<u>104.0</u>	<u>100.0</u>	<u>116.0</u>	<u>100.0</u>	<u>130.0</u>	<u>100.0</u>	<u>143.0</u>	<u>100.0</u>	<u>214.0</u>	<u>100.0</u>

Total primary refining capacity in the USSR in 1961 is estimated to have amounted to 168.2 million tons,\* 10.9 million tons above that in 1960. It is believed that no new refineries were put into operation in 1961. Frequently in the USSR, partially completed refineries are commissioned with the expectation that they will be raised to full capacity at a later date. Although in 1961 work at most of the refineries in operation but still under construction proceeded at an accelerated pace, 12 of the 14 refineries commissioned for use during the postwar period were estimated to be operating at considerably less than design capacity. The estimated increase in primary refining capacity in the USSR in 1961 is believed to have resulted primarily from the completion of new refinery processing sections at the previously commissioned refineries in Perm', 19/ Angarsk, 20/ and Novogor'kiy. 21/ Significant increases in refinery output -- especially at the Novo-Ufimskiy, 22/ Baku, 23/ Moscow, 24/ and Kuybyshev 25/ refineries -- reportedly resulted primarily from automation and, to a lesser extent, from process innovations and new construction.

Six major refineries which have not yet been put into operation were under construction in the USSR in 1961. Initial construction was begun on the 6.6-million-ton Kirishi refinery, and construction was continued at the other five inoperative refineries 26/ as follows:

<u>Location of Refinery</u>	<u>Probable Final Capacity (Million Tons)</u>
Kremenchug <u>27/</u>	6.6
Novo-Yaroslavl' <u>28/</u>	6.6
Pavlodar <u>29/</u>	6.6
Polotsk <u>30/</u>	6.6
Kritovo <u>31/</u>	2.6

Construction also continued at the operating refineries at Fergana, Omsk, Ryazan', and Volgograd (formerly Stalingrad). In addition, the Soviet authorities announced that six new refineries, probably including the one under construction at Kremenchug, were to be constructed in the Ukraine. 32/

Serious lags in the completion of secondary refining capacity in the USSR continued in 1961. 33/ There continued to be an imbalance

\* Based on an estimated crude oil charge of 143 million tons and an assumed operation at 85 percent of refining capacity -- a level of operation which has become common in the USSR. 18/

between secondary and primary refining facilities, and the total secondary refining capacity probably still was below the level required to achieve the desired qualities and proportions in the product mix. There was official criticism of the frequent early completion of the relatively simple and less costly primary facilities concomitant with the deferred completion of the relatively complex and more costly secondary facilities needed to raise the quality of petroleum products. <sup>34/</sup> The estimated increments in refining capacity in the USSR for 1961, by type of process, are shown in Table 5.

Table 5

Estimated Increments in Refining Capacity in the USSR, by Type of Process  
1961

Type of Process	Refining Capacity (Million Metric Tons)		Increase in 1961	
	1960	1961	Million Metric Tons	Percent
Primary distillation	157.3	168.2	10.9	6.9
Secondary process				
Thermal conversion	31.5	33.6	2.1	6.7
Catalytic cracking	22.0	26.1	4.1	18.6
Catalytic reforming	5.4	6.7	1.3	24.1
Catalytic hydrotreating	12.4	16.1	3.7	29.8

### C. Oil Pipelines

The length of crude oil and petroleum product pipelines completed for use in 1961 probably exceeded the 1960 level by 3,000 km. A preliminary estimate indicates that perhaps as much as 3,600 km\* were

\* Soviet pronouncements in various technical journals regarding both oil and gas pipeline construction and/or oil and gas pipelines commissioned for use are often confused and conflicting. Many of these Soviet statements on pipelines cannot be reconciled. A notable example follows: Various Soviet announcements indicate that a total of about 11,200 km of oil and gas pipelines was commissioned for use in 1959 and 1960. It was announced that 7,800 km <sup>35/</sup> of pipelines were commissioned for use in 1961, making a total of 19,000 km commissioned for use during 1959-61, the first 3 years of the Seven [footnote continued on p. 12]



completed for use in 1961,\* compared with only 600 km reported in 1960. 37/ It is probable that 20,900 km of trunk crude oil and petroleum product pipelines were available for use in the USSR at the end of 1961. Trunk oil pipelines available for use and commissioned for use annually in the USSR during 1955-61 and planned for 1962 and 1965 are given in Table 6.\*\*

The total oil pipeline construction planned for 1961 was 2,775 km. 38/ In 1962, work is to be initiated on 5,107 km of oil pipelines, 39/ but only 2,000 km are planned to be completed for use in that year.\*\*\* 41/ The accompanying map, Figure 2,† shows the major oil pipelines available for use at the end of 1961 and planned for installation by the end of 1965.

The oil pipeline construction effort in 1961 was concentrated on the Brody-to-Uzhgorod section of the "Pipeline of Friendship" being constructed between Kuybyshev and the European Satellites, the crude oil line to Irkutsk, the product line to Chita, and the crude oil line to Leningrad. The "Pipeline of Friendship" is to fulfill the three-fold purpose of supplying Soviet crude oil to the European Satellite countries, linking export bases on the Baltic with the producing fields, and contributing to a more adequate distribution of crude oil internally. The 324-km Brody-Uzhgorod portion on the southern branch of the system was completed for use in 1961, almost 10 months ahead of schedule. Until the remaining parts of the entire system are finished, Soviet crude oil will be delivered by rail tank car to Brody, at which point

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Year Plan. Early in 1962 it was announced that more than 16,000 km 36/ of oil and gas pipelines were constructed and commissioned for use during the first 3 years of the Seven Year Plan. Although these two figures cannot be reconciled, it is believed that the construction and commissioning of 19,000 km of pipelines during the 3-year period is probably more nearly correct -- at least, annual announcements on pipeline construction and commissioning during 1959-61 indicate a total closer to 19,000 than to 16,000 km. An estimate of total oil and gas pipelines commissioned for use in 1961 based on a summation of the lengths of the individual lines believed to have been brought into service is in agreement with the Soviet announcement of having brought 7,800 km of oil and gas pipelines into service in 1961.

\* A good portion of the 3,600 km of oil pipelines completed for use in 1961 probably was installed in the earlier years.

\*\* Table 6 follows on p. 13.

\*\*\* It also has been reported in Soviet publications that a maximum of only 800 km of trunk oil pipelines will be commissioned for use in 1962. 40/

† Inside back cover.

Table 6

Estimated Trunk Oil Pipelines Available and Commissioned for Use  
in the USSR  
1955-61 and Plans for 1962 and 1965

Thousand Kilometers		
(1)	(2)	(3)
<u>Year</u>	<u>End-of-Year Availability <sup>a/</sup></u>	<u>Commissioned Annually <sup>b/</sup></u>
1955	10.4	N.A.
1956	11.6	1.2
1957	13.2	1.6
1958	14.4	1.2
1959	16.7	2.3
1960	17.3	0.6
1961	20.9	3.6 <sup>c/</sup>
1962 Plan	22.9 <sup>d/</sup>	2.0 <sup>e/</sup>
1965 Plan	45.4 <sup>f/</sup>	N.A.

a. Unless otherwise indicated, data are from source <sup>42/</sup>.

b. Unless otherwise indicated, data are derived from column 2.

c. The USSR announced that 7,800 km of gas and oil pipelines were commissioned for use in 1961. A total of 4,200 km is estimated to be gas lines on the basis of a summation of the individual gas lines believed to have been put into operation, and the remaining 3,600 km are estimated to be oil pipelines. However, a Soviet official reported that more than 20,000 km of trunk oil pipelines were available for use at the end of 1961, <sup>43/</sup> and this statement would indicate that the USSR may have commissioned only about 2,700 km of trunk oil pipelines in 1961.

d. Computed from the 1962 plan for commissioning 2,000 km of oil pipelines.

e. <sup>44/</sup>. It also has been reported that a maximum of only 800 km of trunk oil pipelines will be commissioned for use in 1962. <sup>45/</sup>

f. Computed on the basis of the Seven Year Plan for constructing and commissioning 31,000 km of pipelines during 1959-65.

the crude oil will be placed into the pipeline for transport to Bratislava, Czechoslovakia, and eventually to Szazhalombatta, Hungary. Also during 1961, construction was begun on the 475-km section from Mozyr' to Brest and on the 250-km section designed to transport crude oil from the producing fields at Al'met'yevsk into Kuybyshev, the origin of the "Pipeline of Friendship" system. 46/

Reports indicate that both the Tuymazy-Irkutsk crude oil pipeline and the separate but parallel petroleum product pipeline under construction to Chita probably have been completed as far as Uyar, 47/ about 100 km east of Krasnoyarsk. At Uyar a large storage base is being constructed for use as a transfer point. At this point and until the crude line is completed to Irkutsk, the crude oil will be transferred to rail tank cars for delivery to the Angarsk refinery. Construction of the crude oil pipeline to Irkutsk has met with considerable difficulty, largely because of severe climatic conditions and a lack of steel pipe. Originally scheduled for completion in 1960, it now appears doubtful that the pipeline will be finished until 1963.

A significant effort was expended in 1961 to install a considerable portion of the 1,500-km crude oil pipeline from Al'met'yevsk to Leningrad. The 580-km section from Al'met'yevsk to Gor'kiy was completed and work was begun on the 300-km link between Gor'kiy and Yaroslavl'. 48/ If current construction rates are maintained, it is probable that the final section, Yaroslavl' to Leningrad, may be completed by early 1963. In addition to supplying refineries under construction at Gor'kiy, Yaroslavl', and Kirishi, the completed pipeline will greatly augment Soviet capabilities for export of petroleum, particularly to the Scandinavian countries.

Finally, of lesser importance than the Leningrad line, but with possibly some bearing on the capability of the USSR to export petroleum, is a 190-km, 20-inch crude oil line which was completed in 1961 to allow transportation of crude oil from Ozek-Suat in Stavropol'skiy Kray to oil refineries in Groznyy. From Groznyy, petroleum products may be transported by existing pipelines to Trudovaya and further to the export bases of Novorossiysk and Tuapse on the Black Sea.

#### D. Natural Gas Pipelines

On the basis of preliminary reports it is estimated that 4,200 km of gas transmission pipelines were commissioned for use in 1961, compared with the plan calling for commissioning of 3,700 km. 49/ About 25,700 km of gas transmission pipelines are estimated to have been available for use at the end of 1961.

The original Seven Year Plan calling for the construction and commissioning of 26,000 km of gas transmission pipelines during 1959-65

is believed to have been revised upward by 3,500 km to 29,500 km. 50/ Transmission gas pipelines available and commissioned for use in the USSR during 1955-61 and planned for 1965 are given in Table 7.

Table 7

Estimated Transmission Gas Pipelines Available and Commissioned  
for Use in the USSR a/  
1955-61 and Plan for 1965

Thousand Kilometers		
(1)	(2)	(3)
<u>Year</u>	<u>End-of-Year Availability</u>	<u>Commissioned Annually <u>b/</u></u>
1955	5.9	N.A.
1956	7.9	2.0
1957	10.1	2.2
1958	13.2 <u>c/</u>	3.1
1959	17.1	3.9
1960	21.5	4.4
1961	25.7	4.2
1965 Plan	42.7 <u>d/</u>	N.A.

a. Unless otherwise indicated, data are from source 51/.

b. Derived from column 2.

c. 52/.

d. Revised figure. The original Seven Year Plan for constructing and commissioning 26,000 km of transmission gas pipelines during 1959-65 is believed to have been revised upward to 29,500 km. A summation of the length of individual gas transmission pipelines apparently planned for construction indicates that if they are all completed by 1965, the revised plan goal will be overfulfilled.

The large-diameter (28-inch to 40-inch) transmission gas pipelines commissioned for use in the USSR in 1961 include the following:

<u>Origin</u>	<u>Terminus</u>	<u>Diameter (Inches)</u>	<u>Length (Kilometers)</u>
Belgorod	Ostrogozhsk <u>53/</u>	40	170
Shebelinka	Dnepropetrovsk No. 2 <u>54/</u>	32	212
Serpukhov	Noginsk <u>55/</u>	32	207
Gor'kiy	Cherepovets <u>56/</u>	Probably 28	600
Kumertau	Ishimbay <u>57/</u>	28	100
Tashkent	Chimkent <u>58/</u>	28	134

It is estimated that only about 400 km of 40-inch transmission gas pipelines were installed in 1961, of which about 200 km were installed on the Gazli-Urals transmission gas line system. Transmission gas pipelines available for use in 1961 and planned for installation by 1965 in the USSR are shown in the accompanying maps, Figures 3 and 4.\*

## II. Solid Fuels (Coal)\*\*

In 1961 the plan for production of coal -- 511.7 million tons -- was underfulfilled by about 2 million tons. Production of coal declined to 510 million tons compared with a figure of 513.2 million tons in 1960. 59/ This is the second consecutive year that the plan for production of coal has been underfulfilled. Although the total production of energy coal is estimated to have been reduced by 5 million tons, falling from 403 million tons in 1960 to 398 million tons in 1961, the domestic supplies of energy coal are believed to have been more than adequate.

A good deal of the reduction in production of energy coal probably occurred in the Moscow Basin, where production of high-cost lignite was scheduled to decline in accordance with the objectives of the Seven Year Plan.\*\*\* In the Donets Basin the USSR had a surplus of anthracite fines, an energy coal which is used best in electric power stations. Because both Bulgaria and Hungary reportedly are planning to build electric power stations with the expectation of using Donets coal, an excess of this coal over domestic requirements is expected to continue well into the future.

\* Inside back cover.

\*\* Except for the data on production of peat, shale, and fuelwood given in Table 1, p. 2, above, the discussion of solid fuels in this report is limited to coal.

\*\*\* Production of lignite in the Moscow Basin, according to the Seven Year Plan, is to decline from about 47 million tons in 1958 to 35 million tons in 1965. During 1959-60, production of lignite in the Moscow Basin was reduced by 4.4 million tons.

The supplies of coking coal in the USSR in 1961 were barely sufficient to meet the demand. The total production of raw coking coal was 112 million tons, or about 2 percent more than in 1960. Because of difficulties in the Donets Basin, which normally contributes about 58 percent of the total output of coking coal in the USSR, the plan for production of coking coal probably was underfulfilled. Significantly, new deposits of coking coal with reserves estimated to be 40 million to 50 million tons 60/ were discovered in the Urals, an area with no previous known reserves of coking coal.

During 1961, there was continued emphasis on production of better quality coal, a higher degree of mechanization and automation, an increase in labor productivity, and a reduction in costs. The gain in labor productivity was about 3.6 percent, and the average monthly output per worker reached 44.4 tons, compared with about 42.9 tons in 1960. Employment evidently declined, although the industry still had more than 1 million workers on production of coal. The Seven Year Plan called for a 12-percent reduction in the cost of producing coal. In spite of reductions in costs in 1960 and 1961 of 2.4 and 1.25 percent, respectively, the cost of producing coal remains about 3 percent above the 1958 level. As a result of the conversion to a shorter work week and the upward revision of wage rates, the cost of producing coal increased about 6 percent in 1959, the first year of the Seven Year Plan. Very unsatisfactory progress in the development of hydraulic mining has retarded the expected reduction in costs. Production of coal by the hydraulic method was 3 million tons in 1961, only 1.2 million tons more than production by this method in 1960, and the 1965 target of 41.6 million tons appears to be unattainable. 61/

The 1962 Plan calls for production of coal to increase by 6.4 million tons, indicating a probable target of about 516 million tons. Presumably, all of the increment will consist of coking coal, in view of the planned expansion in output of pig iron and the commensurate increase in requirements for coke.\* The chronic lag in construction of mining and preparation facilities, especially in the Donets Basin, may affect the supply of coking coal in 1962. Table 8\*\* shows production of coal and coking coal in the USSR for 1959-61 and the plans for 1962 and 1965.

### III. Electric Power

Production of electric power in the USSR in 1961 reached the planned level of 327 billion kwh, an increase of about 35 billion kwh, or 12 percent above 1960. The estimated production for 1959-61

\* Production of pig iron, according to plan, will increase from approximately 50.9 million tons in 1961 to 56 million tons in 1962. 62/

\*\* Table 8 follows on p. 18.

Table 8

Estimated Production of Coal and Coking Coal in the USSR  
1959-61 and Plans for 1962 and 1965

Year	Coal (Million Metric Tons)	Coking Coal	
		Million Metric Tons	Percent of Total Coal
1959	506.6 <u>a/</u>	100.8 <u>a/</u>	19.9
1960	513.2 <u>a/</u>	110.2 <u>a/</u>	21.5
1961	510.0 <u>b/</u>	112 <u>c/</u>	22.0
1962 Plan	516.4 <u>d/</u>	119 <u>e/</u>	23.0
1965 Plan	565 <u>f/</u>	153 <u>g/</u>	27.1

a. 63/b. 64/c. 65/d. An increase of 6.4 million tons compared with 1961. 66/e. Estimate based on planned increase in production of pig iron compared with 1961 Plan and on other factors. 67/f. Estimated. The official plan calls for 600 million to 612 million tons. 68/g. The midpoint of the official plan, which calls for 150 million to 156 million tons. 69/

and that planned for 1962 and 1965 are shown in Table 9.\* The plan for producing electric power in 1962 calls for an increase of 11.9 percent, the same as in 1961, to a production of 366 billion kwh. An average annual increase of about 12 percent during the last 3 years of the plan period will be required to reach the planned goal of 520 billion kwh.

New generating capacity installed by the Soviet electric power industry during 1961 was reportedly more than 7,000 megawatts (mw), 70/ about 800 mw below the plan for installing 7,800 mw. Continued failure

\* Table 9 follows on p. 19.

Table 9

Estimated Production of Electric Power  
by Thermal Electric and Hydroelectric Powerplants in the USSR  
1958-61 and Plans for 1962 and 1965

Type of Powerplant	Billion Kilowatt-Hours					
	1958 <u>a/</u>	1959 <u>a/</u>	1960 <u>a/</u>	1961 <u>b/</u>	1962 Plan <u>c/</u>	1965 Plan <u>d/</u>
Thermal electric <u>e/</u>	188.9	217.5	241.4	270	300	420
Hydroelectric	46.5	47.6	50.9	57	66 <u>f/</u>	100
Total	<u>235.4</u>	<u>265.1</u>	<u>292.3</u>	<u>327</u>	<u>366</u>	<u>520</u>

a. 71/b. 72/c. 73/d. 74/

e. Residual.

f. Increments based on estimated production of new capacity given in Table 10, p. 20, below.

to install capacity as planned can be offset only to a limited degree by a more intensive utilization of existing capacity. Powerplant utilization in the USSR increased from 53 percent in 1957 to 55 percent in 1961. Fifty percent of national capacity is found in the public utility thermal electric powerplants, which can operate at up to 90 percent of capacity. It is at these powerplants that the Soviet authorities hope to increase the national average for powerplant utilization up to 57 percent in 1965. It is doubtful that any significant increase above this level can be attained during the Seven Year Plan period because about 50 percent of capacity is found in hydroelectric powerplants and in small scattered powerplants where the more intensive utilization of capacity is limited by the water flow and by the load factor of the consumer, respectively.

The underfulfillment was primarily a result of the failure to install large turbogenerators as planned and to a lesser extent the failure to install hydrogenerators. For the fourth consecutive year the installation of new capacity for generating electric power was inadequate. The estimated total capacity for 1959-61 and the plans for 1962 and 1965 are shown in Table 10.\*

\* Table 10 follows on p. 20.



Table 10

Estimated Capacity of Thermal Electric and Hydroelectric Powerplants  
in the USSR  
1958-61 and Plans for 1962 and 1965

Type of Powerplant	Megawatts					
	1958 <u>a/</u>	1959 <u>a/</u>	1960 <u>a/</u>	1961 <u>b/</u>	1962 Plan <u>c/</u>	1965 Plan <u>d/</u>
Thermal electric	42,778	46,557	51,940	57,400	63,900	88,000
Hydroelectric	10,863	12,710	14,781	16,400	18,800	25,000
Total	<u>53,641</u>	<u>59,267</u>	<u>66,721</u>	<u>73,800</u>	<u>82,700</u>	<u>113,000</u>

a. 75/b. 76/c. Based on the planned addition of 8,900 mw, of which 6,500 mw is thermal capacity, 77/ to the estimated total for 1961.d. Derived from the planned increase of 58,000 to 60,000 mw during the Seven Year Plan. 78/ Increases in hydroelectric generating capacity during the period will be approximately 14,000 mw. 79/

During 1961, several significant developments occurred in the electric power industry in the USSR, as follows: The first 900 mw of generating capacity were placed in operation at the Bratsk Hydroelectric Powerplant at the end of 1961; upon its completion in 1963, the plant will be the largest powerplant in the world, with a capacity of 4,500 mw. The first stage of the 500-kv network in East Siberia was placed in operation from Bratsk to Angarsk in Irkutskaya Oblast. The network will eventually transmit power to the European part of the country and will thus represent one of the most important projects in the planned development of electric power in the USSR. It is estimated that in 1961 the USSR placed six 200-mw turbogenerators in operation. In view of the fact that the first such unit was planned to be in operation in 1959 and was not actually operational until the end of 1960, the 1961 performance indicated that the USSR has finally mastered the techniques of serial production, installation, and operation of these larger units. The planned installation of a 300-mw unit did not take place, however, indicating technical problems in units of the next larger size. The USSR also did not place in operation the first sections of the Beloyarsk and Novo-Voronezh nuclear powerplants as had been planned. During 1961 the electrification of the Trans-Siberian Railroad from Moscow to Lake Baykal, a distance of 5,500 km, was completed, making this line by far the longest electrified railroad in the world.

#### IV. Trade

##### A. Crude Oil and Petroleum Products

The export of crude oil and petroleum products from the USSR continues to be an important factor in the economy of the country and in the furthering of Soviet political ambitions. In 1961, as in previous years, trade agreements with the industrialized countries of the Free World often involved a large Soviet oil export quota as a means of helping to finance imports of industrial goods and equipment needed to support the planned levels of industrial growth. Under the terms of many of these agreements the USSR is acquiring material and equipment such as large-diameter steel pipe, pipeline equipment, and tankers needed to develop and expand a transportation system for exporting oil. In accordance with a barter agreement, the USSR is to supply Italy with 12 million tons of oil during 1961-64 in exchange for 240,000 tons of 40-inch steel pipe, pipeline equipment, and rubber. Italy shipped the first of the 40-inch steel pipe to the USSR late in 1961. In January 1962, Sweden made the first delivery on an agreement to supply 135,000 tons of large-diameter steel pipe to the USSR. Also, it is estimated that during 1959-61 the USSR received about 500,000 tons of 40-inch steel pipe from West Germany which is believed to have been used in constructing transmission gas pipelines. The terms of trade offered to less developed countries also were especially attractive, in that the USSR was able to offer a market for local commodities that otherwise might have been difficult to dispose of, was able to offer oil at reduced prices, and/or willingly accepted payment for the oil in soft currencies.

In 1961 the total Soviet net exports of crude oil and petroleum products are estimated to have increased by 6.6 million tons, to 35.6 million tons. Net exports to other countries of the Sino-Soviet Bloc are estimated to have reached about 10 million tons, an increase of 1 million tons, or 11 percent above the 1960 level. The greatest increase in exports was shown in the deliveries of crude oil and petroleum products to countries of the Free World. The total Soviet net exports to the Free World in 1961 increased 5.6 million tons, or by about 28 percent, to a total of 25.6 million tons.\* About 15 million tons, or 60 percent, represented crude oil and the remainder, about 10 million tons, or 40 percent, represented petroleum products. Italy is estimated to have imported 6.3 million tons of oil from the USSR in 1961, about 90 percent of which was crude oil, and was the USSR's leading customer in the Free World. Cuba was second and is estimated

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\* Net exports by the Soviet Bloc of petroleum products and crude oil to the Free World in 1961 are estimated to be 29.4 million tons, the Soviet share of which amounted to about 87 percent.

to have imported about 4 million tons of oil, about 70 percent of which was crude oil, from the USSR in 1961. One country, Burma, that did not import Soviet oil in 1960 was included among the importers in 1961, and three Free World countries, Argentina, Portugal, and Lebanon, that previously imported Soviet oil were not among the Soviet oil importers in 1961. The estimated trade in crude oil and petroleum products by the USSR with the Free World and with the Sino-Soviet Bloc during 1955-61 is shown in Table 11.\* As in past years, Soviet oil sales in the Free World caused a variety of reactions that ranged from the level of consumers interested in lower priced products to the level of national governments concerned about increasing their dependence on the USSR for fuels. In general, Soviet sales constituted one of the major "problems" under discussion by the major oil producers of the Free World.

#### B. Coal and Coke

In 1961, Soviet exports of coal continued to increase and are estimated to be 8.2 million tons. Imports of coal from Communist China were probably 0.2 million tons, so that total net exports of coal amounted to 8 million tons. Shipments of coal to the Free World reached 5.3 million tons, of which 4.7 million tons were supplied to 11 European countries and 0.6 million tons to Japan. Soviet net exports of coal to the European Satellites in 1961 amounted to a little more than in 1960 and are estimated to be 2.9 million tons. Except for about 1 million tons of energy coal going to Czechoslovakia, Soviet exports of coal to the European Satellites are believed to be for coking purposes.

In recent years the USSR reportedly has been competing with Poland for coal markets. It is believed that in 1961 the USSR gained access to the Swedish energy coal market by undercutting the price of Polish coal. Sweden, however, is still not a major consumer of Soviet coal. It is possible that this type of competition will continue, particularly since the USSR is expected to continue to have excess stocks of energy coal in the European part of the country.

Soviet exports of coke in 1961 are estimated to be 1.9 million tons, about the same as in 1960. The Free World received about 0.4 million tons, of which more than half was taken by Denmark and Sweden. The estimated Soviet trade in coal and coke with the Free World and the Sino-Soviet Bloc during 1958-61 is given in Table 12.\*\*

\* Table 11 follows on p. 23.

\*\* Table 12 follows on p. 24.

Table 11

Estimated Trade in Crude Oil and Petroleum Products by the USSR  
with the Free World and with the Sino-Soviet Bloc a/  
1955-61

	Million Metric Tons						
Trade	<u>1955</u>	<u>1956</u>	<u>1957</u>	<u>1958</u>	<u>1959</u>	<u>1960</u>	<u>1961</u>
With the Free World							
Imports b/	0.5	1.4	1.3	1.0	1.0	1.0	0.8
Exports	3.1	4.6	7.9 c/	9.6 c/	14.6 c/	21.0 c/	26.4
Net d/	<u>2.6</u>	<u>3.2</u>	<u>6.6</u>	<u>8.6</u>	<u>13.6</u>	<u>20.0</u>	<u>25.6</u>
With the Sino-Soviet Bloc							
Imports	3.8	3.9	3.0	2.9	4.4	3.0	3.2
Exports	2.1	4.1	5.8	8.5	10.8	12.0	13.2
Net d/	<u>-1.7</u>	<u>0.2</u>	<u>2.8</u>	<u>5.6</u>	<u>6.4</u>	<u>9.0</u>	<u>10.0</u>
Total net trade	<u>0.9</u>	<u>3.4</u>	<u>9.4</u>	<u>14.2</u>	<u>20.0</u>	<u>29.0</u>	<u>35.6</u>

a. Unless otherwise indicated, data are estimated from source 80/ except for 1961, which was estimated on the basis of preliminary reports.

b. Austrian reparations.

c. Residual.

d. Net imports are designated by the use of a minus sign.

Table 12

Estimated Trade in Coal and Coke by the USSR with the Free World  
and with the Sino-Soviet Bloc a/  
1958-61

Trade	Million Metric Tons							
	1958 <u>b/</u>		1959 <u>b/</u>		1960 <u>b/</u>		1961 <u>c/</u>	
	<u>Coal</u>	<u>Coke</u>	<u>Coal</u>	<u>Coke</u>	<u>Coal</u>	<u>Coke</u>	<u>Coal</u>	<u>Coke</u>
With the Free World								
Exports	3.6	0.4	4.2	0.4	5.0	0.4	5.3	0.4
Imports	0	0	0	0	0	0	0	0
Net	<u>3.6</u>	<u>0.4</u>	<u>4.2</u>	<u>0.4</u>	<u>5.0</u>	<u>0.4</u>	<u>5.3</u>	<u>0.4</u>
With the Sino-Soviet Bloc								
Exports	2.8	1.3	2.7	1.4	2.8	1.5	2.9	1.5
Imports	0.2	0	0.2	0	0.2	0	0.2	0
Net	<u>2.6</u>	<u>1.3</u>	<u>2.5</u>	<u>1.4</u>	<u>2.6</u>	<u>1.5</u>	<u>2.7</u>	<u>1.5</u>
Total net trade	<u>6.2</u>	<u>1.7</u>	<u>6.7</u>	<u>1.8</u>	<u>7.6</u>	<u>1.9</u>	<u>8.0</u>	<u>1.9</u>

a. Data are adjusted to exclude the reported imports from Poland and most of the reported exports to East Germany because the Polish coal is shipped directly to East Germany.

b. 81/

c. Estimated on the basis of data in source 82/.

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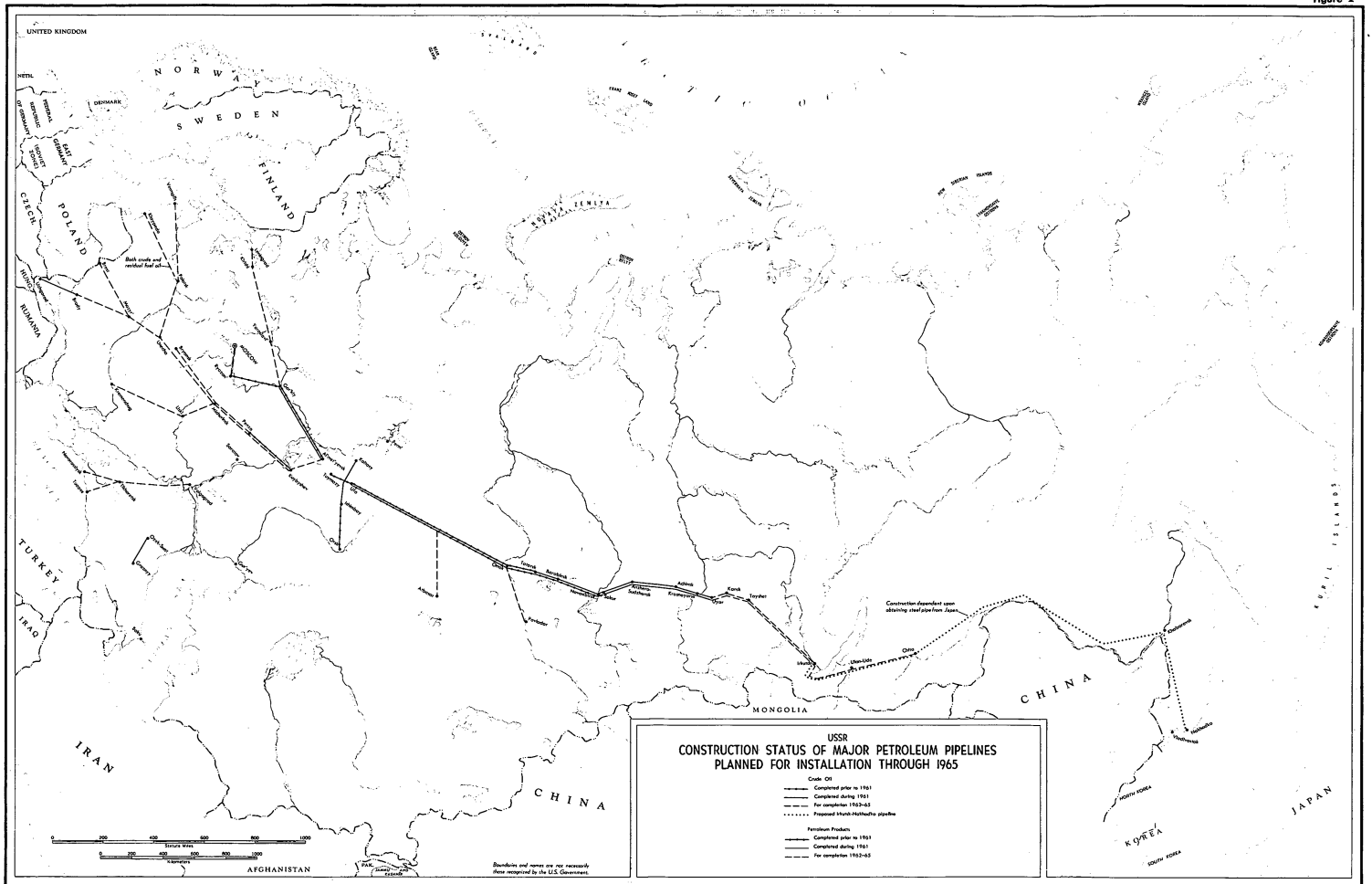
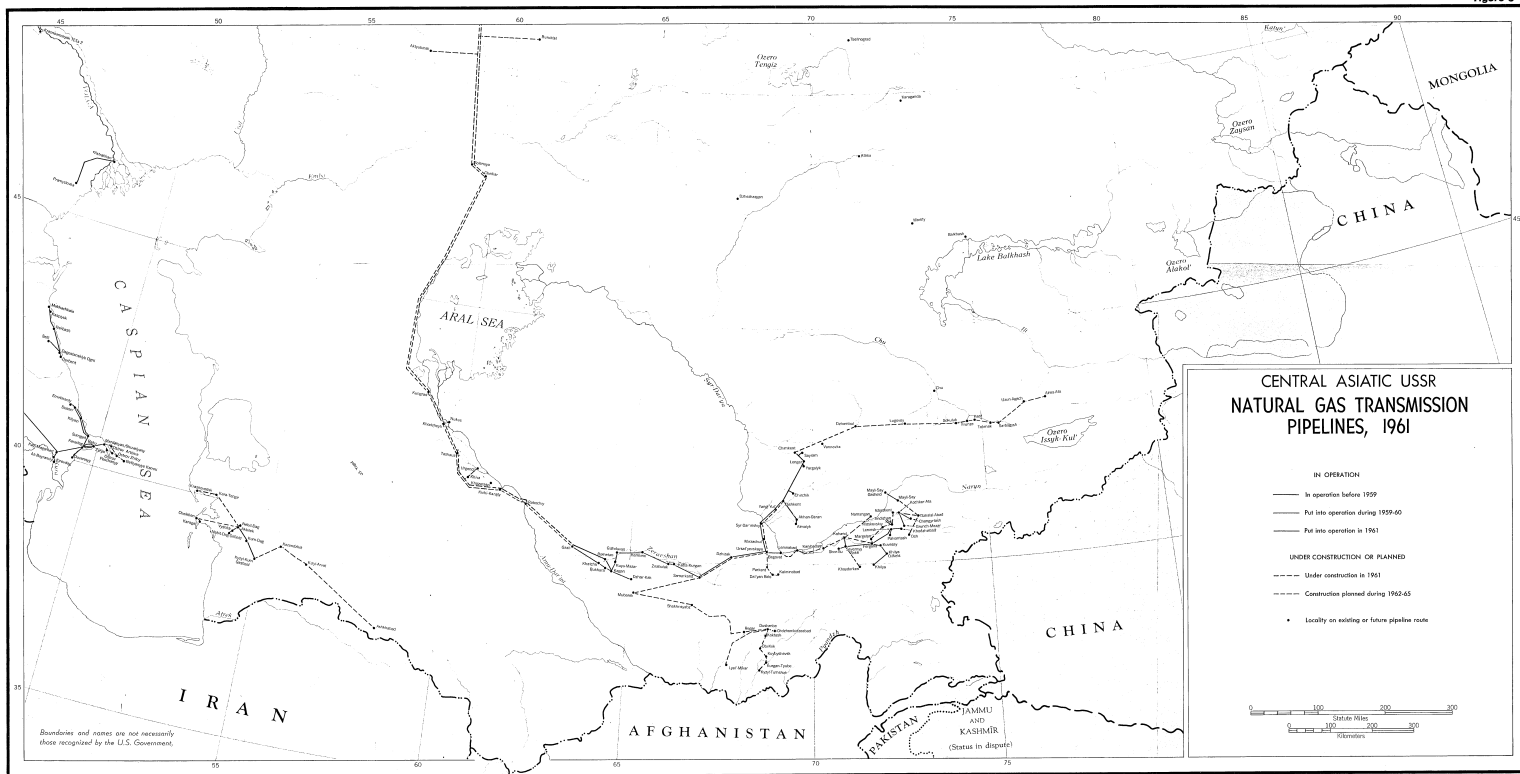


Figure 3



# WESTERN USSR NATURAL GAS TRANSMISSION PIPELINES, 1961

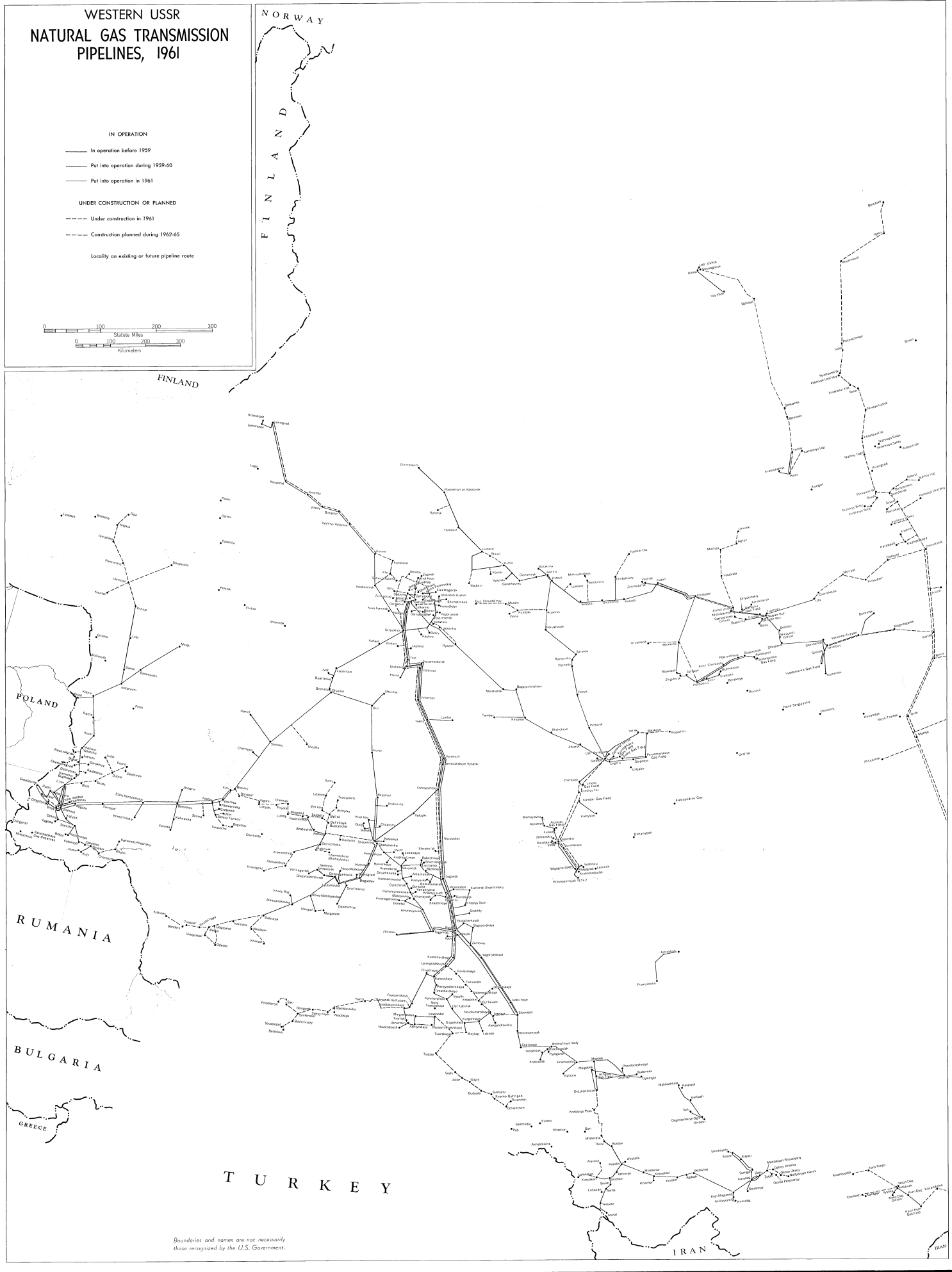
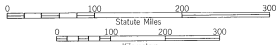
### IN OPERATION

- In operation before 1959
- Put into operation during 1959-60
- Put into operation in 1961

### UNDER CONSTRUCTION OR PLANNED

- - - Under construction in 1961
- - - Construction planned during 1962-65

Locality on existing or future pipeline route



*Boundaries and names are not necessarily those recognized by the U.S. Government.*