

RAW MATERIAL RESOURCES OF THE PETROLEUM REFINING INDUSTRY IN THE TENTH FIVE-YEAR PLAN

I. Ya. Vainer

The 25th Congress of the Communist Party of the Soviet Union has summed up the creative activity of the workers of our nation for the Ninth Five-Year Plan and has mapped out new frontiers which, if attained, will strengthen still further the power of the USSR.

The striving of all Soviet peoples is currently being directed toward resolution of the main task of the Tenth Five-Year Plan, "... an increase in the material and cultural level of life of the nation on the basis of a dynamic and proportionate growth of socialist production, an increase in production efficiency, acceleration of scientific-technical progress, an increase in labor productivity, and an all-out improvement in the quality of work in all sectors of the national economy."*

A significant role in resolving the main task of the Tenth Five-Year Plan is to be played by the fuel/energy complex, including the petroleum refining industry.

The fuel/energy complex is a unified whole, combining the electric power industry, the oil and gas producing industry, petroleum refining; and the coal, shale, and peat industries.

An organic bond exists between the fuel/energy complex and the productive forces of the nation as a whole.

Growth of the fuel/energy complex depends on the degree to which it is provided with equipment, tools, and materials produced by many different branches of industry. At the same time, machinery construction, metallurgy, transport, agriculture, and all the other sectors of the national economy are unable to grow without adequate energy resources.

Our country is liberally endowed with energy resources; these are being used in the economy in increasing amounts. The natural resources of the USSR are such that fuel and energy can also be supplied to the brother socialist nations.

The strong energy base of the Soviet Union is particularly outstanding against the background of the unstable energy position of the developed capitalistic countries, which must import annually at least 1 billion metric tons of nominal standard fuel and must limit the consumption of this fuel.

During the past 15 years (1961-1975), the production of primary energy resources in the USSR has increased by a factor of 2.4, including an increase in production of crude oil and gas condensate by a factor of 3.3.

In accordance with the tasks advanced by the 25th Congress of the CPSU, new trends are being manifested in the Tenth Five-Year Plan in drawing up the energy balance. In his paper at the 25th Congress of the CPSU, Comrade A. N. Kosygin emphasized: "In this Five-Year Plan, foundations are being laid so that, in the future, the growth of our energy potential will come primarily through hydroelectric power, atomic fuel, and low-cost coals. As regards oil and gas, the increase in production will be more and more directed to technological needs."

* Material of the 25th Congress of the CPSU [in Russian], Politizdat, Moscow (1976), p. 166.

Translated from *Khimiya i Tekhnologiya Topliv i Masel*, No. 1, pp. 6-9, January, 1977.

This material is protected by copyright registered in the name of Plenum Publishing Corporation, 227 West 17th Street, New York, N.Y. 10011. No part of this publication may be reproduced, stored in a retrieval system, or transmitted, in any form or by any means, electronic, mechanical, photocopying, microfilming, recording or otherwise, without written permission of the publisher. A copy of this article is available from the publisher for \$7.50.

In view of these circumstances, the share of crude oil and gas condensate in the fuel/energy balance in 1980 will remain at the 1975 level, whereas in the 1961-1975 period it increased by 13%. Whereas residual fuel oil in 1975 accounted for more than 20% of the resources of boiler and furnace fuels, in 1980 its share will fall to 17%, and subsequently even lower.

An important factor in the Tenth Five-Year Plan, along with the increase in quality level of petroleum products, is the increase in relative yields of light petroleum products.

In the past five-year period, the refineries met in full the needs of industry, transport, and agriculture for refinery products. In the Tenth Five-Year Plan, a 25-30% increase in crude oil runs has been mapped out, thus satisfying the growing demand of the nation for petroleum products.

The measures to be worked out during the Tenth Five-Year Plan relative to the geographical distribution of the refining industry, increases in the capacity of existing processes through better operation, and introduction of the most modern manufacturing processes are in accordance with the requirements of the 25th Congress of the CPSU and the Fifth Session of the Supreme Soviet of the USSR relative to the increase in volume of crude runs, the shifting of refinery sites to bring the product sources closer to the consumers, the increase in quality level of petroleum products, and the improvement of the economic indices of the Branch.

In order to fulfill the plan adopted by the Fifth Session of the Supreme Soviet of the USSR for the output of petroleum products, the oil fields must supply the refineries with greater volumes of crude oil and gas condensate during the five-year period.

In order to carry out such a critical assignment, the petroleum refining industry should have the corresponding prepared reserves of oil in place and new oil-field capacity for production; in addition, the carrying capacities of pipelines need to be increased.

The preparation of commercial oil reserves in categories A + B + C₁, or, in other words, the conversion of hypothetical reserves (D₁ + D₂) to prospective reserves (C₂) and then to commercial reserves (C₁), which are used as the planning basis for oil production during the five-year period, requires major effort in terms of labor and material resources.

The commercial or proved oil reserves required to ensure the needed volumes of oil production during the Tenth Five-Year Plan had been for the most part prepared at the start of this period.

However, in view of the lengthy cycle required for the preparation of crude oil reserves, a greater lead time must be provided between the preparation of oil reserves and the scheduled production, in order to guarantee the oil production and ensure that the best sites will be selected for the production.

In view of these circumstances, a critical task has been assigned to the geological prospecting organizations of the country: During the Tenth Five-Year Plan, the volume of commercial reserves of crude oil and gas condensate must be increased by a factor of 1.34 in relation to the actual incremental reserves for this five-year period.

Naturally, the principal increase in new commercial reserves is anticipated in the main center of the oil production industry, i.e., in Western Siberia. Along with this, geological prospecting will be continued in the European part of the USSR, including an extremely promising area in the Komi ASSR and Arkhangel' Oblast' [Province], where, during the Ninth Five-Year Plan, a number of new producing fields have already been discovered and brought into production. Also considered as promising districts for geological prospecting for oil in the European part of the USSR are the Georgian SSR, Perm', and Orenburg Oblast', the water area of the Caspian Sea, etc.

During the Tenth Five-Year Plan, geological prospecting will be expanded in the Kazakh SSR, which is already a major producing area.

The mineral riches of Eastern Siberia and the Far East have long riveted the attention of geologists. In the Tenth Five-Year Plan, the broad expanses of these districts will witness a considerable increase in the volume of geological surveying and exploratory drilling.

A characteristic feature of the geological exploration operations in the Tenth Five-Year Plan and succeeding five-year plans is the greater expenditures of labor and capital that will be required. The search for new oil and gas fields is directed mainly toward great depths, and more and more toward far-distant and relatively uninhabitable districts with poorly developed transportation facilities.

In his paper presented to the 25th Congress of the CPSU, Leonid Il'ich Brezhnev said: "For oil, gas, coal, and ore, we are now going ever farther to the east and to the north."

With a planned increase in added reserves in the Tenth Five-Year Plan amounting to twice that in the Seventh Five-Year Plan, the new capital investment is expected to be greater by a factor of 2.5.

We should point out that an increase is planned in the preparation of gas-condensate reserves, the production of which is expected to increase considerably in the future, particularly in the gas condensate fields of Western Siberia.

The workers in the refining industry obviously know what advantages can be obtained through increasing the resources of gas condensate, which yields almost twice the amount of light petroleum products that can be obtained from crude oil.

The geographical distribution of oil production facilities is a major factor in economical operation of both the production and refining branches, since it determines the amount of capital investment and operating expenses in the transport of crude oil and gas condensate.

In the Tenth Five-Year Plan, in comparison with the preceding plan periods, major shifts are taking place in the geographical distribution of the oil producing industry, primarily due to the high growth rates of the Western Siberian oil region. Here the oil production will reach 300-310 million metric tons by 1980, i.e., will more than double in comparison with the Ninth Five-Year Plan.

The incremental oil production in Western Siberia in the Tenth Five-Year Plan (160 million tons) accounts for all of the USSR increment (149 million tons) and also makes up for the drop in oil production in certain other districts (11 million tons).

The underground riches of Western Siberia and the enormous aid given to this district by the Communist Party and the Soviet Government are making it possible to bring the oil production of this district to 300-310 million tons within a period of 15 years (1965-1980).

In this connection, it is recalled again and again how high a rating was given to the work of the Tyumen' oil and gas workers by Leonid Il'ich Brezhnev from the rostrum of the 25th Congress of the CPSU: "That which has been done, that which is being done in this harsh and forbidding territory - this is a truly heroic achievement. And to the hundreds of thousands of people who are accomplishing this feat, the Motherland pays the tribute of admiration and high esteem."

Apart from Western Siberia, oil production in 1976-1980 will increase in the Kazakh SSR, the Georgian SSR, the Azerbaidzhan SSR (offshore), the Komi ASSR, Perm' Oblast', the Udmurt ASSR, and Sakhalin Oblast'.

At the same time, in certain oil-producing districts where the principal fields have passed or are passing over into the later stage of development, a drop in oil production is foreseen. Here we refer to the Tatar ASSR, the Bashkir ASSR, Kuibyshev Oblast', the Turkmen SSR, the Ukrainian SSR, and the Belorussian SSR.

These circumstances are leading to certain shifts in the geographical distribution of the oil producing industry, as illustrated in Table 1.

The considerable increase in percentage of total production in the eastern districts of the nation, without any decrease in percentage of total fuel consumption in the European part of the USSR, is increasing the amount of oil transport. With the resultant geographical distribution of oil production in the Tenth Five-Year Plan, future expansion of capacity of existing oil pipelines and the construction of new cross-country oil pipelines from the districts with expanding oil production will be accomplished in the direction toward the refineries of the European part of the USSR and toward refineries in Kazakhstan and Central Asia.

Special attention will be allotted to relieving the railroads from transporting crude oil.

While the nation's oil production was increasing by a factor of 3.3 in the years from 1961 to 1975, the turnover in oil pipeline transport during this same period was increasing by a factor of 15.8, through a fourfold increase in the volume of oil pumped and a fourfold increase in the distance transported. During the Tenth Five-Year Plan, in comparison with the Ninth, the turnover will increase by 55% and the distance of pumping the oil by 30%.

By the end of the Tenth Five-Year Plan, the oil pipelines will total more than 60,000 km in length.

It should be noted that, out of each ruble of capital investment to be provided in the Tenth Five-Year Plan for the growth of the oil-producing industry (including oil transport), 16 kopecks are allotted to the construction of oil pipelines.

TABLE 1. Production of Crude Oil and Gas Condensate

USSR district	1970		1975		1980	
	million metric tons	%	million metric tons	%	million metric tons	%
USSR total	353	100,0	490,8	100,0	640*	100,0
European part and Ural district	289,8	82,1	299,4	61,0	285,6	44,6
Tatar ASSR, Bashkir ASSR, and Kuibyshev Oblast'						
Perm' Oblast'	176,1	49,8	178,4	36,3	142,3	22,3
Komi ASSR and Arkhangel' Oblast'	16,1	4,6	22,3	4,5	31,0	4,8
Other districts	7,6	2,2	11,1	2,3	25,0	3,9
Eastern districts	90,0	25,5	87,6	17,9	87,3	13,6
Western Siberia	63,2	17,9	191,1	39	354,4	55,4
Kazakh SSR	31,4	8,9	148,1	30,2	308,0	48,1
Turkmen SSR	13,1	3,7	23,8	4,8	27,0	4,2
Other districts	14,4	4,1	15,3	3,1	13,7	2,1
	4,3	1,2	3,9	0,9	5,7	1,0

*Plan and supplementary assignment.

The increase in absolute and relative allocations for growth in oil pipelines will be provided through technical progress. The basic measures in this area in the Tenth Five-Year Plan will be the use of pipe in the most economical diameters for main oil pipelines (820, 1020, and 1220 mm) and the installation of pump-stations with higher capacities, equipped with automatic control and monitoring systems.

Expanded production in the oil industry is determined to a considerable degree of the preparation of oil reserves and the development of new oil-field capacity. This will depend first of all on the amounts of exploratory and developmental drilling. More than half of the capital investment allotted to the growth of the oil producing industry is earmarked for drilling operations. In order to obtain the increments in oil production and preparation of reserves that are projected for the Tenth Five-Year Plan, it will be necessary to drill wells totaling some 75 million meters, or 1.4 times that for the past five-year period.

Most of this is development drilling (for producing wells).

The need for greater amounts of development drilling in recent years reflects not only the need to provide an absolute increase in the nation's oil production, but also the need to compensate for the decline of oil production from old wells. It should be noted that about 70% of the new production capacity created by development drilling is required to maintain the nation's oil production at the present level.

In the interest of improving the economic efficiency of expensive drilling operations, a 25-30% reduction in the cycle time is specified in the "Basic Directions of Growth of the USSR Economy in 1976-1980," as adopted by the 25th Congress of the CPSU. In order to fulfill this important economic task, while at the same time going to deeper drilling and more severe natural conditions for many of the drilling operations, it is proposed to introduce drilling units with universal setup capability, along with new types of bits, down-hole motors, drilling muds, high-strength casing and drill pipe, advanced methods of well completion, and improved organization of drilling operations.

Of all the problems standing before the oil producing industry, the most important is how to increase the oil recovery from the reservoirs.

At today's level of equipment and technology, no more than half the oil present in the reservoir can be recovered. When we consider that the oil in place amounts to no more than 3-5% of the total conventional types of fuels, and that the oil resources are not being renewed, we cannot reconcile ourselves to such an oil recovery factor.

All over the world today, extensive work is in progress in the search for methods to increase the recovery of oil from reservoirs.

The scientific-research institutes of the Soviet Union are conducting major research and experimental-commercial studies aimed at increasing oil recovery factors.

Already in commercial use is a method for pumping surfactants into the reservoir, as well as the use of heat and other means of acting on the reservoir. Through the use of measures to increase the oil recovery, it should be possible in 1976-1980 to increase production by more than 10 million metric tons, and tens of times this much in the next 10 years.

Mapped out for the oil producing industry in the Tenth Five-Year Plan is a major step-up of production rates, including gas-lift production and the use of new equipment and techniques in producer wells; a high level of complex automation of operations will be achieved in the oil fields.

The introduction of new equipment and techniques and the improved organization of production will make it possible to increase oil-field labor productivity by at least 28-30%. Completion of the complex and critical task of bringing the production of crude oil and gas condensate to 640 million metric tons in 1980 will require major attention to the needs of the oil industry on the part of the interfacing branches of industry, particularly the machinery construction industry, ferrous metallurgy, and the chemical industry.

From the program speech of Comrade L. I. Brezhnev at the October (1976) Plenum of the Central Committee of the CPSU, we see that all branches of industry, agriculture, transport, and the sphere of supporting services are faced with the task of a widespread utilization of reserves and elimination of defects in the organization of production. The oil producing industry is among those which must perform major work in this area.

The specific norms for consumption of metal in drilling are still high, and, which is most disturbing, they are not being reduced, but are increasing each year. Efforts to curtail losses of oil in the fields are still inadequate. There are still shortcomings in overall utilization of wells. In 1975, for example, based on average figures for the Ministry of the Oil Industry, a well completion required 34 days, of which 17 days elapsed in waiting on completion.

A decisive elimination of these and other shortcomings will contribute to successful fulfillment of the plan for growth in the oil producing industry in the Tenth Five-Year Plan.

As shown by experience of the past five years and by a successful start on fulfilling the plan for the production of crude oil and gas condensate in the current five-year period, our petroleum refining industry has at its disposal a strong and stable raw material base for fulfilling and overfulfilling the assignments of the Tenth Five-Year Plan.