The Reproduction of the Mineral Resource Base as the Basis for the Sustainable Development of the Resource-Producing Regions of the North and the Arctic

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Abstract. The article shows that the raw material development of the northern and Arctic regions, as shown by world and Russian practice, is extremely unstable. The reason for this is the depletion of the raw material base, fragile market conditions. In Russia, since the 1990s, there has been a decline in the reproduction of the mineral resource base. On the example of the Nenets Autonomous District, the problems of regional development and the reproduction of the mineral resource base are considered. The analysis showed that in the region there is an increase in the mono-branch nature of the economy, which is mainly focused on the exploitation of hydrocarbon resources. At the same time, the explored and put on the balance of oil reserves in the district are decreasing, since the main deposits were discovered and put on the balance in the Soviet time and today are close to exhaustion. The article shows that in order to avoid the dependence of the region on raw materials, the complex development of the resource area is necessary mainly through the diversification of primary industries and the restructuring of the regional economy. Maintaining oil production is possible only with the intensive preparation of new reserves, which requires large-scale exploration and significant financial costs, including governmental.

1. Introduction
The raw material development of the northern and arctic regions, as shown by the world, and recently the Russian practice, is extremely unstable. The depletion of the raw material base, the precarious market conditions led to a change in the ups and downs of the North regions development, to the decline or even closure of tens and hundreds of resource centers. These problems are rather deeply studied in the works of foreign and domestic scientists [1,2,3,4], as well as the North scholar G.A. Agranat.

Recently, this problem has touched our country. Initially, the cause of this was the global crisis, which resulted, over several months, the decrease of the oil price in almost three times. Then there was the threat of a decrease in oil production and non-fulfillment of the forecast levels of its production. Such problems put the northern regions in a particularly difficult position, since the vast majority of the country's mineral resources are extracted here and their well-being depends solely on the well-being of the extractive industries.

First, scientists, and then practitioners began to raise the question of the need to avoid the dependence on raw materials of the Russian economy. At the same time, modern trends in the development of the Russian economy, analysis of governmental strategic developments (for example,
the “Energy Strategy of Russia for the period until 2030”) suggest that the exploitation of the raw potential will continue to play an important strategic role in ensuring national security, shaping currency balance and creating conditions for the economically effective integration of the Russian economy into the world economy. At present, this is evidenced by the income from the mineral resource complex, which according to various estimates makes up 50-60% of all budget revenues of the Russian Federation. At the same time, 2/3 of the country's resource potential is concentrated in the North, including 100% of diamonds, 80% of gold, over 90% of natural gas, 75% of oil being extracted here. About 8% of the country's population lives in the North, but more than 25% of gross domestic product is produced there.

2. The mineral resource base of Russia and the problems of its reproduction

It is well known that Russia inherited from the USSR the authority of the most mineral-rich country. Its share in world oil reserves was estimated at 11%, gas - 32-35%, coal - 12%, tin, zinc, cobalt, nickel, iron - from 10 to 37%. In gold and diamonds Russia was relegated to second place after South Africa. However, the transition to market relations has shown that a significant part of the reserves previously adopted on the balance sheet does not meet modern market requirements. Since in Soviet times, when setting the balance sheet, profitability was often neglected, it turned out that quite clearly unprofitable hard-to-recover reserves were taken on the balance sheet. For example, in the Donbas coal seams with a capacity of 60 cm were considered as working, and in the Kuzbass – of 70 cm. [5]. Some work on the revaluation of the mineral resource base has been carried out. However, according to experts, it requires a more critical analysis and further improvement of the classification of reserves, taking into account the market conditions of subsoil use.

As for oil, the volumes of its reserves were perceived as if through rose-colored glasses, which gave rise to the myth about the scale of oil reserves in the national economy [6,7]. However, it becomes obvious that proven reserves are not enough to increase production. There are two causes of the problem. Firstly, according to the estimates of foreign experts and the results of the international audit of the largest companies, the modern oil potential is several times smaller than the assessments of domestic oil companies. Recognized global analytical agencies estimate our reserves according to the international classification (10 billion tons) are 2 times lower than the volume of reserves according to the Russian classification category ABC1 + C2 (22 billion tons). This is all a matter of counting methodology: first, foreign agencies, unlike Russian ones, only take into account economically viable reserves for development under the current tax regime [8]; secondly, our economy works in a very depleting mode. Therefore, there is a fear among scientists and experts that, if appropriate measures are not taken, a recession in this industry is inevitable. Even sadder is the picture of the security of the raw material base of metallurgy. Its need for manganese, chrome, titanium, zinc will be met through imports. Most non-ferrous metallurgy mines have reserves of only 5-10 years.

We have to admit that the transition to the new subsoil use system in the early 1990s of the twentieth century resulted in the degradation of the exploration industry, previously regulated exclusively by the state. Since the beginning of the 1990s, proven current oil reserves have declined by more than 20%, and in Western Siberia by almost 30%. Undercompensation with new oil reserves is estimated at 1.5 billion tons. The difficult situation with exploration, which developed in the 90s of the last century, with the introduction of a tax on the reproduction of the mineral resource base began to improve in 2000-2001, when the increase in oil and gas reserves for the first time since 1993 exceeded current production. The situation changed with the introduction of the new Tax Code in 2002 and the introduction of the tax on the extraction of natural resources, when, against the background of increasing oil production (from 293 million tons in 1999 to 505 million tons in 2010), there was a negative trend of reduce of exploration and reduce of the growth of oil reserves. After the fall in the growth of oil reserves in recent years, positive trends have been observed, however, this is mainly due to the revaluation of reserves and the recalculation of the recovery rate.
It should be noted that in the conditions of exhaustion of continental oil reserves in foreign countries, their increase in reserves is also due to the revaluation of existing reserves. Thus, the main increase in stocks in the United States is obtained in the old areas due to an audit of the results of research of past years. For example, in 1997, the increase in oil reserves at the expense of new deposits and deposits amounted to 100 million tons, and due to the audit and revaluation - about 200 million tons. [9, p. 202].

Experts of Ernst & Young \(^1\) have concluded that starting from 2025, the capabilities of current and already distributed new fields on land will not be enough to achieve the target level declared by the Government of the Russian Federation. According to Ernst & Young's calculations, in order to preserve the volume of oil production at the current level after 2030, the cost of geological exploration should be increased in more than three times [10].

The question naturally arises - what happened to geological exploration, which worked so intensively and productively during the Soviet era? In the 90s of the last century, in essence, there was a transfer of regulation of geological exploration from the state to oil and gas companies. In the absence of a well-developed legislative base and budget funds from the state for geological exploration, this led to the fact that the bulk of geological exploration was located exclusively in the long-developed areas and was not conducted in new development areas with undeveloped infrastructure. Geological exploration was not conducted on the most complex geological, technological, etc. subsoil conditions. In addition, the transfer of all expenses on the shoulders of mining companies, but not supported by legislative obligations, had a negative impact on the economic indicators of the core business of the companies and did not make them want to carry out geological exploration. Without going into details it can be stated that the direction of development of exploration, which the state adopted in the 1990s, turned out to be a dead end.

The reproduction of the mineral resource base requires large-scale geological exploration and significant financial costs. What do we see from the state? Public investment in recent years in the reproduction of the mineral resource base is less than half a percent of the federal budget expenditures. For comparison, in most countries with a significant mineral and raw material potential, from 2 to 5% of the expenditure part of the state budget is spent for these purposes [11].

As for the mining companies, it should be noted that at the present time, for example, domestic fuel companies do not spend on exploration and 2% of their turnover. For comparison, foreign companies are consistently spending more than 10% on depth exploration groups. Under current legislation, companies have no interest in preparing a new raw material base for future projects. First, large investments in geological exploration adversely affect the economic performance of the company, being an additional cost; secondly, exploration is extremely risky, especially in areas of new development. Therefore, Russian companies prefer to use reserves of cost reduction inherited from Soviet times in the form of proven reserves, built capacity and infrastructure. However, all these factors are close to exhaustion or obsolete. In order to be competitive, it is necessary to increase raw material resources, renew obsolete fixed assets, and create modern mining equipment.

Mining enterprises mainly use mining equipment, supplied in the 80s of the last century. Its update is not enough. Thus, from 50 to 70% of the existing equipment is physically and morally obsolete in coal and mining production, up to 80% in oil refining. In recent years, the average estimated oil recovery of deposits put into development did not exceed 30%, which is one of the lowest in the world. More than 70% of reserves remain in the depths. The project oil recovery in the country since 1960, when it was about 50%, decreased almost 1.7 times. Such a drop in project oil recovery is equivalent to a loss of 15 billion tons of potential recoverable oil reserves [12].

The situation was aggravated by the introduction of sanctions against oil and gas companies in Russia, which imposed a ban on the equipment and technological supply for the production of hydrocarbons. It is possible to change the situation by introducing innovative developments into

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\(^{1}\)Company Ernst & Young (EY) is a global leader in audit, tax, transaction and advisory services.
Also interesting is a foreign experience in attracting innovative developments in the oil industry. For example, in the United States, the main oil provinces are in a falling production stage. Oil companies are forced to move to the development of hard-to-reach fields characterized by lower technical and economic indicators. In such conditions, small and medium-sized independent companies come to the fore. They are most susceptible to innovation and successfully apply new technologies, the most important of which are horizontal drilling and three-dimensional seismic exploration. Independent companies produce about 65% of gas and 40% of oil. They perform 85% of the total drilling in 33 states [15]. Unfortunately, in Russia independent small oil companies are currently developing in difficult conditions and their number is decreasing. One of the main reasons is the underdevelopment of legislation, where criteria are set out that reflect the peculiarities of subsoil use and allow small and medium oil companies to be classified as small and medium businesses.

3. The place of the mineral resource base in the restructuring of the economy of resource-producing regions of the North

The importance of the North in the economic development of Russia is mainly explained by the explored and promising mineral and raw material resources located on its territory. In the future, the role of the North as a supplier of energy resources will continue. More recently, experts predicted the refusal of mankind from traditional fuels, and most importantly - environmentally dirty oil and the replacement of alternative energy. However, according to the Energy Information Administration (EIA) forecast of the US Department of Energy, these predictions have not yet come true. According to their forecasts, oil and natural gas will remain the main energy carriers and their consumption will grow. Moreover, the share of gas as the most environmentally friendly source of energy in the total consumption will increase.

Considering the development prospects, we can confidently assert that in the foreseeable future the resource orientation in the economy of the northern and Arctic regions will become dominant, will be dominated by industries with a relatively narrow specialization - mining and enrichment of mineral raw materials, mining and partial processing of fuel and energy resources. Obviously, since non-renewable natural resources will occupy an overwhelming share in the industrial production of resource-producing regions, gross regional product, budget revenues, it is necessary to manage their operation so that the revenues allow the northern regions to develop progressively both during the period of decline and exhaustion of the developed resources. At the same time, it is always necessary to remember that the main task that needs to be solved is the departure from the narrow specialization of the economy and the expansion of the sectorial structure of the regional economy.

Analysis of the dynamics of the sectoral structure and the problems of reproduction of the mineral resource base of the resource-producing regions of the North and the Arctic were studied using the example of the Nenets Autonomous Okrug (NAO). The district is at an early stage of large-scale development of oil resources of the Bolshezemelskaya Tundra and, apparently, in the future it will be the most promising oil-producing region. In the district the regional budget, incomes of the population grow. At the same time, many problems arose in the district. Over the years, under the conditions of high oil prices, the local leadership has developed a false sense of security, so the less profitable sectors of the economy have not been given due attention. As a result, enterprises and entire industries that had previously developed well began to decline. The economy of the district is becoming more and more single-industry. Thus, the share of the fuel industry in total industrial production in 2017 was 98.5%, and the share of tax revenues to the district budget — more than 70%. In other words, the well-being of the district is 70% dependent on the well-being of only one industry - the oil industry. And this trend is typical for all resource-extracting regions of Russia.

Unfortunately, the district administration does not seriously think what will happen to the district in 20, 30 years? According to different estimates the amount of oil in the NAO will be enough for 25-40 years of production. However, problems of the socio-economic development of the NAO are already
observed, but they are not associated with the exhaustion of oil resources. Essentially, full-fledged production has not yet begun, but the level of oil production since 2010 has been going down, not up, as stipulated by the NAO Development Strategy [16]. For a long time, it was believed that the constraint on oil production was the underdevelopment of the oil transportation infrastructure. To date, the main trunk infrastructure facilities have been created and are functioning. The reason is that since the 1990s there is no extended reproduction of oil reserves. There will be no significant increase in oil production even if the fields under development and in the undistributed fund are put into operation.

Revenues from oil production for quite a long time will maintain a high standard of living, but not always. The drop in production is one of the signals that it is necessary to invest in geological exploration in order to maintain the achieved level of socio-economic well-being of the district. It is obvious that without serious exploration and reproduction of the mineral resource base, there will be no increase in oil production in the district. At the same time, it is always necessary to take into account the fact that the time gap between the discovery period and the period of operation of a field in Russia varies greatly and ranges from 10 to 30 years. Consequently, those deposits that were found at the beginning of the twenty-first century will begin to be developed mainly in the 20-30s, and those that will be discovered in the near future will become a reserve for the 30s-40s.

Problems of development of the northern resource-producing territories in foreign countries were encountered much earlier than we. For Russia, their experience is especially valuable, since the country does not have its own experience in the development of northern territories in market conditions. As the world practice shows, the raw material development of the northern regions is extremely unstable. The main way out of the situation in foreign countries was seen in the complex development of the resource area mainly through the diversification of primary industries and the restructuring of the regional economy. The diversified structure of the economy, which is very important for the commodity region, makes it possible to reduce the dependence of the regional economy on market fluctuations on the products of primary specialization, as well as during the period of decline and then complete depletion of the developed natural resources most in demand on world markets [17].

In this article, using the example of the Nenets Autonomous District, we will consider the possibility of restructuring the economy based on industrial development of solid mineral deposits. In addition to oil, the subsoil of the region is rich in other minerals: fluorite, agate, amber, copper, nickel, cobalt, diamonds and gold, coal reserves (over 10 billion tons), etc. The involvement of solid minerals in economic activity will allow increasing the number of branches of territorial specialization, significantly expanding the raw material base of auxiliary branches of regional industry (in particular, the building materials industry), reducing the dependence of NAO on the "northern supply".

Solid minerals were identified during the Soviet period of large-scale geological exploration, but no quantitative and qualitative assessment was made. In general, the study of the territory of the district for solid minerals is not high - there are only 4 deposits on the state balance of reserves: one coal deposit, two - fluorite and one - agate. This situation is primarily due to the impressive difference in the demand for hydrocarbon raw materials in the world markets and the majority of solid minerals and their prices. For the same reasons, there is not a single license in the district for the right to use the subsoil of solid minerals.

For the development of the mining industry as a regional specialization industry, first of all, it is necessary to develop a targeted program, within which a comprehensive assessment of the mineral and raw material potential of the district for solid minerals should be carried out. This should be a federal target program with the involvement of regional funds and interested extractive companies. Within the framework of this program it is necessary: to allocate priority objects for conducting exploration and appraisal; take into account the formation of regional and local infrastructure; conduct market research of solid minerals. It is obvious that planning the development of infrastructure facilities in the district is necessary taking into account an integrated approach to the development and development of both the hydrocarbon potential and the potential of solid minerals. In the NAO is particularly difficult
situation with the road transport network. There is only 0.32 km of public roads with hard surface per 1000 km2 of the district, which is 114 times less than in the whole country.

It is obvious that structural restructuring consists in developing production based on local resources without breaking the region’s current specialization. This means that even in the early stages of production, it is necessary to provide for a deeper processing of natural resources, as well as further expansion of the use of renewable resources, the construction of repair and service industries, and the development of the services sector. In other words, as incomes of non-renewable natural resources are depleted, their income should transfer their profit to the development of other sectors of the economy [18].

The restructuring of the economy, as world experience shows, requires considerable financial and material resources, and for its implementation a long period of time is necessary. Under the conditions of the North, funds for these purposes can be obtained solely through the extraction and processing of natural resources. Moreover, it is necessary to restructure the economy at the stage of early production and maturity, while the income from the exploitation of natural resources is significant.

4. Conclusion
We must pay tribute - after the failure of the geological exploration of the 90s of the twentieth century, in recent years, the state has been paying considerable attention to the problems of the development of resource-extracting industries. This is expressed in the strengthening of control over the mining of natural resources, in the development of legislation, and in the creation of programs for the study and development of mineral resources. The state is increasingly involved in the work and financing of exploration.

Currently, the state, as the owner of the subsoil, has, although small, a choice of means to remedy the situation in the industry. Let us dwell on most of them - legislation. According to the adopted State Program for the Study of the Subsoil and the Reproduction of the Mineral and Raw Material Base of Russia, it is predicted that investment in geological exploration is estimated at about 3.5 trillion rubles, and it is assumed that 90% of them come from private investors. Therefore, the state should be interested in mining companies in the field of preparation of new raw materials for future projects. However, there is still no clear mechanism and incentives for attracting company funds in substantial amounts. One of these incentives to attract investors to large projects could be state guarantees that reduce business risks; the possibility of transferring or selling identified stocks. Projects on exploration and development of deposits are carried out in the conditions of a public-private partnership and have a great potential for attracting investments from the mining business.

Constantly amendments are made to the Law on Subsoil, but so far the Law has not been adopted as amended. Unfortunately, the new edition is not free from shortcomings, including the fact that it also does not prescribe a mechanism for implementing the state policy in matters of the reproduction of the mineral resource base. It has long been necessary to provide legislative support for the participation of small, including venture capital companies, in the development of the mineral resource complex. According to practitioners, unprofitable projects of such companies can be exemption from any types of taxes, if profitability has not reached 5%.

In general, the list goes on and on. The main thing in solving the problem is the political will of the state and the willingness, as the owner of the subsoil, to actually implement the tasks. Summarizing the above, it is necessary to emphasize once again that maintaining the extraction of mineral resources at the level declared by the Government of the Russian Federation is possible only with intensive preparation of new reserves, which requires large-scale geological exploration and significant financial costs, including state ones. The well-being of the whole country, but especially the resource-producing regions of the North, depends on the solution of this problem, since at present they are completely dependent on the well-being of the extractive industries only.

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