Application of Achimov deposits in the oil industry as a way of competitiveness increasing of Russia’s raw materials exports

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Abstract. The relevance of this study lies in the fact that the modern oil market is characterized by instability and high competition. Depletion of oil fields, deterioration of oil production equipment, price instability and political conflicts negatively affect Russia's position in the global energy market. The new economic conditions of 2021 are associated with a decrease in demand for oil and its products, high import dependence, conservation of wells to fulfil the OPEC++ deal, which will lead to a 3-10% drop in the market. It is necessary to apply new methods of oil production, one of which is the modern technology of Achimov oil fields development. The source materials were statistical data from the Center for Macroeconomic Analysis and Short-term Forecasting, the Ministry of Economic Development of Russia, the Analytical Center under the Government of the Russian Federation, world rating reports. The pandemic and self-isolation of 2020 led to the fact that the Russian oil sector lost 50-60% of revenue from hydrocarbon exports, more than 50% of its capitalization. The following fact is relevant for Russian oil companies: search for new markets (for example, Asia); application of innovative technologies to maintain the profitability of oil and gas production through the development of Achimovka oil deposits; development of small deposits and deposits with hard-to-recover reserves.

1 Introduction

In the second half of 2020, a fierce competition unfolded on the global oil market due to changes in the pricing policy for this type of product. At the same time, China and India occupied this niche in energy imports. The increase in oil production and supplies from Iraq were indicators that Saudi Arabia was unable to fulfill the role of a stabilizing energy producer by 2020.

The most powerful Russian companies “Lukoil”, “Tatneft”, “Sibur Holding”, “Gazprom”, “Rosneft” operate quite effectively in the oil complex, but this is not enough for international competition. To strengthen Russia's position in the oil sector, the country's leadership has relied on high-tech and innovative development of the energy sector. First of
all, this is the reception of oil production using hydraulic fracturing in the Achimov deposits, which are rich in the whole of Western Siberia.

The volume of publications devoted to the market of oil and gas products is quite large. Foreign researchers primarily point to the problem that has worsened during the pandemic: This is a change in the dynamics of consumed oil and gas resources.

Firstly, there is a clear trend of changing the place of developing countries in the structure of energy consumption due to oil and gas. This idea can be traced in the study by Andrea Gatto, who analyzed the world development indicators of the World Bank (WDI), The Freedom House on the example of 37 oil-producing developing countries and countries with economies in transition for the period from 1989 to 2019 [1].

Secondly, the transformation of the global energy system poses critical questions for many of the largest oil and gas producing countries. International climate policy and advances in low-carbon technologies can indeed exert sustained pressure on development models that rely heavily on hydrocarbon revenues. This trend is noted by Simone Tagliapietra for the countries of the Middle East and North Africa [2].

Thirdly, there is a state of shock in the world oil market (Mohammed Naif Alotaibi) [3]. Zekeriya Yildirim and Arif Arifli proved that a negative oil price shock worsens the trade balance, causes currency depreciation, increases inflation and reduces economic activity [4]. Sławomir Śmiech, Monika Papież, Michał Rubaszek, Małgorzata Śnarska showed in the study that shocks of uncertainty in oil prices lead to a persistent drop in industrial production, which is heterogeneous in its depth in all analyzed countries. This reaction will be prolonged only in the case of developing countries, Mexico and Russia [5].

A similar study was conducted by Russian and Greek experts and proved that positive oil price shocks had a statistically significant impact on almost all types of economic activity in Russia (Svetlana Balashova and Apostolos Serletis) [6].

Fourthly, in modern conditions, the struggle between MNCs and NOC in the oil and gas market has intensified. Europe and North America are the most active regions of cross-border mergers and acquisitions in the oil and gas sector. The most active participants include the USA and Canada in North America, as well as the United Kingdom, the Netherlands, France, Switzerland and Russia in Europe (Yue Guo, Yu Yang, Chang Wang) [7].

Fifthly, the current forecast of the development of global and national companies in the oil and gas sector indicates the need to switch to a policy of energy efficiency at the global and national levels (Marina Yesica Recalde) [8]. Some researchers (Longxin M. U., Zhifeng J. I.) talk about the need to develop constantly traditional ground-based methods of oil and gas exploration for foreign exploration and to support them at the advanced international level [9].

Thus, the analysis of the literature allowed not only to identify current trends in the world oil and gas market, but also to find out that the activities of Russian oil and gas companies are poorly represented in the studies of foreign specialists.

2 Materials and methods

The source materials were statistical data from the Center for Macroeconomic Analysis and Short-term Forecasting, the Ministry of Economic Development of Russia, the Analytical Center under the Government of the Russian Federation, world rating reports. Secondary data sources are presented by the World Bank data [10] (World Development Indicators Database), the Eurostat-OECD PPP Program [11], the CPIA database [12]. Standard methods of statistical data processing with their subsequent analytical substantiation were used.
3 Results and Discussion

The Russian oil and gas sector is represented by various large financial and industrial groups and small oil groups, each of which has its own dynamics of development under the influence of global and regional trends in this area of energy consumption.

About 550 million tons of oil are produced annually in the Russian Federation, and immediately almost half of the oil produced is processed. Russia confidently holds the leading second place in terms of oil production after Saudi Arabia. This situation was largely facilitated by the US sanctions policy against Iran and Venezuela, which led to an increase in crude oil supplies by 3.8% in January – November, 2019. Such data is provided by the Federal Customs Service of the Russian Federation. Since 2018, the fuel and energy complex of Russia has demonstrated positive production and export dynamics. For comparison, in 2018, Russia exported 260.2 million tons of crude oil, which was 2.9% or 7.4 million tons more compared to 2017.

The main buyers of energy from Russia are such countries as the Netherlands, China, Germany, South Korea, Poland, Japan, Italy, Belarus, Turkey, Finland. According to the Ministry of Economic Development of the Russian Federation, Turkey showed an increase in oil imports from Russia. Thus, in 2019, in comparison with the same period of 2018, the export of Russian crude oil to Turkey increased 4.5 times, as a number of Turkish refineries changed their orientation from Western supplies to Russian raw materials [13].

“Lukoil”, which produces 2.2% of the world's oil, stands out favorably among domestic oil exporters. The share of this company in Russia accounts for 16.6% of all oil production [14]. “Tatneft” accounts for 8% of all oil production in Russia and 80% in Tatarstan.

“Sibur Holding” is less well-known, but no less significant in the gas and oil industry of Russia. One of the largest Russian holdings controlling 96% of the oil and gas processing industry is the “TAIF” Group of companies.

In addition to large companies, small oil companies occupy a significant place in the extraction and production of oil and petroleum products. There are about 160 of them, but all together they develop and produce oil at 160 fields in 23 regions of the Russian Federation [15]. These are well-known companies “Sibur Energy” PLC, “Urals Energy”, “Lundin Petroleum” and others. Geographically, these companies are based on the territory of Bashkortostan, Tatarstan.

Global trends in the oil and gas sector are characterized by a reaction to crises, changes in the price of an oil barrel, and a decline in production over the years from 2008 to 2019. Russian companies showed a different trend. A. Bondar in his research notes that Russia has strengthened its position in the global oil market [16]. But R. Ivanov believes that not everything is so optimistic for our country, considering that Russia is far from leading positions in the world oil market [17].

In 2020, there was a rollback to the volumes of oil production and sales in 2017-208. The losses of the oil and gas sector amounted to 50-60% of revenue from hydrocarbon exports and more than 50% of its capitalization [18].

Experts cite data on losses in the field of capitalization - over 5 trillion rubles or about $70 billion. If we compare quotes above $75 per barrel in April 2019, in 2020 they fell below $16 a year later due to a drop-in energy consumption [19]. “Rosneft” in the first half of 2020 had a loss of 113 billion rubles, “Lukoil” - a loss of 64.7 billion rubles, “Gazprom” net profit fell 25 times, falling to 33 billion rubles. Experts believe that 2020 was the worst year for the Russian oil and gas sector.
4 Discussion

New technologies and communication capabilities, among other things, change the place of an employee in production, including oil and gas production. The introduction of information technology leads to human participation reduction in production processes, and in fact we get qualified employees engaged in remote monitoring and parameter setting. In turn, the development of mobile applications allows us to talk about future changes in the very principle of decision-making: the main role will be played by the opinion of not one specialized worker, but a multidisciplinary expert community.

Despite some progress by Russian companies in introducing new technologies into the extraction and production of oil and gas, in general, the domestic oil and gas industries do not have full-fledged platforms for joint cooperation with other global companies using the latest IT technologies, but there are certain shifts in this direction. For example, “Gazprom” has created a Competence Center, which includes geologists, developers, seismologists from the Scientific and Technical Center, the Corporate Center and its subsidiaries [18].

For the first time on the basis of this Center the work began on the “GeoMate” platform (an information system), developed with the participation of experts of the STC “Gazprom” and IT specialists of the company. However, today “Gazprom” is just beginning to master all the possibilities of modern information technologies.

“VTB Capital” analysts estimated a decrease in EBITDA of the largest Russian oil companies in 2021 to $39 billion, although previously their forecast in January 2020 had fluctuated within $ 66 billion. Analysts of the “Investment Bank” marked that the Russian oil sector lost $24 billion in EBITDA in 2020 and $12 billion in 2021.

We should also not forget about the losses from the narrowing of the cream spreads for petroleum products in Europe. According to this indicator, “VTB Capital” experts estimated the losses of Russian oil companies at $2 billion EBITDA in 2020 and $4 billion in 2021. The international rating agency Moody's expresses its hope for the stabilization of prices per barrel of oil, which will lead to a halt in the unprofitable activities of the Russian oil and gas complexes [19].

Gas prices have been showing negative dynamics since November 2019, in March 2020 a cubic meter of gas fell in price by almost half from $0.29 to $0.15. IEA experts noted that the planned underconsumption of gas had amounted to 150 billion cubic meters in 2020, that is, 4% of world production. Previously, such indicators have never been recorded for this industry. Analysts of the Ministry of Energy of the Russian Federation expect a recovery in global gas demand in the near future [18].

![Fig. 1. Europe oil and gas infrastructure market, by category, 2021-2032 (USD Billion)](https://example.com)
Despite the negative global trends for Russian oil and gas companies, the share of imports in this area remains high, especially in the field of innovative technologies that have found application when working with hard-to-recover reserves, hydraulic fracturing and directly offshore production. Despite the signed agreement with OPEC+, no one is going to stop oil and gas production, and it is impossible, but what both experts and company owners agree on is the need to modernize the industry. It is necessary to pay more attention to the development of small deposits and deposits with hard-to-recover reserves, which in the end can bring significant profits: up to 30 - 35 billion rubles and more than 100 million tons of extracted oil [15].

By modernization of the industry, experts understand the introduction of information technologies and automation of oil refining processes, the use of mathematical models to predict the quality of oil and gas production solely on the basis of laboratory tests and indicators.

The relevant areas in this field are the creation of models and experimental studies of processes occurring in the natural environment, the development of software for processing and interpretation of geological and geophysical data, and so on. These developments will help in obtaining virtual images of production facilities, which will speed up the process of creating new types of equipment, design and construction.

Innovative technologies have penetrated into the oil and gas industry, which have affected both the production and sales of energy carriers. Analysts have proved the need to use monitoring technologies for both downhole equipment and ground infrastructure facilities. The ability to watch the results of monitoring in real time allows you to respond in a timely manner to all kinds of technological changes that may lead to accidents, failures.

Today the oil and gas industries have set the task of a technological breakthrough associated with the introduction of productivity enhancement technologies through 3D/4D geomechanical and physico-chemical modelling. Among large companies, such as “Rosneft”, the target strategy for 2024 states that in order to achieve the set goals to increase productivity, it is necessary to apply digital technologies and new industrial standards. In order to navigate this problematic field better, “Rosneft” has signed an agreement with “General Electric” on its intentions to create an enterprise introducing new technologies for optimization, data collection, processing and analysis.

5 Conclusion

The last years turned out to be one of the most difficult years for the oil and gas industry of the Russian Federation. The decline in oil production by 8% looked almost catastrophic over the past eight years. All this happened against the background of the deteriorating situation on the global gas market, where gas production similarly decreased by 8%. Unfortunately, the export of energy resources under the “Power of Siberia” project to China also lags behind the planned indicators.

The improved environmental situation in a number of regions of the world due to the pandemic stimulates the process of electric mobility. For TNCs that are net importers of oil from the European Union, Japan, and Korea, this is a potential source of economic growth. European majors – “BP”, “Equinor”, “Shell”, “Total” – have set goals for decarbonization, turning from oil and gas into diversified energy companies.

Today Russian companies are in a rather difficult situation, which, on the one hand, is due to the need to search for new deposits and new ways of processing raw materials to achieve a more competitive status; on the other hand, companies must understand the further directions of their development associated with the introduction of new digital technologies.
Russian oil and gas companies need to turn to the experience of foreign companies. The largest oil and gas companies are actively acquiring startups in the field of artificial intelligence. For example, “GE” and “Statoil” jointly invested in “Ambyint”. “Saudi Aramco” has invested in “Earth Science Analytics”, a startup developing the next generation of artificial intelligence software for oil and gas science. “BP” has invested in “Belmont Technology”, a startup seeking to expand the company's artificial intelligence and digital capabilities in its offshore exploration business. “Shell”, “Saudi Aramco” and “Chevron” jointly invested in the artificial intelligence startup “Maana”, which partnered with “Microsoft” to use its “Azure” cloud computing platform.

Thus, the oil and gas companies of the Russian Federation should, on the one hand, rethink the strategies of cooperation and interaction, on the other hand, switch to an ecosystem approach in production. As for the energy sector, with the help of innovative technologies, it is possible to achieve highly efficient, energy-efficient, resource-saving and geoecological production. This policy entails the search for new oil and gas fields, which will subsequently lead to an increase in the recovery rate of reserves, will be reflected in the depth of processing of raw materials, naturally will lead to a reduction in losses not only during production, but also transportation.

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