

On February 17, 2014, the Russian Ministry of Energy presented a draft Energy Strategy of Russia until 2035. The central idea of this document is the transition from raw material-exporting to resource-innovative development, whose necessity was justified by the authors of this article. The resource-innovative strategy of Russia's economic development envisages the use of domestic and innovative potentials by forming long process flows and saturating them with new scientific, engineering, and technological improvements. The basis for this strategy is innovative, often breakthrough, technologies, particularly in the oil-and-gas complex, created by scientists of the Russian Academy of Sciences. This article asserts that, with the necessary base and maximal and fast financial returns, the oil-and-gas complex can provide investment support for innovative processes first in related and then in other sectors of the economy. As a result, conditions will be created for the reindustrialization of Russia's economy and for the country's transition to the sixth technological mode.

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Resource-Innovative Strategy of Russia's Economic Development

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Analysis of Russia's recent socioeconomic development shows vividly that the opportunities of the post-transformational restoration growth model, which has been in effect since 1999, have been fully depleted, as have those of the raw-material model of the economy, which has already become traditional for Russia. The slowdown that started in mid-2012 has turned into sharp deceleration, and in 2013 the growth of the Russian economy practically stopped.

The Russian Ministry of Economic Development had long been unable to come to terms with this trend, passing off "attractive," as far as it was possible, forecasts, and then reconsidering them toward the reduction of GDP growth rates. This procedure was repeated more than once. Thus, in December 2012, the estimated GDP growth for 2013 was reduced from 3.7 to 3.6% [1]; in April 2013, to 2.4%; in September, to 1.8% [2]; and in December, to 1.4% [3]. Only the prediction of Minister of Economic Development A.V. Ulyukaev came true: "in 2014 stagnation in the economy will continue, and the continuation of stagnation will be accompanied by a high inflation and the further weakening of the ruble rate" [2].

The Russian government started to find ways and methods of shifting from the raw-material model of the economy to innovative and socially oriented economic development back in the mid-2000s, providing a sustainable increase in people's well-being and national security, as well as strengthening the country's positions in the global community. The first result of

this work was the Concept of the Long-Term Socioeconomic Development of the Russian Federation until 2020, approved by the instruction of the Russian Government of November 17, 2008, no. 1662-r. It noted that, over the period under consideration, Russia would not only remain the world's leader in the energy sector and in the production and processing of raw materials but would also create a competitive economy of knowledge and high technologies thanks to the transition from raw-material exports to innovative and socially oriented development. This would allow the Russian economy to expand sharply its competitive potential by building up its advantages in science, education, and high technologies and employing new sources of economic growth and welfare gain [4].

Such ambitious objectives were also put forth in other documents: Russia's Energy Strategy until 2030, approved on November 13, 2009, by instruction no. 1715-r (ES-2030) of the Russian Government; the Scenario Conditions of the Long-Term Forecast of the Socioeconomic Development of the Russian Federation until 2030 (the Russian Ministry of Economic Development, April 2012); the Forecast of the Long-Term Socioeconomic Development of the Russian Federation until 2030 (the Russian Ministry of Economic Development, March 2013); and in the President's Letters to Russia's Federal Assembly. True, the predicted indicators were reduced in practically every consecutive document.

Simply speaking, the achievement of the target goals was frustrated by the global financial-economic crisis, the recession in the EU countries, and other similar circumstances. However, a deeper analysis indicates that many of the declared goals and objectives are nothing but slogans, weakly supported (or unsupported altogether) by finances and institutional reforms. Simultaneously, Russia's scientific

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community and business representatives started to seek an acceptable way out of the existing situation, generated not so much by the dissatisfaction with the current state of affairs as by the subsequent prospects for the country's socioeconomic development. In particular, as an alternative for Russia's economic growth exclusively through raw-material exports, an *export-science intensive strategy* was proposed, based on the parallel development of the oil-and-gas complex and the export of products of the defense-industrial complex, nanotechnologies, and several other high-tech industries. A stake was placed on increasing the export volumes of science-intensive products to international markets to substitute for the expected decrease in the sales of primary resources and energy sources.

Understanding that the gap separating Russia from highly developed states cannot be jumped over in two leaps and that an innovative economy based on nano-, bio-, information, cognitive, and other similar technologies would not emerge by itself, the scientists and specialists of the RAS and other scientific organizations started to seek the option of economic development that, preserving the advantages of the innovative scenario in the interpretation of the Russian Ministry of Economic Development, would rest on a strong basis, in our case, on natural resources and the industrial-technological potential of the country's fuel-and-energy and raw-material complexes [5]. The working group of RAS scientists, specially created in the mid-2000s (headed by Academician A.D. Nekipelov, Academician V.V. Ivanter, and N.I. Komkov, Dr. Sci. (Eng.)), prepared 12 options of the technological development of the Russian economy. In investigating these options, the associates of the RAS Institute of Oil and Gas Problems came to the conclusion that the only opportunity to meet the target goals was practically a *resource-innovative strategy* that would make it possible to unite the use of the country's richest natural resources and the latest technologies primarily in the resource-producing and resource-processing industries themselves.

The *resource-innovative strategy* is based on the use of the potential of resource-producing industries, domestic science, innovations, and new technologies and primarily implies the accelerated growth of processing industries. This serves as the basis for further development of the complex of processing industries, increasing the scale of end-product output and of production infrastructure restoration. Thus, the named strategy rests on the coordinated and full use of the domestic resource and innovative potentials by forming and supporting long process flows. This implies a shift of priorities from resource extraction to resource high-level processing, saturating the processing and manufacturing industries with innovative and science-intensive technologies, reorienting part of the primary resources in the manufacturing complex to their additional production, and, primarily, entering the global market with new gas-and-

petrochemical products made using high process stages of the unique hydrocarbon resources of the Eastern Siberian deposits. The development of matrix oil resources and their processing will allow us to produce rare and rare-earth metals, new generations of composite materials, catalysts, nanomaterials, and carbon fiber and supply the world market with new hard-to-find products [6–9]. The essence of the proposed strategy is the unification of the scientific and productive potentials.

Few people doubt the necessity to abandon the export-raw material model and to transfer to the innovative and socially oriented type of economic development with simultaneous modernization of the traditional sectors of the Russian economy (oil-and-gas, raw-material, agrarian, and transporting), which will remain the leading sectors in ensuring GDP production in the next decade. There are many more people who doubt the necessity to strengthen the potential of the Russian oil-and-gas complex (OGC) and its technological renovation, including the resource base and the energy infrastructure.

In any case, the issue at stake is *how* to ensure such a transition, taking into account not only the state of the country's economy and energy generation but also the totality of Russia's external threats and challenges. New long-term systemic challenges, including those in the energy sphere, are those external conditions for Russia in which any chosen (or imposed on the country) scenario of its socioeconomic development will be implemented. Such a transition is still more urgent since the decisive trend in developed countries has become the formation of a new technological base of the economy, centered on the use of the latest achievements in biotechnology, informatics, and nanotechnology, which may significantly reduce the need for primary energy resources.

The resource-innovative strategy creates additional internal demand, including that for the products of the defense-industrial complex and for research at all stages of the production chain. Unlike a strategy oriented at a limited circle of high-tech clusters, it ensures multiplicative economic growth thanks to the dissemination of innovations inside the country, the modernization of the existing technologies, and the restructuring of the processing and manufacturing industries. Moreover, this strategy does not oppose resources and innovations on the “or-or” principle but unites them, multiplying the opportunities of both.¹

¹ The state should support innovative processes. According to the assessment of I.D. Grachev, chair of the Energy Committee of the Russian State Duma, “the innovative component in Russia has no strategic support at least because a basic law on innovation activity has not been passed in principle. Individual projects, like Skolkovo, are being made, and special tax packages are issued for them. It would be more logical to adopt a basic law on innovative activity and then a package of tax and other preferences” [10].

We stress that the entering of an innovative road of development does not mean the rejection of the export of primary energy resources. The traditional export will continue to develop in line with the world market requirements, and the export of petrochemical products will improve flexibility, as well as the export structure, and increase budget revenues.

In our opinion, the resource-innovative strategy is able to oppose internal and external threats. The basis of the strategy is the reliance on Russia's natural advantages—the nature-gifted resources and intellectual potential of the Russian scientific and engineering communities. We have to learn to use natural riches efficiently, like the United States (oil, gas, coal, and grain), Norway (oil and gas), Finland (forest resources), Canada (oil and gas), and Australia (oil, gas, and solid mineral deposits). We should not complain about Russia's resource curse, but we should back away from a purely raw-material economy, deriving the maximum gain from the increasingly higher process stages of oil-and-gas products and from creating goods that are based on a new variety of hydrocarbon resources and that are hard to find in the world market.

Resources, particularly the mineral base of the oil-and-gas complex, are a natural competitive advantage of the national economy, or a donor of the Russian economy, that ensures the transition to a new technological mode. The inability to understand that and the opposition of oil and gas (and the resource industries in general) to innovations, bracing such actions with calls to “come off the oil-and-gas needle,” “overcome the resource curse,” etc., in our opinion, are absolutely inadmissible.² Relying on its natural competitive advantage, Russia must manage to carry out the relevant reforms to create a competitive economy of knowledge and high technologies in the country [5]. This point of view is shared by many specialists. Thus, A.A. Konoplyanik notes that the availability of oil-and-gas resources is not only a curse but also a blessing if we use them correctly; i.e., the problem is not in the presence of resources but in the efficiency of their development and in the use of incomes from them [12].

Innovative processes in the oil-and-gas complex will ensure significant financial receipts, which can be channeled to develop transport and infrastructure, as well as for industrial and residential construction. Income growth from extending employment will raise demand and trigger the increased production of consumer goods. The gross production growth will expand

² Unfortunately, such opposition has encountered wide recognition both in society and in certain circles of the country's leadership. This is indicated by the approval on August 28, 2012, by the chair of the Russian Government's instruction no. DM-P8-5060 of a list of 25 innovative territorial clusters in which there are none to specialize in hydrocarbon extraction and only three are to specialize in oil-and-gas processing and oil-and-gas chemistry [11].

the taxable base, making it possible to increase government expenditures on science, the social sphere, and the country's defense. A powerful internal demand will be a precondition for the higher-than-anticipated growth of the consumption of science-intensive and new products, including those manufactured by the defense-industrial complex. The implementation of the resource-innovative strategy will

- intensify the innovative and investment activities of enterprises and increase the financial returns on the implementation of new innovation projects in the oil-and-gas sector, which will accelerate innovative processes in other sectors of the economy;
- reduce disproportions between sectors and improve the general technological level of the country's economy; and
- increase the share of domestic products with high values added in the gross output and export structure, positively affecting the living standards.

The key role in the implementation of the resource-innovative strategy belongs to the country's fuel-and-energy complex (FEC), especially the oil-and-gas complex. This is particularly shown by research conducted at the Institute of Energy Strategy [13, 14].

As is known, the OGC is a donor of the Russian economy. Over the past years of the 21st century alone, it has provided more than \$2.3 trillion rubles of receipts to the federal budget, helping to solve social problems and overcome the attacks of the global financial crisis, but introducing practically no changes in the implementation of innovative processes. The attempts to modernize the economy, which started in 2010, failed. The resource-innovative strategy envisages a radical change in the situation. The OGC's investment opportunities will help ensure the implementation of social programs and structural projects, as well as the development of innovative processes in the country [15].

However, resource-innovative projects are not only generators of the demand for innovations. No less important is their role in strengthening the state and in stimulating the development of new territories. First of all, we are speaking about creating a state-of-the-art production, transport, and social infrastructure, as well as new cities, new centers of economic development, and new points of economic growth in northern, eastern, and other poorly inhabited regions of Russia, which are so important for preserving the country's integrity.

Among the specific features of the resource-innovative economic model, we should refer to the following [7]:

- the naturalness of the proposed road to economic diversification, where investments and demand shift from the oil-and-gas complex to industries of higher process modes and the OGC is appended with new

domestic technologies. The government should efficiently support, utilize, and regulate these processes;

- the maximum interaction between various industries and complexes of the national economy and mutual support for investment and innovative processes, as well as the growth of opportunities for the formation of new sustainable regional and interindustry cooperative chains and integrated companies;

- the formation of sustainable labor demand and the creation of new jobs during industrial modernization; and

- increasing result predictability and reducing investment risks for domestic and foreign companies, as well as developing the real, and not declarative, “rules of the game” in the development of the domestic capital market.

However, the implementation of the resource-innovative strategy requires that the government accept not only the inevitability of the innovative development of the economy but also the necessity to form an innovatively active policy and the corresponding conditions in the country. The population and business must formulate a social order to the government, and the state must work out the necessary mechanism of its implementation. This unification of the potentials of the state and society, as well as those of science and industry, comprises the essence of the resource-innovative strategy of the development of the Russian economy [5].

The transition from export-raw material to resource-innovative development, which rests on the full use of the domestic resource and innovative potentials by forming long process flows and saturating them with innovative technologies, has become the central idea of the project Russia’s Energy Strategy until 2035 (ES-2035) [16]. Reorientation of the energy policy will allow us to put in command not the problem of a quantitative increase in volumetric indicators but that of qualitatively changing the structure of energy consumption; improving the level of energy services, technological energy saving, and modernization; deepening electrification; and developing oil-and-gas chemistry and other new industries [17]. Consequently, the goal of the strategy should be the creation of the country’s innovative and efficient energy sector for sustainable economic growth, for an improved quality of life, and for strengthening the country’s foreign economic positions.

The document also notes that resource-innovative development creates multipliers of economic growth thanks to the dissemination of innovations across the country, production modernization, and the restructuring of extracting and processing industries. It must be the result of *synergic interaction between the institutional environment, the infrastructure, and innovations* [16]. This *must be the result* bears the main accent in

the implementation of both ES-2035 and the very idea of the resource-innovative strategy of developing Russia’s economy.

To ensure the transition to the resource-innovative development of the economy, it is necessary to create efficient conditions for attracting financial resources to the implementation of innovative projects through tax exemptions and preferential loans, by including beneficial conditions for the concentration of resources in target science-and-technology areas and projects and by designing and developing complex technologies. Today, when a major problem is still the systemic underfunding of the country’s science-and-technology complex, this is especially necessary. We have to reject as soon as possible the “leftover principle” in the government financing of science, providing science with the status of a protected budget item, and to develop support mechanisms for organizations that accumulate and channel financial resources to highly risky innovation projects, as well as to create priority conditions for the formation of investment resources for the implementation of domestic technologies.

The accumulated load of social, economic, engineering, and environmental problems requires fundamentally new approaches to the functioning of the economy and society. However, political and state restructuring is not enough; we need another, different from the previous, orientation of the entire potential—natural, productive, and scientific-technological—toward the creation of spiritual and material values [9]. We should promptly begin those institutional reforms that were recently discussed by specialists, politicians, and broad layers of Russian society.³ The fair calls for innovations, modernization, and reindustrialization must be supported by specific large-scale actions, economically justified and financially secured.

With what should we begin? First of all, we should identify industries that are ready for the large-scale implementation of innovative processes. Most likely, these are the traditional leaders of the Russian economy: the FEC, space, and the defense industry. We should distinguish the FEC among them and especially the OGC, which has explicit advantages in implementing innovative transformations.

³ The main reform trends are presented, for example, in the Report of the Higher School of Economics to the XIV April International Scientific Conference on the Problems of the Development of the Economy and Society (Moscow, April 2–5, 2013). This is the implementation of the principles of the rule of law, the consistent cultivation of independent courts, the restructuring of relations between business and the entire block of law-enforcement and court bodies, which is necessary to improve trust between business and the state; the expansion of authorities of local self-government and the activation of civil society; the social block (pension reform, health care, education, the housing market); democratization and the creation of conditions for efficient political competition and periodical shift of power [19].

Russia's oil-and-gas complex still has the world's largest mineral resource base, a developed infrastructure, qualified engineering and technical personnel, and a unique innovative potential, and, importantly, it is characterized by massive, fast, and efficient returns on financial resources invested into it.

The resource-innovative strategy is primarily innovative technologies designed by RAS scientists and ready for implementation. However, such technologies remain unclaimed by the industries of our economy. Directive instructions do not work in market conditions. The oil-and-gas sector, which largely provides the budget with receipts, is facing a dangerous situation for the country's economy. We are threatened by the rapid depletion of the "active" reserves of light oil, whose share today exceeds 90% of the total Russian oil production. However, a decrease of 45–50 million tons in this reserve category is expected by 2020–2022. In addition, the share of difficult oil reserves is increasing; the producible oil index is decreasing; the oil-and-gas resources at depths down to 3.0 km are being largely depleted, and the epoch of giant deposits with unique oil and gas reserves, whose operation started in the 1960s and 1970s, is coming to its end.

The situation is seemingly desperate. However, this situation calls for energetic and efficient actions, and it has made the leadership of oil companies change their attitude to costly but very efficient innovation technologies. Therefore, today the OGC is one of the most open sectors to the implementation of innovative technologies, and the oilmen and gasmen themselves realized long ago the inevitability of processes related to reserve change and to the depletion of giant hydrocarbon deposits.

The RAS scientists foresaw changes in the structure of oil reserves and created innovative technologies ready for immediate implementation [18], which make possible the following:

- increase oil production in flooded fields that entered their late stage of development;⁴
- involve the hard-to-recover reserves and unconventional resources into intense development;
- settle the challenges of maximum recovery of low-pressure gas reserves, over 5 trillion cubic meters of which are found at the Urengoi, Medvezhy, and Yamburgsky fields;
- improve the efficiency of oil and gas field development in complex mining-and-geological and natural-climatic conditions;
- prolong the life of main oil and gas pipelines by 1.5 times; and

⁴ If 10000 wells are treated by the Temposcreen-Luxe technology, an additional 120 million tons of oil can be extracted by 2021.

- ensure the large-scale manufacture of new oil-and-gas chemical products scarce in the world market.

At the first stage of the resource-innovative strategy of economic development, it is necessary to ensure large-scale state support for the all-round implementation of innovative technologies in the OGC.

In 2013 the country's leadership made a decision to create oil-and-gas chemical clusters as part of the complex hydrocarbon deposits in Eastern Siberia, which would allow a sharp increase in the output of polymers and other valuable products. The discovery of one of the world's largest matrix oil deposits in Orenburg oblast creates prospects for the production and supply of unique products to the world market. These are primarily rare and rare-earth metals, as well as nanosorbents, nanotubes, hydrocarbon fiber, new-generation catalysts, and composite materials. The value of these products exceeds the value of the oil-and-gas raw materials by tens and hundreds of times.

Let us stress especially the necessity to improve the mechanisms of private-public partnership that are to ensure investment inflows from both oil-and-gas companies and the government. The economic effect from investments into the OGC, compared to other industries, is the fastest and largest. Thus, each ruble invested in the implementation of the Temposcreen-Luxe technology yields 58 rubles.

In general, innovative processes will provide an efficient modernization of Russian industry. They must determine the direction of modernization in each individual cluster and in each subindustry of the economy, where primarily enterprises that work for the implementation of innovative technologies should be modernized. These enterprises will manufacture new products and provide employment for 25 million highly skilled workers [19]. This approach will create conditions to restructure the country's industry and to transfer to the economy of the sixth technological mode. This is the essence and the main goal of the resource-innovative strategy of the development of the Russian economy.

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