Problems of innovative development of the fuel and energy industry in Russia

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Abstract. The fuel and energy industry in Russia is the basis for the functioning of the national economy, on the one hand, providing energy and energy resources for all types of economic activities, as well as for the nonmaterial sphere, on the other hand, forming the greater part of budget revenues from energy exports. In modern economic conditions, and also taking into account the stage of the economic cycle, these problems can be solved through innovations. The prerequisites for the implementation of innovative activities in the fuel and energy industry in Russia are considered. The authors described the level of innovative development at the enterprises of fuel and energy sector giving reasons for its relatively low importance. Based on the technical and economic characteristics of the products and production processes of the companies of the fuel and energy industry, specific features of the organization and implementation of innovative activities in it are determined. Studying the experience of implementing innovative ideas in the Russian fuel and energy sector allowed the factors hampering the success in this direction to be formulated. To implement innovation activities effectively in the Russian fuel and energy industry, it is necessary to carry out a number of transformations both at the level of industries and in individual enterprises in order to reduce the negative impact of the identified factors.

1. Introduction

The Russian fuel and energy industry is currently in stagnation. In order to overstep this period we need to create incentives for the development of the national economy. The worsening conditions at the external markets, which negatively affect the volumes of Russian energy exports due to the combination of factors, including the reduction in demand with the slowdown in the growth of the world economy and the economies of the largest consumers of fuel and energy resources (FER), are negatively affect the development of the fuel and energy industry (FEI) [5].

In addition, there is an increase in the supply of FER from other countries, which also worsens the competitive position of Russian energy resources.

2. Methods of research

Given the conditions that prevailed in 2016, the main challenges for the sustainability of Russia's energy industry and ensuring the FEI growth were formed on the basis of the following factors:

- Preservation of technological and financial sanctions of Western states;
- Domestic demand for energy, associated with low expected growth rates of Russian GDP;
• Lack of free or credit funds available for investment projects with long payback periods;
• Depreciation of fixed assets of FEI enterprises and increase in the probability of accidents.

The financial and technological sanctions adopted by the countries of the European Union, the United States and other countries manifested themselves among others in closure of the European capital market for commercial companies and state financial institutions of the Russian Federation, which led to the unstable situation in FEI. Especially these sanctions negatively affected the technical and technological support of FEI.

3. Results and discussions

As the analysis of exports of different types FER shows, the most sensitive to changes in the external market conditions is the export of gas, the volumes of which may drop by 20% by the year 2025. The volume of coal exports is also quite sensitive (decrease by 13-17% by the year 2025). The dynamics of exports of oil and oil products is controversial: if in the mild scenario a small (about 3.5%) growth in volumes of export is expected by 2035, then in the pessimistic scenario they fall by 16%.[9]

Alongside with the reduction in domestic demand for FER, this challenge is also connected with the tightening of the maximum requirements for investment and price load on the part of FEI, the risks of reducing the opportunities and profitability of investments in the energy sector in Russia.

The situation in the economy in 2016-2017 was formed under the impact of the complication of external economic situations, primarily the oil price fall, the extension of economic sanctions by the EU and the USA, and a stable tendency to investment activity reduction. At the same time, as the calculations show, in general, the situation in the energy sector of the Russian Federation in 2016-2017 can be characterized as stable.

Despite the decline in the average annual prices for URALS crude oil, the amount of oil produced with gas condensate increased by 2.5% compared to 2015, coal production – by 3.1%, electricity generation increased by 2.1%, gas production – by 0.7%. In 2016, the Russian export of energy resources increased by 1.5% compared to 2015, including oil – by 4.2%, natural gas – by 6.7%, coal – by 8.8%. As a result, there was a tendency to stabilization of the ruble exchange rate with its lower dependence on world oil prices. Ruble in 2016 strengthened against the dollar by more than 16% [10, 11, 12].

In 2016, the coal mining enterprises of Russia produced 385.7 million tonnes (+3.1% to 2015) [12]. At the same time, according to the Federal Agency for Subsoil Use “Rosnedra”, in 2016 the balance reserves of coal increased by 1238.5 million tonnes [12]. Taking into account the facts discussed above, as well as the growth of total coal supplies by 11.5% in relation to 2015, the situation in the reporting period was positive. The coal industry was characterized by challenges associated with the continued fall in investment in the industry and caused by the uncertain development of the external and domestic markets for coal products. At the same time, the coal industry was much less exposed to threats related to dependence on imported equipment, which was due to the high degree of diversification of supplies. [3]

The total supply of Russian coal in 2016 amounted to 338.2 million tonnes (101.6% by 2015). Volumes of coal supply to the domestic market amounted to 168.6 million tonnes instead of 178.0 million tonnes planned for 2016 (95.6 percent by 2015), including 86.7 million tonnes for the needs of the electric power industry (92.5%); for coking – 39.9 million tonnes (99.2%); residential energy consumption and agroindustrial complex – 20.3 million tonnes (86.8%) [12]. The decrease in the amount of coal shipped to the domestic market was due to the evolving demand in coal. The obstacle for the development of domestic coal market was the macroeconomic situation in the country and the world, the transition of generating capacities to gas fuel and the continued implementation of gasification programs of the regions in housing and communal sector. [8]

It should be noted that, given the domestic energy market demand for coal products, the Russian coal industry fully provides consumers with coal in the domestic market.
The main challenge that determines the technogenic and natural threats affecting the fuel and energy complex in Russia is the high level of wear and tear on the majority of production assets in the FEI.

In 2016, according to the data of Situational and Analytical Centre of the Ministry of Energy of the Russian Federation 41 accidents (incident) were registered at the coal industry enterprises which is 41% lower than in 2015, among them 8 major accidents (the same in 2015), including: 6 accidents (87.5%) – in the mines; 2 accidents (12.5%) – on the open pit mines. [11, 12]

Causes of accident in 2016 were: explosion of gas and coal dust – 4 accidents (in 2015 there were no accidents); fires – 1 accident (by 4 accidents fewer than in 2015); flooding of mine workings, water or clay breakthrough – 1 accident (in 2015 1 accident); rock or support collapse – 1 accident (1 accident fewer than in 2015); other types (fall of the excavator) – 1 accident (in 2015 there were no accidents) [11, 12].

According to the updated information of Rostekhnadzor, 56 people got fatal injuries at the enterprises of the industry in 2016 (by 36 people more than in 2015) [11, 12].

In 2016, specific fatal injuries amounted to 0.145 cases per million tonne of production (0.05 per million tonne of production in 2015), including: 54 people (over 96%) got fatal injuries under the ground (+ 41 to 2015); at the open-pit mines – 2 people (less than 4%), (by 5 fewer in comparison with 2015) [11, 12].

A sharp increase in deaths is associated with the technogenic accident that occurred on February 25, 2016 at the mine “Severnaya” of JSC “Vorkutagol”, when as a result of the explosion of methane and coal dust 30 miners were killed. Assessing the state of energy safety in respect to man-caused and natural challenges, it should be noted that due to the high level of physical deterioration of fixed assets in the field of coal mining and non-compliance with safety rules in mining operations, which led to an increase in accidents in 2016 in comparison with 2015, including accidents with fatal accidents, safety measures of conducting mining operations were strengthened at the mines and open-pit mines.

In 2016, all enterprises of coal industry of the Russian Federation transited to the elements of a multifunctional safety system, namely: determination of the personnel location in mine workings by the system, the systems of air-gas monitoring, search and detection of people in emergency situations.

At all mines and large open-pit mines, auxiliary mine rescue teams were created that included the workers of operating organizations.

To improve the energy security in relation to man-made and natural challenges, in the near future it is necessary to complete the modernization of FEI technological base. In the beginning, technological improvement of the existing production facilities will be carried out due to the limited investments. Then, their main transformation and formation of new production capacities will take place on the basis of domestic and foreign technologies that meet our requirements. To reduce and prevent the consequences of accidents, natural disasters and manifestations of natural anomalies, it is necessary to carry out work on improvement of quality of fuel and energy supply system of the country and its regions during emergencies. These works should be carried out in the following main areas: normative consolidation of the necessary volume of (estimated) sparing main and auxiliary equipment of heat supply sources and heat networks, as well as emergency stock of materials and spare parts, etc. [1, 2, 4, 6, 7]

Financial and technological sanctions on the part of the countries of the European Union, the United States and other countries negatively affected the work of coal industry enterprises. The analysis showed by 2016 that in the coal industry the share of mechanized support of foreign production used in coal mines reached almost 45%, coal-mining and tunneling combines 79% and 47%, respectively [11, 12].

In this regard, the Ministry of Industry and Trade of the Russian Federation adopted the import substitution program, the goal of which is to reduce this dependence to 43% by 2020.

Starting from 2014 there was a change in the dynamics of coal consumption, it began to decline leading to the reduction in production [8]. At the same time, the main consumer of coal is China (about 50% of world consumption), therefore, the development strategy of its economy significantly
influences the dynamics of world prices for coal. The main competitors in this market for Russia are China, the USA, India, Australia and Indonesia. The main risk of market development is the global environmental initiatives for the decarbonization of economies, limiting production and import of products characterized by a significant “carbon footprint”.

4. Conclusions

Thus, in the next few years, the growth of world coal consumption is unlikely, at the same time the positive dynamics of coal prices is possible this year [8].

In 2016, the coal export from Russia amounted to 169.6 million tonnes (+ 7.8% by 2015), instead of 147 million tonnes provided by the plan for 2016. 82.5 million tonnes of coal were shipped in the Atlantic direction. Most of the exports in this direction (76% or 62.5 million tonnes) account for port shipment, including the Baltic ports (14.4 million tonnes). Through the border points 20 million tonnes are exported, mainly to the countries of Eastern Europe and the CIS [11, 12].

In the conditions of aggravation of a competition between the countries – exporters of coal production, the growth of Russian coal supplies for export is taking place, primarily to the countries of the Asia-Pacific region. The coal market supports demand in the industrial centers – Japan, South Korea, India, Vietnam and the Philippines. The main consumers of Russian coal in the Atlantic market are the countries of the European Union (54 million tonnes or 65.5% of the export volume in this direction and 32.7% of the total volume of Russian exports), the CIS countries that have concluded agreements with the EU (Moldova – 0.9 million tonnes), the Middle East (15 million tonnes), Africa (2.3 million tonnes) and South America (1.0 million tonnes) [11, 12].

The largest consumers of the Russian coal in Europe are the UK (10.7 million tonnes in 2016), Germany (8.6 million tonnes) and Poland (5.4 million tonnes) [12]. At the same time, there is an increase in world prices for coal, which improves the financial condition of coal companies. In 2016, the pre-tax profit in the industry amounted to 60 billion rubles, the share of unprofitable enterprises in total coal output reduced to 8%, debt on loans and credits decreased. An increase in the share of exports in the supply of coal products indicates the preservation of the positive dynamics of coal exports while ensuring the full demand for coal in all sectors of the Russian economy.

The factor, that has negatively affected the modern development of the coal industry, is the growth of transportation tariffs. The consequences of this factor are the complication of the conditions of competition in the external market and the deterioration of the economic situation of the Russian organizations.

Due to the growth in world prices for coal and the increase of share of coal export in 2016-2017 compared to 2015, the dynamics of the level of growth of this energy carrier is at a good level of the projected indicators for the country’s budget.

The modern innovative development of FEI in relation to foreign economic and foreign policy challenges is characterized by the fact that the development of the Russian economy will take place, at least in the next 2-3 years, in the conditions of continuing geopolitical instability, the continued imposition of economic and technological sanctions on Russia by the EU and the USA.

As a priority measure to ensure the FEI sustainability in the unstable macroeconomic situation, it is necessary to transit to a taxation system based on the financial result, improve the pricing system for electricity and natural gas on the domestic market, and implement mechanisms for eliminating non-payments. To minimize the sanctions risks, it is necessary to continue implementation of the policy of import substitution in FEI, including the expansion of state support measures for projects that aim to create domestic technologies, equipment and software for the needs of FEI. To attract investment into FEI, liberalization of investors involvement into large projects is necessary.

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