

Challenges and the Experience of Positive Solutions of the Industrial Ecology Problems

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Abstract— Ecology concerns everyone, and any positive changes in the matter of improving it require careful consideration and study. In 2017, two most important documents for the future development of the Russian Federation were approved by decrees of the President of the Russian Federation: the Strategy for the Environmental Safety of the Russian Federation for the period up to 2025 and the Strategy for the Economic Security of the Russian Federation for the period up to 2030. They should play great role for Russian development. Using the example of a Russian enterprise, the positive experience of applying modern environmental technologies, the so-called best available technologies, is examined in this article. Basing on the analysis of data on the environmental economy in the Russian Federation, it is concluded that a positive trend has been outlined in the country in solving the most acute environmental problems, such as limiting harmful emissions by industrial enterprises.

Keywords: *ecology, economics, best available technologies, industrial enterprises, positive experience*

I. INTRODUCTION

In the spring of 2017, two most important documents for the future development of the Russian Federation were approved by decrees of the President of the Russian Federation: The Strategy for the Environmental Safety of the Russian Federation for the period up to 2025 and the Strategy for the Economic Security of the Russian Federation for the period up to 2030. Of course, it is no coincidence that economic and environmental issues were raised at such a high level at the same time and transferred to the field of practical solutions to the problems of ensuring national security in general. In parallel, 2017 was declared the Year of Ecology in the Russian Federation, and in 2018 the passport of the Ecology national project was approved, which was developed by the Ministry of Natural Resources of Russia pursuant to Decree of the President of the Russian Federation of May 7, 2018 No. 204 “On National Goals and Strategic Tasks of the Development of the Russian Federation” for the period until 2024”.

II. RESEARCH RESULTS

Let us consider some aspects of the current state and development of the industrial ecological and economic system of Russia. It should be noted that our goal is to show the positive experience of practical solution of certain environmental problems by Russian industrial enterprises.

The “Strategy for the Economic Security of the Russian Federation for the Period until 2030” states that factors related to global climate change, which can cause food and fresh water shortages and increase competition for access to renewable resources, begin to significantly affect the state of economic security [1]. And the development of the so-called “green technologies” is related to the main modern challenges of economic security, respectively, the need to create conditions for the introduction of modern technologies and stimulate innovative development is indicated among the main directions of state policy in the field of economic security. This is directly related to the characterization of the environmental situation in the Russian Federation, which continues to be tense and without the use of modern advanced technologies, including the most accessible ones, it is hardly possible to solve many environmental problems.

Here are some figures that, to one degree or another, allow us to characterize the ecological situation in the Russian Federation, and we will pay more attention to precisely the problems that are global in nature and have a technogenic genesis. In Russia, a situation has developed where most of the country's population and its production capacities and the most productive agricultural land are located on 15% of the territory of the Russian Federation. These territories as a result of such an uneven distribution of people and resources are unfavorable for environmental parameters. This means that about 65% of the country's territory is practically not affected by economic activity and biological ecosystems are preserved on them. At the same time, about 75% of the Russian population living in cities is exposed to

significant negative environmental impacts, mainly as a result of the activities of industrial, transport and energy facilities. The most alarming situation with air pollution. 17.1 million people, i.e. 17% of the country's population lives in cities with high and very high levels of air pollution. According to statistics, the atmosphere annually receives more than 30 million tons of various pollutants. However, following the task of showing positive trends in solving environmental problems in our country, we note that recently the volume of harmful emissions has ceased to increase, and for some indicators there has even been a slight decrease (Fig. 1)

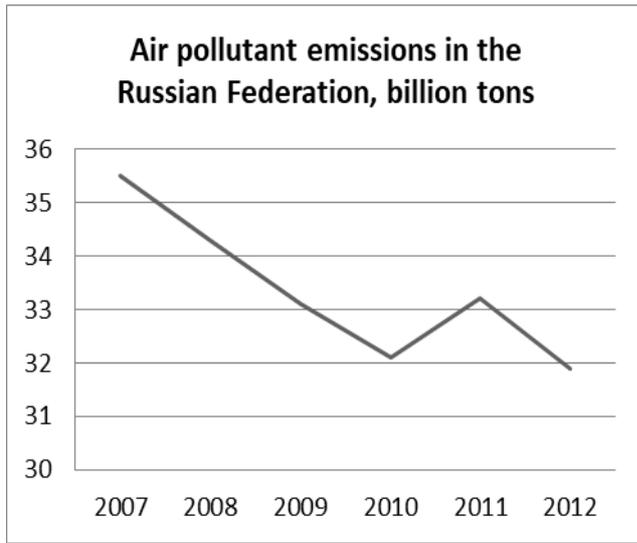


Fig. 1. Dynamics of pollutant emissions into the atmosphere of the Russian Federation, million tons

Water quality due to discharges of mainly industrial as well as domestic wastewater and water from agricultural land continues to be alarming, as 19% of these discharges do not undergo treatment at all, 70% are not sufficiently cleaned, and only 11% undergo cleaning in accordance with established norms and standards. As a result of this situation, 30-40% of the population of Russia are forced to use water that does not meet hygiene requirements. But it is necessary to point out some positive trend. Namely, according to the Ministry of Natural Resources of the Russian Federation over the past twelve years, emissions into water bodies on the territory of our country have decreased by 16% (Fig. 2), although, unfortunately, the increasing growth of nitrate emissions from 391 thousand remains. tons to over 420 tons over the past ten years.

Next, we dwell on the state of the soil. Today, about 75 million hectares of land in economic circulation can be classified as polluted, and more than 1 million hectares of land have lost their economic value or have a negative impact on the environment, desertification is observed on more than 100 million hectares more-less. But in this area, the environmental situation has, although not significant, but positive dynamics, the area of disturbed lands is very slowly decreasing.

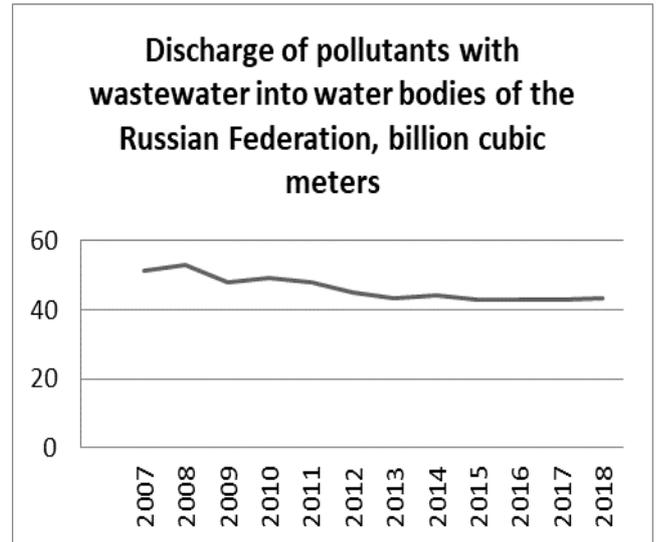


Fig. 2. Dynamics of pollutant emissions into the water bodies of the Russian Federation, billion cubic meters

The greatest concern today is the environmental situation associated with household and industrial waste. Serious measures are being taken today to change the current situation. On January 1, 2019, a number of legislative acts governing various aspects of the problems of household and industrial waste came into force. In the framework of this article, we dwell on those that are specifically related to industrial waste. So, environmental quality standards and environmental impact standards have undergone changes, respectively, the calculations of these standards and the rules for their development are determined. The procedure for obtaining a comprehensive environmental permit for business entities is defined, and new requirements are established for the design and construction of facilities that have a harmful effect.

New environmental requirements for industrial enterprises have been established, which were divided into 4 categories according to the degree of negative environmental impact and associated risks. The fundamental direction of the changes is to improve the interaction of the best available technologies (BAT) with the technologies of enterprises and the application of new state regulation based on the risk category of negative impacts on business entities depending on the level of danger of their activities on soil, air or water.

These changes cannot bring significant changes to the situation instantly, but for now, according to official statistics and data from the Ministry of Natural Resources of the Russian Federation, over the same past twelve years, the annual volume of waste generated has increased by almost a third (Fig. 3).

It is in the field of waste that domestic industrial enterprises have the most significant work to do. This is understandable since and the state of air, and water, and soil, is largely derived from the quantity and composition of the waste from the activities of enterprises and to what

extent they are subject to treatment or modern utilization and processing.

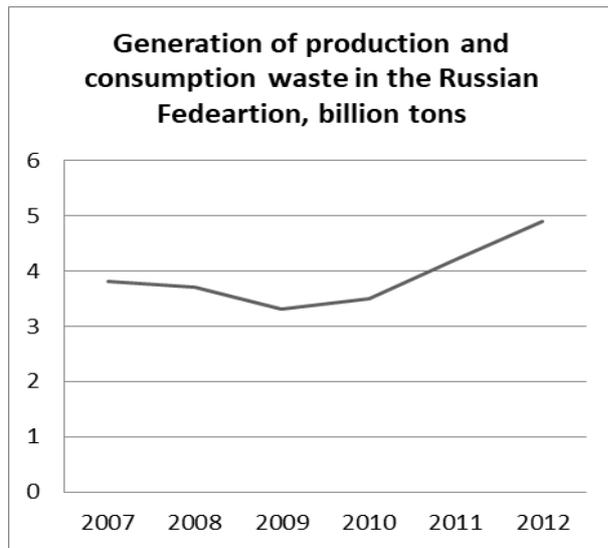


Fig. 3. Growth dynamics of production and consumption waste generation in the Russian Federation, billion tons

Despite the rather tense situation in the field of industrial ecology, it should be noted that the Russian Federation has significant positive potential and quite noticeable examples of the implementation of positive effective practices in environmental protection. In his speech on December 27, 2016 at a meeting of the State Council on the issue “On the environmental development of the Russian Federation in the interests of future generations”, President of the Russian Federation V.V. Putin cited the following impressive figures: Russia's losses from environmental degradation range from 4 to 6%, and taking into account losses from harm to the health of citizens of the country, this is all 15%. Despite the fact that in the Year of Ecology in 2017, 76.5 billion budget rubles were allocated for environmental protection in the Russian Federation, which is 17.1 billion more rubles compared to the previous year. The level of budget financing of environmental activities in our country is below the level of other developed countries. In Russia, it fluctuates around a mark of 1% of GDP, more often declining than rising. Not significantly, but still higher in the Netherlands -2.5%, in Austria - 1.9%, Germany, Poland, Slovakia - about 1.7%, the Czech Republic and Hungary - about 1.3% of GDP [2]. In 2019, in the direction of “Environmental Protection”, expenditures in the federal budget are planned in the amount of 187.6 billion rubles, which is 66% more than the expenses of the previous year, which amounted to 113.2 billion rubles, while in 2021 year, expenditures are planned at the level of 230.7 billion rubles. This means that over the next three years, federal spending on environmental activities will increase by more than 2 times [3].

In the same speech, V.V. Putin also noted Russia's gigantic resource potential, which is of planetary importance, because Russia has enormous reserves of fresh water, forest resources, huge biodiversity and acts as an environmental donor of the world, providing it with

almost 10 percent of biosphere sustainability. The challenge is to maximize the opportunities available, and for this it is necessary to rely on the good practice of those who have succeeded in environmental protection.

Ecological modernization of Russian enterprises is being carried out, inter alia, through the implementation of the best available technologies (BAT), while using the experience of European countries, where a similar implementation scheme has been implemented since the 70s of the last century. A few years ago, in the Russian Federation there was a legislative decision on the transition of Russian enterprises to the use of BAT. Today, this decision is moving into a practical plane; in 2019, the first 300 large domestic enterprises should switch to BAT.

An obstacle to the widespread adoption of modern environmental technologies is their high cost and the lack of ability of Russian enterprises to use advanced technologies in environmental protection. That is why so far we have to apply strict measures to control the implementation and use of the latest achievements. Moreover, in accordance with the requirements of recent times, automated systems for monitoring the environmental impact of enterprises should be introduced. So, in the automatic mode, operational data on emissions and discharges of harmful substances will be measured and transmitted in the report mode.

Of course, strict monitoring of environmental discipline is mandatory, but it would not be correct to rely only on the effectiveness of punishments in the form of significant penalties for detecting violations. Measures are needed to stimulate enterprises to introduce the latest environmental technologies; it is necessary to make such activities economically beneficial for business entities. Moreover, environmental friendliness of production should become one of the most important competitive advantages of those companies that are ready to take on the environmental responsibility of the manufacturer. In solving these difficult tasks, the growth of the general ecological culture of society as a whole should play a large role.

An example of successively following the strategy for introducing the latest environmental technologies is the only and northernmost pulp and paper mill in our Russian Arctic zone - the Arkhangelsk Pulp and Paper Mill, one of the leading wood chemical enterprises. The plant was founded in 1940, today the company's products are sold in 60 countries. The plant is a city-forming enterprise of the city of Novodvinsk. Formulating its mission and strategy, the company, among its other most important goals, also indicates increasing the environmental safety of production and reducing the negative impact on the environment. The current general director of Arkhangelsk PPM JSC Dmitry Zylev, in an interview with Expert magazine, stated that "for the Arkhangelsk PPM, ecology is a kind of passport of responsibility to society." [4]

The company approved the Development Strategy until 2025, under which more than 20 billion rubles will be invested in the development of production, and a

significant part of these funds will be spent on environmental activities. In accordance with the company's plans, the use of coal at the enterprise should be completely eliminated by 2025, and the switch to gas and renewable fuels should be carried out, the share of highly processed products should increase by more than 20%. The result of the implementation of what was planned at the enterprise should be a 50 percent reduction in water consumption, 65 percent reduction in pollutant emissions, 75 percent reduction in emissions to water bodies and a reduction of 18 thousand tons of greenhouse gas emissions.

To achieve such high values of environmental indicators allowed the systematic and consistent activities of the enterprise in the field of environmental protection. We list some of them:

- the implementation in 1998 of investments in the “dual-use” project for the reconstruction of production and the transition to a more complete and efficient use of available resources, which significantly reduced the formation of harmful emissions and discharges;
- consistent modernization of the enterprise and the priority implementation of BAT;
- an increase in funds invested in environmental protection measures, over the past 10 years they have reached 8 billion rubles;
- implementation of a multi-stage investment project to minimize the negative impact on the environment;
- since 2003, APPM was the first in the Russian Federation to make voluntary commitments to reduce greenhouse gases compared to the base year 1990 with an increase in production;
- in 2013, the climate strategy of the enterprise was developed and adopted for implementation until 2020;
- by 2017, a reduction of greenhouse gases by 41% compared to the base year 1990 was achieved;
- obtaining a certificate of compliance of the greenhouse gas emissions management system with the requirements of the international standard ISO 14064-1: 2006, the first among Russian companies;
- obtaining a high climate responsibility rating according to the CDP (The Carbon Disclosure Project - an international project for the disclosure of data on greenhouse gas emissions);
- implementation of a carbon footprint project in conjunction with CCGS;
- conducting for the first time in the Russian Federation field work to assess the possibilities and economic efficiency of using biofuels, in particular, using industrial landfill gas as a fuel, involving unique foreign most advanced technologies.

The plant justifiably considers its main achievement in the field of environmental protection to be the exclusion of the enterprise from the “hot spots” of the Council of the Barents Euro-Arctic Region (BEAC), in which the plant was included back in 1993. Today, the budget for environmental protection measures is 955.7 million rubles.

In July 2019, the RAEX agency identified leaders among Russian companies in terms of environmental protection spending. Arkhangelsk PPM took an honorable third place.

An example of the Arkhangelsk PPM clearly shows that only progressive and constant movement towards solving environmental problems by domestic industrial enterprises can give overall positive dynamics and can actually lead to positive shifts in the entire ecological and economic system of the country. Similar practice gives results. So according to VTSIOM data, there is a positive trend in assessing the environmental situation in our country - an increase from 39% in 2009 to 61% in 2018. Surveys conducted regularly among Russians showed that 21% of all respondents believed that today there are no environmental problems. Assessing the environmental situation in their city, 25% of Russians say about improving the state of the environment. An interesting fact is that only 6% of the inhabitants of our country consider industrial enterprises to be the main culprits of environmental problems. Responsibility for solving environmental issues lies with the state and municipal authorities, which should become the initiator, organizer, and controller of environmental activities, including those carried out by domestic industrial enterprises [5].

III. CONCLUSION

For our part, we believe that ecology concerns everyone, and any positive changes in the matter of improving it require careful consideration and study, in order to disseminate positive experience in environmental activities.

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