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PROBLEMS AND WAYS TO REDUCE HARM FROM COAL MINING IN RUSSIA

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Аннотация: Статья рассматривает последствия добычи угля для экологической ситуации в различных регионах Российской Федерации. Автор обращает внимание на то, что добыча угля занимает большую долю в ВВП страны, однако данное производство вредит экологии регионов с каждым годом все больше. Также в статье анализируются меры, предпринимаемые для смягчения последствий угледобычи. Говорится о том, что необходим комплексный подход к решению экологических проблем.

Ключевые слова: угледобыча, экология регионов, выбросы, природопользование, проблемы.

Abstract: The article examines the consequences of coal mining for the environmental situation in various regions of the Russian Federation. The author draws attention to the fact that coal mining accounts for a large share of the country's GDP, but this production harms the ecology of the regions more and more every year. The article also analyzes the measures taken to mitigate the effects of coal mining. It is said that a comprehensive approach to solving environmental problems is needed.

Keywords: coal mining, regional ecology, emissions, nature management, problems.

In the context of active economic growth, the coal industry continues to play a key role in the country's energy sector, but its impact on the environment is becoming increasingly noticeable.

The most significant consequences of coal mining are:

Air pollution is one of the most obvious problems, since dust, carbon dioxide, sulfur and nitrogen oxides are released into the atmosphere during the extraction and processing of coal. These emissions lead to deterioration of air quality and can cause respiratory diseases, allergies and cardiovascular diseases in the population living near coal mines and factories.

Water pollution - wastewater from coal mines often contains heavy metals and sulfur, which can pollute rivers and lakes. This process leads to deterioration in the quality of drinking water, disrupts the ecosystems of water bodies and threatens the life of fish and other aquatic organisms.

Landscape destruction - open-pit coal mining requires significant land areas and often leads to changes in the natural landscape. The destruction of mountain

ranges, excavation of land and the formation of quarries can negatively affect flora and fauna, and also lead to soil erosion.

Increased risk of natural disasters - intensive coal mining increases the risk of various natural disasters, such as rockfalls and mudflows. This is especially true in regions where underground mining is carried out, which can cause changes in the geological structure and negatively affect the stability of the area. In addition, disturbances in the ecosystem can lead to an increase in the number of forest fires and other disasters.

Social consequences - environmental problems caused by coal mining also have social consequences. Public health is at risk, which leads to an increased burden on the healthcare system. Local residents, often forced to leave their homes due to deteriorating living conditions, face problems of resettlement and loss of their usual way of life.

There have been several high-profile mining accidents over the past 3 years:

In 2021, a methane-air mixture exploded at the Listvyazhnaya mine in the Kemerovo Region, killing 51 people and injuring 12.

In 2022, a mine collapsed in the Rostov Region. As a result, miners were under the rubble at a depth of 550 m. The bridge over which coal was being transported from the drying building to a closed warehouse collapsed. There were no casualties.

Also in 2022, a 3.5 magnitude earthquake occurred in Yakutia,

According to the Ministry of Energy, accidents in the fuel and energy sector in the past three years have resulted not only from violations of safety regulations during equipment operation, but also from personnel errors, as well as a high level of wear and tear of facilities.

In 2023, Russia consumed 181.6 million tons of coal, and the population of Russia was 143.8 million tons in 2023. That is, on average, 1 Russian consumes about

1.26 million tons of coal per year.

Table 1 shows the amount of carbon dioxide emissions from burning 1 ton of coal.

Table 1 – Amount of CO₂ emissions into the atmosphere when burning 1 ton of fuel

| Fuel type | Emission volume CO ₂ , t |
|-----------------|-------------------------------------|
| Coal | 2,29 |
| Brown coal | 1,45 |
| Coal briquettes | 2,12 |

At the same time, aspen is the tree that consumes more carbon dioxide per year than others - up to 3.6 tons / ha. That is, to compensate for the coal mined by aspen,

million hectares of aspen should grow in Russia (currently, there are about 18 million hectares of aspen in the forests of Russia). Thus, the tree population is sig-

nificantly insufficient to absorb carbon dioxide and preserve the atmosphere, and it is necessary to introduce innovations to preserve the ecosystem of the regions.

Since 2021, a bill has been introduced to tighten liability for violating environmental standards during coal transshipment in ports. It is expected to introduce significant fines for failure to comply with orders to eliminate violations of the law.

In 2019, the federal project "Clean Air" was launched in 12 large industrial centers across the country. The largest number of potentially hazardous facilities are located in the Primorsky Territory, Kemerovo and Tula Regions, Perm Territory and the Komi Republic. The key objective of the project is to reduce the total volume of pollutant emissions by 2 million tons by 2026, which is more than 20%. These results are planned to be achieved through the modernization of industrial enterprises and existing boiler houses, the transfer of heating in private households from coal to more environmentally friendly fuel, and the launch of public transport on electricity and gas motor fuel.

For example, in the city of Vorkuta, a thermal power plant was converted from coal to natural gas, which resulted in a reduction in greenhouse gas emissions (by 50%) and pollutants (by 87%) from this enterprise in a year.

In general, decarbonization of the economy and the desire for carbon neutrality is one of Russia's goals until 2050. At the same time, it is planned to maintain sustainable economic growth.

Figure 1 shows the expected results of Russia's carbon neutrality strategy.

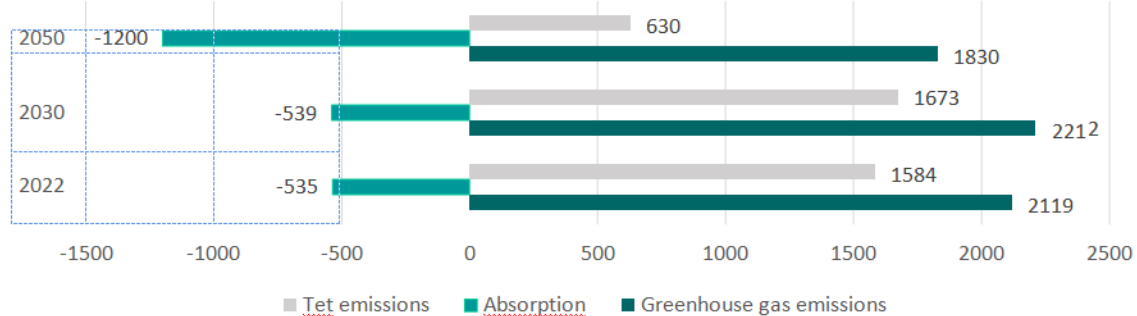


Figure 1 - Expected results of Russia's carbon neutrality strategy, million tons of CO₂

Thus, emissions from coal mining are expected to decrease by almost 3 times.

In addition to all of the above, almost all large Russian companies organize their production in accordance with the goals of sustainable development. One of them is "affordable and clean energy".

Thus, coal mining in Russia, although an important source of energy and income for the economy, carries a number of serious environmental and social consequences. To reduce the negative impact of coal mining on the environment, it is necessary to introduce more sustainable mining methods, as well as to intensify programs to restore previously affected ecosystems. Only by taking into account environmental factors can a balance be achieved between economic development and the preservation of natural heritage for future generations.

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