

THE MINING INDUSTRY AND THE RECYCLING OF RAW MATERIALS AS AN IMPORTANT ELEMENT OF THE BULGARIAN ECONOMY

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ABSTRACT. This publication examines and summarizes the significance of mining industry for the national economy. Here are presented the strengths and weaknesses of the mining industry in the country. The recycling of raw materials and industrial wastes is considered as a possible alternative and an important element of the mining industry and the economy of Bulgaria. Some conclusions about the recycling of raw materials and future development of the mining industry in the country are summarized.

Keywords: mining industry; recycling; alternatives; economy; future

ДОБИВНАТА ПРОМИШЛЕНОСТ И РЕЦИКЛИРАНЕТО НА СУРОВИНИ И МАТЕРИАЛИ КАТО ВАЖЕН ЕЛЕМЕНТ ОТ ИКОНОМИКАТА НА БЪЛГАРИЯ

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РЕЗЮМЕ. Настоящата публикация разглежда и обобщава значимостта на добивната промишленост за националната икономика. Представени са силните и слабите страни на минната индустрия в страната. Рециклирането на суровини, материали и минни отпадъци е разгледано като възможна алтернатива и като важен елемент от добивната промишленост и икономиката на България. Обобщени са някои изводи за бъдещото развитие на добивната промишленост и на рециклирането на суровини и материали в България.

Ключови думи: добивна промишленост; рециклиране отпадъци; алтернативи; икономика; бъдеще

Introduction

The mining industry is one of the oldest ones, it provides many of the constructive elements of the modern way of life in the developed countries. The ongoing demographic growth, the urbanization and the development of the global average class will continue to stimulate the demand of more metals and minerals. The demand will be stimulated additionally by the movement towards the production of low-carbon energy and electro mobility preventing the negative environmental impacts and the social activities of the mining and metallurgy industries is one of the most important sustainability problems, that have to be addressed worldwide (Christman, 2020).

The mining industry in Bulgaria

The resources and raw materials generated by mining are widely used in areas such as industry, energetics, construction, medicine, electronics and others. Ore and non-ore minerals, as well as fuels, are an important and integral part of the normal functioning of the national and world economy.

After 1991, with the end of communism and newly accepted constitution, it became possible to lease mineral deposits on

state-owned concessions to private investors. The rise in prices of metals (Pb, Cu, Fe) on the market after 2009 makes the development of old and new deposits in the country profitable. The mining industry has given a strong impulse to the socio-economic development in Bulgaria and well-being of the municipalities on whose territory mineral resources have been discovered and mined, for example: Radnevo, Panagyurishte, Etropole, Mirkovo, Chelopech, Kardzhali, Smolyan, Madan and many others. Most mining companies annually donate significant funds for implementation of infrastructure projects and stimulate healthcare, education, culture, sport and social activities in the municipalities where they operate (Ministry of the Bulgarian economy, 2020).

The non-renewable natural resources (mineral raw materials) are base for development of the world economy and human well-being. The continuous growth of demand and consumption of natural resources is directly dependent on the aim to improve quality of life. The process of utilizing huge quantities of non-renewable and renewable resources, subject to anthropogenic impact, leads to their depletion and disturbs the ecological balance. That raises the question of how to apply the complex and the seemingly at first glance unclear concept of sustainable development in the mineral sector. The most

popular definition of sustainable development is formulated in report of the World Commission on Environment and Development (Brundtland, 1987), describing: sustainable development, as one "which meets the needs of the present without compromising the ability of future generations to meet their needs." The most important idea is consideration (and limitation) of human needs with the limit of resources, as well as equality between present and future generations (Denev et al., 2010).

An important and economically interesting aspect of the mining activity in the country are industrial wastes. Currently, the areas occupied by existing landfills for industrial waste in Bulgaria amount to about 70,000 decares. According to a preliminary estimate, the funds needed for closure and reclamation of these areas will exceed 1.2 billion BGN (Pavlov, 2018). Industrial wastes can be considered as a negative side of the extractive industry, reflecting on the environment, as well as a significant "loss" of useful components and maintenance costs for industrial waste landfills or tailings. On the other hand, with the development of technology in recent years, industrial wastes have become an effective way to extract useful components, to recycle and use ores previously considered "loss" or waste.

Strengths of the mining industry

Without the extraction of mineral resources, the life of mankind is impossible. The mining industry is at the centre of all other industries and is an important factor for the economic stability and energy independence of any country with mineral resources. Constantly during its development, humanity has always sought access to subterranean resources and has had the need to extract them. Metallurgy, chemical industry, machine building, construction, transport, higher class technology and others are impossible without raw materials - the products of the mining industry. In Europe, industries dependent on access to mineral resources, annually generate € 1,324 billion in added value and provide employment to approximately 30 million people (Ministry of the Bulgarian Economy, 2020).

GDP and employment

About 5% of our country's GDP is due to the mining industry. Most of the people - nearly 25,000 - are directly linked with this industry, 120,000 are indirectly connected, and those related to the supply of materials and others are about 800,000 workers operating in this sector. The mining industry of the past, now and in the future is the backbone of our economy, because without extraction of raw materials, coal, etc., we cannot exist. In addition, the mining industry provides both premises for investments in the country and also high salaries for its employees, as well as preservation of the population of small settlements and development of these regions. In general, the successful development of the mining sector in the country creates conditions and premises for the stay of young qualified personnel in Bulgaria.

Investments, new technologies, quality

Companies extracting minerals and raw materials are among the few aiming towards and working on the application of various innovative practices, methods and models. They lead to increasing the competitiveness of their products and achieving better financial and economical results. Among them

are: innovations of processes related to environmental protection; innovations of processes related to improvement of work organization; innovations related to increasing the efficiency in the utilization of natural resources (Galabova, Trifonova, 2018). Bulgaria is among the leading European countries in terms of the share of value added created by those employed in the mining industry in the national economy. The share of the value added of the extractive sector from the value added of the entire industry of Bulgaria in the period 2000-2017 fluctuates between 6% and 12%, which confirms its significant contribution for the country (Galabova, Nestorov, 2019). Mining companies in Bulgaria distinguish themselves with relatively high productivity, which is nearly 2.5 times higher than the average industry in the country. Compared to European ones, for the most part the Bulgarian companies are proven to be profitable and competitive, offering quality and convertible products on international markets (Galabova, Nestorov, 2019). This is due to significant investments in tangible fixed assets, as for the last 18 years the leading mining companies have invested over 4 billion BGN in technological renewal, which provides improved economic and environmental outcomes, as well as improved performance in terms of health and safety. Innovative leaders in these aspects are Assarel-Medet AD, Ellatzite-Med AD, Dundee Precious-Chelopech AD, Gorubso-Madan, Maritza-East Mines EAD and others. They have implemented international standards for quality management, environmental protection and occupational safety.

Corporate social responsibility

There is an increase of attention to corporate social responsibility (CSR) by more and more mining companies in Bulgaria understanding its importance and benefits. This results in them taking responsibility for development of their employees, as well as for their impact on environment and society. Social responsibility includes both economic and environmental responsibilities. Stakeholders are not only within the company, but also outside of it. The broader goal of corporate social responsibility is to create a higher standard of living for people inside and outside the company, while maintaining its profitability. In time, this concept has become a successful business strategy for sustainable development, which helps companies not only to increase their influence on the market, but also to create a positive public image. People today are tolerant to companies that participate in charitable initiatives and support cultural and social events. Also respected are the efforts to protect the environment through the recycling of unnecessary consumables (toners, paper, glass, plastic packaging, etc.), the introduction of energy efficiency measures and treatment or disposal of hazardous industrial waste. On the other hand, employees are looking for employers who offer them not only good pay, but also a suitable social benefits for them and their family members. Thus, with slow steps and regardless of its various forms and manifestations, corporate social responsibility is gradually taking over companies around the world (Petrova et al., 2012). The tendency of responsibility continues to develop towards employees, nature and society. This is a positive aspect of the mining industry and an important part for the future success of this business. Moreover, among the challenges, the industry faces are the wide range of administrative procedures and the large number of permits related to the so-called "work license" obligation documents for the trust of the community

towards companies to do mining extraction activities (Petrova, 2019).

Weaknesses of the mining industry

Risk (high risk - high reward; Investment, exploitation and time-bond)

Long investment process term from the exploration to realization of mining projects, i.e. extremely long economic life of investment projects with a long investment period (Mitev, 2004; 2014). High market risk, especially for exchange products. Natural risk associated with difficult predictability of quantitative and qualitative indicators of geological supplies and mining and technological indicators of deposits (Mitev, 2004; 2014), as well as risk of natural disasters. There is also a risk of lack of market balance (supply / demand) for construction materials due to unbalanced processes for demand and exploration of these materials. Social risk, which is associated with significant investments to ensure healthy and safe working conditions for employees. Significant investments in environmental protection and reclamation. Significant risk of unfair competition in the form of illegal extraction activities. It is important to note the risk of lack of a clear and transparent regulatory framework related to various aspects of natural resource management (Ministry of Economy of Bulgaria, 2020). For the mining industry, risk is based on large initial investments in localization and preparation for operation of a certain deposit. The long time period before the exploitation of the deposit and the return of the investments, predetermines the high market risk in the branch. Generally, the mining business is high risk and accordingly, very profitable (with justified risk).

Ecology

In a global aspect, the humanity existence is based on the development of mining. While, this activity causes demolitions, subsidence, erosion processes, reversible and irreversible pollution of top earth layers. It generates huge amounts of waste. Parts of mining areas in our country are occupied by such polluted and impaired terrains (Pavlov, 2018). Extractive industry has a negative impact on the environment, for reducing the damage, adequate environmental measures must be applied by the companies developing mining activity in Bulgaria. Economically, this means damage to the environment as well as a loss of time and money in order to limit and reduce the negative anthropogenic impact through mining processes and after its completion.

Recultivation

Generally, recultivation is a system of engineering-ecological, ameliorative, agro-technical, forest management, planting and other activities aimed towards restoring of damaged terrains, soil cover and fertility to create locations with different purposes: agricultural, forestry, sanitation, recreational and others. A number of technological solutions have been developed and are being implemented for restoration and recultivation of terrains and soils impaired or polluted due to ore extraction and processing. The preservation of lands exposed to anthropogenic impacts is controlled with a number of laws and regulations in line with European directives (Pavlov, 2018). The ecological mark and the costs of recultivation are among the weaknesses of the mining industry. The damage to nature and the consequences that we are trying to limit are the most

significant weaknesses of mining industry in Bulgaria and around the world. From an economic point of view - these are necessary and major financial and time costs in order to reduce the anthropogenic impact on nature. Mining companies in the country comply with a number of laws and requirements and are making all the necessary efforts to reduce the negative impact of extraction activities on nature.

Future perspectives and tendencies of improvements for the mining industry as a part of the economy

Recycling of mineral resources should be considered as a process, which increases global supplies and offers significant potential in certain conditions. This is evident from a number of well-known facts. In modern mining methods and technologies - millions of tons of gaseous, vaporous, liquid and solid waste pollute the environment. In some types of raw materials, only 2% become useful products, and the remaining 98% remain as technogenic accumulations. Generally, from the annual production of about 25 billion tons of various mineral raw materials results in no more than 1.5 billion tons of effective production. Approximately two thirds of the extracted from earth's depths mass, accumulates for long periods of time in various landfills. Recycling technologies are being developed at a rapid pace and are becoming a mandatory part of mining companies's development programs. If the appropriate technologies are available, secondary production may mean that irrelevant and uneconomical to use low class raw materials that were impossible to use in the past will be available for recovery in the future. This helps to delay the inevitable depletion of resources and confirms the arguments of the paradigm for sustainable development. Aside from the problem of environmental damage, associated with mining should be noted the fact, that lower class of resources can also become a major argument in fulfilling the demand and aspiration to retain the economic and social standard of living.

Recycling of the mining industry wastes becomes possible due to improvement of technologies. For example: 1 tons of steel can be extracted from 2.5 - 4 tons of ore, the same amount can be extracted from 1.1 tons of ore wastes. Another appropriate example is that 1 tons of purified copper can be obtained from 300-500 tons of ore, or from 1.2 tons of ore wastes containing copper. The examples indicate significantly higher efficiency and lower energy consumption in the extraction of raw materials by recycling mining waste compared to standard extraction and processing of ore (Grigorova, Nishkov, 2015). The differences in efficiency and energy consumption vary for respective raw materials and the results are not always as impressive as in the given examples. It should be noted that the recycling of mining waste and raw materials is a great alternative for the mining branch. A number of countries (such as China) are considering and are taking advantage of this opportunity for efficient use of waste to generate profits and to reduce the environmental damage. Annually China purchases and recycles large amounts of mining waste. Recycling of resources, raw materials, as well as industrial and household wastes is an alternative, which may ensure the normal future existence of humanity.

Conclusion

Society and technologies should strive to develop new rational alternatives that ensure equality between current and future generations in terms of non-renewable natural resources (Denev et al., 2010). The extractive industry, with its strengths and weaknesses, remains a significant element of the national and global economies.

The focus of extractive industry should be not only on exploration and exploitation of new deposits, but also on the opportunities for enrichment and recycling of raw materials, as well as on the efficient use of wastes. Investments in the construction of new factories for recycling of raw materials and for processing of industrial wastes are a necessary alternative and may prove to be an important strategic move for the future economic development of Bulgaria.

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