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# Mining Circular and Economy

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**Abstract.**
The article is devoted to the issue of waste management in the mining regions, as the problems of industrial waste or waste products will always be relevant in nowadays. The most experts focus on urbanization processes, on increasing the resources' requirements, which in turn will increase the needs of the population and environmental pollution. The processing of waste in the mining regions can be achieved through the use of elements of the circular economy, which will lead to the economic use of natural resources and the interaction of economic, environmental and social development. The building of Eco-Industrial Park using a sector-clustered approach to waste management is suggested in the conclusions. The EcoIndustrial Park will allow related industries to work in symbiosis, where secondary raw materials can be involved in recycling, remanufacturing, recovery, regeneration.

## Introduction

The entire modern world economy is aimed at increasing competitiveness and achieving the goals of sustainable development on the background of the formation and implementation of the principles of Industry 4.0, which is inextricably linked with the digitalisation and use of the latest technologies in all economic, industrial, commercial and social processes. The trends, principles and methods of Industry 4.0 are being implemented in different fields in different ways, taking into account the direction of the conference and focusing on the mining industry, it can be noted that the use of a wide range of technological accelerators of Industry 4.0 allows us to provide a new level of production efficiency and rational use of natural resources (energy efficiency) within the framework of the "3R principle" – reduce, reuse, recycle. [1] However, in the mining regions 3R principle can also be supplemented by the principle of "remanufacture" to obtain a new economic cycle or ultimately a new energy, raw material or new product, as well as ensuring minimum environmental pollution.

## Material and Methods

Today, much attention is being paid to the issue of rational use of production and consumption results under the conditions of depletion of natural resources and large-scale environmental pollution, which carries catastrophic threats to the Earth's future. The UN World Report of 2015 "Prospects for the Development of the Population in the World" [2] experts analyzed that the population of our planet is rapidly increasing (to date, 7.4 billion, and already in 2050 - 9.7 billion and in 2100 the population of the planet will be 11.2 billion people). An increase in the number of population leads to an increase in the consumption of natural resources. However, natural resources are tirelessly exhausting, and some of them

will be fully exhausted over 50-100 years. This is due to the fact that the urbanized needs of people and the rapid intensification of the development of science and technology are oriented only on consumer interests (increase in production capacity and profit maximization, which will inevitably lead to an ecological crisis). According to the scale of this issue, the United Nations has formulated the long-term goals of world sustainable development in the XXI century, namely: at the United Nations Conference in September 2015, the goals of sustainable development (CSR) for the period 2016-2030 were adopted, which set out 17 goals of sustainable development and 169 tasks to be carried out by all countries of the world by 2030. The 17 goals of sustainable development include the work of three balanced directions: economic, social and environmental. Figure 1 shows the goals of sustainable development. However, achieving such a balance so that social, economic and environmental needs are very symbiotic, requires a colloquial link with all actors, namely, the state, business and science. Today, global environmental problems are aggravating, among them: biodiversity reduction and environmental pollution. In connection with them, a violation of the natural balance occurs, and the further development and prosperity of humanity is in question. Considering Figure 1, we can argue that most goals are interconnected and mutually complementary. Achieving sustainable development can be provided for a synergistic solution to the goals presented. Within the framework of the presented research, the 12th goal of sustainable development (responsible consumption and production) is most relevant. This goal is the result of the transition to a new economic model - circular [4,5,6,7,8,9].

**Results and Discussion**

The concept of sustainable development and circular economy are very similar: both concepts are global in nature; they emphasize the importance of better integrating environmental and social aspects with economic progress; both concepts emphasize intra- and intergenerational obligations arising from environmental hazards; both signal the importance of increasing the participation of the authorities and the public. The main differences appear to be the following: the motives for sustainable development are based on past common traditions. While the motives for circular economy are the observation that resources can be used in a more efficient way. Sustainable development aims to benefit the environment, the economy and society as a whole, while the main beneficiaries of a circular economy are economic entities using this system. The application of the circular economy in the industry makes it possible to create new innovative ways of production, the possibility of reuse of goods and materials with less resource costs, as well as the efficient use and protection of natural resources shortages. Circular economy is the premise and driver of the fourth industrial revolution Linear economic models ("take, make, waste"), which were laid down in previous revolutions, are not able to work efficiently today, but bear global environmental problems

**Conclusions**

Summing up the above-mentioned, it can be stated that the main instrument for increasing environmental and economic indicators is the cooperation of heterogeneous enterprises united in the industrial symbiosis - the eco-industrial park; the key approach is the introduction of a circular economy in various fields that will achieve the 12th goal in the objectives of the World Sustainable Development, however, it should be noted that using this approach can be achieved the following 6 goals (6. Clean water and sanitation; 7. Affordable and clean energy 11. Sustainable cities and communities 13. Climate action 14. Life under water 15. Life on land). An important issue of the transition to a circular economy is to solve the problem of financing circular initiatives, since their non-profit period is much longer than traditional

projects. This transition can be helped by government incentives through changes in taxation, government procurement, increased knowledge of the problem, creation of incentive complexes, and so on. Also, the widespread introduction of digital technologies should play a significant role in this. The introduction of a circular economy can be implemented exclusively through Industry 4.0 due to the need to more effectively coordinate the flow of materials and information. The reason why the circular economy is not implemented today is the lack of information, and the digital economy is the "missing link" for its implementation. The main importance should be taken by the following technologies: cyber-physical systems, readers, automated market and logistics platforms, the Internet of things and blockchain. Consequently, the application of the principles of the circular economy in the mining industry will lead to the economic, environmental and social benefits of the state, region, enterprises and a number of related enterprises that will operate in the structure of the ecoindustrial park, which is consistent with the concept of sustainable development.

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