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ECOLOGICAL AND ECONOMIC BASIS OF ORGANIZING THE CYCLE OF SECONDARY RESOURCES

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Abstract. This article discusses the issues of effective use of secondary resources, establishing a system for their recycling, and ensuring environmental and economic efficiency. In the context of climate change, increasing waste volumes, and limited natural resources, the use of secondary resources is a pressing issue today.

Keywords: Recycling, resource conservation, waste management, environmental efficiency, economic efficiency, sustainable development, renewable resources, ecological culture of the population, environmental protection.

Introduction. The limited natural resources and the increasing volume of waste generated as a result of industrial development are disrupting the ecological balance. At the same time, the increasing demand for raw materials for economic development requires more efficient use of existing resources. Secondary resources (i.e. materials recovered from waste) are today one of the important means of ensuring economic and environmental sustainability.

As environmental protection standards are increasingly being tightened around the world, the problem of industrial waste disposal is becoming more urgent. An effective way to solve this problem is to use these wastes as raw materials with functional properties necessary for various economic sectors (secondary use) and obtain appropriate products.

Since incineration or landfilling of waste cannot completely solve the problem of environmental pollution, the concept of environmental efficiency has been developed, which provides a dual benefit for both the environment and the economy [1].

Waste as a secondary resource is becoming an increasingly global problem worldwide, but it has also become an even greater regional problem within the borders of a nation state, and in some cities it has become a serious local problem. Household waste is also becoming a major problem in large cities, and its transportation and disposal outside the city limits are required. This requires the availability of special transport and enterprises.

One of the serious problems in the socio-economic development of any country is the waste problem. This problem is becoming increasingly complex in Uzbekistan.

Also, a large amount of secondary waste is generated in the production process of mechanical engineering, thermal power, light and food industries. Some of them are toxic and can pollute surface water and air. The accumulation of industrial waste is completely harmful from an ecological and economic point of view, and it is advisable to use them in various fields according to their mineralogical and chemical composition.

Secondary resources are materials that have been used or have become waste, which are used to create new products through processing. This concept includes recycling, reuse and reduction.

A logistical approach to the circulation and transportation of secondary resources (e.g., recycled or used materials) is very important. Effective organization of this process helps to ensure optimal recycling of resources and does not harm the environment.

The logistical approach includes the following main aspects:

1. Collection and separation of resources.

Collection system: The process of collecting discarded or used materials must be carefully organized. These resources are collected from various sources (e.g., production processes, consumers, or manufacturers).

Separation and classification: Secondary resources are separated according to their type. For example, plastic, metal, paper or other materials are separated separately and then sent for recycling.

2. Transportation and storage.

Transportation system: An efficient system is needed to transport secondary resources from the collection point to processing plants or landfills. In this process, it is necessary to take into account transportation costs, distance and the characteristics of the resources.

Storage: The collected materials are temporarily stored. When organizing these storage areas, the types, quantities and storage conditions of the resources to be collected are taken into account. Also, the environmental safety of waste storage areas must be ensured.

3. Recycling and resource use.

The recycling process requires good integration of logistics and technological processes. Recycling methods (e.g. melting, crushing, chemical processing) vary depending on the type of material.

Some materials (e.g. metals) have a high recycling value, while other materials may have energy-intensive recycling processes. A logistics approach can help ensure that these resources are recycled efficiently.

4. Environmental protection.

The logistics system must be environmentally friendly. This can be achieved, for example, by storing waste in safe places, recycling contaminated materials, or reducing the environmental impact of storage facilities.

Transport processes should focus on energy efficiency and waste minimization.

5. Monitoring and management.

A monitoring system is necessary for the correct and efficient management of resources at any stage. Through this system, it is possible to monitor the movement of materials, the level of recycling and the environmental impact.

Logistics processes should be constantly evaluated and optimized. This will help to increase the efficiency of processes, prevent wasteful loss of resources and reduce costs.

Waste reduction ratio:

This ratio shows how much waste volume is reduced through recycling:

$$K_{ek} = \frac{Q_b - Q_q}{Q_b} \times 100\%$$

Here:

K_{ek}- waste reduction coefficient (%),

Q_b - initial waste amount (tons),

Q_q - waste amount after processing (tons).

It is difficult to assess the economic value of waste in general, therefore, it makes sense to comment on its effectiveness after determining its composition. For example, the presence of aluminum, glass bottles, steel, paper, plastic, broken glass, etc. in the waste increases the efficiency of their second use. Aluminum is a very energy-intensive metal, which is widely used in the national economy. Sometimes the cost of purchasing aluminum raw materials is lower than the energy cost. It costs 5% less than the metal obtained from aluminum oxide cast from the metallurgical plant. 1 ton of aluminum cast from the secondary metallurgical plant saves 4 tons of bauxite, 700 kg of oil products, and also reduces the amount of aluminum

fluoride emitted into the atmosphere by 35 kg. It turned out that the production of paper products by recycling waste paper allows you to save forests on large areas from deforestation, save energy, and prevent environmental pollution. A waste paper processing enterprise costs 50-80% less than building a pulp and paper mill. There are more than 200 waste paper processing enterprises in the United States, and recycling the Sunday issue of the New York Times alone and making pulp from it can save 75 thousand trees from being cut down. Large developed countries (Canada, Italy, Mexico, South Korea, Germany) purchase waste paper from abroad and produce finished paper. This has been proven to be very economically efficient. According to the Organization for Economic Cooperation and Development, recycling 50% of the paper used in the world would satisfy 75% of the demand for it, which would save 8 million tons of paper. It protects the forest in the area from being cut down.

Conclusion. The use of secondary resources is an important factor in maintaining ecological balance, increasing economic efficiency, and achieving sustainable development goals. This requires an integrated approach through cooperation between the state, society, and the private sector.

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