

INTERNAL SOURCES AND RESERVES OF INNOVATIVE TRANSFORMATIONS IN THE HOUSING AND UTILITIES SECTOR OF THE REPUBLIC OF BELARUS

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Abstract: the Subject is innovation and innovative mechanisms for working with solid municipal waste, including polymer waste in the absence of sufficient funding for their sorting, processing and disposal. Mechanisms for working with polymer waste. Results. The author's research directions of mechanisms for working with solid municipal waste allowed us to formulate proposals for finding endogenous sources of financing for their processing.

Introduction. One of the key goals set in the National strategy for sustainable socio-economic development of the Republic of Belarus for the period up to 2030 is the country's transition to a knowledge-based economy [1]. In order to ensure the concentration of state resources on the implementation of the most important and significant areas of scientific, scientific, technical and innovative activities, the Decree of the President of the Republic of Belarus dated 07.05.2020 No. 156 "on priority areas of scientific, scientific, technical and innovative activities for 2021-2025" was adopted.

Main part. A special place in a number of problem housing is the problem of disposal of plastic waste, the annual increase which has reached a critical value (5%) for many countries, including the Republic of Belarus. The study of recycling polymer wastes are investigated in the Republic of Belarus at the Institute of Housing and communal services, national Academy of Sciences of Belarus to 2018 completed research subject: "study of the morphological composition of plastic waste consisting of municipal solid waste and preparation of proposals for their reuse". During 2019-2020 the subject of this topic is the area of research interests of employees of the Department of Economics and management of innovative projects in industry of the Belarusian national technical University and the Department of Economics and management of the Institute of entrepreneurship (Minsk).

The subject of the study is the morphological composition of polymer waste in municipal solid waste (MSW).

The purpose of the research is to study the morphological composition of polymer waste in MSW, related by origin to production and consumption waste, and to develop proposals for possible directions of their use, taking into account existing technologies and existing processing facilities.

It should be noted that the production of polymers is one of the most dynamically developing industries. If world production of plastics in 2010 amounted to about 250 million tons, and according to expert estimates, is growing at 5-6 % annually, for the 2019 world production of polymers has exceeded 355 million tons., and by 2022 will reach more than 470 million tons [2,p. 132].

In accordance with the intended purpose, within the framework of the research addressed the following objectives.

The collection, analysis and generalization of information on the volume of formation in the Republic of Belarus of polymer waste that is part of MSW, by type.

The analysis of the volume of plastic production in the Republic of Belarus based on data on their production, export and import (except for rubber and rubber products) for 2016 and 2017,2018 and 2019 by type was carried out.

The estimation of potential volumes of polymer waste generation in the Republic of Belarus by types in General and as part of municipal waste was carried out.

An assessment of the potential volume of plastic (polymer) waste generated in the Republic of Belarus by type for the main products included in Annex 1 to the Decree of the President of the Republic of Belarus No. 313 dated July 11, 2012

. data on the use of polymer packaging by type in the production of basic consumer goods, including per unit, were Collected and processed.

The actual morphological composition of polymer waste in MSW in cities with different degrees of housing improvement was determined based on the results of measurements (the "summer" season) .

Intermediate conclusions are made based on the obtained data and the results of the analysis and the formation of summary data on the volume of polymer waste in MSW with a sufficient degree of reliability.

In the Republic of Belarus, about 765.0 thousand tons of secondary material resources (BMR) were harvested and sent for processing by all collection systems in 2019. The level of utilization of MSW has reached 22.5 percent. At the same time, the volume of collection (harvesting) of certain types of WMR corresponds to the European level. So, the volume of waste paper and cardboard collection is more than 70 % of the volume of education, glass waste-more than 60 %, while polymer waste – less than 25 % [3, p. 2].

Conclusion. As a result of the research, the following results were obtained.

1. Defined and improved methodological approaches to the differentiation of plastic waste on the basis of their morphological composition.

2. justification of reserves for the use of MSW and WMR was Performed. The potential estimated volume of polymer waste (industrial and municipal waste) in the Republic of Belarus in 2019-2020 was 62,000-64,100 tons.

3. the morphological composition of polymer waste is Determined by the complexity and cost of disposal (polymer waste is divided into three groups of polymers – pure production waste, medium-complexity waste and hard-to-recycle waste).

The results of the analysis of the profitability of the process of collecting and processing polymer waste are presented. For example, for hard-to-recycle waste, cost

coverage involves external financial resources (tax incentives, targeted investments, subsidies). The percentage of such polymer waste from the total amount is 60-85%, and the degree of processing (except for burial) is only 3 %.

4. based on the analysis of world practices of polymer waste management, the main areas of work with them in the Republic of Belarus are identified-sorting and incineration.

Sorting - allows you to extract some of the materials from solid household waste that can be used as secondary material resources. It is established that as a result of sorting, the volume of waste sent to landfill is reduced by 10-20 %.

Burning. This method helps to significantly reduce the amount of waste and requires the least preparation for the incineration process.

Dioxin emissions from municipal solid waste (MSW) incineration in well-regulated equipment reach only 0.6 micrograms per ton of waste. When burning a ton of coal, 1-10 micrograms of dioxins are released in the equivalent of toxicity, and a ton of gasoline-from 10 to 2,000 micrograms.

In world practice, the most developed technology is layer combustion (850-1,000°C), which is promising for heat treatment of the enriched (combustible) MSW fraction. Leading positions in the market are occupied by furnaces of such companies as "Steinmueller "(Germany), " Noell "(Germany), "Martin GMBH" (Germany) and "Foster Wheeler" (USA), " CNIM "(France) [4, p. 9].

This method of MSW processing has its advantages:

- energy consumption is possible (200-300 kWh / t of waste);
- reduction of waste volume up to 10 times;
- reducing the risk of soil and water contamination by waste;
- the ability to recover the generated heat.

The disadvantages of this method include the following:

- danger of air pollution;
- destruction of valuable components;
- high yield of ash and slag (about 30% by weight), which require special measures for disposal;
- low efficiency of recovery of ferrous metals from slags;
- difficulty in stabilizing the combustion process;
- a high percentage of chemical and mechanical underburning,
- a large volume of waste flue gases (1 kg of waste requires 6-8 kg of air), which complicates and increases the cost of cleaning them;
- the possibility of formation of dioxins and furans, since the temperature of the combustion process is 800-1100°C.

Taking into account world practices and approaches in the Republic of Belarus, it is necessary to develop the direction of incineration of sorted waste using a technology where the combustible component of solid household waste (RDF) will be used as fuel.

Currently, the cement industry is beginning to actively introduce the technology of using the combustible component of solid household waste (MSW) as fuel, which is commonly called RDF (Refuse Derived Fuel). The leader in the application of this

technology in Europe is the Estonian company Heidelberg Cement in Estonia. Currently, the entire Estonian cement industry uses only RDF as fuel.

RDF is the main product of waste sorting plants and, as practice shows, can be effectively used in the cement industry and energy.

Based on the results of the study, proposals are formulated on the possibilities of further treatment of waste polymers that are part of MSW, and their secondary use in the Republic of Belarus.

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