



MUNICIPAL SOLID WASTE IN UKRAINE: CHALLENGES AND OPPORTUNITIES

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Abstract. *From 2017, Ukraine has been actively developing legislative framework in the field of waste management based on European practices and experience. With the adoption of the main law On waste management in 2022, the principles of waste hierarchy and circular economy were used in the development of new waste management systems at national and regional level. Nevertheless, the main method of waste management in the long term is dispose to landfills and dumps (90%). The existing separate waste collection system in more than 1,400 settlements is ineffective. The recycling sector is experiencing a shortage of secondary raw materials, while they replenishes the existing landfills and dumps. Today, there are more than 5,700 of them with a total area of about 8,000 hectares, not counting illegal dumps. A typical Ukrainian landfill does not provide a high level of environmental protection. Landfill gas collection and treatment systems are being actively implemented at large landfills, while leachate collection and disinfection systems works only at few (1-2%) landfills. Under war conditions, landfills and dumps are actively replenished with waste from destruction, in addition to specially organized sites. Creation and development of effective municipal solid waste management systems is possible on the basis of constructive dialogue between the population, business, waste management sector and recyclers, representatives of the authorities. Inconsistency between legislative reforms and opportunities for their implementation aggravates the crisis situation in the waste sector.*

Keywords: *landfill, recycling, separate waste collection, waste management.*

Introduction

The problem of municipal solid waste (MSW) is one of the urgent environmental problems of Ukraine, which is receiving a lot of attention from the administrative, management, scientific and public sectors. According to the data of The Ministry for Communities, Territories and Infrastructure Development of Ukraine (Ministry of Infrastructure), over 44 million m³ of MSW, or more than 9 million tones, was generated in Ukrainian settlements in 2023, 89.5% of which is landfilled in 5.6 thousand dumps and landfills with a total area of more than 12 thousand hectares. Today, the total mass of landfilled waste exceeds 235 million tones. The active landfills and dumps do not comply with European standards and operate in overload mode. Leachate and biogas collection and disinfection systems are mostly available only at large landfills. All of this leads to significant contamination of the environment with waste degradation products and to the withdrawal of territories for new disposal sites. With the beginning of military operations in 2022, a new type of waste appears - waste from destruction, the volume of which is quite comparable to the volume of MSW generation. The issue of such waste management is acute today. At the same time, Ukrainian recyclers are experiencing a shortage of waste paper, polymers and glass fibre, are forced to import recyclable materials and do not work at full capacity. Among the main reasons is the lack of an effective model of separate collection, which allows separating a significant part of potential recyclable resources from the general MSW mass. Today, separate collection has been established in more than 1400 settlements, but only 8.75% of MSW is delivered to recycling



collection centers and sorting lines. Today there is a need to introduce a new concept of MSW management, but the sphere of waste cannot develop in the conditions of economic crisis. The purpose of this paper is analyzing the current situation in the sphere of MSW management in Ukraine.

1. Development of regulatory and legislative framework in the sphere of MSW management

With the beginning of the process of European integration of Ukraine, the regulatory and legislative framework on waste issues is undergoing significant changes. Thus, during the last eight years there has been a significant reforming of the regulatory-legislative base of Ukraine in the MSW area. The amendment to Art. 32 of the Law of Ukraine ‘On Waste’ on the prohibition of landfilling for untreated MSW from the 1 of January 2018, which meets the requirements of Directives 1999/31/EC and 2008/98/EC can be considered as the beginning of this process. But due to the lack of a mechanism for practical implementation and uncertainty of the term ‘untreated waste’, this requirement of the Law was not actually fulfilled. Further in 2017 the ‘National Waste Management Strategy in Ukraine until 2030’ was approved [1], for the fulfillment of which the draft National Waste Management Plan until 2030 was developed (approved on 20.02.2019). The next stage was the adoption on 20.06.2022 of the Law of Ukraine ‘On Waste Management’ [2]. This Law of Ukraine, the National Waste Management Strategy in Ukraine until 2030, as well as the National Waste Management Plan provide for a modern approach to the formation of the regulatory and legislative base in the field of waste management.

Reforms in the legislative sphere have touched not only the basic principles of management, but also individual waste streams [3]. The global experience of rejecting plastic bags motivated the development the Law of Ukraine ‘On Reducing the Quantity of Certain Types of Waste Made of Polyethylene in Civil Circulation’ in 2019. The complicated situation with hazardous waste as part of MSW, in particular batteries, prompted the development of a legislative initiative that would allow the implementation of the EPR principle on the example of recycling used batteries. Today, the draft laws ‘On Batteries and Accumulators’ and ‘On Electronic and Electrical Waste’ are developed. The draft law ‘On Packaging and Packaging Waste’ from 18.09.2023 is being finalized.

At the end of 2022, there were more than 150,000 damaged or destroyed residential buildings in Ukraine. It has become obvious that management of demolition waste according to the existing mechanism, similar to MSW, already in the short term threatens to overflow landfills. Taking this into account, back in September 2022, the Government of the country introduced a legislative framework for a different algorithm of demolition waste management, which provides for the organization of territory cleaning, as well as recycling and reuse of such waste (if possible). The corresponding order was approved by the Resolution ‘Procedure for management of waste generated in connection with damage (destruction) of buildings and structures as a result of hostilities, terrorist acts, sabotage or works to eliminate their consequences’.

As we can see, now there is a significant reforming of the legislative base on waste issues and administrative methods of waste management. But it should be noted that the reforming of legislation in accordance with European requirements should be carried out taking into account the possibility of their implementation in Ukraine. Without creation of appropriate material base and economic conditions to ensure reforms in the field of MSW, new laws will have only declarative character.

2. The estimation of MSW generation and landfilling amounts

According to official data, in 2023, Ukraine generated about 9.3 mln. t of MSW, of which 8.1 mln. t were disposed on landfills. Compared to 2021, MSW collection decreased by 14%, which is a consequence of the military actions that started in 2022. In addition, the total amount of



MSW collected in 2023 does not include data from Luhansk Oblast, more than 90% of which is occupied.

The analyses of changes in the amount of MSW collected since the beginning of the full-scale invasion showed that the most intensive decline in the amount of MSW collected is characteristic of Kherson (-97%) and Donetsk (-63%) regions, the territories of which are largely occupied or are under active military actions. The amount of waste collected in Dnipropetrovsk region (-42% by volume) and Ternopil region (-35 and -70% by volume and mass) is also significantly decreased. However, the amount of collected waste increased in Odesa (by 67.7%), Kirovograd (40.6 and 84.8%), and Kyiv (33% by volume) regions. On average in Ukraine, the amounts of collected waste fell by 13.7% (volume) and by 10.7% (mass).

Fig. 1 shows the dynamics of changes in the volume of MSW collection (generation), as well as the number and area of landfills for the period 2000-2023. As we can see, from 2022 there is a decline in the volume of waste generation starts from 51.22 mln. m³ to 38.98 mln. m³. In 2023 the area of landfills and dumpsites increased from 8,000 to 12,000 ha. Obviously, this is due to the need to place for waste from destruction.

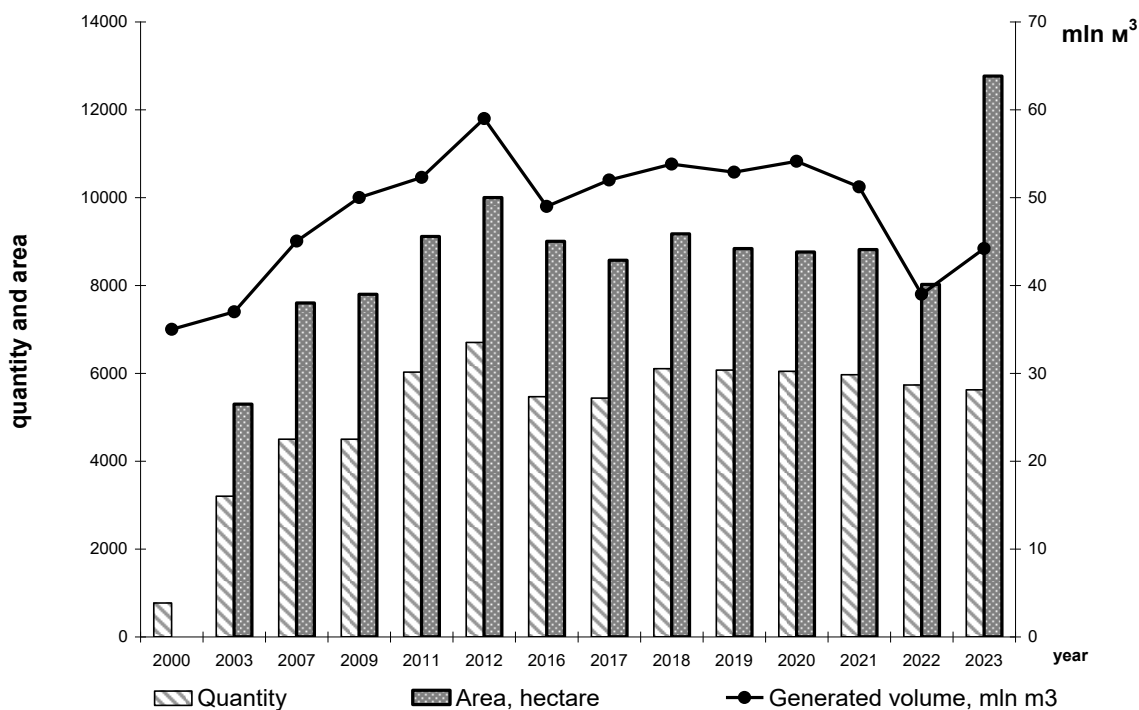


Figure 1. Dynamics of waste generation volumes, number and area of landfills

One of the indicators of the waste disposal situation is the technogenic load module - the mass of waste landfilled per unit area of the territory. According to the data for 2021, the value of the technogenic load module was 18.62 t/km², and in 2023 - 15.69 t/km². If we consider the total mass of landfilled MSW, the value of the technogenic load module was 459.6 t/km² in 2023. The share of disposed waste in 2023 was 4.23%. This means that accumulation of total waste mass has been taking place for more than 30 years.

3. Characteristics of MSW disposal sites

The main factor in choosing a method of MSW management is the cost: the cheapest way is to dump MSW, especially illegal dumping. As of 2023, there were 5623 officially registered landfills and dumps of MSW with a total area of 12,764 hectares in Ukraine. The need for new landfills and dumpsites is 281 with a total area of 1193.82 hectares. Due to the poor system of



MSW management in rural areas and private sector, 13,000 illegal dumps with an area of 0.47 thousand hectares were identified in 2023.

As for the environmental protection on landfills, they should have a system for collection and utilization of biogas, collection and disinfection of leachate, impervious blanket on the bottom and sides of the landfill, and protection against the transfer of light waste fractions. Most of the existing landfills and dumps do not fully meet these requirements. Thus, 57 landfills have leachate collection systems, 40 landfills have their own leachate treatment systems. As of 2021, landfill gas collection systems are taking place at 26 landfills, which operate power generation units with a capacity of 39 MW. The amount of biogas recovery in 2021 was 73.9 mln. m³. The reduction of GHG emission as a result of biogas recovery from landfills was 39,390 t, which is 12.7% of the total emission from waste disposal sites – 307,900 t of methane [4].

4. Recycling and recovery of resource-valuable MSW components.

There is a situation when recycling enterprises do not work at full capacity and use imported secondary raw materials, while these potential recyclable resources fill up already overcrowded landfills in Ukraine. Among the main reasons is insufficient development of separate waste collection and its low efficiency. The most settlements are characterized by gross collection without separation into components, and recyclable materials are particularly collected through recycling centers, which are mostly part of the ‘grey sector’ of MSW management.

Separate collection of MSW has been introduced in 1440 settlements of Ukraine. In 29 settlements 34 waste sorting lines are operating. However, only 8.75% of waste is delivered to waste treatment plants or recyclers.

The municipal solid waste management concept makes it possible to implement a ‘zero waste’ principle by means of waste separation into four streams: easily-decomposed organic material, inert waste, potentially recyclable material resources and hazardous waste.

Conclusions

Finding solution to the problem of municipal solid waste (MSW) disposal is very important for Ukraine. In the context of the transformation of the regulatory framework in accordance with European requirements and the availability of infrastructure for processing the most common and resource-rich categories of secondary raw materials, limited funding determines the individual trajectory of solving the problem of waste in Ukraine. It is expected that waste disposal will persist in the long term, increasing negative environmental effects.

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