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## **POLISH MUNICIPAL WASTE IN THE CONTEXT OF PLANS TO TRANSFORM THE EUROPEAN UNION ECONOMY TO CIRCULAR ECONOMY MODEL**

**Summary:** The European Union is preparing to implement the model of circular economy advocated by environmental organizations, the main objective of which will be to maximize the long-term effectiveness of the use of natural resources. Circular economy is to replace the prevalent linear model that over-exploits natural resources, which might be strategically dangerous to Europe due to its limited access to a number of different raw materials. The article describes the condition of Polish municipal waste management on the basis of official reporting practices and problems of the industry indicated by press reports in the context of requirements proposed in official European Union documents. The aim of the article is to discuss the basic obstacles that the Polish municipal waste management system encounters on the road toward circular economy.

**Keywords:** circular economy, municipal waste in Poland.

### **Introduction**

Global competition for scarce key resources might, by means of dependence on them, expose the economy that does not have its own access to these resources to high prices, dependence on foreign industries, market volatility, and the political situation of the countries that deliver them. At the same time, the current model of linear economy based on the pattern “take, make, dispose” or “extract, make, use, dispose” is leading to a constant increase in the consumption of natural resources and to environmental pollution. The concept of circular

economy is a response of modern environmental economists to the problem of managing limited natural resources.

The transition from the linear model to circular economy seeks to maintain the value of the materials and energy used in products for as long as possible, at the same time minimizing the production of waste and the consumption of resources. A successful transition to circular economy requires appropriate activities at all stages of the value chain: from the acquisition of raw materials, through the design of materials and products, the production, distribution, and consumption of goods, as well as repair, regeneration, and reuse systems, to waste management and recycling [www 1] This article focuses only on the last stages of the value chain, namely on waste management and recycling – of course, it does not mean that these aspects of the problem are of the greatest significance for the concept of circular economy; therefore, one should note at the very beginning, that the introduction of the model of circular economy only on the basis of activities related to municipal waste management is impossible, as those can merely help achieve this goal.

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## **1. European Union economic transformation plans**

The concept of circular economy operates in the European legal space in the form of an official announcement about the European Commission's efforts to implement this concept. The Communication from the Commission to the European Parliament, the Council, the European Economic and Social Committee, and the Committee of the Regions of July 2 2014, in spite of its general and largely declaratory nature, determines specific goals and time frames for the implementation of new regulations concerned with municipal waste management in the European Union. "In order to boost the economic, social and environmental benefits gained from the better management of municipal waste, the Commission proposes to:

- boost reuse and recycling of municipal waste to a minimum of 70% by 2030;

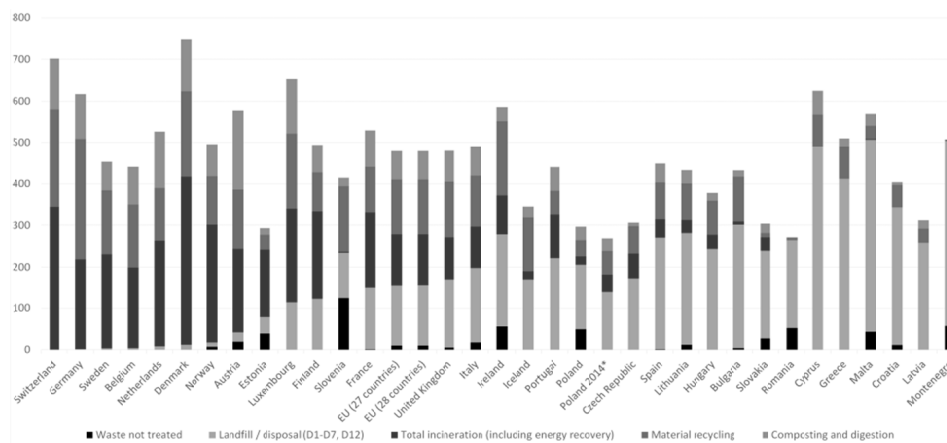
- increase the recycling rate for packaging waste to 80% by 2030, with interim targets of 60% by 2020 and 70% by 2025, including targets for specific materials;
- ban the landfilling of recyclable plastics, metals, glass, paper and cardboard, and biodegradable waste by 2025, while Member States should endeavour to virtually eliminate landfill by 2030;
- further promote the development of markets for high quality secondary raw materials, including through evaluating the added value of end-of-waste criteria for specific materials.
- Clarify the calculation method for recycled materials in order to ensure a high recycling quality level” [Communication from the Commission..., 2014].

However, putting special emphasis on the role of municipal waste management in the implementation of the concept of circular economy is a misunderstanding, which was expressed in Press Report No. 71/2014 from the European Economic and Social Committee of December 12, 2014, a response to the Communication from the Commission to the European Parliament, the Council, the European Economic and Social Committee, and the Committee of the Regions of July 2, 2014. “The Committee endorses the Commission’s proposals on waste reduction and recycling targets. However, it regrets that the proposals focus overly much on waste policies while neglecting “upstream” proposals. Only an inclusive action plan, bearing in mind the scarcity of resources and targeting the lifespan of products by smart ecodesign, their re-use and re-manufacturing, and thus greening the economy will strengthen Europe’s competitiveness and resilience in the long-term” [Press Report No. 71/2014..., 2014].

## **2. Municipal waste in Poland in contrast to other European states**

The official statistics presenting the production and processing of municipal waste in Europe place Poland among countries experiencing significant delays in the development of the industry – as opposed to more advanced nations – although not among those facing the most severe problems in this area. Landfilling is the least desirable method of municipal waste management in the European Union; therefore, figure 1 presents a list of more than 30 European countries (not only member states) studied by Eurostat, ordered according to their share of waste landfilled in the overall amount of waste produced. Poland – with a storage share of about 53% – was ranked 19th in the 2013 study, ahead of 13 other countries. The structure of the chart could be based on the sum of the shares of landfilled and non-processed waste, whose existence results from the weakness

of the statistics. Eurostat did not present the amount of unprocessed waste – it was calculated by deducting the other four categories from the overall amount of waste generated, and thus this type of collation was not presented.



\* data recorded for the year 2014 according to the Central Statistical Office

**Fig. 1.** Municipal waste in Europe in 2013 by states and processing methods [kg per capita]

Source: Based on Eurostat's data.

At the same time, the discussed chart presents the basic priority for waste management – avoiding its production by means of indicating the yearly *per capita* amount of waste produced in different countries. In this respect, Poland is listed only behind Romania and Estonia. As a result of the introduced reforms, methods of estimating the municipal waste stream have been changed in Poland. Since all inhabited properties became subject to the municipal waste management system in 2014 (theoretically, all municipal waste is collected and managed by relevant municipalities or communes), the process of estimating the stream of uncollected waste has been discontinued, which has resulted in further decrease in the officially visible waste stream. This tendency has been present in Polish statistics for many years now, which is a reason for a number of critical opinions about the way these reflect the reality (mutually exclusive processes: consumption grows – the amount of waste decreases). This criticism is all the more justified that the reform introduced in Poland does not provide for incentives to limit the amount of generated waste; quite the opposite – the flat rate fee encourages little concern with limiting the stream where it originates. For this reason, it is difficult to prejudge Poland's success in terms of the basic priority for municipal waste management, which in the EU hierarchy consists in avoiding waste generation.

The plans to introduce circular economy in the European Union, within which not only landfilling, but also incineration of waste are completely undesirable methods of waste management, force even today's ranking leaders to introduce far-reaching changes, as they largely base their systems on incineration (about 50% in Sweden, Belgium, Holland, Denmark, Estonia, Finland). Germany remains the closest to the circular economy model in terms of municipal waste management, with nearly 47% of the shares of material recycling and 17.5% of the shares of biological methods. In Poland, these are 13.1% and 10.8% respectively, which should be considered considerably divergent not only from the ultimate goal, but also from the ranking leader (Fig. 1).

### **3. Obstacles to the introduction of circular economy in Polish municipal waste management**

The basic obstacle preventing the introduction of circular economy in Polish municipal waste management is the assumption common in the society and among managers of municipal waste, that in this field one cannot stop generating mixed waste. Although nowhere is this belief officially formulated, its existence is confirmed by generally accepted legal, infrastructural and organizational solutions emphasizing mixed waste management in both central and the majority of local government units. The solutions used in Poland insufficiently penalize the generation of mixed waste, which makes this group prevail in the system. Meanwhile, mixed waste management makes it impossible for Poland to progress on the road toward the model of circular economy, as this type of waste processing is highly inefficient – in accordance with [Założenia do projektu..., 2010], it can be used to obtain only about 7% of secondary raw materials of poor quality and value to be recycled. The remaining amount ceases to be processed by being incinerated or landfilled; these processes are ranked low in the EU hierarchy of waste management methods, but characteristic of the linear model of economy.

The discussion of the problem was divided into three parts. The basis here is **social discipline in waste segregation** – without efficient waste segregation at the source of its generation, one cannot speak of large amounts of high-quality secondary raw materials that are an indispensable element of circular economy. The function of weak waste segregation discipline is the **model of collecting waste**, and, as a result, the method of its processing by units of **waste management infrastructure**.

### 3.1. Social discipline in municipal waste segregation

Low social discipline in municipal waste segregation is a common problem in Poland, and few exceptions in the form of individual municipalities, communes, or even smaller local communities only confirm this principle. Admittedly, in accordance with a mid-2014 survey, 89% of the respondents declared that they segregated waste, but simultaneously – according to the CSO – 86.5% of municipal waste for the whole year 2013 was mixed [*Environment 2014*, 2015].

The reasons for this problem are largely varied: of significance here are not only flawed regulations, but also a lack of economic incentives, low environmental awareness among society, or even – more generally – socio-cultural determinants. This study focuses generally on legal regulations and economic incentives that these regulations may create. Other issues will not be mentioned.

The prohibition of mixing municipal waste in Poland does not apply to its generation – producers of municipal waste may mix it regardless of whether or not a given entity declares waste segregation. Although by declaring waste segregation the producer of municipal waste undertakes to produce part of the waste in accordance with the provisions of regulations for maintaining order and cleanliness in a given municipality or commune in exchange for a lower fee, since the law does not formally require a specific portion (by weight or volume) of municipal waste that should be segregated by the producer, in practice, the majority of waste produced within the so-called model of selective collection is mixed.

The problem is deepened by the standard adopted by probably all municipalities, in accordance with which alongside selectively collected waste producers of segregated waste always have at their disposal containers for mixed waste, which, in combination with very few municipalities or communes that collect kitchen or ashes waste at the source, generally results in very low efficiency of municipal waste segregation in the country. According to [Strzelczyk, 2013], municipal waste includes more than 50% of kitchen waste (about 40%) and ashes (about 15%). If these two types are mixed with one another and with other types of waste, one cannot later manage such mixed waste within the model of circular economy, and the maximum possible successfulness of selective collection is reduced to several, at most several dozen percent of the whole amount. Hence the results cited not only in statistics by the CSO [*Environment 2014*, 2015], but also in reports prepared by Province Marshals for the purpose of tasks concerned with municipal waste management for the year 2013 [*National Waste Management Plan 2022*, 2016] – about 80% of mixed waste in the overall amount of waste collected in Poland.

### 3.2. Municipal waste collection model

The model of selective collection of municipal waste indicated in the previous subchapter assumes that people are able to properly segregate waste into legally required groups and place those in proper containers. This assumption is possible to be implemented in two scenarios. The former consists in long-term and stable education of the residents about what should and should not be done with waste. Several decades of this kind of work with the society might lead to high environmental awareness and an increase in the effectiveness of selective waste collection. An alternative to it might be a shorter period of intense monitoring of the activities of particular households and severe punishments for cases of improper waste segregation on the basis of strict rules concerning this matter. Both ways can be combined to achieve the effect of synergy.

Unfortunately, averaging the Polish conditions, one must note that neither of the scenarios has ever been implemented, and that there are very few municipalities or communes introducing long-term stable models of municipal waste segregation along with many years' environmental education programs, and those still achieve unsatisfactory results from the point of view of circular economy, which is usually caused by the fact that ashes and kitchen waste is overlooked in the applied and promoted model of waste segregation. Monitoring the activities of particular households in conditions of collective living in multi-family houses is out of the question in Poland due to infrastructural deficiencies; therefore, one cannot speak here of any punishments. Admittedly, there are technical possibilities of introducing the monitoring of the intensity of waste segregation by individual households, but it is difficult in terms of organizational aspects and requires a specific type of waste collection infrastructure; on the other hand, from the political point of view, punishing people for their failures or low intensity in municipal waste segregation is politically risky for local authorities, and thus such cases were not recorded in the study.

However, in the model of municipal waste segregation, the main obstacle to the introduction of circular economy is the frequent failure of local authorities to acknowledge kitchen waste and ashes as separate groups. These are undoubtedly the heaviest groups in terms of their share in the total amount of municipal waste [Strzelczyk, 2013], and, at the same time, they pollute other waste to the greatest degree in the process of mixing municipal waste.

Another important obstacle to the implementation of the concept of circular economy is insufficient hazardous waste collection infrastructure in the form of recycling stations, in Polish law called points of selective collection of municipal

waste (PSZOK). These recycling stations might help put used but not fully consumed durable goods of daily use (household appliances, furniture, clothes, books, etc.) to reuse instead of producing waste from those. Unfortunately, in Poland such stations are a rarity.

Although from among the 2,479 surveyed municipalities and communes (1,879 of which filled the questionnaires completely) 1,389 said that they had full-time recycling stations, at the same time more than 20 municipalities or communes reported that they had more than 10 such stations and four of them reported that they had more than 100 of those; therefore, it is difficult to say to what extent these stations correspond to the intentions of the legislator and whether these can be considered recycling stations supporting the model of circular economy. After all, the scope and method of functioning of the stations were not investigated; the study considered only the declarations of municipalities or communes concerning the legal management of recycling stations and the costs of those, and thus conclusions in this area are incomplete and imprecise.

### **3.3. Municipal waste management infrastructure**

Municipal waste management infrastructure must be adapted to the waste that is generated. Polish plants processing mainly mixed waste prevail. According to the document [Aktualizacja Krajowego..., 2015], “96 regional mechanical and biological processing plants for municipal waste (...) and one mixed municipal waste incineration plant operated in Poland in 2013”. These plants offered a total capacity of approximately 7.5 mln tons of waste per year, but processed only about 4.2 mln tons. Moreover, under construction there are six more municipal waste incineration plants to be used mainly to manage mixed municipal waste; those have a total processing capacity of approximately 1 mln tons per year.

“During the works on the Update of the 2014 *National Waste Management Plan*, it was agreed that in the next few years the construction of eighteen municipal waste incineration plants (aside from those currently under construction) and RDF processing plants with a total capacity of about 2.1 million Mg per year would be planned. Due to their specificity, the majority of these plants were to be cross-regional. Taking into consideration plants under construction at the moment of the development of the 2014 Update (...), one may estimate that the total capacity of these municipal waste incineration plants in the country might exceed 3.1 million Mg per year” [Aktualizacja Krajowego Planu..., 2015].

According to the balance of availability of municipal waste presented in the [Aktualizacja Krajowego Planu..., 2015], it can be clearly observed that with the



plants in operation, plants currently under construction, and plants to be built there will be about 1 million tons of “input” too little per year. However, a more serious problem is the clash between the requirement saying that no later than in 2030 at least 70% of municipal waste should be recycled, which is to be introduced in Europe in connection with the [Communication of the Commission..., 2014], and the total capacity of the Polish existing, constructed, and planned mechanical and biological processing and incineration plants for municipal waste, which amounts to about 10 mln tons per year – roughly as much as the annual amount of waste collected.

The excess capacity of mixed waste processing plants is likely to become a significant obstacle to the development of circular economy in the future. The pressure to increase selective collection of municipal waste at the source and to simultaneously allow the development of circular economy will be successfully superseded by the pressure to provide the “input” of mixed waste for mechanical and biological processing and incineration plants for municipal waste, dictated by the need to provide return on investment. As these plants were and are built mainly on the basis of public funding, one cannot expect the authorities to try to hinder their activities by introducing regulations limiting the stream of mixed waste; quite the opposite – excess processing capacities in the abovementioned plants will promote the policy of stimulating the production of mixed waste.

## **Conclusion**

As Poland, we are only at the beginning of the road toward circular economy. The implementation of this objective will not be easy, and particular goals should be considered to be long-term projects. The Polish municipal waste management industry is ready to accept the challenge; however, not without concern. Nevertheless, we must rebuild the foundations of the system, and then proceed to laboriously implement changes at the operational level. The new [*National Waste Management Plan 2022*, 2016] is preparing the industry for a transformation, introducing numerous objectives taking into account the EU policy of municipal waste management. Its success will depend on close cooperation between central and local authorities, entrepreneurs, and the society, as this area requires not only efficient central and local regulations, but also great social effort and the openness of businesses.

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### **POLSKIE ODPADY KOMUNALNE W KONTEKŚCIE PLANÓW TRANSFORMACJI GOSPODARKI UNII EUROPEJSKIEJ DO MODELU GOSPODARKI O OBIEGU ZAMKNIĘTYM**

**Streszczenie:** Unia Europejska przygotowuje się do wdrażania postulowanego przez ruchy ekologiczne modelu gospodarki o obiegu zamkniętym, którego podstawowym celem jest maksymalizacja długookresowej efektywności wykorzystania zasobów naturalnych. Gospodarka o obiegu zamkniętym ma zastąpić dotychczas powszechny model linearny, który nadmiernie eksploatuje zasoby naturalne, co dla Europy może być strategicznie niebezpieczne z uwagi na ograniczony dostęp do wielu surowców. Artykuł opisuje stan polskiej gospodarki odpadami komunalnymi na podstawie oficjalnej sprawozdawczości oraz problemów branży sygnalizowanych przez doniesienia prasowe w kontekście wymogów zaproponowanych w oficjalnych dokumentach UE. Celem artykułu jest omówienie podstawowych barier polskiego systemu zarządzania odpadami komunalnymi na drodze ku gospodarce o obiegu zamkniętym.

**Słowa kluczowe:** gospodarka o obiegu zamkniętym, polskie odpady komunalne.