

PACKAGING WASTE MANAGEMENT ON EXAMPLE OF CITY ZIELONA GÓRA

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Abstract:

The article presents the legal requirements of the European Union's packaging waste, and their most recent transposition into Polish law. The author has attempted to describe selected achievements of the Department of Public Utilities and Housing (DPUaH) in Zielona Góra, which for many years on behalf of the city, in a systematic way it's developing municipal waste management system (including packaging), consistent with EU policies and objectives of sustainable development. The deficiencies and weaknesses in the system are taken into consideration, whose liquidation is a priority for future investment of DPUaH consistent with the Waste Management Plan for the City of Zielona Góra.

Key words: Directive 94/62/EC, Directive 2008/98/EC, packaging waste, recovery, recycling

INTRODUCTION

Packaging industry as packaging themselves are very important in industry of every country in the world. As A. Korzeniowski writes "almost 90% of all products made in the world require using suitable packaging" [7]. According to act on packaging and packaging wastes from 11 of May 2001 (Journal of Laws of 2001, No 63, Item 638 with amendments) packaging can be divided into: summary, transport, unit and from the last group the biggest amount of wastes are produced in the shortest time. Their life cycle is very short, that causes the need of management of packaging waste in e.g. collecting, transport, recovery and neutralization in proper way and in proper place [22].

Packaging wastes understood as "all packages including packages of multiple use which are removed from secondary usage, are the wastes in meaning of law regulations about wastes, excluding wastes produced in process of packaging production", compose around 50-60% volume of municipal wastes but weight - around 26-30% of municipal wastes [8]. Because of continuous and dynamic increase of produced municipal wastes it is very important to develop the management system of them (including packaging wastes) to reduce amount of producing and depositing in landfills.

According to policy settlements of EU which promotes ideas of sustainable development, waste economy is one of the most difficult tasks for local governments (municipal wastes) and enterprise (manufacturers of industrial wastes) which requires quick solution. Complexity of mentioned task and increase meaning in process of proper creating of sustainable development highlight topicality of taken topic. Aim of this article is to present previous achievements of the Department of Public Utilities and Housing (DPUaH) in Zielona Góra in range of modifications in law regulation. Moreover author indicates the inaccuracies in statistics and deficiency in waste economy system which are priority ob-

jectives of future DPUaH's investments consistent with Waste Economy Plan for the city of Zielona Góra.

LEGAL SETTLEMENT CONCERNING PACKAGING WASTES

Legal settlement system creates: international agreements (conventions), community law (primary and derivative) and national legislation (laws and regulation). Currently, Polish legal system of waste management is very expanded. It is not only consists of the strict rules for waste management, but also other acts concerning e.g. environmental protection, prevention of environmental damage and its repair, monitoring and statistics in the field of waste management, etc.

EU basic legal act regulating the handling of packaging waste is Directive 94/62/EC on packaging and packaging waste (supplemented by four decisions of the European Commission and a some numbers of standards), which requires on the Member States to prevent the production of packaging waste, to ensure that reduced weight and the amount of packaging placed on the market the minimalized, and the development of reusable packaging systems, which help to reduce their impact on the environment. The Directive also set levels of packaging recovery and recycling, which member states have to achieve until 2014. Thus, according to the directive the packaging waste management should include in the first place preventing from their producing (e.g. reuse of packaging), and the next step should be their recycling and other forms of recovery. The European Commission on 11.02.2004 adopted Directive 2004/12/EC amending Directive 94/62/EC on packaging and packaging waste, which proposes a more precise definition of packaging and to increase the level of recovery of packaging waste - not later than 31.12.2008 at least 60% by weight, and the recycling level between 55% and 80% [4, 6].

The main national act which regulates the disposal of the packaging is the **law on packaging and packaging waste**

of 11 May 2001 (Journal of Laws of 2001. No. 63 pos. 638, as amended.), to which the articles (Art. 5, Art. 6, Art. 7, Art. 9, Art. 10, Art. 19), applies the relevant regulations of Ministry of the Environment, and which makes in its regulation the implementation of the directive of the European Parliament and Council Directive 94/62/EC of 12.20.1994 on packaging and packaging waste (Official Journal. L 365, 31.12.1994, p 10, as amended.). The following decision also applies to packaging [21-25]:

- Environmental Protection Law of 27 April 2001 (Journal of Laws 2008. No. 25 pos. 150, as amended);
- Waste Act of 27 April 2001 (Journal of Laws 2010. No. 185 pos. 1243, as amended);
- Act of obligations of companies in the management of some wastes and about the product and deposit fees of 11 May 2001 (Journal of Laws 2007. No. 90 pos. 607, as amended);
- Law on amending the Law on maintaining cleanliness and tidiness in municipalities and other acts from 1 July 2011. (Journal of Laws of 2011., No. 152, item. 897, as amended) which amended the Act of 13 September 1996 about maintain cleanliness and tidiness in municipalities (Journal of Laws of 2005 No. 236, item. in 2008, as amended).

In November 2008, the Directive 2008/98/EC was enacted in the matter of on wastes [5], which significantly changes the current rules for almost all definitions and adds new ones. There is a new way to define the concept of waste, recovery and recycling (Art. 3) and Annex II was added which contains non-exhaustive list of recovery processes. The Directive also contains definitions, which may be referred to as a new link in the waste economy chain – this is a dealer and a broker. “Dealer” means any unit acting as an

ordering party in a purchase, and then sale of wastes, thus it also denotes dealers who do not take the wastes over into possession (Art. 3.7). “Broker” means any unit organizing waste recovery or disposal on behalf of other parties, including brokers who do not take wastes physically into possession” (Art. 3.8). The most important thing is to create programs for waste prevention and waste production cycle (Chapter II, Art. 9).

Because of the coming Directive 2008/98/EC into effect, the work on amendments to the Law about wastes continues (partly revised text of the act and was standardized in 2010; Project of Waste Law is on Ministry of Environment’s websites) and the Act on Packaging and packaging waste (Project of law on the packaging management and packaging waste can also be found on the webpages of Ministry of Environment). Because of the extensity of the issues concerning the changes in the management of waste economy, only some aspects of them will be discussed in this article [11, 12].

In the case of packaging and wastes resulted by the process of making them, the significant was to determine: the requirements of packaging for reasons of environmental protection, the procedures of packaging which will ensure protection of human health and life and environmental protection in accordance with the principle of sustainable development and establishment of the rules of proceeding with packaging waste. Priority objective in these cases is to limit the amount of generated packaging waste and to ensure an appropriate level of recovery and recycling of packaging waste. The target level of recovery and recycling of packaging wastes (to be achieved by 12.31.2014) which appears in Annex 1 to the Project of Law on Packaging and Packaging Waste dated on 08.18.2008 (table 1) and only then it will be consistent with the requirements determined in Directive 2004/12/EC [9, 11].

Table 1
Suggested annual levels of recovery and recycling of packaging waste until 2014 [4, 8, 11]

I.	Packaging type that generated waste	To 31.12.2008r. according to 2004/12/EC level of recycling in %	National regulation			
			to 2010 r. - % level of		to 2014 r. - % level of	
			recovery	recycling	recovery	recycling
1.	Packaging (total)	55-80	min. 60	min. 38	min. 60 ¹⁾	55 ¹⁾ -80 ³⁾
2.	Plastic packaging	min. 22,5		min. 18		min. 22,5 ^{1) 2)}
3.	Aluminum packaging	min. 50		min. 45		min. 50 ¹⁾
4.	Steel packaging, including steel sheet	min. 50		min. 35		min. 50 ¹⁾
5.	Paper and cardboard packaging	min. 60		min. 54		min. 60 ¹⁾
6.	Household glass packaging excluding ampoules	min 60		min. 49		min. 60 ¹⁾
7.	Wood	min. 15		min. 15		min. 15 ¹⁾

1) Does not apply to packaging items in a direct contact with medical products defined in the regulations of the Pharmaceutical law,

2) The level of recycling includes only recycling as a result of which the obtained product is made of plastic,

3) Recycling at the level of 80% in 2014 is provided for in KPGO 2010, but it is not provided by Project of act of management of packaging and packaging waste.

Table 2

Calendar of implementation of new obligations according to the Act of changing the act about preserving cleanliness and tidiness in municipalities and some of other laws

I.	Deadline	Tasks
1.	to 1 st July 2012	- local council resolves an update of Province Plan of Waste Management (WPGO) and resolution in case of implementation WPGO, which will identify areas and regional systems for waste management such as the combustions, the sorting, the composting.
2.	to 1 st January 2013	- resolution of local regulations of sanitation and tidiness in the municipalities, - defining the height of taxes and the rules of bearing them, - that day the educational and informational campaigns for residents about the new rules of taking wastes in their municipality will be held.
3.	to 1 st July 2013	- the introduction of the new way of waste management on its territory, - selection of companies that transport wastes in tenders - to inform residents about new way of waste management in which every resident can give back their quantity (including e.g. bulky wastes) and segregation of wastes will be rewarded i.e. reducing bills for wastes.

MANAGEMENT MUNICIPAL AND PACKAGING WASTES ON EXAMPLE OF ZIELONA GÓRA CITY

The basic unit of local government is the municipality, which can create organizational units, such as budgetary units, budgetary establishments, household dummies, acting within its legal personality. Managers of these units operate on property in the field of management, based on the power of attorney granted by the executive authorities of the various local government units. They are created and equipped in the property, in order to perform tasks which are in the range of the activities of municipal (local) community [2]. Providing a rational, comprehensive and integrated waste management required a specific organizational structure, enabling the achievement of the tasks in name of the city of Zielona Góra. The executor of tasks related to public utilities since 1946, is a financial company under the name Department of Public Utilities and Housing (DPUaH) based in Zielona Góra, subjected to the City Council of Zielona Góra. According to the Status of DPUaH for managing the department and payment of legal action on behalf of the company is authorized Director of the Department with power of attorney granted by the Mayor. Director of the Department is hired and dismissed by the Mayor and the mayor evaluates director's work. The activities of the Department are under control of the City Council and Mayor [14].

Zielona Góra in waste management is a reflection of the activities of local government that are responsible for providing technical and organizational conditions conducive to the protection of the environment from waste. One of important aspects of these activities is to seek to have an adequate technical infrastructure, technology, facilities targeted in accordance with European and national law, to transform waste into useful secondary raw materials, it will increase the recovery and recycling. Accordingly, the City Council of Zielona Góra on 28.02.2006 adopted Resolution No. LXII/547/06 *Waste Management Plan for the City of Zielona Góra*, which is a separate part of the Environment Program and is consistent with the plans of higher level. An integral part of the Waste Management Plan for the City of Zielona Góra is a system of "Preko - ZG" created in 1993, ordering to the problem of wastes, both municipal, utility, as well as arising from industry activity. A feature of this system is modularity and the change of implementation order of individual modules, but on condition that all will be made [10, 13].

This Plan determines that the waste management is "comprehensive and integrated group of activities related

to the quality and quantity of municipal waste, commercial and industrial created in a certain area - taken to their minimization, collection, transportation, disposal and sales and operating in current legal, economic, technical and educational system supported by the control, supervision and social acceptance" [20]. The executor of the activities included in the Plan, including the rational waste management in Zielona Góra is DPUaH, in structure of which the Department of Waste Management (DWM) need to ensure [19]:

- sorting of individual fractions of municipal waste collected selectively,
- mechanical-biological conversion of mixed municipal waste and residues from the sorting,
- composting green waste,
- storage of the processed waste.

100% of households in Zielona Góra are covered by organized system for collecting and receiving waste, as well as business entities, facilities and also infrastructure placed in areas which are open space. Waste management system adopted and implemented in Zielona Góra, through years aims to increase the effectiveness of selective waste collection. To select commercial waste "at source" and especially packaging waste from all fractions of municipal waste, uses a different color and labeled containers with a capacity of 1.1 m³ and 5 m³. Wastes covered by the collection of raw materials "at source" are: paper, plastic, broken glass, textiles and bulky waste. Moreover, in the case of single-family housing, each person who signs a contract with Department of Public Utilities and Housing can get free waste bags usage in color:

- yellow - with a capacity of 90 liters for plastics and metals;
- blue - with a capacity of 90 liters per paper;
- white - with a capacity of 70 liters of glass (clear and colored).

According to Department of Public Utilities and Housing (DPUaH) everyone in the Zielona Góra produces an average of 360 kg of municipal waste per year, of which collected are 354 kg/M/year, which confirms the effectiveness of functioning waste management system. All waste collected from the city are transported to the Department of Waste Management "Racula" in Zielona Góra [18, 19].

Waste Management Department has a Sorting Waste Station (SWS), operational since December 2000, in which takes place [18]:

- reception of collected in a selective manner "at source" secondary raw materials,

- removal of contaminants from the waste stream and the acquisition of raw materials in a pure form of higher market value,
- reduction of waste disposed directly to landfill municipal,
- improve the quality of waste redirected to a mechanical-biological waste installation.

The basic elements of Sorting Waste Station: Grading line for sorting waste paper and plastics, equipment for grinding, pressing and baling of recovered materials including the load as a result from a municipal waste re-composting prepared to be as an alternative fuel known as the refused derived fuel (RDF) in order of getting cheaper heat. The station takes collected separately "at source" type of waste [19] to sort:

- waste paper,
- plastics,
- glass in the form of glass bottles and broken glass,
- wood in the form of furniture and construction waste, pallets excluding sawdust,
- waste rubber – mainly tires and inner tubes,
- textiles (excluding towels).

You could say that Sorting Waste Station completes municipal and industrial waste management systems. It took

the previous function of buying and preparing recyclable materials, performed by the Regional Enterprise Recyclable Materials. The amounts of secondary raw materials collected by SWS in the years 2006 – 2010 is shown in table 3.

Wastes brought to the station are mainly the wastes from the system of segregation "at source" and as you can see from the statement (table 3) are on average 6.62% of the total annual quantity of municipal waste adopted by the DWM "Racula" (the total 82716.10 Mg of municipal wastes were adopted in 2010). This ratio is low, despite of the deployment of suitable containers for waste in the city segregation and access to colored waste bags utility, which has already been written. According to the author, it shows insufficient public awareness (how, where and what should be sorted) and the lack of incentives and financial instruments to encourage residents to greater segregation of wastes. Secondary raw materials obtained in pure form are at the level of 3.5%, while the remaining amount is known as "sorted ballast", which is sent to municipal landfill. Part of recovered recyclables is also derived from the segregation of mixed municipal wastes. Selected raw materials with market value are transmitted to domestic production facilities in order to re-use. These quantities are compared with selectively collected waste "at source" and resorted in Sorting Waste Station presented in summary of the table 4.

Table 3
Summary of the amount of secondary materials by Department of Waste Management "Racula" [17-19]

I. Type of obtained secondary material	Amount of packaging wastes in Poland [Mg/year]				
	2006	2007	2008	2009	2010
1. Paper and cardboard	1606,09	1699,78	1831,93	1956,40	1837,91
2. Glass	595,76	632,23	716,09	654,97	700,48
3. Plastic	527,48	625,88	738,77	776,49	803,40
4. Metals	318,86	313,73	214,77	212,02	293,53
5. Fabrics	8,06	5,68	4,93	13,38	18,59
6. Organic wastes	364,04	407,86	377,44	0,00	0,00
7. Wood	4,72	13,94	8,98	12,46	8,10
8. Amount of secondary materials	3425,01	3699,10	3892,91	3625,72	3662,01
9. Sum of wastes collected selectively	4739,99	5661,89	6156,96	6011,83	5709,38

Table 4
The amount of collected and sold recyclable materials selected in years 2006 – 2010 [17-19]

I. Specification	Amount of secondary materials [in Mg] in the reporting year				
	2006	2007	2008	2009	2010
1. Wastes collected selectively "at source"	4739,99	5661,89	6156,96	6011,83	5709,38
2. Secondary materials selected in SOU Station	3425,01	3699,10	3892,91	3625,72	3662,01
3. Sold recycling materials	2063,00	2058,00	2063,00	2501,00	2769,00

As indicated by the *Waste Management Plan Update for Lubuskie* (WMPUfL), enacted in 2010, the 2006 recovery rate of municipal waste in the province was 84.4% (from the mass of 104.6 thousand Mg of waste subjected to recovery), of which Waste Management Department in Zielona Góra recovered was 22% of the total weight of the waste (22973.00 Mg). In the Lubuskie province 10.45% of municipal waste are wasted from the group of 15 or waste packaging, absorbents, wiping cloths, filter materials and protective clothing not specified in other groups (together 75482.67 Mg). The level of recycling of waste subjected to recovery was 80% in total, of which the packaging made from [1]:

- plastics - 71%,
- aluminum - 0%,
- steel - 35.5%,
- paper and cardboard - 90.9%,
- glassware - 0%,
- natural materials (wood and textiles) - 20.2%.

This level is formed mainly by cities in Lubuskie, including the largest Zielona Góra and Gorzów Wielkopolski. Recovery and recycling of municipal waste system is less in rural areas due to incomplete, 84% level of covered municipalities by organized system in waste collection. Changes in waste management system, introduced by the *Act to amend the act of maintain cleanliness and order in municipalities and some other acts* will lead to a complete coverage of all the inhabitants of towns and cities by waste collection system, but its effectiveness will still be depended on the attitude of its population.

Noteworthy is the fact that different data is available on the pages of Statistical Office in Zielona Góra and Department of Public Utilities and Housing (DPUaH) compared to data from WMPUfL. According to first source, the recovery system of recycled is working in Zielona Góra (and most are packaging waste - table 3), for others - there is zero economic recovery of glass and aluminum. These data require refinement and upgrades, especially in the case of *Waste Management Plan Update for Lubuskie* enacted in 2010, most data comes from 2006. According to the author worth of discussion and worthy of detailed study is aspect of the zero level of recycling of aluminum (which includes: carbonated soft drink cans, boxes, foil) as well as domestic glassware (all glassware, plates, glasses, mugs, pots, decorative glass e.g. vases, lamp shades, crystal), which next to the window and container glass cullet is part of cullet (presented in the table 3 pos. 2 under the general term "glass"), lack of which is theoretically supported by the new investments in the Department of Waste Management (DWM). Currently, the DWM is subjected to extends in the frames of the Project No. POIS.02.01.00-00-013/09 "*Expansion and modernization of the Waste Management System for the area of the Zielona Góra*", which assumes in its plans: construction of new headquarters D for municipal waste and development of DWM "Racula" in the field of [17]:

- construction of the technological facility with line for the segregation of glass;
- construction of the technology hall for bulky waste removal, electrical and electronic equipment waste;
- upgrading the storage of dangerous wastes.

According to the plans of Department of Public Utilities and Housing the expansion of the plant will increase its capacity, performance, and improve the rate of selected

waste, packaging waste in particular (currently capacity of sorting is 12,000 ton per year). In the case of stream of mixed municipal waste it is assumed that the expansion will increase the recovery of sorted waste, or reduce the amount of deposited ones in the landfill by about 1/3. A bulky waste also requires the refinement (as mentioned in the project), in which are often built the secondary materials which require recycling [1, 18].

Despite of the many challenging tasks that DPUaH sets itself, including the Department of Waste Management, the comparison of each method of waste disposal shows that the plant already meets European standards for waste management. Comparison of the contribution of each waste disposal methods used in Zielona Góra, on the background of the European Union and Polish is presented by the Figure 1.

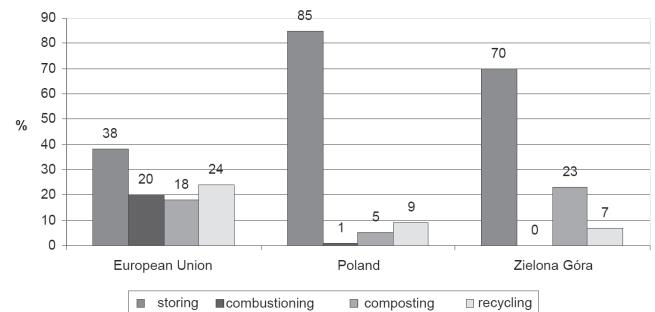


Fig. 1. Percentage usage of municipal methods in waste management in 2009. [15 - 17]

SUMMARY

Waste Management in Zielona Góra is oriented at preventing or reducing of negative impact of wastes on the environment and human health. Department of Public Utilities and Housing (DPUaH) on behalf of the City tries to ensure the rational and integrated development of municipal waste management system (including the packaging waste), consistent with EU policies and objectives of sustainable development. Operation of the plant includes the function of the collection, transport and waste management and neutralization of waste from individual households, businesses and enterprises, facilities and infrastructure in areas which are open space. As recognition and respect for European standards is that the selective collection of waste is 100% of households and establishments are engaged in economic activities, which means that the Zielona Góra already meet the targets contained in the newly introduced Law on amending the law to maintain cleanliness and order in municipalities and some other acts.

Zielona Góra built a modern and environmentally safe Department of Waste Management equipped in sorting and composting of waste and the landfill with the appropriate technological infrastructure in accordance with all EU standards. The planned expansion and modernization of the existing equipment probably will increase the recovery and recycling level of packaging waste, but the important role is played by the attitude of the residents and their involvement in the issue of segregation of waste "at source", which today is low (it is only 6.62% of the total amount of municipal waste per year adopted by the DWM). Moreover, refinement, updating and clarification require data on waste management in both the micro and macro region (which was written on several occasions [26-28]). The new Act [24] introduces changes in waste management, but as can be seen in the Zielona Góra example it will not bring

the expected result without appropriate public education, providing relevant information for residents and increasing their commitment to segregation "at source". The act will leave the entire responsibility for municipal waste on the shoulders of municipalities, cities and companies acting on its behalf, and the inhabitants despite of having the right tools for segregation will work in a traditional way or mix the wastes as they did before.

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