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## SELECTIVE COLLECTION OF COMMUNAL WASTE IN OPOLE AND STRZELCE OPOLSKIE

The economic transformation which has enforced changes in the Polish legal system, as well as Poland's aspirations to join the structures of the European Union, have markedly affected the national policy of waste management. The importance of the problem on both the local and global scales is tremendous, due to the necessity of protecting the natural environment and minimising costs, with a simultaneous optimisation of effects. As a consequence, new methods of neutralising waste or its economic utilisation are being introduced and constantly improved according to the classification and possibilities of processing it.

The present article focuses on communal waste, which is subject to collection on a pre-selection basis, that includes glass, scrap paper and plastic. The authors decided to examine the effectiveness of the undertaking in the area of two cities and communities of the Opole Province, namely in Opole and Strzelce Opolskie. An inventory was made of points dealing with pre-selective collection of waste, which are based in the examined area. Similarly, data referring to the amount of raw materials obtained in this way, the system of reception and cleansing of the latter, as well as their further management by responsible units were collected.

The article is based on of the legal acts which are currently in force and which include regulations concerning waste management, and also with the use of materials for the internal needs of companies dealing with the collection and further processing of waste material. The main aim is to compare methods of carrying out the tasks arising from the legal acts in two different communities and also to try to evaluate the economic effectiveness of the management of communal waste, which is collected on the basis of pre-selection.

Waste management comprises all sorts of activities aimed at the maximal protection of the environment. The priority activities in this respect are the following:

- prevention of waste formation or minimising its amount;
- utilisation of waste which is environmentally sound;
- neutralisation of waste compliant with principles of environment protection [Skalmowski and Skalmowski, 1996, 22].

Poland's aspirations to join the structures of the European Union impose on the authorities an obligation to unify and explicitly formulate norms and regulations concerning waste management. The latter is reflected in the binding legal acts included, among others, in the following documents:

- Act of 27 April, 2001: The Law on Environmental Protection [Government Regulations and Laws Gazette (GRLG) – Dziennik Ustaw – No. 62, Item 627];
- Act of 13 September, 1996 on the Maintenance of Cleanliness and Order in Communities [GRLG No. 132, Item 622];
- Act of 27 April, 2001 on Waste [GRLG No. 62, Item 628];
- Act of 8 March, 1996 on Territorial Self-government [GRLG No. 13, Item 74].

The Act on the Maintenance of Cleanliness and Order in Communities concentrates on communal waste and determines tasks for the community, as well as duties of owners of estates, e.g. Art. 4, Passage 1, which states that each estate owner is obliged to carry out a pre-selection of waste. An identical entry is to be found in the above-mentioned Act on Waste. It consists of nine chapters, where the basic terms and principles of waste management are explained. The most significant principle entails imposing on economic subjects a duty to apply such forms of production and services, or utilise raw materials that prevent formation of waste or result in keeping their amount on a low level. Chapter 3 deals with principles of elaborating plans of waste management and also regulates the calculation of penalties and charges for storage of waste (with the exclusion of communal wastes). The plans are elaborated at the national, regional, county and commune levels. In the remaining chapters of the act, the duties of those who possess waste, ways of dealing with waste containing PCB, waste oils, etc. as well as storage and neutralisation of the latter are discussed. One chapter also explains the principles of the international turnover of wastes. In cases where particular articles are not obeyed, set penalties are inflicted.

The Act on Communal Management determines the principles and forms of activities included in the tasks of the community, determined in

Art. 7, Passage 1 of the Act on Territorial Self-government. The most important resolutions in the above-mentioned act include:

- Article 2, which states that communal management may be carried out by the use of firms depending on the central budget or through commercial law companies;

- Article 3, Passage 1 – a community may entrust physical or legal persons, or organisational units that do not have legal status, with carrying out these tasks in the form of an agreement, with preserving the regulations of the Act on Entrusting Subjects with Public Orders.

While making decisions on waste management, the directives concerning the Act on Spatial Management and the Act on Territorial and Community Self-government must also be taken into account. The regulations of commercial and civil codes, as well as the Act on the Privatisation of State-owned Companies have an auxiliary function. Issues pertaining to this problem area are regulated in the Strategy of the Commonwealth, which comprises the following five principles:

- prevention, both through proper technologies and through products;
- recycling and re-usage of waste;
- optimal ultimate disposal;
- regulations concerning shipment (regulations protecting against hazards during transportation);
- reparation activities within the environment.

Due to the character of the present research, the authors concentrated on the principle of recycling and re-usage of waste. The term 'recycling' has come to determine a system of periodic, economic utilisation of waste as waste raw materials coming from exploited, faulty or damaged goods. The possibility of the re-use of such follows from the fact that they are made from renewable materials, that is it is possible to restore initial properties to them, to recover individual components or to remove harmful elements by applying appropriate operations [Rosik-Dulewska, 1999]. It is obvious to state that not all of the produced types of waste have the same degree of suitability for further processing, due to the criteria of the materials used, chemical composition, toxicity or the degree of hazard to environment. The process of the segregation of waste includes both waste like cells or car batteries, which is dangerous to the environment and waste available for re-usage – recycling, which brings economic and environmental benefits.

Pre-selection of waste and management of waste materials are one of the fundamental elements of a waste management system. The most significant tasks fall, in this respect, to basic self-governmental units, that is communities and counties. Their competencies comprise construction, maintenance and exploitation of communal waste storage grounds and

also creation of conditions favouring pre-selection, segregation and storage of waste that can be available for future use, as well as organisation of common systems involving several communities.

The necessity of preparing programs of environmental protection by communities is an important obligation introduced by the Act on Waste. Such programs must include issues referring to the rational management of communal waste [Jakubczyk et al., 1998] (Act on Waste: Art. 14, Passage 6; Act on the Law of Environmental Protection: Art. 17, Passage 1). This means a procedure which takes into account a tendency towards decreasing the general mass of waste, economic or other use of waste, and – eventually – its neutralisation (Act on Waste: Art. Art. 5–13). Also the Act on the Maintenance of Cleanliness and Order obliges communities to create a system which includes pre-selection, segregation and re-use of waste (Art. 3, Passage 2, Point 6). There are three types of segregation distinguished as follows: ‘at source’, in sorting plants and negative. Segregation of waste should include the following materials: paper and cardboard; white and coloured glass; plastic; scrap steel; scrap non-ferrous metal; textiles; rubber articles, tires, etc.; large-dimension waste; construction debris; organic waste; hazardous waste.

Segregation ‘at source’, considered to be the most profitable, is implemented in the case of basic types of materials, that is paper, glass, metals and plastic. Consequently, the waste which finally reaches the dumping ground is the waste which cannot be utilised or re-used economically anymore. This is compliant with the legal terms recorded in the Act on Waste and with the need to minimise the amount of waste, because of the costs of its storage.

Based on the research into the morphological composition of waste, it can be accepted for the reason of assessment that the highest percentage of the whole amount of communal waste in cities comes from organic waste (34.5%), followed by paper and cardboard (20%), plastic (13%), glass (12%), mineral waste (9.2%) and metals (3.5%) [Zaworska-Matuga, 1999].

It can therefore be assumed that ultimately with a widely-spread system of pre-selective collection and utilisation of waste it will be possible to decrease the amount of waste by about 50%, which – in turn – promises the prolongation of the working life of waste dumps and lowering of the costs of their exploitation. Long-term benefits, primarily, will be substantial, mainly because of protection of the environment. The processing of raw materials, however, requires lower outlays of energy, decreases the outlay of primary and necessary raw materials in the technological processing of, for example, water.

The collection of communal waste on a pre-selection basis began in Opole in 1993 and comprised scrap paper, white and coloured glass and

aluminium cans. This system turned out to be ineffective and, accordingly, the company LOBBE, who were responsible for removing the waste, in agreement with the authorities of the communities they were rendering services to, took a decision to modify the project. The new concept, which was introduced in 1997 and implemented a year later, limited the collection to two types of scrap materials, namely scrap paper and glass, collected all over the city, and plastic at several selected points.

In the other area under examination, that is in the town and community of Strzelce Opolskie, segregation was begun by collecting cardboard boxes, which – however – were not deposited into separate containers. In 1999, 48 sets of containers designed for collecting scrap paper and glass were purchased and distributed all over the town. Then a complex segregation process was started. The project of collecting PET bottles and plastic packages has been in operation since May 2001 and has been conducted within the pilot system in the city and in a few villages. Due to the fact that the activity undertaken in both areas displays a similar range, it is possible to make comparisons as regards changes in the effectiveness of the management of waste which is subject to segregation.

In the area of the city of Opole, whose population in 2000 amounted to c. 129 thousand inhabitants, 197 two-container sets were deployed. All the features of the bins conform to Western-European norms: the containers are of MGB type with a capacity of 1.1 cubic meters, made of tinned steel, and with a service life up to 25 years. What makes the use of the bins simple are the distinct colours: blue denotes paper, green – glass. The sets of containers are situated in places easily accessible to residents, according to the point-seat system. This system assumes that none of the residents should have to walk more than 500 meters to a set and there should be one set for every 1,000–1,500 users. Nevertheless, for Opole, the distance was altered to 200–300 meters and so was the number of residents per set – 500–1,000 (the average was 655 people per set), respectively. Depending on the density of population, the area of Opole was divided into three zones with regard to the frequency of the removal of waste paper and two zones with regard to the collection of glass. The frequency of removing the waste materials was adjusted to the average rate of filling the bins and amounts to between 1 and 5 weeks, depending on the zone and the material. The collected waste is taken by means of specialist vehicles to the base of the LOBBE company, where – on completing a shipment load, the waste materials are transported to the receivers. The major receiver of the waste paper is the paper mill based in Krapkowice, and the cullet is shipped to the glassworks in Orzesze.

The analysis of the effectiveness of the management of waste for recycling covers the period after the implementation of the 'new' system and refers solely to the collection of glass and waste paper. This results from the limited accessibility to source data.

After changing the system, 84 tons of waste paper and 99 tons of glass were collected from November 1998 to May 1999.<sup>1</sup> From the assessment calculations it follows that during a whole year, provided the same level of waste collecting were maintained, there would be 144 tons of waste paper and 170 tons of glass collected. Comparing these figures with the real ones for the year 2000, one can notice a positive upward trend in the amount of collected waste materials, especially cullet; collection of waste paper has remained at a stable level. The real (for the years 1998/99 and 2000) and the planned amounts of collected waste raw materials are presented in Table 1.

**Table 1.** Real and planned amount of collected waste raw materials in Opole in the years 1998/1999 and 2000

Type of waste material	Amount of collected waste [t]		Planned amount of waste material collection [t]
	1998/99	2000	
Waste paper	144	146	575
Glass	170	195	290

Source: Own elaboration on the basis of data obtained from LOBBE Ltd. Opole.

As it can be easily noticed, both the amount of recovered waste paper and that of glass are still far behind the planned ones. About 3% of all the volume of waste paper that can be recovered is collected, and 2.7% of the cullet. The municipal dumping grounds receive about 4,500 tons of waste paper and 7,200 tons of glass each year. It is clear that the waste had not been pre-selected, which makes for as much as 35% of all communal waste in Opole. According to the project only 13–15% of waste not available for further recovery should reach the dumping site.

A serious problem in the system of waste raw materials collection is contamination of the waste, which amounts to *c.* 10% in the bins. This mainly occurs in residential districts, and refers to throwing other waste than required into the bins. In consequence, the waste raw materials are lost for recycling or there is a need to apply costly segregation and additional cleansing by hand.

<sup>1</sup>Materials issued for internal use of LOBBE Ltd. in Opole.

The community of Strzelce Opolskie is located in the eastern part of the Opole Province. It is inhabited by c. 35.5 thousand residents, 23 thousand of whom live in urban areas. The community belongs to a group of communities of a high degree of industrialisation, hence there is a greater variety of waste there.

In order to carry out the tasks imposed by legal acts, a program called "Program of Protection of Environment for the Town and Commune of Strzelce Opolskie for the years 2000–2005" was created, a substantial part of which deals with waste management issues [Zaworska-Matuga, 1999, 17]. According to the program, in the years 2000–2001, a number of tasks were realised within the waste management system. The tasks can be divided into several groups as follows:

- preparation and intensification of collection of waste on a pre-selection basis;
- modernisation of the dumping grounds in Szymiszów and their exploitation;
- liquidation of 'wild' dumping sites;
- cooperation with neighbouring communities with a view to comprehensive solutions of the problem.

As far as pre-selective communal waste collection is concerned, the activities undertaken by the community followed two paths. A plan for expanding the collection of waste raw materials and large-dimension waste was prepared and implemented, with attention paid simultaneously to collecting segregated waste, that is its management. At the moment, there is practically no system of pre-selective collection of waste in operation in Poland. In the majority of communities such a system is either just being introduced or still in its initial phase of development. Similarly, in Strzelce Opolskie, most of the waste is collected and stored in a traditional way in the dumping grounds in Szymiszów. During the last 10 years (1990–2000), the amount of stored waste systematically grew and reached its peak in 1999. Afterwards it dropped by 2 thousand cubic meters in the year 2000 (54 thousand cubic meters).<sup>2</sup>

It is hard to answer the question whether the observed drop is a result of the conducting of the pre-selective collection of waste or merely a temporary fluctuation connected with economic or demographic conditions. If the downward tendency is to continue in the following years, it will be possible to determine these dependencies more accurately. Altogether, as a result of the collection of waste on a pre-selection basis carried out in the area of the town (24 sets of containers) and community (ditto) of

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<sup>2</sup>Materials issued by the Municipal and Commune Office of Strzelce Opolskie.

Strzelce Opolskie conducted from 1999 to August 2001, there were recovered 45,165 kg of waste paper and 41,400 kg of glass were removed.<sup>3</sup>

Because we can only analyse the global results for the years 1998–2000 and specific data for the first half of 2001, it is difficult to make an explicit evaluation referring to the rise in the amount of recovered raw materials. However, the overall tendency seems to be of an increase. The company which is responsible for collection and removal of the communal waste in the commune is Przedsiębiorstwo Usług Komunalnych i Mieszkaniowych (Company of Communal and Housing Services). Secondary segregation takes place on the premises of its base, and in the next phase the raw materials are transferred for economic utilisation. The receiver of the cullet is the glassworks "Jarosław", based in Jarosław (formerly the glassworks Orzesze near Mikołów), while the waste paper is shipped to the paper mill in Krapkowice.

Summing up, the results of the research allow us to state that the pre-selective collection of waste that is carried out in the chosen administrative units of the Opole Province does not at all match the norms concerning recovery of waste materials introduced into the market, which were set up by the European Union. The activities undertaken by companies which deal with collecting, transporting, segregating, cleaning thoroughly and transferring waste raw materials to particular receivers encounter numerous difficulties. The most hampering obstacle on the way to effective waste management seems to be the low price offered for the recovered material, which does not fully cover the high costs borne within the complex service of the whole system (concerning mainly the costs of transportation). Despite the fact that all the instructions as regards the number and type of containers, as well as the directives referring to the technical service of the system have been satisfied successfully, this kind of business activity is unremunerative in the present conditions. It is postulated, accordingly, to create systems of financial support for processes of recovering raw materials from waste.

Low pro-ecological awareness also is a deterrent in the process, so is unwillingness to undertake activities connected with the segregation of waste in households. Such an approach results from a lack of tradition and acquired attitudes. The lack of willingness on the residents' part to pre-select their waste derives from inadequate information on the system and a lack of understanding of the project. It also stems from the conviction that their efforts are in vain since "after all, everything will sooner or later find its way onto the dumping ground". It is not only edu-

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<sup>3</sup>Materials issued by the Municipal and Commune Office of Strzelce Opolskie.

cation that is important in this case, but also a proper information policy to propagate concrete activities taken by local authorities, including explaining the whole technical process applied with reference to the collected waste raw materials up to their final recycling. In order to accomplish the goals mentioned above, it is vital that information programs should be organised to instil in society the need to recover waste raw material.

## Literature

- Government Regulations and Laws Gazette (GRLG) – Dziennik Ustaw, No. 13, Item 74, 1996.
- Government Regulations and Laws Gazette (GRLG) – Dziennik Ustaw, No. 132, Item 622, 1996.
- Government Regulations and Laws Gazette (GRLG) – Dziennik Ustaw, No. 62, Item 627, 2001.
- Government Regulations and Laws Gazette (GRLG) – Dziennik Ustaw, No. 62, Item 628, 2001.
- Jakubczyk, Z., Pastusiak, O., Lichtoń, J., “Gospodarka odpadami w świetle aktualnych przepisów prawnych”, in: *Regionalna gospodarka odpadami*. Warszawa, 1998
- Rosik-Dulewska, C., *Podstawy gospodarki odpadami*. Lublin 1999.
- Skalmowski, K.; A. Skalmanowski, *Poradnik Ekologiczny dla samorządów*, 2, 1996.
- Zaworska-Matuga, W., K. Kobiela, M. Moczulski, W. Zieliński, *Program Ochrony Środowiska Miasta i Gminy Strzelce Opolskie na lata 2000–2005* (The Program of Environmental Protection for the Town and Commune of Strzelce Opolskie for the years 2000–2005), 1999.