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ADMINISTRATION OF THE SYSTEM OF MUNICIPAL SOLID WASTE MANAGEMENT LUBLIN EXPERIENCE IN THE PERIOD FROM 2007 UNTIL 2010

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Abstract. This article presents main concepts of building modern system of communal resources management in Lublin. The author indicates major tools used for realisation of the project, describing the results of introducing above mentioned system in the first four years of its functioning (2007–2010).

Key words: solid waste management, Lublin

Introduction

The dynamic social and economic development of Poland after 1989 caused that our society started to produce more and more material goods and services in order to satisfy their own needs. An increased demand for consumer goods was connected with a rapid increase in solid waste volume.

Technical and technological progress, migration and urbanisation processes of urban centres caused that solid waste has become one of the major challenges facing local governments of those cities. For more than twenty years, since early 1990s, the system of municipal solid waste management in Poland has been developed based on the subsidiarity principles and free competition in a municipality area – collecting companies – property managers. In the second half of the decade two key legislative acts regulating the matter of solid waste management were adopted.

In 1996 the Act on cleanliness and order in municipalities abbreviated as [a.c.o.m.] [1] and the Act on solid waste of 1997 abbreviated as [a.w.] [2] with subsequent amendments in 2001 were adopted.

Poland's accession to the European Union resulted in a significant change in Polish legislation on solid waste management in 2005.

It became necessary to create legal instruments which would allow for obtaining recovery rates of municipal solid waste set out by the European Union and reduce the amount of landfilled waste, especially biodegradable waste.

The Act of 29 July 2005 amending the Act on solid waste and some other acts [3] fundamentally changed the two most important legal acts regulating solid waste management, including municipal solid waste. This refers to the above-mentioned acts:

– on cleanliness and order in municipalities of 1996 [1] and

– on solid waste of 1997 with subsequent amendments [2]

Both a.c.o.m. and a.w. contained provisions regarding the obligations of municipalities in the field of municipal solid waste management, development and implementation of separate collection system and collection of municipal solid waste from property owners and their proper further management.

Municipalities were provided with legal tools allowing for the construction of modern municipal solid waste management systems, allowing for the fulfilment of the obligations imposed by the European Union.

Polish legislation defines municipal solid waste as waste produced by households but also as waste which does not contain hazardous waste and comes from other producers but because of its nature or composition is similar to waste from households.

This group also includes green waste composed of parts of plants from the maintenance of green areas, gardens, parks and cemeteries, as well as markets excluding waste from cleaning streets and squares [2].

The authorities of Lublin noticed the problem of the increasing production of municipal solid waste and drawing on the experience of Western European countries regarding the administration of solid waste management adopted the Resolution of the City Council No. 207 of 26 June 2003 [4] which introduced in the city the separate collection system of municipal solid waste with the division to dry fraction and wet fraction defining:

– **dry fraction** as municipal solid waste including:

1) uncontaminated paper, cardboard, including packaging

2) plastic, including packaging (e.g. foil, plastic bottles)

3) metals, including packaging, e.g. aluminium and metal tins, small scrap

4) glass packaging

5) wooden packaging and textiles

6) composite packaging (e.g. drink and dairy products cartons)

Defined as the type of solid waste with the code 20 01 99 according to the Regulation of the Minister of Environment of 27 September 2001 on solid waste catalogue [5] suitable for re-use for material or energy purposes.

– wet fraction as municipal solid waste (e.g. food waste, contaminated paper and plastic waste, damaged dishes, worn textiles and other waste) listed in the group 20 in the waste catalogue according to the Regulation of the Minister of Environment of 27 September 2001 on waste catalogue.

The, Solid waste management system', apart from the above-mentioned legal regulation, was defined in detail in the Solid Waste Management Plan for the city of Lublin [4]. The plan was approved by the City Council on 8th July 2004 and it complied with the higher tier plans, i.e. The National Solid Waste Management Plan and Waste Management Plan for the Lubelskie Voivodeship. [6]

At the end of 2003 the City Council commissioned the Organisation and Management Scientific Society in Lublin to carry out tests on the morphological composition of municipal solid waste taking into account the type of buildings. The analysis was to provide a 'base' (reference point) in relation to which an assessment of the implementation of the separate collection system and its optimisation are made. The study involved three different types of buildings in the city, i.e. high multi-family buildings (skyscrapers) medium multi-family buildings (four-storey blocks of flats) and single-family houses.

In each of the three types of buildings organic waste (so-called wet fraction) had the largest percentage by weight, its amount ranged from 52.8 % (single-family houses) to 57.8 % (multi-family buildings) (Table 1).

Table 1

Solid Waste make-up according to the type of buildings

No.	Waste component group	Type of buildings		
		high multi-family	medium multi-family	Single-family
1	2	3	4	5
1.	Organic waste	57.8	57.5	52.8
2.	'Green' waste	0	0	0
3.	Paper, cardboard	8.5	7.7	6.1
	including packaging	*2.2*	*2.4*	*1.65*
4.	Plastic	13.8	9.2	7.2
	including packaging	12.6	8.5	6.15
5.	Glass	8.3	12.4	9.9
	including packaging	8.3	11.9	8.7
6.	Composite waste	6.9	5.7	6.2
7.	Textiles	2.2	3.6	2.9
8.	Metals	2.0	2.1	2.7
	including: iron packaging	*1.6*	*1.8*	*2.1*
	other from iron	*0.2*	*0.16*	*0*
	colour	*0.2*	*0.16*	*0.6*
9.	Mineral waste	0	1.5	0.15
10.	Small fraction	0.2	0.2	14.6

Source: Own work on the basis of materials of the Environmental Protection Department of the City Hall [7]

A large part of the collected waste consisted of reusable materials from 27 % in single-family houses to 32–37 % in total in medium and high buildings.

Medium buildings and single-family houses produced the most of glass (including packaging), i.e.

12.4 % and 9.9 %, while in high buildings – plastic – 13.8 %. The amount of separated metal was similar in all types of buildings and ranged between 2–2.2 %.

The main differences in the comparison of the composition of waste were found in the amount of small fraction (ashes), which in single-family houses amounted to 14.6 %, while in multi-family buildings only to 0.2 %.

Hazardous substances were observed in solid waste in the course of the study. 13 batteries, one car battery without electrolyte and 3 litres of engine oil were found in the total mass of the tested waste.

In the second half of 2005 local government of Lublin decided to create an integrated system of municipal solid waste management and subject it to the principles of sustainable development.

It was assumed that the system has to fulfil four basic premises; it has to be:

1. **realistic** – have economic foundations of its operation;
2. **flexible** – its operation has to take into account the changing environment;
3. **effective** – ensure the achievement of the recovery rates and reduction of the amount of landfilled waste;
4. **verifiable** – there are objective tools to check its effectiveness.

The following two local laws adopted in 2006 were legal instruments of the new integrated system:

§ The Resolution of the City Council of Lublin No. 963/ XXXIX / of 23 March on the Regulations of cleanliness and order in the city of Lublin [4];

§ The Ordinance 496/2006 of the Mayor of Lublin of 16 November 2006 on the requirements for entrepreneurs applying for a permit for the collection of municipal solid waste from property owners and emptying holding tanks and transport of wastewater in the city of Lublin [4].

The new legislation maintained a basic separation of solid waste into wet fraction and dry fraction. Furthermore, in order to implement new statutory requirements inhabitants were required to separate collection of (Fig. 1):

§ green waste
§ solid waste from construction works
§ bulky municipal waste
§ hazardous municipal waste
§ waste electrical and equipment

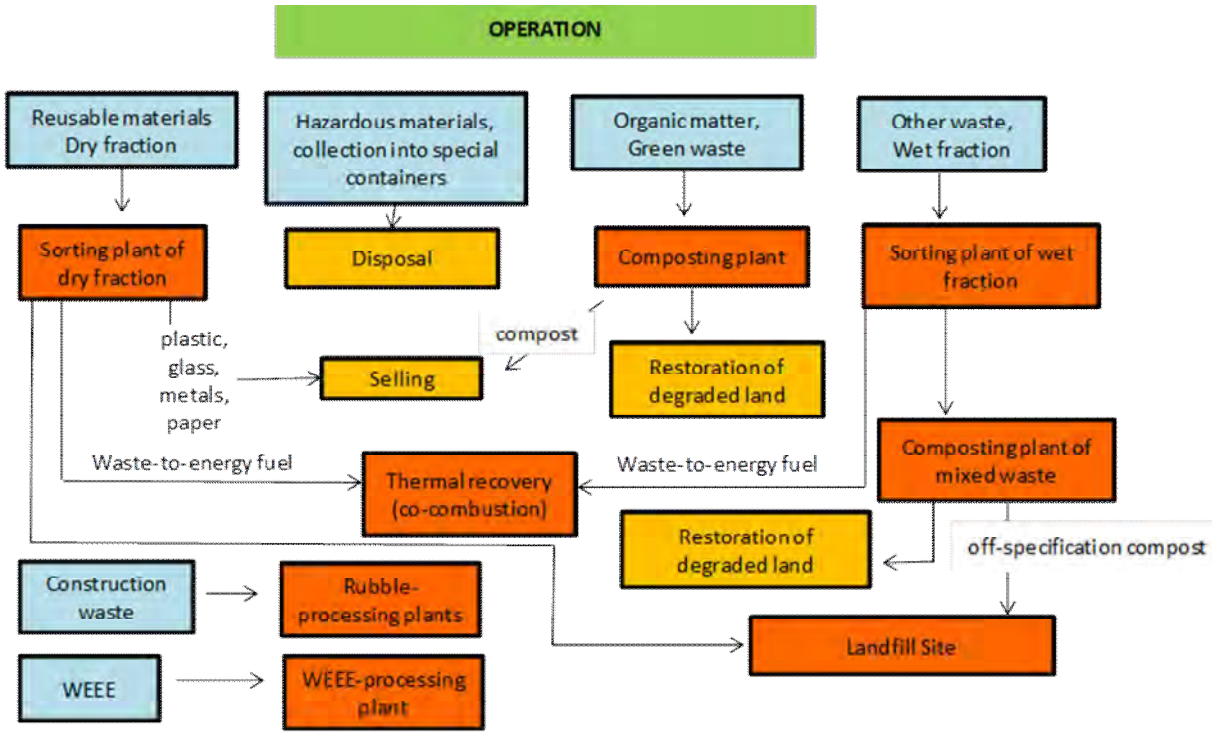

Fig. 1. Functional diagram of solid waste management in Lublin in 2007

Source: Own work on the basis of materials of the Environmental Protection Department of the City Hall

In order to implement these ambitious plans it became necessary to develop an effective model of cooperation with the following main cells:

– the inhabitants represented by district councils;

– entrepreneurs managing solid waste / WMP-Sita; WMP-Kom-Eko;

– local governments of municipalities.

It was assumed that there will be four functional areas of close cooperation:

– **education;**

– **organizational;**

– **economic;**

– **logistics.**

In the **education** area particular emphasis was put on informing each inhabitant of the city about the conditions of the new system:

§ 50 thousand information folders were prepared, printed and distributed among the residents;

§ an advertising spot promoting separate waste collection under the title 'Our Town – Our Home' was prepared and emitted;

§ a two-day training for city councillors, heads of housing estates administrations, managers of large stores, heads of departments of administration in Lublin hospitals, universities, important industrial plants was conducted;

§ educational workshops for teachers of Lublin schools in the Solid Waste Management Plant Kom-Eko Sp. z o. o. were organised;

§ 75 students (obtained a title of educators in the field of solid waste) were trained by the Lublin Environmental Protection Foundation (acting in cooperation) and they conducted lectures in Lublin schools in October and November;

§ an annual event 'Eco-Picnic' aiming to present the issues of separate waste collection was created.

§ The following was prepared in the organisational area:

§ circulation of documents confirming the origin of municipal solid waste;

§ annual schedules of the collection of dry fraction in the districts with low buildings;

§ agreement between the Mayor of Lublin and the Board of Cemex Polska Sp. z o. o. regarding Refuse Derived Fuel (RDF) supply from the Solid Waste Management Plant (WMP)-Sita and Solid Waste Management Plant (WMP)-Kom-Eko.

In the **economic** area actions were focused in two levels:

§ varied maximum rates for the collection of municipal solid waste – wet fraction and dry fraction – for the owner of the property (Table 2).

Table2

Price list of maximum rates

Wet fraction of municipal solid waste	
Capacity	**Cost**
bin SM-110l i 120l	**16.50 PLN**
bin SM-240l	**24.20 PLN**
bin SM-360l	**33.20 PLN**
bin 550l-750l	**38.50 PLN**
bin PA-1100l	**55.00 PLN**
container 7 m^3	**410.45 PLN**
container 10 m^3	**513.10 PLN**
container 15 m^3	**806.25 PLN**

Dry fraction of municipal solid waste	
Capacity	**Cost**
bag 110 l	**6.45 PLN**
bin with the capacity of 1.1 m^3	**38.50 PLN**
bin with the capacity of 2.2 m^3, 2.5 m^3	**77.00 PLN**
container 7 m^3	**185.00 PLN**
Green waste	
Capacity	**Cost**
110 l	**5.15 PLN**
container 7 m^3	**205.40 PLN**

Source: the Resolution of the City Council [4]

▪ varied costs of landfilling municipal solid waste (for entrepreneurs using the Landfill Site in Rokitno) depending on the obtained recovery rates at the fixed level of 7 % calculated according to the formula:

$$S/(S+W)*100\ \%=7\ \%,$$

where: S – solid waste in Mg separated or subject to recovery; W – solid waste landfilled in Mg

The largest changes regarded the **logistics** area. Within the area the following were prepared and implemented:

§ dry fraction collection system;

§ bulky waste collection system;

§ green waste collection system;

§ collection system of solid waste from construction works;

§ bins for dry fraction (2.5 m^3) and 7 m^3 were designed and purchased – 1185 pieces;

§ bins for the collection of grass packaging – 115 pieces;

§ bins for the collection of hazardous waste were designed and purchased – 21 pieces;

§ bins for the collection of drugs that have passed their expiration date – 77 pieces;

§ collection subsystem of cemetery waste was organised;

§ subsystem of mobile collection points of hazardous waste was organised;

§ collection subsystem of WEEE (2 fixed points and 6 mobile points) was organised;

§ collection subsystem for drugs that have passed their expiration date was organised together with Lublin pharmacies;

§ collection subsystem of used tyres (seedlings for tyres) was organised.

The Environmental Protection Department was entrusted with the implementation and supervision over the system.

A unit devoted to the issues regarding solid waste, the solid waste management division, was created within the organisational structure of the Department.

Employees of the solid waste management division together with the municipal police officers formed 'environmental patrols' which aimed to directly control the implementation of the Lublin solid waste management system in companies and inhabitants producing municipal solid waste.

The effectiveness of the implementation of the Lublin solid waste management system is shown in Table 3.

Table 3

Weight of solid waste collected in the period from 2007 until 2010 in Mg

Type of waste	2007	2008	2009	2010
WEEE	421.3	512.0	282.65	392.39
Hazardous waste	9.518	19.135	21.420	13.445
Drugs that have passed their expiration date	1.963	4.782	5.420	5.865
Bulky waste	802.8	1008.2	1068.47	793.88
Clothing	589.4	600.2	607.58	537.35
Tyres	45.1	14.5	15.8	16.8
RDF	2570.2	5335.92	13555.12	27563.5
Packaging	4452.76	3787.54	3986.14	4273.26

Source: Own work on the basis of materials of the Environmental Protection Department of the City Hall [7]

Results and Discussion

In the period from 2007 until 2010 a total of 73,313.67 tons of solid waste was collected. The collected amount of solid waste which was not landfilled due to the implementation of the integrated municipal solid waste management system proved the validity of the assumptions and the selection of tools for their implementation. The thesis was confirmed in 2009 when the Municipality of Lublin was awarded the title of 'Leader of Polish Ecology' for the project entitled 'Lublin system of separate waste collection – a model for other municipalities', and in 2011 the title of 'Leader of Polish Ecology' was awarded to Kom-Eko for consistent implementation of Lublin solid waste management system.

The described period of preparation and implementation of the integrated municipal solid waste management system was highly praised by stakeholders: city authorities, entrepreneurs and, most importantly, the inhabitants.

Summary

The article presents main assumptions of the creation of a modern municipal solid waste management system for the City of Lublin. The author shows the tools which were used in the implementation of the project and describes the results of implementation of the system during the first four years of its operation, i.e. from 2007 until 2010.

Conclusion

In conclusion, the implementation of the law on cleanliness and order in municipalities was a great challenge facing Polish local governments. The studied example shows that many Polish local governments were able to implement new legal requirements. Two main factors determined the undoubted success of the authorities in Lublin.

The first one was the implementation of the model of separate waste collection in and its subsequent modifications.

The second key factor was the agreement with the company Cemex Polska Sp. z o. o., which allowed for maintaining the development dynamics of the separate waste collection despite the temporary collapse of the secondary raw materials market.

References

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