

EVALUATION OF WASTE STORAGE IN THE SOUTH-EAST DEVELOPING REGION OF ROMANIA

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Abstract: Economical activity of collection and disposal of urban and rural waste in the south-east developed region, are organized differently depending on: the size of locality, the number of people served, equipment, property form, the area from which collection (urban or rural) and the disposal surface.

The south-east region is the second largest between the eight developing region of Romania. The districts that are included in this development region are: Braila, Buzau, Constanta, Galati, Tulcea, Vrancea. This study presents a complete analysis on the waste collection and a comparing between divers types of disposal area.

South-east developing Region is located in the south-eastern Romania, covering 35,762 km² or 15% of the total area of our country.

Keywords: transport system, storage area, types of disposal.

1. INTRODUCTION

Waste quantity, like result of human activities, is growing year by year. One of the most important problems is to find places for waste deposing. For the activity of collection and waste deposing, need money and new landfill. That landfill must take from agricultural area. Surround of the biggest cities from south-east region like Constanta, Galati, Tulcea, Braila, Buzau and Focsani there are not free space for waste deposing. In that case is necessary to make a selective collection and to do a minimum of processing before waste deposing.

The locality network of South-East Region was composed of 33 cities (of which there were 11 municipalities) and 1455 villages (organized in 339 communes). South - East is an area of 35,762 km², representing 15% of the total area of the country and participate with about 12% to GDP in the total economy. The largest city of the region is Constanta, followed by Galati and Braila, Buzau, Tulcea and Focsani.

In 2010, the Region had a population of 3,125,500, inhabitants, representing 13.1% of the Romania population. The density is of 80,1 inhabitants/ square km, is below the national average (90.91 inhabitants / square km). The highest density of population is in Galaţi County (139.5 inhabitants / square km), dominated by industrial and commercial centre with the same name, and the lowest in the county of Tulcea (29.9 inhabitants / square km), where natural and economic conditions are less adequate.

In this development region (Braila, Buzau, Constanta, Galati, Tulcea, Vrancea) the business of collection and transportation of municipal waste in organized area,

depending on: the size of locality, the number of people served, types of separate equipment and the depot zone.

The specificity of South - East developing Region is the disparity between the nodes of concentration of industrial and tertiary activities (Braila - Galati, Constanta - Navodari) important industrial points and county Buzau, Focsani and Tulcea with specific tourist areas (example: Danube Delta).

For the south-east developing region is characteristic discontinuity of industrial activities and an increased the trade, services, tourism and agriculture. This is because counties of Constanta and Galati are characterized by a higher rate of employment in industry by comparing with Buzau, Braila and Focsani.

Economically after Eurostat studies [10], made in 2010, Romania is situated on the penultimate place in the EU according to GDP per capital. For 2010, experts from Eurostat anticipate a GDP national average per capita of 5400 Euro. Under this level will find our south-east developing region with 4700 Euro.

2. RESEARCH ON WASTE COLLECTION SYSTEMS

For waste collection there are urban services that are employed by local city halls of Residence County. They made the collection and transport of waste in terms of the quantity produced of the area that serves. The table below presents the statistical number of environment agencies and the people it serve [1].

Note that in the south-east region for Constanta and Galati is the highest number of environment agencies (Source: Local Administration).

Table no.1 Environment Agencies for year 2010

County	Number of environment agencies	Number of inhabitants	Percent from overall populations (%)
BRĂILA	3	233.556	62,82
BUZĂU	4	128.730	25,96
CONSTANȚA	11	504.573	70,68
GALAȚI	5	478.230	62,87
TULCEA	6	110.064	46,04
VRANCEA	10	97.891	25,29
TOTAL	40	1.606.044	49.5%

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Another analysis was effectuated to evaluate the number of people served by environment agencies in rural and urban.

Table 2 presents the number of residents in rural and urban that receiving environment services.

Table no.2. Served population by Environment Agencies in 2010 year.

	URBAN			RURAL			TOTAL on REGION		
	TOTAL	Number of inhabitant	Number of inhab. %	TOTAL Population	Number of inhab.	Number of inhab. %	TOTAL Population	TOTAL inhab. served by environment agency	TOTAL inhab. served by environment agency %
Region	1.581.446	1.375.967	87.0	1.261.624	30.907	2.4	2.843.070	1.606.044	49.5
Braila	242.570	230.441	95.0	129.179	3.115	2.4	371.749	233.556	62.8
Buzau	205.285	125.237	61.0	290.593	3.493	1.2	495.878	128.730	26.0
Constanta	507.731	484.950	95.5	206.094	19.623	9.5	713.825	504.573	70.7
Galati	353.349	328.460	93.0	267.812	0	0.0	621.161	478.230	52.9
Tulcea	119.643	109.547	91.6	119.403	517	0.4	239.046	110.064	46.0
Vrancea	148.450	93.732	63.1	238.588	4.159	1.7	387.038	97.891	25.3

The next step in the development of research performed was to measure and expressed in percent

quantities, types of waste produced in the region of south-east [2, 3], in the period 2006 to 2010 (table no.3).

Table no. 3. The degrees of waste collection between 2006 to 2010 years.

Indicators	2006	2007	2008	2009	2010
House hold %	91,2	86,2	84,3	83,6	82,3
Municipally waste	0,4	0,5	0,5	1,3	1,6
Number of inhabitant serves by environment agencies (%)	45	46	47	47	48
Quantity of waste collected (Kg/inhabitants/year)	209	235	236	228	235

If we take in account the ways of waste collecting, for that it was using garbage bin, containers and euro-container as it seen in the table no.4.

After the calculus result that the optimal frequency of collection is on 3 days. Therefore, the euro-container and containers should be chosen so as to cover the volume of waste to be generated during this period.

It is estimated that the collected is doing every three days; the amount of waste generated will be approximately constant, like in table.

In the south-east region before the processing of waste paper, metal, plastics, for recycling, primarily these wastes are collected in authorized points, like in table no.4.

Than, the collected waste are separated from unauthorized collectors (private persons) or directly from people engaged in commercial activities. Waste separated is delivered by economic recovery.

Table no. 4. Waste collected (container, euro-container and garbage) 2010 year.

Region/ County	Type of container				Total volume (m ³)
	Garbage bin (0,1-0,2 m ³)	Container (4-5 m ³)	Euro-container (1,1 m ³)	Other	
Region South-East	15.569	8.688	2.328	2.467	44.837
Brăila	1.199	1.939	170	1	9.057
Buzău	469	341	1.078	-	2.748
Constanța	9.399	5.563	43	1.422	28.055
Galați	801	167	452	7	1.351
Tulcea	3.549	129	485	-	1917
Vrancea	152	549	-	1.032	3.520

Taking into account that a waste density is 0.25 t/m³, the waste generated for three days is 44,804 m³ and on a week is 89,608 m³.

The next review of Waste Management Regional Plan will must to calculate the specific capacity of containers (a day or week) and that is made for cover the population needs. Under Romanian law containers of waste must be collected each day in summer and during the winter every two or three days.

3. ON WASTE TREATMENT

Today, at level Region south-east there is a sorting station located in Constanta County. This sorting station is established in 2005 and her name is SC MM RECYCLING LLC and is used for treatment of solid urban waste. The capacity of sorting is of 9 tons / hour for solid waste and too has a recovery capacity of 450 tons / hour for PET. This firm has possibility by sorting waste paper, plastics, iron and aluminium. In Galati County is beginning in 2008 the construction of a sorting plant and a composting plant that serve too and Braila county. The end of construction is 2013.

At level of Region is necessary to build a station plant for the mechanical and biological treatment of waste.

Recovery of waste is done in general for waste plastics, metals, paper and cardboard, tires, batteries, etc.

The companies that collect and treat waste recycled mills are equipped with the package, weighing equipment for processing waste mass plastics, electronic bascule bridge, crane, cutting kits, electric grinder.

The identification of the economic activity involved in collecting and/or recovery facilities and capabilities at their disposal.

3.1. Waste treatment into the disposal

In Constanta county there is a cement factory Lafarge Medgidia, which is part of the Lafarge Group. The cement factory engaged in co-incineration plant using only the

residues with high caloric value, such as the waste used oils, tires or plastic.

In local politics, waste management in South-East developing region has been drawn up in accordance with Law 426/2001, as amended by Government Ordinance 61/2006 [5], in compliance with requirements imposed by European directives [8,9] and EU accession [4]. According to GO 349/2005 [6] on waste disposal, which incorporates Directive 99/31/EC [7], landfills are classified so:- for no hazardous waste landfills (type a); -for hazardous waste landfills (type b); - for inert waste landfills (type c).

Regarding to the Directive 99/31/EC, on the disposal of waste was made following steps: - have been campaigns of public awareness regarding orders GD 349/2005, 857/2004 and 1247/2005.

The Municipally Council has the responsibilities of planning and authorization, identified, inventoried and classified deposits existing in each county of south –east region of Romania.

Environment Agency with municipal council planned the closure of existing waste landfills (that are full and none conformed) and the construction of new landfills in municipal or rural areas.

In the South-east Region storage is the main option for municipal waste disposal. In addition to deposits listed in table no.5, show if in the south-east Region there are 1068 disposal locations which are not all in line with European standards and regulations. These are mostly wild warehouse operated by the community, especially located in rural areas.

The closing date of all none conformed deposits will be 2009, according to GO no. 349/2005, Article 3, and paragraph 7 [6]. Before closing, an environment audit is necessary. This audit describes procedures to reduce environmental impact.

Table no. 5. The number of waste landfill existing in the South-East Region

County	Number
Braila	121
Buzau	369
Constanta	53
Galati	196
Tulcea	188
Vrancea	170

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In 2010 year the number of conformed waste disposal is nine at this time: 3 at Constanța, 2 at Galati, 1 at Braila, 1 at Buzau, 1 at Tulcea and 1 at Focsani.

In the county of Constanta are 3 organic deposits (located in areas Ovidiu, Costinesti and Albesti). The quantity of waste stored here is about 346,000 tons / year. Ecological Depot and industrial waste - Ovidiu administered SC TRACON SRL, serving 400,000 inhabitants (Constanța, Ovidiu, Lumina, Navodari). Of the projected 8 cells, 2 are closed, the third is in operation and the fourth is under construction. Ecological disposal and industrial waste - Costinesti is administered by SC Iridex GROUP IMPORT EXPORT SRL, serves 53,000 residents in Costinesti, Amzacea, Agigea, Cumpăna, Eforie, Techirghiol, Tuzla, Topraisar number they can add 70,000 - 100,000 tourists per year. Organic waste depot - Mangalia

(Albesti) located at a distance of approximately 500 m from Lake Mangalia is administered by SC ECO GOLD INVEST SA.

In the county of Galati new landfill Tirighina is an extension of the old warehouse and will be developed adjacent to existing uncontrolled landfill. New deposit of waste will have 4 cells with a total area of 18 ha. The first cell has a capacity of 920,000 m³ and a life expectancy is projected to be 4-6 years. In the county of Tulcea (Vararie) and Vrancea (Haret) is provided for construction of new municipal landfills.

A collection such as "door to door" would give more positive results in neighbourhoods with houses and gardens, only those blocks. In neighbourhoods of blocks could arrange "voluntary collection points" at which people selectively deposit recyclable waste.

The next step in our research was to establish all data about the waste disposal such in table no 6.

Table no.6. Dates on Warehouse in South-East Developed Region.

Disposal Name	Surface (ha)	Capacity (m ³)	Volume (m ³)	Free capacity (m ³)	Volume of waste in depot on year (m ³)	Number of inhabitants	Closed Year
Ianca	0,97	9000	4500	4500	18000	9800	2009
Braila - Muchea	3,11	434000	120000	314000	70000	232000	2031
Faurei	2	37700	30000	7700	2000	4000	2017
Nehoiu	0,4	15000	4000	11000	2350	13000	2009
Rm.Sarat	2	950000	499500	450500	45000	25000	2017
Galbinasi	14,7	970000	34200	935800	70000	125000	2023
Buzau	10	1600000	1600000	0	0	125000	2010
Cernavoda	3	565000	290000	275000	11480	19500	2012
Constinesti (cellule 1)	2	368000	230000	242000	10023	53.000	2019
Basarabi	2,6	432000	100000	60000	3600	11000	2015
Techirghiol	3	451000	120000	30000	15000	7200	2012
Harsova	5	150000	90000	60000	8900	10400	2010
Negru Voda	3,5	280000	140000	140000	6200	2500	2006
Eforie Sud	4	310000	160000	10000	8900	10000	2006
Albesti	22	3200000	1800000	1400000	130000	51000	2006
Medgidia	6	693500	632000	61500	61000	43634	2006
Ovidiu	16	7000000	3100000	3900000	390000	400000	2025
Umbraresti	1,15	12000	1500	9700	160	7637	2009
Bazanu Beresti	0,4	0	875	700	175	2700	2009
Rates Tecuci	3,5	210000	100000	110000	49200	45000	2017
Tirighina	2,5	5.000.000	413000	870	108000	320000	2014
Isaccea	0,25	9865	4800	5065	2500	5400	2009
Babadag	3	90000	35520	54480	4440	10135	2009
Sulina	1,2	25.000	17000	8012	1300	3278	2017
Macin	2	nd	35970	nd	5750	7500	2016
Vararie	1,2	25000	16987	8012	1300	92000	2007
Agighiol	5,2		1415000	500000	76500	92000	2015
Odobesti	1,4	168000	125000	43000	7000	8000	2009
Haret - Marasesti	2,2	120000	75000	45000	9500	10000	2017
Panciu	2,8	140000	78000	62000	8100	9000	2017
Adjud	3	360000	216000	144000	17000	21000	2017
Golesti	6,5	1300000	1100000	200000	110000	100000	2009

As we seen from this table there are some warehouse that must be closed from 2006. But because the closed of warehouse need money, the administration extended the closing date thereof. Another problem is the space (necessary area) for opening a new warehouse.

In addition, the specific conditions of the region in terms of topography (sea level to the Macin mountain), the prevalence of rural and urban areas, industrial and port existing and future protected areas many small and large (Danube Delta) steppe zones and coastal development and tourism should be taken into account the establish objectives in south – east developed region.

The introduction of collection in rural areas must take account of local characteristics, the existing infrastructure of roads and the location of some settlements from others and from transfer stations and landfill area existing or projected.

The maximum distance from the economic point of view that can be made between the transport of waste transfer station and a warehouse area is not advisable to exceed 50-60 Km round trip.

4. Conclusions

Principles defined in the National Strategy for Waste Management which motivate the activities of waste management are listed below:

- The primary protection of resources - is formulated in the broader context of sustainable development with emphasis on the use of secondary raw materials;
- The measures preliminary concerns the application of existing state of technological development;
- The prevention establishes a hierarchy of activities of the waste management hierarchy to place first to avoid waste generation, minimize quantities eliminated and treatment to

recovery and to eliminate the safe environmental and public environment;

- The polluter pays principle in line with the principle of producer responsibility and the responsibility of the user requires a legislative framework appropriate and economically so that the waste management costs can be covered

- The substitution emphasizes the need to replace hazardous materials with hazardous materials to avoid generating hazardous waste;

- The proximity principle states that waste must be treated or disposed of as close as possible to where they were generated;

- The principle of subsidiary establishes that the responsibilities must be allocated to the lowest administrative level to the source of generation, but on the basis of uniform criteria at regional and national level.

These principles are an integral part of regional objectives and targets. The objectives are in accordance to those approved by the National Plan for Waste Management that is in accordance with Romanian legislation on waste and environment and EU requirements.

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