

## ABOUT THE COST OF WASTE COLLECTION AND DISPOSAL IN THE SOUTH-EAST DEVELOPMENT AREA IN ROMANIA

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**Abstract:** *The evolution of population in the development area south – east of Romania and the decrease the average income of the population, determine difficulties in the collection of the fees for waste administrations.*

*In the domain of waste collection is built a schedule of the taxes and the consumer (the unemployment rate, ordinary peoples, services personals involved in trade, industries, education ) must to sustain these fees. Large quantities of waste generated per capita are produced in the six big cities of south-east development region. Similarly, the waste managing costs are influenced by consumer behaviour.*

*The paper presents a new vision of the administration cost of waste in the south-east developing region of Romania.*

**Keywords:** *waste managing costs, municipal waste, separation, waste collection*

### 1. INTRODUCTION

The south-east developing region in Romania is comprised of six counties as follows: Constanta, Braila, Galati, Buzau, Tulcea and Vrancea. An important problem is to diminish the waste quantity from the offices, enterprises, stores and house hold because in the last period the depositing areas are reduced dramatically.

It is known that the plastic packaging replaced the paper packaging on the many domain and in the decay-time we expect to change the composition of waste with a significant negative impact on the environment. The impact of new rules on packaging (such as those relating to the storage of packaging) and placing the separate collection, may lead to decrease the generation of municipal solid waste storage.

Regarding economic development in the south-east developing region is expected to trend upward, with an average annual rate of GDP [1] that decreases dramatically to 2010 year.

After the 2009 year estimated GDP can be around 5%. We can expect that the rate of waste quantity to follow the same course.

### 2. WASTE ADMINISTRATION

The quantity of waste on year in urban areas was approximately 0.9 kg / inhabitant per day and in rural areas of 0.4 kilograms/inhabitant per day.

Based on prognosis in table 1 and started from indicator of house hold generated in 2009, 2010 and estimated on 2011, 2012 and 2013 years. We considered the average waste quantity generated of 0.9 kg / inhabitant per day in urban areas and 0.4 kg in the rural area and apply to the estimate population in the two specifically environments. In the table no. 1 is shown the quantities of waste generated and estimated for 2011, 2012 and 2013 years. These quantities are recorded in tones.

Table no. 1 Prognosis of waste generation for the south-east developing region

No.	Waste types	2009 (tones)	2010 (tones)	2011 (tones)	2012 (tones)	2013 (tones)
1	Collected house hold					
	urban	523	509	519	552	562
	rural	154	162	167	174	179
2	Uncollected house hold					
	Urban	22	16	11	6	0
	rural	39	33	29	24	20
3	Waste from trade, industry, institutions	199	211	209	204	206
4	Waste from parks and gardens	24	26	29	35	35
5	Waste from markets	21	23	26	31	31
6	Street waste	32	38	37	32	32
	Total waste quantity	1014	1018	1027	1058	1065

Source: National Prognosis Commission [5]

The flux of waste separately collected has been included in the equivalent of household waste. The percentage of 70% is household waste from trade and industry. For the categories of detailed packaging waste, the National Agency of Environmental Protection [2,3] has given equal growth for packaging paper and cardboard, glass, plastic, metal and

wood. Their composition for 2009 is as follow: 26.5% for paper and cardboard; 30% plastic; 20% glass; 11.15% metal; 11.75% wood. Waste separately collecting will be generalised at the south-east developing region. In the next table is shown some collecting dates and a prognosis on types of waste on 2011, 2012 and 2013, in the south east region.

Table no. 2 Types and waste percent on 2009-2013

	2009 (tones)	2010 (tones)	2011 (tones)	2012 (tones)	2013 (tones)
Paper and cardboard	66.8	71.5	75.9	75.9	84.0
Plastic	12.3	13.8	15.5	15.5	23.3
Glass	38.0	44.0	48.4	48.4	60.2
Metals	56.9	64.4	72.2	72.2	87.0
Wood	8.5	12.2	15.5	15.5	19.1
Total recycling	37.5	41.9	45.9	45.9	50

Source: National Prognosis Commission [5]

**3. ECONOMIC ELEMENTS ON WASTE IN THE SOUTH-EAST DEVELOPING REGION**

In the present stage of the process of planning, investment costs are based on the average total cost of various facilities and the various types of equipment to be purchased.

Taking as a starting point for the proposed funding for the region and said unit costs were estimated the following costs for investment.

Result analysis is a calculation of the overall VPN (net present value) associated costs of new services for waste management.

Also, the calculated values are updated per tonne of waste, during the planning and per person per month.

Costs associated with proposed investments of waste management have been extracted from several sources.

Establishment costs are high about the experience of projects implemented in Romania, as well as experience gained in the estimation of the costs of equipment and waste management, in line with international projects.

Operating costs are also influenced by the locations of new facilities and advantages. An increased level of safety on the estimate of costs can be achieved in later stage of planning, related to feasibility studies and is accompanied by the conceptual and detailed outline of the site, and the particular characteristics of the installations.

If we assume that a program of investment is financed entirely by user fees, the impact of the average monthly investment would be 0.46 Euro per person. It is likely that investment is borne by the EU.

Assuming that 70% of the EU financial support is directed towards investment we can say that the cost of operation and maintenance [4] is financed entirely by user charges. The impact of the average monthly investment would be 0.36 euro per person.

The total investment amounts to 79.7 million euro of between 2007 and 2013. This amount does not include projects that have already ISPA funding.

Also needed will be of 0.4 million € / year, for replacement containers of waste after 2013.

Table no. 3. Investments costs for south-east developing region.

Types	Collecting units	Values/unity €	TOTAL x1000€
Collecting systems	11374		7985
➤ euro container 1 m <sup>3</sup>	7080	400	2832
➤ euro container 2.5 m <sup>3</sup>	4294	1200	5153
Collecting equipment	132		21780
Vehicles	132	165000	21780
Infrastructure			
Transfer stations	22		2200
Sorting and treatment	43		2643
Sorting stations	19	20,48	1331
Composing station	24	33,63	1312
Investment in new depot	12		40395
Warehouse	11	9,3	38595
Dosing	4	150000	600
Compactor	4	150000	600
Excavating	4	150000	600
Warehouse closed	3	110000	410
<b>TOTAL investment costs</b>			<b>79723</b>

In the analysis carried out assumes that the future income will increase by the rate of GDP growth in the region.

In the table below shows that the annual rate of GDP growth after 2009, will fall to 5%, and will remain constant in 2011 and beyond each year to all regions. Taking as a point

of reference income levels from 2009 and adjusting them with the forecasted values of regional GDP can be calculated acceptable level of monthly costs for waste management for each developing region from Romania.

Table no. 4. Payment for waste administration in €/ on month/on person

	2009	2010	2011	2012	2013
Romania	1,94	1,91	2,15	2,26	2,37
1. NORTH - EAST	1,85	1,85	1,94	2,04	2,14
2. SOUTH - EAST	1,79	1,72	1,89	1,98	2,08
3. SOUTH	1,96	1,85	1,95	2,04	2,14
4. SOUTH - WEST	1,79	1,73	1,98	2,08	2,18
5. WEST	2,08	1,91	2,30	2,42	2,54
6. NORTH - WEST	2,00	1,9	2,22	2,33	2,44
7. CENTER	1,99	1,98	2,21	2,32	2,43
8. BUCHAREST	2,65	2,3	2,94	3,08	3,24

Source: National Prognosis Commission [5]

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The most important source of income for households in urban areas is the salary and welfare. Impact of food produced in the private and the agricultural products have an important impact on total income of urban households (11% of total revenue).

In rural areas the most important source of income is farming activities and self income is low. Other sources of income are wages and self-financing (28%) and welfare (20%).

In south-east region the rural population represents 44.5% of the total population. It can be very general estimate that the ability of the monthly support charges of waste management - the person in rural areas - has fallen from around 1.3 euro in 2009 and will increase to 2.8 euro in 2013.

In south-east developing region the monthly average availability of supporting the growth rates for waste management, is from 1.32 euro to 2.08 euro between 2009 and estimated for 2013 year. For example, the ability to pay monthly in Region 8 (Bucharest) is the highest maximum monthly payments accepted beyond the national average by 30%.

Tariffs applied to households in 2009 were about 1.3euro to 1.7euro. This level is 3% to14% from payment estimates.

In 2010 year, the maximum of tariff for the management of waste at the south-east region was estimated at 5.40lei/ person / month and the minimum tariff was 1.98 lei/ person / month like in table no.5.

Table no. 5. Level of waste administrative taxes in south-east developing region

Localities	Tariff (including TVA)		Waste tariff at warehouse with TVA	Collecting quantity (30.06.2010)		
	Populations	Companies		Total	From what	
					Popula-tions	Compa-nies
lei/pers /month	lei/mc/ month	lei/ mc	Quantity (mc)	Quantity (mc)	Quantity (mc)	
Brăila	5,40	40,49	33,81	7545	5.690	1.855
Buzău	4,28	46,54	40,04	58615	49.882	8.733
Constanța	3,00	69,00	38,64	74634	61.809	12.825
Galați	2,25	29,78	4,66	34.014	19.064	14.950
Focșani	2,99	27,47	9,95	69849	42.754	27.095
Tulcea	4,00	39,00	10,00	47034	47.034	
Tecuci	1,98	28,7026	6,0	10.896	10896	

Source: National Prognosis Commission [5]

#### 4. CONCLUSIONS

Primary predictions of the financial flows of investment in waste management service in the region have been developed, taking into account increased costs for the proposed investments and their impact on operating costs.

The impact of additional investment and operating cost (increase / decrease) in regional infrastructure it must to see in the quality of waste manage.

The proposed investment falls within acceptable limits possible in the region. In south-east region, a rate of 70% of waste collected is due to households.

If the costs would be distributed proportionally between the generators of waste (population, business administration), is it possible to decrease the costs of waste administration per person on month.

The values presented represent average per capita who has not taken account of what share of investment should

be allocated to families or businesses that generate waste household type.

The costs for waste management in the region not included in the analysis and are assumed to be constant. These costs cover both the needs of current operations and the need for replacement existent equipment. This analyse can be characterized as follows: it was developed in real terms for 2009 year prices. This price were adjusted during 2011-2013 with planned NPV (value present net) calculation for a longer period of 2020 (it was considered only the additional cost generated by the investment during the planning and were calculated based on average cost uniform standard).

The calculations that we show have considered the costs for different categories of activities: collection, sorting / recycling / transfer, transport and disposal at landfill site (costs for these components are based on standard unit costs).

#### 5. REFERENCES

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- [5]. National Prognosis Comision ([www.cnp.ro](http://www.cnp.ro))