

WP 2, TASK 2.2 – TECHNICAL REVIEW OF THE UTILISATION OF WASTE MATERIAL FOR BIOGAS PRODUCTION IN ROMANIA

Content:

1. Introduction

The report was developed based on information gathered from different data sources. The base document was National Waste Management Plan.

Questions of waste removal business in general:

Is waste removal in general done by public authorities or by private owned companies?

In urban areas, the management of municipal waste is performed in an organised system, by specialised services belonging to the municipalities or to private operators. Waste management services are provided based on contracts concluded with individual generators, but this system only covers 95% of all municipal waste generators in the urban areas.

In rural areas, waste management services are not so well organised in many cases the transport to disposal sites being performed individually by the waste generators. Only a limited number of rural settlements are covered by organised waste management services, particularly those located in the immediate vicinity of urban centres. Separate waste collection systems are only implemented in some pilot projects. In total in 2001 the separate waste represented 2% and in 2002 – 7% of the total municipal waste collected. In most of the cases this was recyclable waste separately collected in pilot projects in industrial units, institutions or in sometimes in commerce.

What happens with waste from households? Incineration? Waste disposal?

Household waste collection is non-selective (there are only a small number of pilot projects doing that) and usually waste collected it is disposed into land filling (in urban or rural waste disposal sites); according to estimates, a mere 5 % of the total quantity of household waste is collected with a view to recovery. There are a number of projects aiming to develop integrated waste management systems in several counties.

What percentage of organic is in waste from households?

The average percentage of biodegradable organic waste from the household waste is 51 % (data from 2002). As could be seen in table 1 the biodegradable organic waste increased quantitatively in 2002 as compared with the 1998 data from 139 to 179 Kg/inh*year.

Table 1. Average percentage domestic waste composition for 1998 to 2002

Components	1998		2002	
	%	kg/inh. · year	%	kg/inh. · year
paper, cardboard	13%	34	11%	39
Glass	6%	16	5%	18
Metals	5%	13	5%	18
Plastic	9%	24	10%	35
Textiles	6%	16	5%	18
Biodegradable	53%	139	51%	179
others	8%	21	13%	46
Total	100%	263	100%	352

Source: ICIM waste database

What kind of waste collecting system is normally established?

Two system are used: a) general collection system (no separate collection); b) pilot projects for separate collection of wastes.

Municipal wastes are collected at local levels by the local authorities who have this responsibility (Law 139/2002 to approve the GEO No. 87/2001 regarding the sanitary public services). Every local authority (municipal councils) is obliged to organize this service for the population. Usually in rural areas, the activity of waste collection from the population and economic units is not organized, excepting the rural areas located near the cities. It is estimated that only 5% of the rural population benefits of these services.

Municipal waste from households, institutions, different economical entities (commerce, industry) are pre collected in recipients of different capacities, placed in special locations.

From the total wastewater treatment sludge, only 3% of the annual quantity is used in agriculture. 95% of the municipal waste is disposed every year in the land field. In every urban area exists at least one waste landfill. 252 municipal waste landfills belonging to the cities were registred in 2002, representing 27% of the total number of waste landfills in Romania.

2. Availability of appropriate organic wastes

2.1 Kitchen wastes:

Is there any separate waste collecting system?

No separate waste collection system implemented up to now. There are several pilot projects for this.

Are there pig farms using kitchen waste for feeding?

The pig farms are NOT using kitchen waste for feeding. Only the small farms are using kitchen waste for feeding.

Do Restaurants and Hotels have to pay for the waste removal?

Yes both hotels and restaurants have to pay for waste removal. The fee for the separate collection is not different, and recently a sanitary tax was introduced, which includes the collection, the transport and the closing of the existing landfill. Thus, this tax reaches 12EUR/tonne and inhabitant (data from 2002).

2.2 Wastes from Supermarkets

Is there any separate waste collecting system?

Wastes from supermarkets are collected separately and most of them are recycled.

What happens with over dated food stuff.

Not know up to this date.

2.3 Wastes from Industrial production

Is the food production industry? Milk industry, slaughter house etc.

The question is not clear!

What kind of organic waste do they have?

What do they do right now?

Is there biotechnology drug production? What are they doing with residues?

2.4 Agricultural wastes like pig or cow manure, horse dung or grass cut from local authorities

Are there animal farms with more than 1000 pigs or cows?

Yes, a list of these farms could be provided.

What do they do with the manure? Do they have mixed farming?

Are the farms that need manure as fertiliser but do not have own manure.

Is horse dung a problem?

2.5 Bio-wastes from local authorities

Any local authority that is interested in environmental protection projects? Is there any chance to promote a new collection system, to separate organic bio-wastes from inorganic waste fraction? Anywhere waste problems with possibility to start a discussion?

The promotion of new collections systems is already done in pilot projects. This kind of pilot project has been implemented in different counties (eg.Ramnicu Valcea, Bucharest 2005). A national strategy was developed for a proper management of the waste.

3. Potential plant sites

- Agricultural production sites like pig farms or cow farms that are interested in co-fermentation.

A list of this kind of farms could be provided.

For the moment, Avicola Iasi (Razboieni) announced interest in biogas plant development, and also Copora (Bucharest). Both sites are chicken farms.

- Municipal sites like landfills. On a landfill site the organic fraction of the waste could be separated and used in a biogas plant. This safes landfill capacity and reduces methane emissions.

A list of projects with new facilities is presented in figure 1 and table 2;

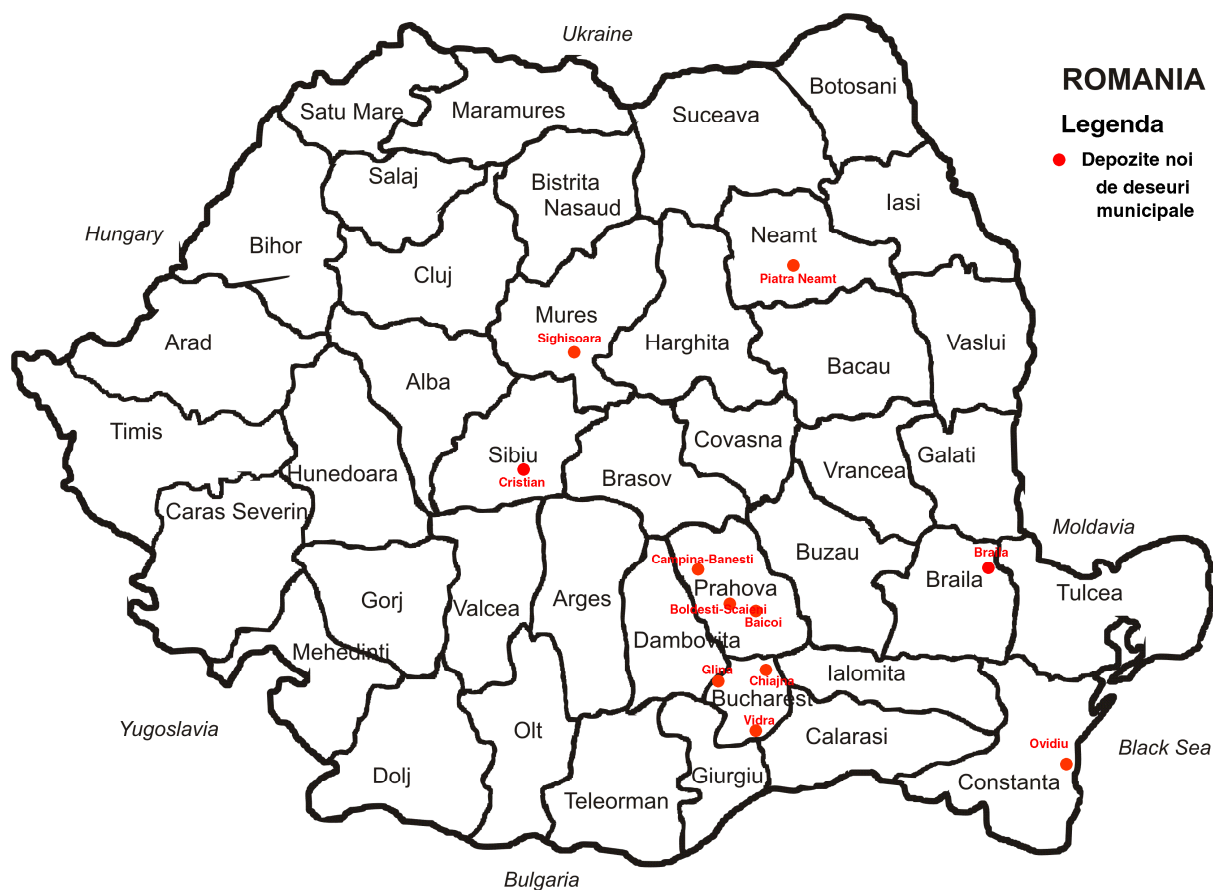


Figure 1. The new landfill facilities distribution

Table 2 New municipal waste landfills at national level

No	County	Name of the waste landfill	Opening year	Estimated closing year
1	Constanța	Mixed waste landfill Ovidiu	1997	2025
2	Neamț	Municipal waste landfill Piatra Neamț	1999	2005
3	București	Waste landfill IRIDEX - Chiajna	2000	2019
4	Brăila	Ecologic waste landfill Tracon - Brăila	2001	2031
5	Ilfov	Municipal waste landfill Glina	2001	2005
6	Ilfov	Ecologic waste landfill Vidra	2001	2023
7	Mureș	Municipal waste landfill Sighișoara	2002	2020
8	Prahova	Ecologic waste landfill Băicoi	2002	2012
9	Prahova	Ecologic waste landfill Boldești-Scăieni	2002	2014
10	Prahova	Mixed waste landfill Cămpina-Bănești	2002	2012
11	Sibiu	Ecologic waste landfill Cristian	2003	2034

From a total 9578 (thousands tones) an uncollected quantity is representing almost 20% (1946 thousands tones). The total collected (separated and mixed) is representing 7632 thousands tones, the separated collection representing only 492 tones (ICIM data, 2002).

4. Summary of best opportunities for each country

Based on the available data a series of scenarios regarding the waste generation have been developed. The scenarios took into consideration the following data needs: locality type, population distribution on terms of locality type in 2002 (Dense urban areas – 37 %, Urban areas – 15.5 %, Rural areas – 47.5 %); estimated domestic waste quantity in 2002: (370 kg/inhabitant · year in dense urban areas, 290 kg/inhabitant · year in urban areas, 150 kg/inhabitant · year in rural areas); estimated municipal waste quantity for 2003 (628 kg/inhabitant · year in dense urban areas, 488 kg/inhabitant · year in urban areas, 256 kg/inhabitant · year in rural areas).

In Romania, according to official data, the average index of municipal waste generation (calculated depending on the inhabitant number from urban and rural areas, respectively of adequate domestic waste generation indexes) had between 1995-2000 a value of 293kg / inhabitant · year, respectively 0.80kg / inhabitant · day (comparing to other EU countries, these values are about 40% smaller).

Table 3. Dense urban areas

Year	2003	2007	2013
Population evolution (%)	37%	36.5%	35.8%
Populations evolution (no. of inhabitants)	7,992,000	7,805,455	7,538,659
Quantity of produced domestic waste (kg/inhabitant · year)	370	371	400
Quantity of produced municipal waste (kg/inhabitant · year)	628	648	680

Source: ICIM data processing based on the Romania – France Twinning Program

Table 4. Urban areas

Year	2003	2007	2013
Population evolution (%)	15.5%	15.5%	15.5%
Population evolution (no. of inhabitants)	3,348,000	3,314,645	3,268,510
Quantity of produced domestic waste (kg/inhabitant · year)	290	299	314
Quantity of produced municipal wastes (kg/inhabitant · year)	488	504	528

Source: ICIM data processing based on the Romania – France Twinning Program

Table 4. Rural areas

Year	2003	2007	2013
Population evolution (%)	47.5%	48.0%	48.8%
Population evolution (no. of inhabitants)	10,260,000	10,264,708	10,279,990
Quantity of produced domestic waste (kg/inhabitant · year)	150	154	162
Quantity of produced municipal waste (kg/inhabitant · year)	256	264	277

Source: ICIM data processing based on the Romania – France Twinning Program

A series of hypothesis have been proposed in order to develop the scenarios:

a) For the dense urban areas, the coefficient of municipal and similar waste collection is 100% and for urban areas is 90% which is estimated to be constant until 2007, when it will increase with 2% per year until 2012, to become 100%.

b) For the rural areas, the collection coefficient is about 10%, estimating an annual increase of 1% until 2007 and a 7-8% per year increase between 2008 and 2012. After that, the increase will be 10% until 2013, when the collection coefficient will be 60%.

c) The percent of city's wastewater treatment sludge collection is 100%; in urban areas, the percent of collection is 90%, estimating a 1% per year increase to 100% in 2013; in rural areas, the collection coefficient is 10%, estimating a 5% annual increase until 2007, and a later annual increase of 10% until 2014, when it will be 100%.

Biodegradable waste

In Romania, the biodegradable matter from the municipal waste is a major component. This category includes: a) biodegradable waste from household and public alimentation units; b) vegetable waste from parks and gardens ; c) biodegradable waste from markets; d) biodegradable component of street waste; e) sludge from treatment of urban waste water;

The percentage of biodegradable matter in the municipal waste decreased from 72% in 1998 to 61% in 2002, but the quantity of biodegradable matter for each inhabitant and year increased in this interval, because the quantity of municipal waste and city sludge also increased (the average of biodegradable waste production during the last 5 years: 243 kg of biodegradable waste/inh. · year).

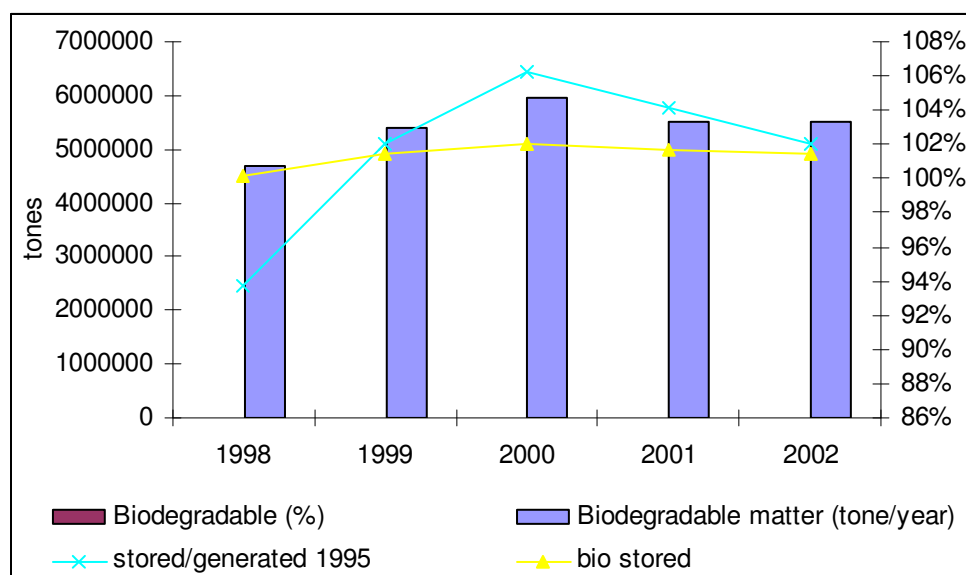


Figure 2 The dynamics of biodegradable waste generation (Source: ICIM waste database)

For the biodegradable waste, GD No.162/2002 regarding the land fill waste stipulates the necessity of reducing the quantity of biodegradable waste disposed with 25%

comparing with the quantity of biodegradable waste produced from 1995 until 2011. Knowing that in the year 1995 (year of reference), the quantity of biodegradable waste was 4,800,000.00 tones (representing 70% of the municipal waste), results that the biodegradable waste disposed during 1998 – 2002 increased with 2% in average, having a decreasing tendency. Table 5. shows the dynamics of biodegradable waste in this period.

Table 5. The dynamics of biodegradable waste during 1998 - 2002

	UM	1998*	1999	2000	2001	2002	media
Percentage of biodegradable waste in the municipal waste**	%	72	70	67	65	61	67
Quantity of biodegradable matter generated	tones/year	4,677,276	5,412,432	5,942,330	5,520,116	5,520,779	5,414,587
Quantity of biodegradable matter disposed	tones/year	4,500,000	4,900,000	5,100,000	5,000,000	4,900,000	4,880,000
Disposed quantity / generated quantity 1995	%	94%	102%	106%	104%	102%	102%
Tendency comparing with 1995	%	-6%	+2%	+6%	+4%	+2%	+2%
Generated biodegradable	kg/inh. · year	208	241	265	246	253	243

* Incomplete data

Source: ICIM waste database

** including the biodegradable matter of the wastes from gardens, parks, markets, streets and the wastewater treatment sludge, without the paper and the cardboard,

Case studies (Ramnicu Valcea):

For example, in the year 2000 in Ramnicu Valcea was realized a project for domestic waste sorting in the view of implementing a separate collection system. Samples collection was made in a different way, comparing to the waste collection of the sanitary agents. Three types of buildings were chosen for different areas. The recipients chosen for the sampling units were weighted and before the emptying was measured the grade of the recipients filling and also the eventual special characteristics. There was a special problem in collecting the sampling units for the buildings with many stores, because frequently there are many recipients for a single building, so there is not possible to determine exactly the number of inhabitants who use the four available recipients. This is why in these locations the grade of filling of all the recipients was registered. With the sample's weight and the total volume of the recipients, the quantity of waste for every inhabitant was calculated.

The results of domestic waste sorting certify that the separate collection and organic waste composting implementation in Ramnicu Valcea represents the base of the waste management project, if the purpose is the reduction of the biodegradable waste quantity. The biodegradable fraction of the domestic waste in Ramnicu Valcea has high water content, but by mixing with other biodegradable aggregates, its share decreases, obtaining an optimal starting mixture for the composting process.

Having this scenarios especially about the biodegradable waste generation and the dynamics in the next years it was possible to suggest two ways to deal with this situation (increase biodegradable wastes): one is the reduction of quantities at sources

(information campaign) and the second one is the reduction through composting and biogas production. Nevertheless the biogas production is not mentioned directly in the National Waste Management Plan.

5. Annex

Objectives of the National Waste Management Plan

Wastes category	Sub-category	Objectives	Targets
1. Wastes from agriculture, breeding, forestry and timber industry, food industry	1.1. Vegetable wastes, dejections, sawdust, waste from wood processing.	1.1.1. Effective control of the untreated wastes disposal.	Deadline: 2010
		1.1.2. Encourage the recovery through aerobic and anaerobic methods.	Material or energetic recovery of 50% of the biodegradable wastes until 2013.
		1.1.3. Support the energetic recovery, where material recovery is not technically and economically feasible, in environmental and human safety conditions.	Energetic recovery of 50% of the sawdust quantity until 2013.
4. Wastes from the wastewater treatment facilities	4.1. Wastes from soil excavating (contaminated and not contaminated)	4.1.1. Develop facilities system in view of an appropriate final disposal.	Industry responsibility.
		4.2.2. Re-use and recycle of the wastes, if these are not contaminated.	Implement the practices for recycling and material recovery of all the wastes resulted from soil excavation (industry responsibility).
		4.2.3. Develop facilities system for treatment of the contaminated wastes resulted from soil excavation, in view of recovery or disposal and safe final disposal.	Develop inert treatment facilities for all contaminated wastes resulted from soil excavation (industry responsibility).
	4.2. Wastewater treatment sludge	4.1.1. Ensure, as much as possible, the recovery and use as fertilizer.	Organize the agricultural recovery of uncontaminated wastewater treatment sludge resulted from the municipal wastewaters treatment stations starting with 2004.

		4.1.2. Dehydrate and pre-treatment in view of disposal by co-incineration in the kilns of the cement factories.	Implement the co-incineration of the wastewater treatment sludge, after the elaboration of the feasibility studies by the cement companies.
	5.1. Biodegradable wastes: household wastes, similar commerce wastes, and waste from services, industry, institutions, street waste, and municipal sludge. 6.1. Packaging	4.1.3. Prevent the uncontrolled disposal on the soils.	Deadline: Permanent from the moment of adopting the domestic regulations.
		4.1.4. Prevent the sludge discharge into the surface waters.	Deadline: Permanent from the moment of adopting the domestic regulations.
5. Biodegradable waste 6. Packaging waste	6.2. Packaging wastes	5.1.1. Reduce the quantity of biodegradable wastes by recycling and processing (organic matter mitigation in view of reducing pollutant emissions through levigate and deposit gas reduction).	Reducing with 25% until 2010 Reducing with 50% until 2013 Reducing with 65% until 2016.
		6.1.1. Increase the packaging re-use and recycling degree.	Deadline: Permanent
		6.1.2. Optimize the amount of packaging wastes by packaged (through re-design).	Deadline: Permanent
		6.2.1. Reduce the quantity of packaging wastes generated per product unit.	Until 2013 55% of the packaging wastes weight.

		6.2.2. Increase the quantity of the collected packaging wastes, as of the efficiency of their selective collection.	Stages of the selective collection: 2003 – 2006: experimental (pilot projects), 2007 – 2017: extension of the selective collection at the national level.
7. Tyres 8. End of life vehicles	6.2. Packaging wastes 7.1. Tyres 8.1. End of use vehicles	6.2.3. Create and optimize the wastes material recovery schemas.	Organize zonal systems and material recovery of about 50% of the packaging waste. Deadline: 2013
		6.2.4. Create and optimize the energetic recovery schemas for the packaging wastes (“inadequate” for material recovery”).	Organize zonal systems and energetic recovery of about 10% of the packaging wastes. Deadline: 2022.
		8.1.4. Extend the re-use and recycle of the materials from the out of end of life cars and the energy recovery those materials that cannot be material recovered.	Beginning with 2007: <ul style="list-style-type: none"> - re-use / recycle 80% of the out of use cars weight. - Energy recovery of 5% of the wastes that cannot be material recovery For the cars produced before 1980, the rate of: <ul style="list-style-type: none"> - Re-use / recycle of 70% of the out of use cars weight - energy recovery of 5% of the wastes that cannot be materially used.