

SPECIFIC TECHNOLOGIES FOR SEPARATION OF RECYCLABLE MATERIALS FROM MUNICIPAL SOLID WASTE (MSW), APPLICABLE IN BUCHAREST - ROMANIA

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Urban waste usually comes from household and public activities that mean private lodgings, shops, hotels, restaurants, offices, etc. Taking into consideration the year 2000 as a standard level, we estimate about 11,200 t/day of urban waste to be produced in Romania, from which about 2,200 t/day only in Bucharest.

1. General considerations

The activities regarding the recycling of urban waste take place in the perspective of Romania's integration in EEC, which also implies the joint of our environmental and public health legislation to the European one.

The first phase of these activities is to conceive new technologies and types of equipment suited to Romania's specific conditions.

The extensive development of Romania's localities, in last ten years especially of urban ones, led to a major increase in importance of the salubrity sectors, based on much bigger quantities of household, industrial and public space waste, which has to be neutralized and/or reused. Urban waste usually comes from household and public activities, as lodgings, shops, hotels, and office or/and from cleaning public streets and parks.

The quantity and composition of the above debris varies from country/place to country/place, following the local level of development, the geographic position and the climate. Romania has a total population of 23 million inhabitants, from which about half live in urban areas.

Bucharest, the biggest city in Romania, is confronting with big problems for generating, accumulating, recycling, collecting of municipal urban waste: recyclable waste - 80 to/day; waste to be collected - 1620 to/day; collected waste - 1400 to/day (87.5%); uncollected waste - 220 to/day (12.5%). The sources who generate the municipal waste are: 63% house waste; 14% commercial waste; 12% industrial waste; 6% construction waste; 4% waste from the street; 1% waste from big offices. These repartitions are represented in diagram no.1 and no.2.

2. The structure of municipal solid waste in Bucharest

The principal structure of municipal solid waste in Bucharest is as following: 29% garbage; 25% paper; 20% another incombustible; 9% glass; 8% plastic; 4% metal; 4% textiles; 1% another combustibles. This structure is presented in diagram no.3.

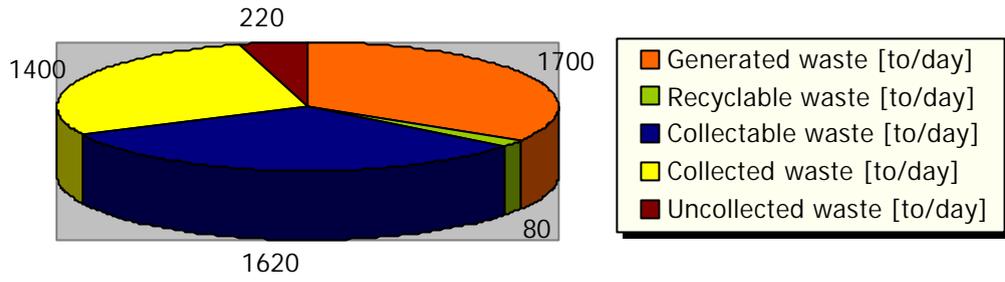


Diagram no. 1

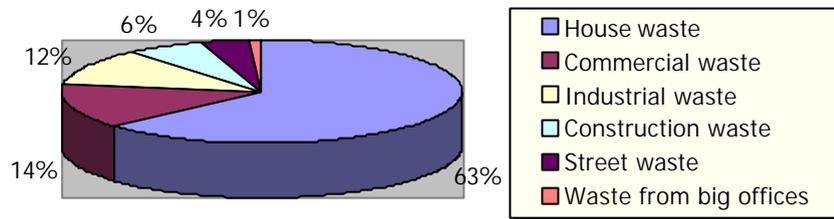


Diagram no. 2

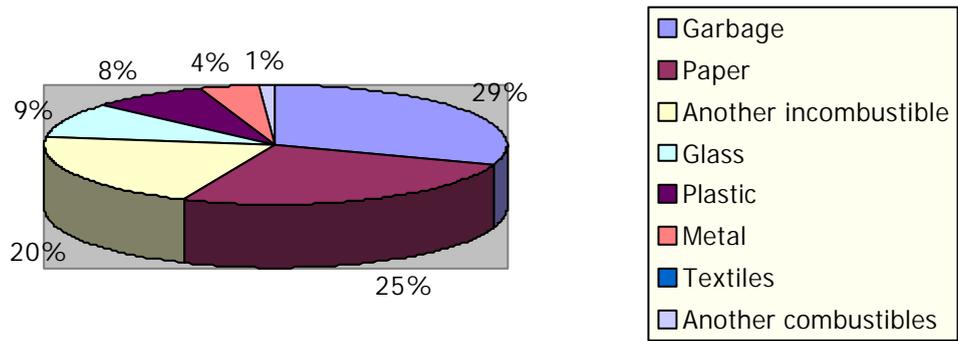


Diagram no. 3

3. Technological proceeds proposed for municipal waste recycling in Bucharest

For the typical kind of waste and the quantities of waste evaluate for city of Bucharest we propose two types of proceeds for waste recycling.

a) manual center of separation

This type of center contain manual separation area - the most important one; secondary separation area; evaluation area; evacuation area; stockage area by sorts. Manual center of separation is presented in diagram no. 4.

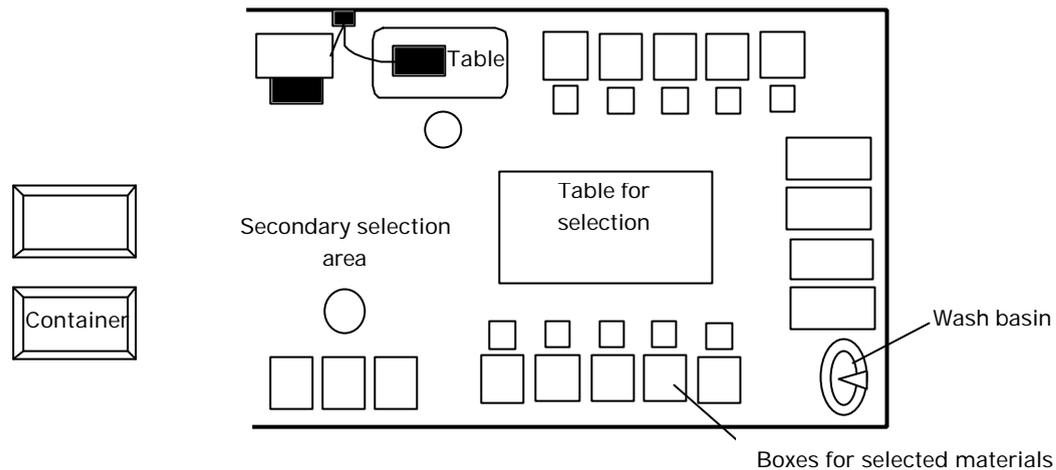


Diagram no. 4

After collection, the waste is stoked and is prelevate a quantity of 100 kg for selection. The weigh of each prelevated bag is registered, for a better knowledge of waste quantity in function of bag volume. The same person for all duration of identification campaign does the weighing and registering. The bags are opened on the selection table and the waste is distribute on different classes of materials, each person being responsible per a specific class of waste separation. Around the selection table are placed the boxes for every categories of waste. The boxes are distributed as following:

- in the back of the area are placed the boxes for the collection of materials which are a big volume glass, cardboard, plastic cans, metallic cans);
- the other s waste classes are distributed symmetrically both sides of the selection table.

The direct identifiable waste is the first separated, and the fines components pass to a fine selection. Because of the apparition on the market of most sophisticated packages or materials, which are difficult to differentiate, some types of waste categories are from beginning, the object of a raw selection and next to a secondary selection. In the table no. 1 is presented the secondary selection.

The waste selection is a fine work and need a constant supervising for prevent the errors that can disturb the next analysis.

The average quantity in an hour from selected waste from a person is little – about 10 kg/person hour.

Table no. 1– Secondary selection

Type of waste	Effectuated separation
Textiles	Synthetic cloth/natural cloth
Package for liquids	Packages from aluminum/without aluminum
Composite packaging	Al+plastic/Al+plastic+paper/Al
Plastic cans	Plastic without Cl/plastic with Cl
Cans for drinks	From Al/from Fe

b) mechanized separation

From a multitude of solutions of mechanized selection system of municipal waste, we think that the most efficient for the type of waste of Bucharest is the static installation which is produced by many manufacturers.

The incoming material is fed into the air-sieve, where the heavier fraction falls through the air stream for separate collection. The light fraction is entrained in the air stream and pneumatically conveyed to the separator, where, within an expansion chamber a sudden decrease in air speed allows the light material to drop freely through the funnel into the rotary valve. The separated light fraction can be fed into a storage bunker, open container, a portable or static compactor or a baling press.

The principles of operating are:

- controlled feed of material is essential, the system has a high speed feed conveyor (1) with speed controller to provide the required feed into air-sieve (2) (see diagram no.5);
- some materials require a vibration table before the feed conveyor to ensure an even flow of material;
- with delivery into the air-sieve, the material passes through a controlled air stream; the heavy material falls through the air flow into a storage bunker (3) or onto a discharge conveyor belt; to control the efficiency of light material separation, the air-sieve has adjustable diffusers to control air velocity and direction;
- the extracted lighter materials are pneumatically conveyed via a ductwork system (4) to a separator (5); the separator incorporates an expansion chamber, feed chute and rotary valve;
- the rotary valve ensures the waste is delivered without pressure into a container, compactor, baling press, or storage bunker;
- from the separator, the conveying air volume is returned to the recirculating fan (6).

The advantage of this mechanized selection system is highly efficient separation of a wide range of materials due to the adjustable air stream.

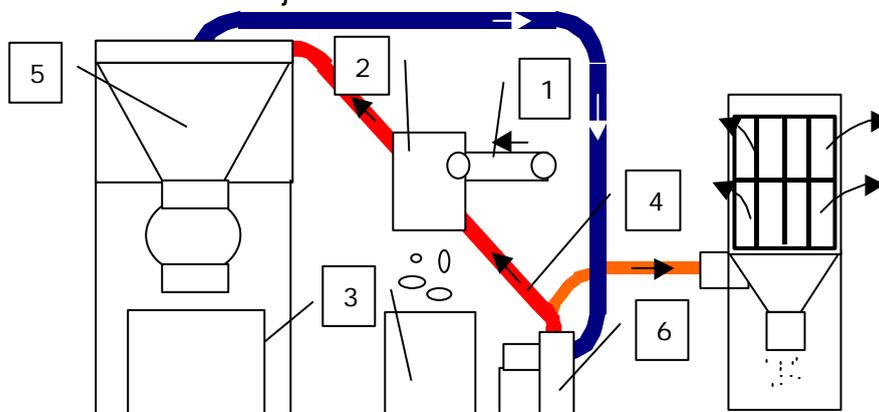


Diagram no. 5