

**TECHNOLOGY AND METHODS FOR WASTE MANAGEMENT.  
CASE STUDY – RECYCLING INTEGRATED POST CONSUMPTION  
OF PACKAGING POLYETHYLENE**

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**Abstract**

Purpose and Objectives of the project: *In order to increase the environmental protection with minimum investment and effort, we can look more closely to plastic materials used daily by each one of us, and to the possibilities we have to recycle them. Waste management is an essential component of the strategy of reducing the effects of global warming. One of the acute problems regarding the environmental protection that Romania faces is represented by the waste administration, due to an increase of consumption in the last 10 years, millions of tons of waste are generated every year. Complete or partial recycling would lead mainly to reduction of the waste quantity to be deposit. Another advantage would be that most of the recycled materials from the recycling special programs can be reused by the population and the companies. Even in the policies regarding the environmental protection and natural resources have gained a higher importance lately, and recently people have become more and more aware of these dangers requesting more dynamic actions for environmental protection, there are still very few economic bodies that performs such activities. Methodology used: EU Directives regarding the wrapping and wrapping east, Government Order 621/2005 modified by the Government Order 247/2011.*

**Keywords**

*Waste management, recycling, packaging*

**Introduction**

The EU directives regarding the wrappings and wrappings' waste have been transposed into the national legislation by Government Order 621/2005 modified by Government Order 247/2011. In compliance with this Order, until the end of 2015, Romania must recycle at least 55% from the total weight of the wrappings' waste. Reaching these national goals is the producers and importers task that introduce on the market wrapped goods and/or wrappings. By the law, they can choose in order to satisfy the national goals, either to manage the wastes by themselves, or to transfer this responsibility to an economic agent certified by the Environmental Ministry.

The green economy concept involves the waste should no longer be a burden but even an important resource economically. Unfortunately for Romania, wastes are threats instead of being treated as the opportunities.

In Romania, the municipality deposits occupy 800 hectares, but some of them will be closed, because they are not in compliance with the European norms, some other dozens hectares of new deposits, ecological ones will appear in the future. The principle that makes the entire recycling system move is that the polluter pays. The law obliges those that release on the market wrappings of any kind to be involved into their valorization.

Romania has obtained from the EU a prolongation of the deadlines to achieve the targets regarding the valorization and recycling of waste from plastic wrappings. Municipal waste recycling threshold set by the European Commission to 65% by 2030. Also, we are talking about a 75% target for recycling of packaging waste, as well as a reduction in landfill 10 %, all by 2030.

## **1. Literature review**

Our country has negotiated a transition period to implement a European directive regarding wrappings and plastic waste.

Though the Romanian legislation admits the EU principle „the polluter pays” complying with the targets remains a higher challenge for the Government.

The wrapping waste consist out of: 18-30% wrapping waste out of the total municipality waste, depending on the environment that generates it, where almost:

- 23,08% – paper – cardboard
- 30,30% – plastic
- 21,04% – glass
- 11,50% – metal
- 10,20% – wood
- 3,88% – others

Depending on the environment that generates it.

The companies participating to the fulfilment of the environmental targets established with the EU – either through their own wrapping management system, or by giving this task to a certified company – they don't have to pay the tax of 2 Ron/kilo of wrapping, applied to the other polluting companies, stipulated by the Environmental fund law. This tax is paid also by the companies trying to fulfil their environmental obligations, but they do not totally succeed; in this case the tax is applied to the difference between the quantities of wrapping representing the established goals and the quantities physically recycled every month.

Besides these companies, there are companies on the market that have concluded contracts with the big waste generators that must, according to the law, have implemented an own waste management system.

## **2. Methodology**

### *2.1. Concerns and tendencies regarding the waste management in Romania*

1. Each Romanian citizen produces daily almost 1 kilo of waste. At a national level it is about 8,700 t of solid waste every day.
2. The wastes consist out of rest from preparing food, plastic containers, wraps, newspapers, textiles, garden waste, metallic components, and recently electronics out of use, cars and much more. These waste that we usually call „urban waste” or „municipal waste” are collected, transported, deposit, neutralized in a manner to affect the least possible the environment for the present and future generation.
3. As well, we have to take into consideration the waste resulted from the production flows. Here, the branches that are the biggest producers of waste are; agriculture, constructions, mining, towns. The biggest quantity of waste comes from agriculture while the most negative environmental impact wastes are those coming from industry.
4. Thus, waste management becomes more and more acute, a preoccupation of citizens and local authorities from all the country's areas because throwing waste at random in areas that are not specially designed for this, for several years, has led to a dangerous impact on the environment.

5. The recycling process of the domestic waste includes collecting and sorting operations of the recycled waste. Recycling waste is the simplest way we can contribute to the environmental protection. Creating competitive products that can be recycled through the existing technologies, without generating waste – this is the way to the environmental protection and to the durable development of the society. Many domestic solid waste such as paper, glass, iron metals and non-iron metals, some plastics being selected can serve as secondary raw material.
6. Recycling plastic supposes mainly installations to separate impurities, bundling machines, wet and dry grinding, automatic sorting systems and quality verification. In the recycling industry of plastic, one of the present problems is the sorting on different types and classes of plastic. The sorting is done generally mechanical and manual, but due to the increase of the products and wrapping diversity, the classification depending on color or shape is more and more difficult.
7. Nevertheless, the most important problem in this field remains the high cost of such investment that can insure the waste's collection, recycling and deposit.
8. Thus, the management of such waste is difficult and complex because it needs considerable financial means.
9. Even if the policies regarding the environmental protection and natural resources have gained a higher importance lately, and lately people have become more and more aware of these dangers requesting more dynamic actions for environmental protection, there are still very few economic bodies that performs such activities.

## 2.2. *General waste management*

The main stages in the waste management are:

- Waste collection and transport

The domestic waste collection is mainly the task of local administrations and sorting centers.

- Waste sorting

Waste sorting is done in several stages, some are automatic and some are manual. After sorting the recycling waste, the following categories result: glass, metal, plastic, paper, wood.

- Waste processing and deposit

There are three methods of eliminating waste: deposit it in garbage pits, burning (it is not an eco-friendly procedure because important CO<sub>2</sub> quantities are released into atmosphere) and recycling (it is the most „healthy” method regarding the environment).

## 2.3 *Types of waste:*

### 2.3.1. Plastic waste

1. According to the market's analysis, in Romania there are over 1000 companies certified to collect wrappings post consumption from plastic materials.
2. Besides these companies, there is a series of sorting stations related to the new ecological landfills managed by the Local Councils or the County Councils.

### 2.3.2. PET waste

1. In Europe, each year, each inhabitant produces 3.5 tons of waste. From the huge quantities of garbage only 33% is recycled. Romania is one of the states that drive these statistics back. And not only Romania. Generally, the new member states reach a ratio of sending garbage to the garbage pit of 90%, and only 10% is recycled.
2. But in Holland, 89% from the waste is recycled and only 11% goes to the garbage pits. Due to these huge differences, the European Commission has established

different goals for the member states. Romania, for instance, has gone some derogation regarding the level of recycled wastes.

3. The recycling of the plastic materials has constantly developed and is realised in a various way in many countries. Instead of polluting rivers' water or big ground areas by their accumulation, PETs can be collected and recycled.
4. Recycling the plastic containers can represent an important challenge, mainly due the big number of PETs (terephthalate of polyethylene – a sophisticated material with a high resistance) used with a high efficiency as a recipient for drinks. The advantages of recycling PET are enormous, due to the high number of bottles used that can be exploited at a reasonable cost.

### **Conclusions**

Within the research presented in this paper and in the light of the assent to the European Community, Romania has assumed the collection and recycling targets of post-consumption wrapping that gradually grows until they reach European standards. If Romania misses recycling targets, which it assumed, will risk infringement procedure, which would mean a fine of 200 000 euros per day for each goal unfulfilled.

The project of waste recycling is consistent with the recycling targets set by the EU and by national and European legislation in the field of waste management. By implementing the new concept, the proposed project will contribute of environmental benefits.

By applying the recycling, we can reduce: the acid rain, the environmental pollution, the storage areas, and preserve significant hydrocarbon resources. This is why it is so important for us to understand exactly what the benefits are and to join our forces in order to save the environment with such reduced resources.

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