

## THE IMPACT OF PLASTIC WASTES ON SUSTAINABLE DEVELOPMENT

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**Abstract:** *The purpose of this paper is to present the importance that wastes have (particularly plastic wastes) on sustainable development. The long term objective of EU and national policies is to reduce the amount of waste generated and when waste generation is unavoidable, promote their use as a resource and achieve higher levels regarding recycling and disposal safe. Such waste management policies aim to reduce the negative impact of waste on the environment and health and to improve energy efficiency in the Member States of the European Union. The application of instruments set out in existing Community legislation, such as disseminating best available techniques or eco-design of products, are therefore important factors for achieving this purpose.*

**Key words:** *wastes, impact, sustainable development, health, recycling*

### INTRODUCTION

The concept of sustainable development crystallized in time, over several decades, within depth scientific debates internationally and acquired clear political meanings in the context of globalization (National Strategy for Sustainable Development of Romania. Horizons 2013-2020-2030, 2008).

The first signals of the fact that the economic and social developments of the world countries and humanity as a whole can not be separated from the consequences of human activity on the natural environment was made in the 1972 report of the Club of Rome entitled "*The Limits to Growth*" (Meadows Report). The document summarized the data on the evolution of five factors (population growth, the impact of industrialization, the effects of pollution, food production and depletion trends of natural resources), suggesting the conclusion that the development model performed in that period can not be sustained in the long term (Meadows et al., 1972).

The problematic of the relationships between humankind and environment started to be a part of the international community's concerns since the first ONU Conference on Environment (Stockholm, 1972) and resulted in the works of the World Commission on Environment and Development, established in 1985. The report of this Commission presented in 1987 by G.H. Brundtland and entitled: "*Our common future*" offered the first broadly accepted definition of sustainable development as a "*development that meets the needs of the present generation without compromising the ability of future generations to meet their own needs*"

The complex challenges of sustainable development began to be addressed at the highest level at the World Conference on Environment and Sustainable Development in Rio de Janeiro (1992), at the Special Session of the ONU General Assembly and practicing the Millennium Goals (2000) and at the World Conference on Sustainable Development in Johannesburg (2002). Within this process, there were adopted a number of international conventions that establish clear obligations from the part of states and strict implementation deadlines regarding climate changes, preserving biodiversity, protecting forests and wetlands, limiting the use of certain chemicals, access to information on the

state of the environment and others, which outlines an international legal space for the practical application of the principles of sustainable development.

In 2005, the European Commission launched a review process of the European Union strategy on sustainable development, published in February, a critical assessment of progresses recorded since 2001, that pointed to a series of lines of action to follow next. The document revealed some unsustainable tendencies, with negative environmental effects that could impact the future development of the European Union, namely **climate changes, threats to public health, poverty and social exclusion, depletion of natural resources and erosion of biodiversity**.

Having identified these problems, the European Union Council adopted on 9 June 2006, the renewed Sustainable Development Strategy for an enlarged Europe. The document was designed in a unified strategic vision and consistent with the overall objective of continuously improving the quality of life for present and future generations through the creation of sustainable communities able to manage and use resources efficiently and to tap enhance the potential of eco-innovation and social of economy to ensure prosperity, environmental protection and social cohesion (EU Sustainable development Strategy revised, 2006).

In this purpose, there were identified four **key-objectives**:

- Environmental protection through measures enabling decoupling economic growth to negative environmental impact;
- Social equity and cohesion through respecting fundamental rights, cultural diversity, equal opportunities and through combating discrimination of any kind;
- Economic prosperity by promoting knowledge, innovation and competitiveness to ensure some high living standards and full employment opportunities and of high quality;
- Fulfilling the European Union's international responsibilities by promoting democratic institutions in the service of peace, security and freedom, of the principles and practices of sustainable development throughout the world (EU Sustainable Development Strategy revised, 2006).

To ensure the integration and balanced correlation of economic components, environmental and socio-cultural aspects of sustainable development, the European Union sets the following **guidelines**:

- Promotion and protection of fundamental human rights;
- Solidarity within and between generations;
- Cultivating an open and democratic society;
- Information and active involvement of citizens in decision making;
- Involvement of businesses and social partners;
- Policy coherence and quality of governance at local, regional, national and global level;
- Integration of economic, social and environmental policies through impact assessments and stakeholder consultation;
- Use of modern knowledge to ensure economic efficiency and investment;
- Applying the precautionary principle where scientific information are uncertainty;
- Application of the "polluter pays" principle (EU Sustainable Development Strategy revised, 2006).

The substance of the European Union Strategy concentrates on seven **crucial challenges** and two **cross-sectoral** fields. Many of the targets agreed at EU level are set in numerical or percentage form, with strict implementation deadlines, being mandatory for all Member States.

The objective of the sustainable development of European Union is reflected as well among the priorities established for the period 2014-2020, namely the development of an economy based on "*smart growth, biological and favorable for inclusion*" (EC, 2010). Thus, the three priorities of 2020 Europe Strategy aims at:

- Developing an economy based on knowledge and innovation (smart growth);
- Promoting a more biological and competitive economy based on more efficient use of resources (sustainable growth);
- Promoting a highly labor employment economy, ensuring social and territorial cohesion (inclusive growth).

Developing a sustainable future of the EU should be based on the achievement of measurable objectives that will guide this process, namely employment, research and innovation, climate changes and energy, education and combating poverty.

## MATERIALS AND METHODS

The materials used in preparing this study consist of relevant documentary sources of United Nations, European Commission, Romanian Government, Ministry of Environment, Water and Forests, National Environmental Protection Agency, including official documents of these bodies. It was also envisaged the flow of national and international publications in the area of the works. The methods used were analysis, synthesis, comparison, deduction and induction.

## RESULTS AND DISCUSSION

The environmental challenges of the modern world have led to a reorientation of perceptions on how the "environment" and human society influence each other, world states making joint efforts for to deal with new problems emerged: globalization, economic crisis, energy crisis, climate changes, the loss of diversity of biological and ecological systems, abiotic environmental deterioration.

Applying the principles of sustainable development involves a new approach regarding wastes using organic basic concepts. In this sense, the "**National Waste Management Strategy 2014-2020**" proposes a framework of measures to ensure the transition from the development model based on production and consumption (current model) to a model based on prevention of waste emerging and use of raw materials from the recovery industry, thus ensuring national preservation of natural resources, creating the premises for reconciling the economic imperatives and "environment" (Decision no. 870/2013).

Given the current pressure level on natural resources at national, continental or even global scale, wastes must be analyzed in a broader context defined by the flow of energy and raw materials and their sustainable use. Reducing the consumption of natural resources, recycling of raw materials that are found in products becoming wastes, as well as energy recovery must be vectors of a major change towards a sustainable life standard. For this purpose, the "National Waste Management Strategy 2014-2020" focuses on encouraging the expansion and development of recycling capacities, but also on the use of wastes in the production process in the view of their material or energy recovery.

The European Union approach in waste management field is based on four main principles:

- **prevention of waste emerging** - factor considered to be extremely important in any waste management strategy, directly related both to improving the production methods

and the determination of consumers to modify their application on products (orientation towards green products) and to address a way of life, resulting in low waste quantities;

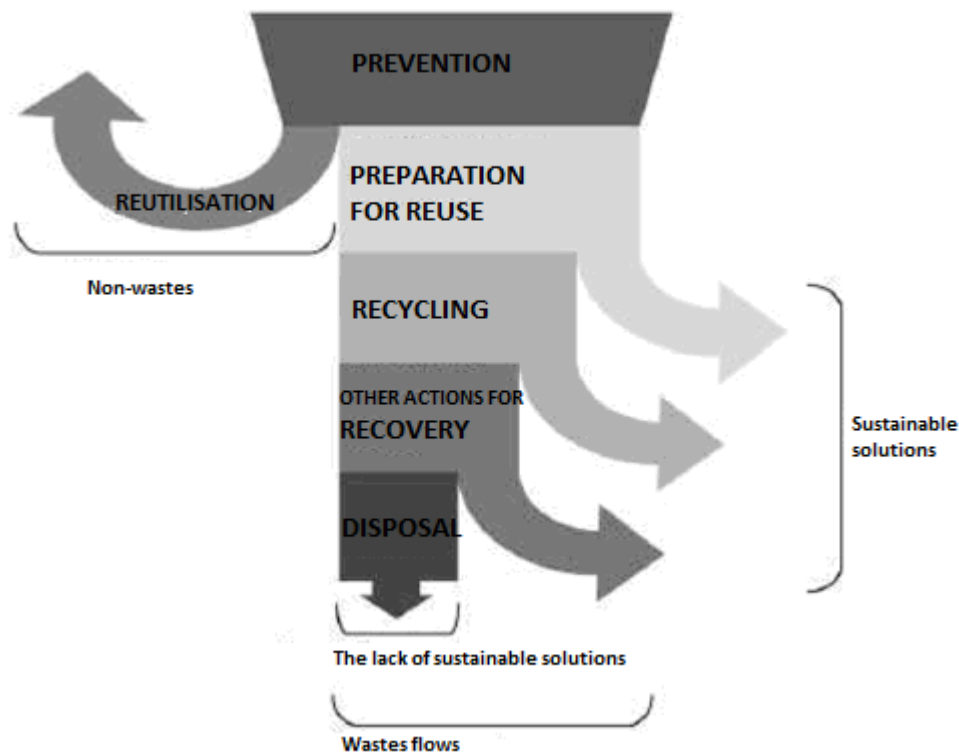
- **recycling and reuse** - encouraging a high level of material components recovery, preferably by recycling. In this respect, there are identified several waste flows through which recycling is a priority: packaging wastes, end of life vehicles, waste batteries, waste electrical and electronic equipment;

- **recovery by other operations of wastes that are not recycled;**

- final disposal of wastes - where wastes can not be recovered, they must be disposed of safely conditions for the environment and human health, with a strict program of monitoring (Directive 2008/98 /EC on waste).

The national policy on waste management must be subscribed to the objectives of European policy on waste emerging prevention and to aim at reducing the resource consumption and practical application of the waste hierarchy (National Waste Management Strategy 2014-2020).

**The waste hierarchy** (Directive 2008/98/EC on waste) represents the concept according to which various measures/ options of waste management are grouped based on their long-term impact on the environment. The category with the lowest impact, namely waste emerging prevention is a top priority, followed by preparation for reuse, recycling, recovery and, last of all, the removal (eg landfills). This group represents the best option in terms of environmental protection, but there may be deviations from these for some specific waste flows, where justified and are only on the basis of analysis type assessment of life cycle regarding the global effects of the generation and management of such wastes.



**Figure 1. The hierarchy of wastes management**

Wastes are a major environmental issue, being simultaneously a social and economic issue. The increase of consumption and the economy at continuously development generates large amounts of waste, which requires greater efforts to reduce their quantities and to prevent them. If in the past it was considered that wastes were not reusable, in the present these are increasingly recognized as resources. This fact is reflected

in waste management, where there was the transition from their disposal to their recycling and recovery (integrated approach of wastes).

Within the EU there has been a clear shift in terms of waste management. Currently, a proportion of 31.33% of municipal solid waste (representing 9.69% of the total waste generated in the EU) is located in landfills. The trend is toward recycling/composting (42.77%) or incineration including with energy recovery (25.90%), depending on the waste flows.

In Romania, the main way of waste disposing is still represented by storage (96.83%), recycling and recovery operations being used in a very limited extent (2.83% recycling and composting 0.34%) (Table 1). The degree of recovery is low and is primarily because of **technical reasons** (lack of infrastructure of separate collection and sorting in most areas of the country, namely the lack of recycling capacity for certain types of materials such as wood), but also **economically** (the lack of some financial instruments to encourage/oblige sanitation operators to deliver the collected waste to treatment/recovery plants and not to disposal). We mention the fact that, alongside the sanitation operators, there are parallel circuits of collection and sorting of recyclable waste from municipal waste (authorized collection points, ad-hoc screenings at the entrance to the landfill), but which are not quantified correctly, therefore leading to an apparent decrease of the value of recycling/ recovery levels of these as whole (National Waste Management Strategy 2014-2020).

Table 1

**The amount of municipal waste in the EU Member States by type of technology  
(thousand tons, 2013)**

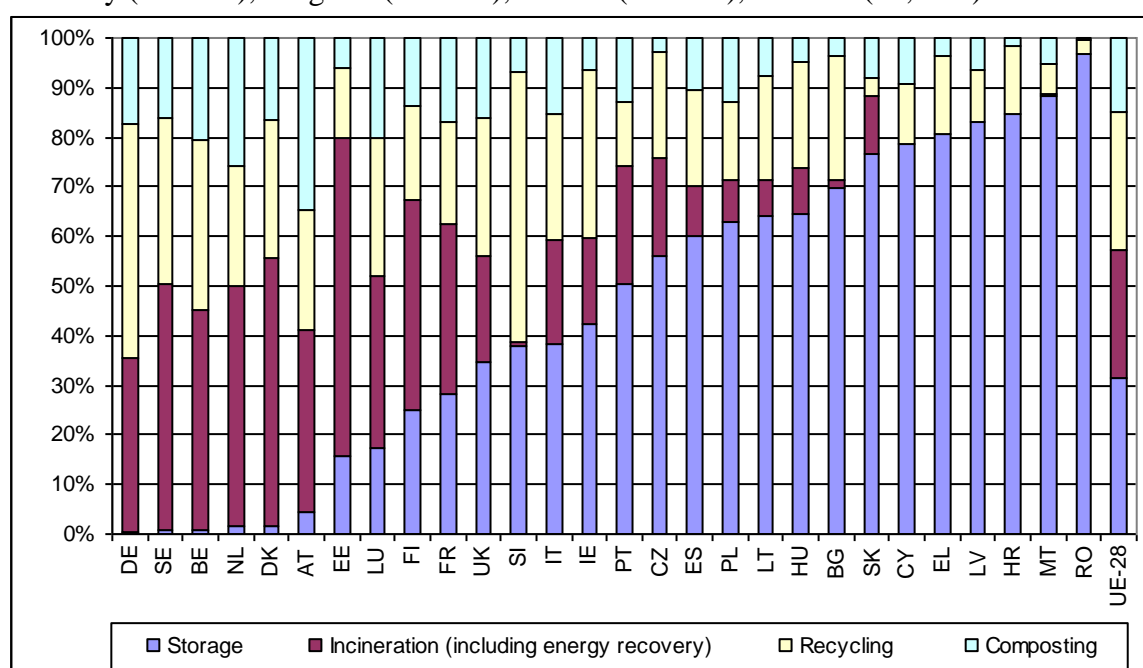
State	Total municipal waste	Treated waste	Storage	Incineration (including energy recovery)	Recycling	Composting
Belgium	4905	4926	46	2180	1684	1016
Bulgaria	3135	3110	2167	49	787	107
Czech Republic	3228	3228	1815	631	686	96
Denmark	4192	4192	65	2270	1164	693
Germany	49780	49780	109	17559	23424	8688
Estonia	386	334	53	214	47	20
Ireland	2693	2439	1028	427	829	156
Greece	5585	5585	4507	0	869	209
Spain	20931	20931	12606	2038	4123	2164
France	34828	34828	9886	11845	7227	5870
Croatia	1721	1671	1413	1	228	29
Italy	29595	28538	10914	5970	7335	4319
Cyprus	538	538	423	0	66	49
Latvia	627	627	521	0	66	40
Lithuania	1280	1246	798	92	261	95
Luxembourg	355	355	62	123	99	71
Hungary	3738	3738	2415	336	799	188
Malta	241	222	196	1	13	12
Netherlands	8845	8844	131	4305	2114	2294
Austria	4905	4668	199	1716	1126	1627
Poland	11295	9475	5979	766	1499	1231
Portugal	4598	4598	2320	1091	594	593
Romania	5441	4387	4248	0	124	15
Slovenia	853	592	224	4	324	40
Slovakia	1645	1502	1152	174	57	120

Finland	2682	2682	672	1137	510	362
Sweden	4399	4399	28	2192	1467	711
United Kingdom	30890	30524	10584	6514	8504	4923
EU-28	243311	237960	74561	61634	66026	35738

Source: Eurostat, Code: tsdpc240

<http://ec.europa.eu/eurostat/tgm/table.do?tab=table&init=1&language=en&code=tsdpc240&plugin=1>

According to EUROSTAT data for the year 2013, between Member States of the European Union there are significant differences in terms of waste management, ranging from the situation of countries where storage is performed largely as the case of Romania (96.83%), Malta (88.29%), Croatia (84.56%), Latvia (83.09%) and Greece (80.70%) to that of countries where municipal waste recycling is prominently: Slovenia (54.73%) Germany (47.05%), Belgium (34.18%), Ireland (33.99%), Sweden (33,35%).

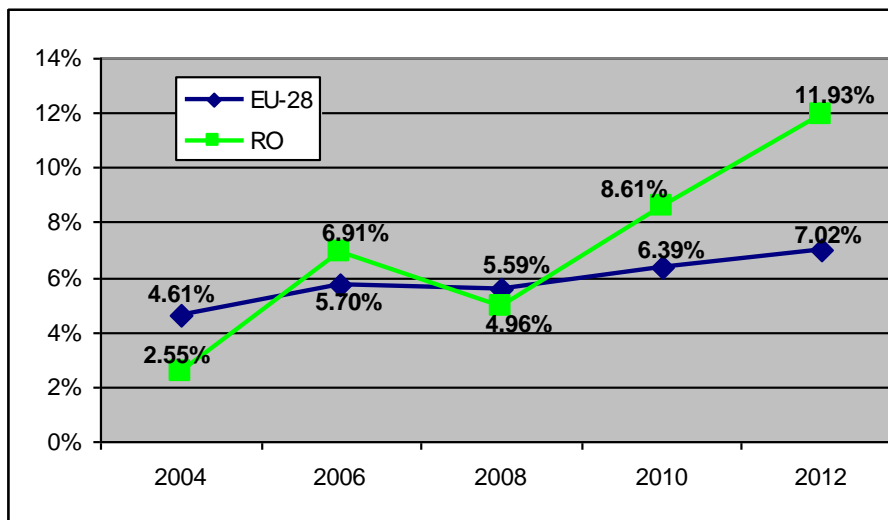


**Figure 2. Treatment of municipal waste in the EU Member States by type of technology (2013)**

**Recycling** has a beneficial effect on the environment by reducing the amount of wastes deposited in landfills, thereby reducing pollutant emissions. It also helps at dealing with material demands of economic production, alleviating the need for extracting and refining of raw materials. Also, recycling presents significant economic and social benefits: it generates economic growth, fosters innovation, creates jobs and helps to ensure the availability of critical resources. Recycling is a vital priority for the European and global politics: the transition to a green economy to generate wealth and preserve at the same time, a healthy environment and social equity for present and future generations.

An important issue of waste management system in Romania is represented by the **low area of coverage with collection services**. Thus, at national level in 2011 only 76% of the population was served by sanitation services, urban share being approximately 90% and only 59% in rural areas (National Agency for Environmental Protection (2014)). This explains why a large amount of municipal waste, 1.054 million tonnes, meaning 19.37% of total waste (Table 1) remains uncollected (untreated) directly affecting human health, flora, fauna and landscape.

An important component of wastes are **the plastic wastes**. These types of waste falls into the category of municipal waste and similar (Law no. 211/2011 on the regime of waste) and in the year 2012 represented a percentage of 11.93% of the total municipal waste, continuously increasing in recent years (Figure 3) which shows the direction of orientation of the consumer behavior towards plastic packing products.



**Figure 3. The evolution of plastic wastes in Romania and the EU-28**

In the world there are more than fifty types of plastic materials that are made from raw material resources such as oil, coal and natural gas. Plastics present a very wide range of use and represent 13.84% of the amount of household wastes (Eurostat). Their main issue is that they are not biodegradable, resisting in the environment for long periods of time.

Among the many types of plastic packaging there are commonly recycled packaging as for mineral water or juices made from PET (polyethylene terephthalat), which is a recyclable raw material. PET is a highly popular material in food industry (bottling of soft drinks, water, milk, oil, vinegar) and not only, being cheaper, lightweight, shock resistant and recyclable. The increase of their consumption, especially in the last 10 years has led to an alarming increase of packaging discarded irresponsibly in nature. By collecting and recycling of these, it aimed at reducing negative impacts on the environment and humanity. The recycled polyethylene terephthalate (RPET) can have multiple uses and can be used for polyester fiber (75%) being used themselves as raw material for carpets, upholstery, toys, textile felts, as insulation in coats, sleeping bags, automotive etc. industrial foil, straps and bands, new food and non-food PET packaging (egg cartons, household items, etc.).

Another positive aspect of PET recycling is of reducing the amount of wastes to be stored. Today there are technologies that, respecting environmental standards, are able to remelt and reprocessing plastic waste. This fact is not being performed yet in Romania, but there are Romanian companies that collect plastic packaging, are crushing them and export them overseas factories that have their own installations which are required for recycling them. Since we are among the last European countries that do not have a public system of waste recycling, the urgent and unconditional implementation of a national public system of selective collection of waste for recycling must be a priority for all citizens. Applying a sustainable system of waste management must involve significant changes of the current practices in this field in Romania.

In the regard of all mentioned above, the purpose of national waste management Strategy 2014-2020, as defined in the mentioned document, is to turn Romania towards a "society of recycling" through:

- prioritizing efforts in waste management field in accordance with waste hierarchy;
- encouraging the prevention for waste emerging and reuse for a greater efficiency of resources;
- development and expansion of separate waste collection systems in order to promote a high quality recycling;
- developing/ implementing technologies/ facilities of recycling and/or obtaining a high efficiency of extraction and use of raw materials from waste;
- supporting energy recovery from waste, where appropriate, for waste that can not be recycled;
- minimization of waste disposal by storage.

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