

DEVELOPMENT OF SYSTEMS FOR UTILISATION OF PACKAGE WASTE IN BULGARIA

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Abstract. Recently the requirements that the EU places towards the industrial and food production packages admissible to the European market have sharply increased. The present report considers the principle stipulations of the ED 94/62/EU and the Bulgarian ordinance, that is being prepared at present. An analysis of the existing systems in the EU countries has been made. Some technical possibilities for the practical implementation of the requirements for reduction, utilisation and recycling of the package waste have been also considered.

Keywords: package waste utilisation, the EU requirements, the Bulgarian ordinance.

AIMS AND BACKGROUND

Recently the requirements that the EU has placed towards the industrial and food production packages admissible to the European market have sharply increased. The aim is to protect the environment from package wastes and substances released in the atmosphere after burning them that is a problem of transboundary pollution. For solving that problem the ED 94/62/EU has been adopted. The objectives of the Directive include: harmonising the requirements in packing and package wastes, reducing or eliminating the harmful effect of the package wastes on the environment and guaranteeing the functioning of the home market without hampering the free trade and protecting the competition.

ANALYSIS OF THE EXISTING SYSTEMS IN THE EU

The general principles of the Green Point systems in all the countries are: financing the separate waste collecting, sorting out and processing the package wastes from industry and communications with the consumers for acquiring ecologically sound consciousness and behaviour. At the same time the system reports the specific characteristics of the different countries. The applied systems differ in the number of services and the costs, the level of responsibility, methods of collecting, processing and monitoring¹.

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Table 1 presents the systems used in package waste management in the European countries and Table 2 – the types of packages for which the Green Point system is applied.

Table 1. System of package waste management

System of waste collecting according to its organisational structure	The EU member countries
Municipalities	Denmark, the Netherlands, Finland, the United Kingdom
Municipalities and Industry	Austria, Belgium, Germany, France, Portugal, Spain, Italy
Industry	Sweden
System of waste collecting according to its financing	The EU member countries
Municipalities	Denmark, the Netherlands
Municipalities and Industry	Finland
Industry	all the rest countries

Table 2. Types of packages for which the systems are applied

Types of packages	Countries
Only consumers' packages	France, Belgium, Spain, Luxemburg
Consumers' and small retail trade packages	Germany
All types of packages	Austria, Portugal, Ireland, Hungary, Czech Republic, Latvia, Lithuania, Sweden, Poland, Greece, Turkey

The EU member countries have got different quotas for waste recycling. For example, Germany has got the maximum quota for plastic waste packages – 60%, while France, Spain, Portugal and Ireland have reached the minimum quota of 15%.

The period of transit proved to be also different – 10 years were necessary for France, a year for Austria and 18 years for Germany².

NEW BULGARIAN REGULATION

In February 2004 a new 'Regulation for packages and package wastes' was adopted in Bulgaria³. The Regulation followed strictly the principles of the ED 94/62/EU. The Regulation specifies the responsibilities of the producers, importers and distributors of packed goods for the packages released on the market and

for the package wastes recycling and use, as well as the shared actions of the municipalities for the organisation and development of a system of collecting and sorting out the household package wastes. The Regulation refers to all types of packages and only packages complying with its stipulations can be released to the market.

The Regulation provides opportunities for individual realisation of the aims set in recycling and use as well as for collective systems of package waste management.

Bulgarian business – 17 big companies – reacted immediately to the requirements of the Regulation by establishing the first collective system – an organisation of utilising the package wastes called ‘EcoPack Bulgaria’. Those who have not been included in any system are obliged to pay a product fee for the packages presented in Table 3 (the amounts are given in EURO by the exchange rate on the exact date).

Table 3. Product fees for packages

Packing material	Codes	Amount of the package fees by years (EURO/kg)*		
		2004	2005	2006-2011
Plastic	01-19	0.36	0.70	0.87
Paper, cardboard and corrugated cardboard	20-39	0.10	0.21	0.26
Metal	40	0.025	0.03	0.04
Aluminium	41	0.085	0.17	0.22
Glass	70-79	0.05	0.06	0.077
Composed materials	80-99	0.39	0.53	0.66

* The exchange rate applied is 1EURO = 1.9558 BG levs.

The reduction of the harmful effect of package waste on the environment includes: preventive measures for decreasing the package waste at the very source; multiple-use of the packages; recycling of the package wastes; energy use by incineration of package wastes; organic recycling; final decontamination. Below we shall treat each of the measures separately.

PREVENTIVE MEASURES FOR REDUCING THE WASTES

Preventive measures for package wastes reduction have been included in the European and in the national legislation of the EU member countries. It is the only possible way of reducing the natural resources (raw materials and energy) consumption⁴.

The basic preventive measures in the source are: changing the product concept (1); modification of the packing technology (2); changing the package concept (3); simplifying the packing system (4); optimising the package size (5); technological innovations in the production of packing materials enabling quality assurance and improvement when using thinner materials (6); technical evolution in package production (7); optimising the transport packages (8).

Figure 1 presents the relative share of the basic preventive measures applied by interviewed French companies.

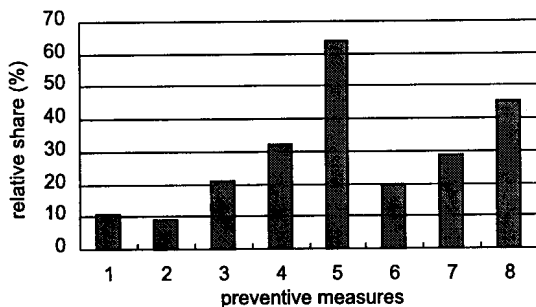


Fig. 1. Relative share of the basic preventive measures applied by interviewed French companies

When developing new packages the preventive measures should be one of the major starting points when doing their functional analysis.

In future the production of new packing materials based on renewable biological resources will lead to the reduction of package wastes. Nowadays intensive research is being conducted in the area of biodisintegrating and edible packages.

POSSIBILITIES FOR MULTIPLE USES OF THE PACKAGES

The multiple use of the packages is only possible for liquids especially as far as glass packages are concerned. The organisation is more complex compared to disposable packages. The factors limiting the multiple use are: the complex logistics of collecting, sorting out, transportation, consignment, marking the cycles (up to 25); washing the packages (polluting waste waters); problems of the system for closing and control; availability of huge amounts of a product for sale in standard packages with cycles not less than 10; provision of at least 90% collecting of the used packages. As for the transportation packages their secondary use has less limitations and the system is successfully applied.

TECHNICAL POSSIBILITIES FOR WASTE UTILISATION

The possibilities of package waste utilisation depend on the type of the used packing materials: glass, metal, paper/cardboard, plastic. The structure of use of those materials is individual for each country, however all of them follow a common tendency. Table 3 presents quotas for package waste processing in the EU.

The possibilities of waste utilisation are: waste recycling (mechanical and chemical) with the aim of obtaining second-hand materials; incineration with the energy use; biological applications.

The recycling of glass and metal packages is not a problem and the closed-cycle realisation is possible. New packages are produced from the recycled glass, the energy consumption being significantly reduced (up to 35%) in comparison with the use of new glass. The secondary glass quality depends on the sorting out and breaking up. Metal package recycling is also popular. Major materials for metal packages are steel and aluminium. Steel is a material that could be processed unlimited number of times. Its magnetic properties enable the easy sorting out. Its processing saves energy. Aluminium could be also processed without limitations, thus saving up to 95 % of energy compared to primary one.

Waste paper utilisation can be realised by three methods: recycling, incineration with energy use and organic recycling (composting). Nowadays in paper and cardboard production significant amounts of maculature as follows: for top quality graphic paper – up to 28% and for newspapers – even up to 100%. After sorting out the materials obtained are fragmented, soaked and the impurities are extracted from the pulp. Afterwards fine purification from printing paint follows.

The major methods for utilisation of plastic packages are: mechanical recycling with obtaining secondary raw materials (for packages of bigger weight – bottles, vials, etc. of PVC, PE, PET); energy use from incineration (folio, sachets, packages); chemical recycling of the material. The factors limiting recycling are: economic efficiency, restricted opportunities for a whole-cycle production; production of the same products from which new waste is got again; reducing the quality indices of the second-hand materials; technical problems.

Plastic package wastes have significant calorificity due to the available carbon and hydrogen (Fig. 2) and that is why their incineration for energy use is valuable. After the preliminary sorting out with the aim of recycling the plastic wastes their energy capacity drops down (< 5000 kJ/kg) and additional fuel or gas is needed for their burning out⁵.

Incineration conditions are legislatively set: temperature; minimal time of stay in the oven; amount of the oxygen input; maximal permissible levels for the release of CO_2 and other contaminants in the atmosphere. The incineration installations should be equipped with reliable purifying appliances: up to 20% of the pollution of the atmosphere with chlorine derivatives is due to PVC con-

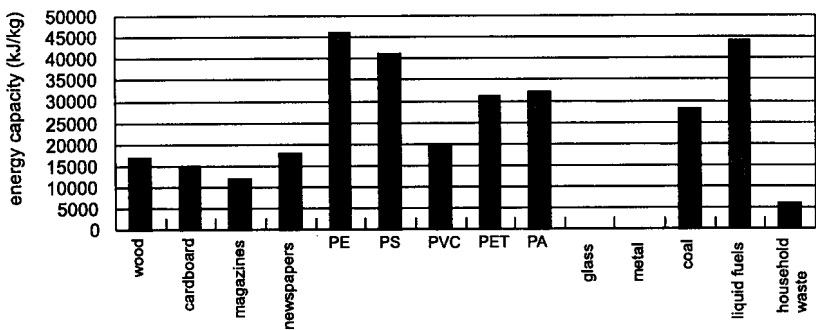


Fig. 2. Energy capacity of some materials

tent in the wastes; the legislative limit of its release is about 0.15%; heavy metal emissions (lead, cadmium, etc.) are also restricted.

The chemical recycling of plastic waste aims at disintegration of the polymer molecules for obtaining lighter products or source monomers. Major techniques applied in package waste processing are: **pyrolysis** (used for all types of plastics, the impurities reaching up to 20%; liquid or gaseous products for refineries are obtained); **hydrogenisation** (used for mixed plastics); oils for refineries and for chemical industries are obtained; **gasification** (used for mixed plastics); extruded agglomerate is used in cast iron production instead of mazut; in the intermediate phase of the gas synthesis methanol is obtained from the agglomerate; **depolymerisation** (used for PET; source monomers are obtained). The limiting factors in chemical recycling are: economic efficiency; reducing the quality indices of the second-hand materials; ecological restrictions (the ecological balance often points out the advantages of incineration).

CONCLUSIONS

- The choice of the right system of collecting, sorting out and utilisation of package wastes should be based on the analysis of their real structure.
- The preventive measures are extremely important for reducing the amounts of wastes. It is necessary to establish a system for training staff for packing industry.
- For the efficient reduction of the harmful effect of package waste on the environment it is necessary to develop criteria for applying different techniques for waste utilisation rendering an account of the specific characteristics in Bulgaria.

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