

RECYCLING OF ELECTRONIC AND ELECTRICAL EQUIPMENT AND INTRODUCTION IN NATIONAL LEGISLATION OF SERBIA

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ABSTRACT

Integration of economics and ecological aims is basis for consensus about developing aims in the European Union. Waste in Electrical and Electronic Equipment (WEEE) and Restriction of the Use of Certain Hazardous Substances in Electrical and Electronic Equipment Regulations (RoHS) Directives do not only refer to prohibition of putting of electrical and electronics waste on the depot. They also refer to decreasing and prohibition of using of dangerous materials in the production of electrical and electronics devices.

It is recommended to use more suitable and pure technologies which have not been used in production of electrical and electronics devices.

Recycling of the electrical and electronic waste (EEW) in the Serbia is still realized on the most primitive way by hammer and screwdriver printed boards, capacitors, cables are disassembled and stripped manually.

Keywords: recycling, electronic and electrical equipment, legislation

1. INTRODUCTION

The problem of spatial spread of the landfill for storing a bulky waste and the problem with the storing of hazardous waste increase the awareness of the unsustainable development of uncontrolled production of material goods.

In order to achieve better results in the production as well as improve the quality of people life more perfect technologies which constrain the use of modern computer equipment and therefore the replacement of outdated are introduced.

Accelerated growth of the use of electronic and electrical (EE) equipment is the most obvious example of application of information technologies (IT) equipment and personal computers (PC) which are the most important and the highest quality tools in the man's hands in the last decade.

Simple use as well as lower costs make the PC device is attractive for more and more users and customers. Today it is almost impossible to find an area in which the PC is not used as basic or as a secondary means.

The amount of electrical and electronic waste (EEW) is growing alarming rate year $3 \div 5\%$, which is three times more than the total amount of municipal solid waste. Today, the proportion of this waste exceeds 5% in the total amounts of municipal solid waste.

Therefore, the huge amount of the EEW is found deposited in various places in basements, garages, warehouses, municipal solid waste landfills and because of the irregular legal framework and inadequate control measures the most part of this type of hazardous waste finished in underdeveloped countries.

Amount of EEW and the space required for its storing are not the most important problems, but its impact and danger for man and his environment are much more significant because of large amounts of heavy metals and other toxic substances that are embedded in components of these devices.

Basel Convention calls on all countries to a minimum of hazardous waste and that if it is possible to address the problem of waste within their own borders. This commitment from the Basel Convention is not conditional on the level of development of waste management in the importer countries.

Fifteen European countries have implemented the Basel Convention, and banned the export of their hazardous waste in developing countries for any reason. Also, the EU has prepared directives that the manufacturer of EE devices and equipment required to be responsible for the whole life cycle of their products. These regulations require the manufacturer to buy all outdated and faulty EE devices and equipment on their own expense and to begin removing and replacing toxic substances in their products gradually.

2. EUROPEAN UNION DIRECTIVE RELATING TO THE EEW

The European Union is implemented the following two directives related to the EE waste in its legislation:

- Directive 2002/96/EC European Parliament and the Council of Europe - Waste in Electrical and Electronic Equipment (WEEE) Directive. This Directive is referred to the management of waste made from old or faulty electrical and electronic equipment, and
- Directive of European Parliament and the Council of Europe - Restriction of the Use of Certain Hazardous Substances in Electrical and Electronic Equipment Regulations (RoHS) Directive. This directive is referred to the limitations of the use of certain hazardous substances in electrical and electronic equipment.

These two directives were adopted in January 27, 2003 by the EU and started to apply in February 13, 2003. After the adoption of the Directive member countries of the European Union in the period until August 13, 2004 have been obliged to introduce these two directives in their legislation. Implementation is carried out through national laws, regulations and other administrative measures.

WEEE and RoHS Directives are intended to significantly reduce the amount of EE equipment or the EEW that dump to the landfill without control or entered in waste incinerator as well as to eliminate dangerous substances which EE products include.

It is estimated that over 90% of this waste ends in plants for incineration or communal landfills, instead of re-used or subjected to the process of recycling. Due to the large content of toxic materials, the EEW has a large portion in the pollution of soil, air and water.

The EU directives do not directly burden customers of EE devices, companies or individuals, but require member states to introduce the same in their national policies. It is important to note that the EU can introduce punitive penal for member states that fail to implement these directives.

WEEE Directive is a very extensive and covers practically all the electrical and electronic equipment. To stimulate manufacturers to use design of the device that allows easy repair, disassembly, and especially re-use and recycling of the EEW and its components and materials, WEEE Directive has established the principle of extended producer responsibility (EPR). This principle implies that EE equipment manufacturers are financially responsible for the care of their products at the end of the life cycle and manage them in accordance with the Directive.

In this context, member states should take appropriate measures that producers through the design or the way of their production do not prevent the possibility of re-use of EE equipment, unless such design or the way of production can improve the aspect of environmental protection and / or security requirements.

Dealers should provide the possibility of substitution on the basis of "old for new". However, the Directive allows member states not to apply this provision.

The primary goal of the directives is to minimize the amount of the EEW as a specific municipal solid waste, and to reach a high level of separate collection of such waste.

The EEW management systems have to be organized by the producers on the individual and collective basis, so that manufacturers can create common systems for the fulfillment of their obligations using the best available techniques for treatment, repair and recycling.

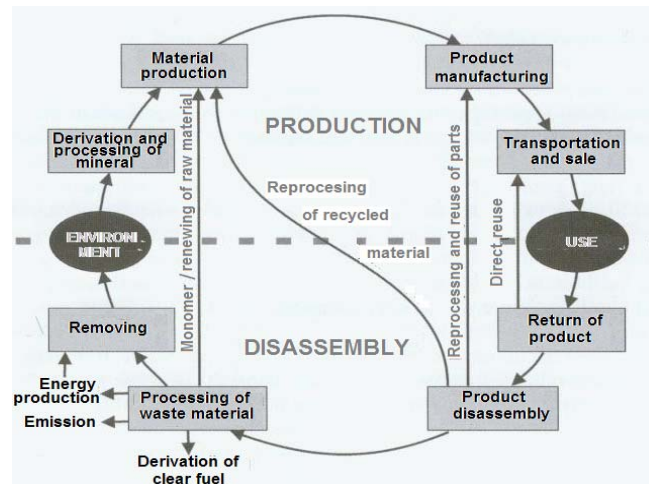


Figure 1. Production, disassembly and reprocessing of recycled material

Each export of EE waste equipment for further processing has to be in accordance with the regulations of the EU and the OECD (Organization for Economic Cooperation and Development) regarding the export of waste.

According to the WEEE Directive, producers of EE equipment have to bear the costs of collection of the EEW as well as the cost of further treatment of this waste

For historical products, those that were released on the market before the August 13, 2005 the cost of waste management should be shared by all manufacturers. Users with the exception of households may be partially or fully responsible for the financing of "historical products" management.

For new products, i.e. those that have been on the market after the August 13, 2005 the producers have "individual responsibility". So that each owner will bear the costs of managing its outdated EE equipment, was on an individual or company. This can make through the programs set by individual companies or through the participation in the collective programs. It is not allowed any compensation for the financing of waste management resulting from new EE products.

When manufacturers put a new product on the market they have to provide financial guarantees that the waste management of products will be covered. Manufacturers can join the Organization for the responsibility of the manufacturer, where all involved manufacturers pay for recycling insurance, or to open a bank account for these guarantees independently.

Every new product has to be wearing the label that:

- 1) confirm that it is released to the market after the August 13, 2005,
- 2) confirm that it will be separately collected and
- 3) contains the name of the manufacturer

Manufacturer has to provide information to consumers about the available systems for collecting the EEW and about the impact of hazardous substances contained in the EE waste of products on the environment and health.

Manufacturer also has to provide information for easy recycling, reparations and re-use EE device. This information includes the identity of components and materials and location of hazardous substance within the product.

Symbol for separate collection of EE equipment, was crossed out cans with wheels. Symbol has to be printed visibly, legibly and that it can not be deleted.

The members of EU have to establish production search information about the number of EE equipment that was put on the market, as well as information on quantities collected, re-used, recycled and repaired EE equipment.

The members of EU have to establish systems for inspection and monitoring and impose the effective penalties for lack of cooperation.

RoHS Directive follows WEEE Directive and their scope is similar, because the products covered by WEEE are included in RoHS Directive. Defining the terms and conditions of implementation by member states in the imposition of penalties are the same for both the Directives.

RoHS Directive formulates that even if all the EEW collected and recycled separately, the toxic content can be a risk to health and the environment. For that reason, this directive requires the substitution of hazardous substances with safer materials, which are also more suitable to improve the profitability of the recycling of waste, as well as for reducing the impact on the health of workers in the factories for recycling.

3. SOME EXAMPLES OF THE SITUATION IN SERBIA

Recycling of the EEW in the Serbia is still realized on the most primitive way by hammer and screwdriver, printed boards, capacitors, cables, etc. are disassembled and stripped manually. The most drastic example of such recycling was found in the village Osipaonica near Smederevo, where the "recycling" intensely engaged in many unregistered "companies".

In that village inspection authorities found "remarkable" business undertakings and the case that cables were imported from Slovenia, they were secretly burned, and then clean copper was exported back to Slovenia. Inspectors find whole transformers in the trash.

Computers and printers are sold in the west "on the palette" at a cost of € 10, which is only one of the direct confirmation that is, to a greater extent, from the total imported goods separate still useful parts, make devices for sale, and the rest go the dump. This is the answer to the question why we are still at the bottom of the computer use, below even the region, although before 3 years we imported 250.000 of used computers and the logical assumption that they were imported much more in the previous period, when you did not need permission for importing the used computers.

By this we have calculated to almost every household in Serbia has used the computer, which, according to the statistics, far from the truth. A story about high-tech denies also the fact that huge quantities of used hair dryers were even imported. What encourage is that recently some advanced recycling capacities for EEW have recently been built in Serbia.

4. CONCLUSION

For disintegration and adequate care of lasted PC inclusion of the state with the support of producers and end-users of PC, without whose help solving the problem of preserving the eco system would not be possible, is necessary.

Analysis of international documents shows that most countries have a special authority which is responsible for environment and within that authority the national policy and management of waste are organized. Competencies of local authorities is to implement policy, and apply regulations passed at the national level, and some regulations that state could not adopt to make within their jurisdiction.

Waste management problems in many countries and also in Serbia are faced with the need to repair the existing situation and the need to operate at the same time prevention and control of new sources of pollution, although all industrial countries passed or pass through this phase, many of them begin to solve problems using new approaches.

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