

WASTE ELECTRICAL AND ELECTRONIC EQUIPMENT MANAGEMENT IN TWO EU DEVELOPING COUNTRIES: ROMANIA AND BULGARIA

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Abstract

Romania and Bulgaria are countries with similar WEEE* management systems, but with different results. This article is an overview of the waste electrical and electronic equipment management in Romania and Bulgaria. The paper defines the concepts of waste electrical and electronic equipment and e-waste management according to the literature and legislation in force in both countries. There is presented also the legal basis for WEEE management, how the WEEE Directive is implemented in both EU countries and their capacity to adapt to the EU requirements.

The analysis of WEEE management is made in amount of electrical and electronic equipment put on the market, WEEE collected and recycled and it is based on a description of the WEEE management in the two European countries applying European Directives.

Besides providing information regarding collection, recovery and recycling, the paper presents some weaknesses of the WEEE management in Bulgaria and Romania (the lack of promotional campaigns for collecting and treatment plants, the phenomenon of grey market for WEEE, etc.).

Key words: waste electrical and electronic equipments (WEEE), WEEE management, electrical and electronic equipment, informal collection.

JEL Code: K32, Q53, R11.

Introduction

In the last years, there has been put on the market a bigger quantity of electrical and electronic equipment, due to the development of technology and to the increase of living standards. The

* Abbreviation for Waste Electrical and Electronic Equipment.

volume of waste electrical and electronic equipment (WEEE) has registered an increasing trend. According to the Huisman et al. (2007) report, the quantity of WEEE generated by the Romanian households is going to increase within the period 2010-2020.

Waste electrical and electronic equipment has become one of the priority flows in waste management especially because the effects on the environment. Electronic waste or e-waste is one of the most rapidly growing pollution problems worldwide (Kiddee et al., 2013).

The Waste Framework Directive 2008/98/EC explains waste as “any substance or object which the holder discards or intends or is required to discard” and waste management as “collection, transport, recovery and disposal of waste, including the supervision of such operations and the after-care of disposal sites, and including actions taken as a dealer or broker”.

The concept *electrical and electronic equipment* or *EEE* is defined in the new Directive 2012/19/EU on waste electrical and electronic equipment, article 3: “equipment which is dependent on electric currents or electromagnetic fields in order to work properly and equipment for the generation, transfer and measurement of such currents and fields and designed for use with a voltage rating not exceeding 1000 volts for alternating current and 1500 volts for direct current”. The Directive 2012/19/EU explains also WEEE concept as “electrical or electronic equipment which is waste, within the meaning of Article 3(1) of Directive 2008/98/EC including all components, sub-assemblies and consumables which are part of the product at the time of discarding”. Managing e-wastes involves a series of activities such as separate collection, transport, treatment, recovery, recycling to reduce their effect on human health or on the environment.

Also known in legal terms as e-waste, waste electrical and electronic equipment is any electrical or electronic device, broken or abandoned. (Wang Feng, 2008). Sinha Khetriwal et al. (2005) defined WEEE as “any device connected to a power source that no longer satisfies the current owner to the purpose for which it was created”. According to the OECD, e-waste is "any device that uses a power source, that has reached end of life", basically refers to the moment when the equipment is scrapped. The electrical and electronic waste include both "white goods" such as refrigerators, washing machines, microwave ovens and "brown goods" such as televisions, radios, computers that have reached end of life for the current owner. (Sinha Khetriwal et al., 2007).

1 THE LEGISLATION FOR WASTE ELECTRICAL AND ELECTRONIC EQUIPMENT (WEEE)

Due to the increased quantity and diversity, to their negative impact on the environment and human health, but also because of the obligations imposed by the legislation, the waste management of electrical and electronic equipment is becoming a necessity and a significant issue for each country. WEEE was identified as a very important domain which required specific measures and regulations at the European Union level (Ciocoiu, Burcea, Târtiu, 2010).

The European Union established a WEEE legislation to make an improvement on the environmental protection. In Romania and Bulgaria, the development of WEEE management system has been stimulated by the need to align to the European Commission Directives. For WEEE, European legislation refers to Directive 2002/96/EC of the European Parliament and of the Council of 27 January 2003, which established a rate of separate collection of at least four kilograms/inhabitant/year from private households.

Electronic waste is one of the fastest growing pollution problems worldwide given the presence of toxic substances which can contaminate the environment and threaten human health (Kiddee et al., 2013). Directive 2002/95/EC regarding the restriction in using dangerous substances to the production of electric and electronic equipment (EEE) has the goal to reduce the effects of WEEE on the environment (European Comision, 2006). The electrical and electronic equipments contain many materials requiring special end-of-life handling, most prominently lead, mercury, arsenic, chromium, cadmium, and plastics capable of releasing, among other compounds, dioxins and furans and (Wong et al., 2007). The WEEE must be separately collected, this being a requirement for the treatment and recycling of the wastes.

The Directive 2002/96/EC was replaced by the Directive 2012/19/EU on waste electrical and electronic equipment which introduces higher collection targets that will be applied from 2016 and 2019. The Directive 2012/19/EU contains the following categories of electrical and electronic equipment as shown in table 1:

Tab. 1: Categories of electrical and electronic equipment covered by Directive 2012/19/EU

Category 1	Large household appliances
Category 2	Small household appliances
Category 3	IT and telecommunications equipment
Category 4	Consumer equipment and photovoltaic panels
Category 5	Lighting equipment
Category 6	Electrical and electronic tools (with the exception of large-scale stationary industrial tools)
Category 7	Toys, leisure and sports equipment
Category 8	Medical devices (with the exception of all implanted and infected products)
Category 9	Monitoring and control instruments
Category 10	Automatic dispensers

Source: <http://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX:32012L0019>, Directive 2012/19/EU

The WEEE Directives were transposed into the national legislation of the two analyzed countries. In Bulgaria, the Decree No. 76/2011 amended certain legislation including on waste packaging, vehicles, batteries, electrical and electronic equipment, being in force since April 11th, 2011. The newest WEEE law in Bulgaria is the Decree 256/2013 which it was published on November 13th, 2013 for adopting Waste Electrical and Electronic Equipment Ordinance. It came into force on 1 January 2014 (<http://step-initiative.org/index.php/bulgaria-approving-weee-rohs-ordinance-decree-822006.html>). The Ordinance sets annual WEEE collection targets of 41% in 2016, 48% in 2017, 55% in 2018, 60% in 2019 and 65% from 2020 onwards.

The Romanian legislation on WEEE was based on the Waste Framework Order 78/2000 supplemented and amended by Law 426/2001, replaced by Law 211 /2011. The specific WEEE legislation includes 1037/2010 Government Decision (which replaced the Government Decision 448/2005) and regulations in some Ministerial Orders (MOs) on registering of producers, collective organizations, EEE and WEEE and on measures to protect workers' health at retailers and collection points and on labelling of EEE. The EU Directive 2002/95/CE on hazardous substances is also transposed into the Romanian legislation. Until the complete transposition of the new Directive 2012/19/EU on waste electrical and electronic equipment, Romania applies the minimum WEEE collection target of 4 kg waste/capita/year from private households.

2 RESPONSIBILITIES ON WEEE MANAGEMENT

The national legislation in force establishes responsibilities for all the stakeholders involved in the WEEE management. The responsibility for WEEE management in Romania goes to the producers and importers, manufacturers, local public authorities, the Ministry of Environment and Sustainable Development, the National Environmental Protection Agency, the Ministry of Economy and Commerce, National Authority for Consumer Protection and also by consumers.

In order to achieve the annual objectives for collection, reuse, recycling and recovery of WEEE, the producers can act *individually* using their own resources or *transferring these responsibilities*, on a contract, to a legally constituted and authorized economic operator.

The producers and importers of electrical and electronic equipment organized themselves into collective associations which are taking their responsibilities regarding WEEE collection, treatment, revaluation and safe disposal, according to the national legislation regulations (Ciocoiu, Târtiu, 2012). According to the list published by the National Environmental Protection Agency, in Romania there are 9 economic operators authorized to take the responsibility for the collection of WEEE and 75 economic operators licensed to treat WEEE, one of the most important recyclers in the country being GreenWEEE from Buzău.

Law 211/2011 obligates the municipalities from Romania to collect WEEE from collection points organised by them. According to the Government Decision 1037/2010, the delivery of the national targets must be made by the registered producers.

According to Dimitrova thesis (2008), the WEEE management in Bulgaria depends on the involvement, contribution and efforts of the EEE producers and importers/distributors with the supervision of the local authorities regarding WEEE handling. The responsibility on WEEE management lies to the local authorities and institutions such as: The Ministry of Environment and Water, The Ministry of Healthcare, The Ministry of Agriculture and Forestry, The Ministry of Finance, The Ministry of Economics, The Ministry of Regional Development and Public Works, The Ministry of Transport and Communications, The Bulgarian Institute of Standardization, Customs Agency etc.

In 2008, the only take back system authorized by the Bulgarian Ministry of Environment and Water was Ecobultech, a collective compliance organization for WEEE recovery and there were no treatments facilities for the hazardous waste, these substances being exported to Germany, Czech Republic, Austria or China (Dimitrova, 2008). The

stakeholders involved in the WEEE practices are the Ministry of Finance, Ministry of Health, local authorities, all producers and manufacturers of EEE except the ones that export to non EU member states, importers of EEE, retailers of EEE, consumers of EEE, the repair centers for EEE, collection points of WEEE, dismantling facilities of WEEE, retailers of metals and scrap, all companies dealing with control or management of WEEE, transportation companies exporting WEEE, nonprofit organizations and the media (BalBok, 2004).

3 STATISTICS OF WEEE MANAGEMENT IN ROMANIA AND BULGARIA

In an analysis from 2006 to 2010, the total quantity of EEE put on the market was 41.09 kg per capita in Romania and 41.65 kg per capita in Bulgaria (table 2). The amount of electrical and electronic equipment (EEE) put on the market has increased progressively in recent years in Romania, growth rates being slowed after 2008 only by the economic crisis (Ciocoiu, Burcea, Târtiu, 2010).

In the analyzed period, Romania collected a total WEEE quantity of 4,49 kg/capita and recycled just 2,9 kg/capita, while Bulgaria collected 18.91 kg/capita and recycled 13.58 kg/capita as shown in table 2.

Tab. 2: Statistical comparison in the analysis of WEEE - kg/capita/year 2006-2010

Romania

Year	EEE put on the market	Collected WEEE	Recycled and reused WEEE
2006	6.65	0.05	-
2007	9.01	0.18	0.02
2008	11.88	1.06	0.27
2009	6.08	1.9	1.51
2010	7.47	1.3	1.1
TOTAL	41.09	4.49	2.9

Bulgaria

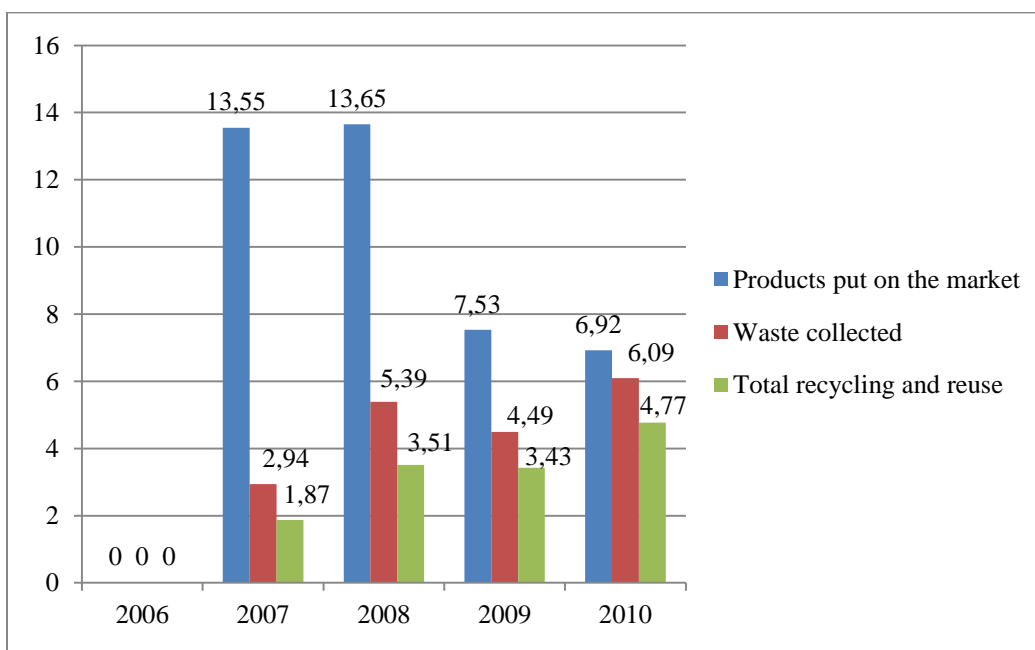
Year	EEE put on the market	Collected WEEE	Recycled and reused WEEE
2006	-	-	-
2007	13.55	2.94	1.87
2008	13.65	5.39	3.51
2009	7.53	4.49	3.43
2010	6.92	6.09	4.77
TOTAL	41.65	18.91	13.58

Source: adapted from Eurostat (epp.eurostat.ec.europa.eu), accessed on 25.04.2014

During the period 2006 to 2010, the amount of electrical and electronic equipment (EEE) put on the market is similar in the two EU countries. Although the quantity of EEE put on the market is similar in the two countries, Bulgaria succeeded to overcome far and away Romania which collected 4.49 kg/capita and recycled – 2.9 kg/capita of WEEE, reaching 18.91 kg/capita at collection and 13.58 kg/capita at recycling and reused WEEE, during the five years taking into consideration as shown in table 2.

The quantities per year of EEE put on the market and then collected, recycled and reused wastes are highlighted in figure 1 for Bulgaria and figure 2 for Romania. Bulgaria fulfills the WEEE Directive 2002/96/EC requirements regarding collection target of 4 kg per person/year. Beginning with 2008, this target was achieved and Bulgaria collected 5.39 kg/capita in 2008, 4.49 kg/capita in 2009 and 6.09 kg/capita in 2010 according to figure 1.

Fig. 1: Statistics of EEE and WEEE in Bulgaria during 2006-2010 (kg/capita)



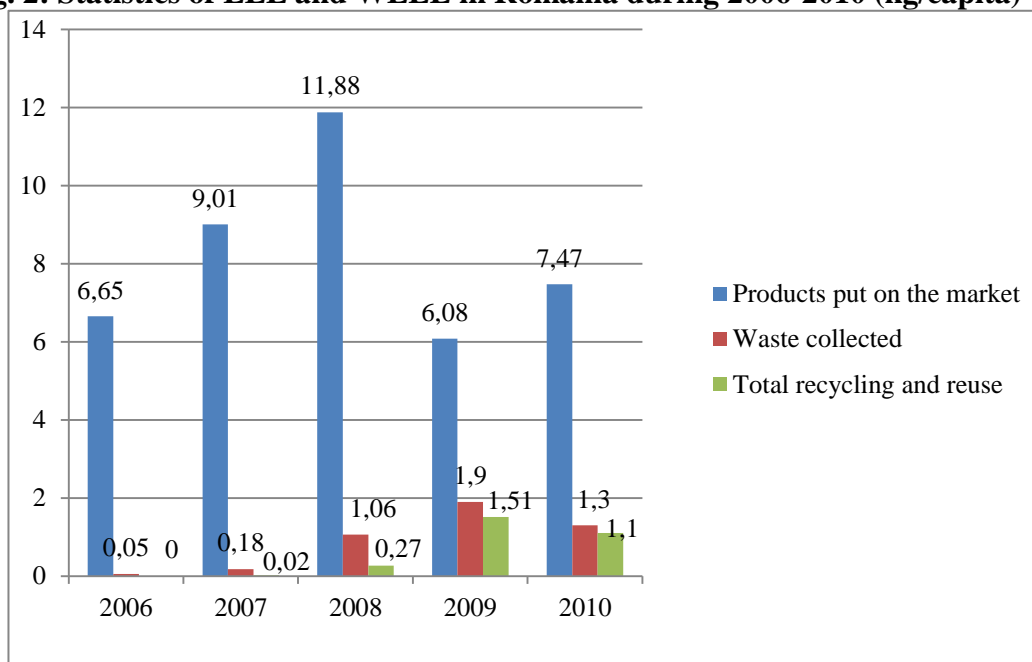
Source: adapted from Eurostat (epp.eurostat.ec.europa.eu), accessed on 25.04.2014

Bulgaria opened in Novi Iskar from Sofia in July 2010 the largest WEEE recycling factory in Eastern Europe. The factory has enough capacity to process Bulgaria's entire e-waste and take on waste from neighbouring countries as well, it can also process toys and medical equipment, having two conveyor lines – for refrigerators and for TV sets and monitors and it can also recycle kitchen appliances, computers, printers, medical equipment, electric tools and toys. (<http://www.wtert.eu/Default.asp?Menu=18&NewsPPV=8492>). The factory was designed and developed by the German company Adelman.

In comparison with Bulgaria, Romania collected 1.06 kg/capita in 2008, 1.9 kg/capita in 2009 and 1.3 kg/capita in 2010 according to figure 2. Statistically, even from 2007, Bugaria collected more wastes than Romania collected every year until 2010.

Romania failed to meet the collection target of 4 kg/capita/year required by Directive 2002/96/EC. In the latest European statistics on Eurostat (2010), our country occupies the last place both at collection and recycling WEEE.

Fig. 2: Statistics of EEE and WEEE in Romania during 2006-2010 (kg/capita)



Source: adapted from Eurostat (epp.eurostat.ec.europa.eu), accessed on 25.04.2014

Regarding recycling, Romania opened in 2011 SC GREENWEEE INTERNATIONAL SA BUZĂU, a WEEE recycling factory. GreenWEEE is the largest integrated plant for WEEE treatment in Romania and one of the most modern in Europe. With a treatment capacity of 50.000 tonnes of WEEE per year, the factory from Buzău is one of the largest plants in Eastern Europe and offers full recycling facilities, developing a national network of electrical and electronic waste collection, including bulbs and batteries (<http://www.greenweee.ro/>).

4 THE ROLE OF INFORMAL SECTOR

Romania and Bulgaria have the gypsy population as a phenomenon that contributes to the grey market of WEEE. In Bulgaria they are often spotted dragging or transporting on their vehicles refrigerators or washing machines (Dimitrova, 2008). There is a similar situation in Romania, where currently there is no database regarding the informal sector. Carrying out studies on the number of those active in the informal sector and on WEEE quantities they

manage may be an essential starting point to integrate the informal system in WEEE management (Ciocoiu, Burcea, Târtiu, 2012).

In Bulgaria, at the collection point, the gypsies receive money for the scrap. However, for a fridge to turn into scrap a “procedure” is needed, which removes the CFC from it and this hazardous waste is simply thrown somewhere carelessly by the gypsy population (Dimitrova, 2008).

The scrap dealers in Romania collect the equipments that can be reused or recycled, they are not organized and operate only for profit or survival motives.

Because of the informal sector of WEEE, the waste quantities are not reported to the authorities and the recycling activities are not conducted according to the recycling standards imposed by the Directive. In NSW MC (May 2009) the informal sector is defined as individuals, families, groups or small enterprises engaged in the recovery of waste materials with revenue generation as the motivation either on a full-time or part-time basis. They are classified as: itinerant waste buyers, jumpers at collection trucks, garbage crew, waste reclaimers and small and illegal junkshops (NSW MC, May 2009).

WEEE streams increase health risks in the sector because it takes a long time for specific health risks to become obvious, but also because it takes the informal sector some time to learn how to handle materials safely, or even, what the valuable elements are that can be extracted. Integrating the informal sector can only have positive effects on the management of WEEE in Romania.

Conclusion

Regarding the implementation of the legislation, the main problem at the moment in Romania is failing the four kilograms/capita/year collection target. Despite the efforts made by the authorities and the responsible operators, the annual collection target of four kilograms per capita was not reached so far. According to the European statistics, it collects waste electrical and electronic equipment almost six times less than Bulgaria.

The WEEE management practices in Bulgaria allow the achievement of the collection target but they are not enough to meet the targets for WEEE recovery and recycling. They don't comply yet with waste management European requirements and the communautaire acquis.

Currently, Romania and Bulgaria have both recycling capacity, but just one recycling factory and it is steel need for more and more efforts to align to the European standards. The

two countries implemented the WEEE management system in a similar way, but Bulgaria succeeded to manage better the waste electrical and electronic equipment. The major problem in Romania and Bulgaria is the lack of adequate infrastructure for collection and treatment of WEEE and the lack of population's knowledge regarding the process of WEEE management within all that implies.

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