

Waste electrical and electronic equipment management in Romania: harmonizing national environmental law with European legislation

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Abstract: *This article presents the institutional and legal framework in the field of waste electrical and electronic equipment (WEEE) management and elements of environmental impact in conditions that are not complying with the regulations on the WEEE management. The study is based on the description of the WEEE management in Romania in the context of harmonizing national environmental law with European Directives. High amounts of WEEE and the limited capacities for disposal and recycling, related to the necessity of transposing the European Union legislation into national law became a problem for WEEE management in Romania.*

Keywords: *waste electrical and electronic equipment (WEEE); WEEE management; European Directives.*

JEL: *Q51;Q53;Q57.*

Introduction

WEEE issue has become a matter of concern for professionals in the solid waste management field (Musson et al., 2000). The challenges the management of WEEE is facing now are not only the consequences of the amount of waste increase, but also of their complexity, WEEE being the most complex waste streams due to the variety of products from mechanical devices to integrated high performing systems and acceleration of technological innovations (Yla-Mella et al., 2004). Today, production, recovery and reuse of electrical and electronic equipment is becoming a serious problem and is becoming increasingly important to properly define the limits of the waste management system from this type of equipment, embracing product's life cycle thinking.

The waste electrical and electronic equipment (WEEE) has become one of the most challenging environmental issues due to the increased quantity and diversity, but also because of the legislation. The European Union has established policies for waste electrical and electronic equipment (Directive 2002/96/EC) and Restriction of Hazardous Substances in electrical and electronic equipment (Directive 2002/95/EC), which aims at improving environmental protection by the electronic products (Nnorom et Osibanjo, 2008).

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The European Union has established a WEEE legislation, in order to make an improvement regarding environmental protection. In Romania, the emergence and the development of WEEE management system has been stimulated by the need to align to the European Commission Directives (Ciocoiu, Tartiu, 2012).

1. European directives for waste electrical and electronic equipment

1.1. Conceptual framework

According to the new Directive 2012/19/EU of the European Parliament and of the Council of 4 July 2012 on waste electrical and electronic equipment (WEEE), article 3, the concept "electrical and electronic equipment" or "EEE" means 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. Directive 2008/98/EC defines 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 Directive 2012/19/EU explains also what means WEEE, namely "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". Waste electrical and electronic equipment (WEEE), also known in legal terms as e-waste is a waste type consisting of any electrical or electronic device, broken or abandoned. (Wang Feng, 2008). 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. Sinha 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." Deepali Sinha Khetriwal et al. (2007) highlights that 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.

1.2. Legislation

For the waste electrical and electronic equipment (WEEE), European legislation primarily refers to Directive 2002/96/EC of the European Parliament and of the Council of 27 January 2003 and Directive 2012/19/EU of the European Parliament and of the Council of 04 July 2012 (ec.europa.eu/environment/waste/weee/legis_en.htm). Except for the mentioned Directives, EU legislation has the RoHS Directive 2002/95/EC which contains restrictions in the use of hazardous

substances in electrical and electronic equipment and it has been in force since February 2003. Due to the quality of member in the European Union, Romania had the obligation to transpose the European regulations into the national legislation. The European Directive no. 2002/95/CE (RoHS) on the restriction of certain dangerous substances which are used in electrical and electronic equipment was transposed in Romania by Government Decision no. 992/2005, while the European Directive 2002/96/CE on waste electrical and electronic equipment was transposed by Government Decision no. 448/2005, then replaced by Government Decision 1037/2010 (Ciocoiu, Tartiu, 2012). If these directives have already been transposed, the new Directive 2012/19/EU of the European Parliament and of the Council of 04 July 2012 on waste electrical and electronic equipment is under transposition into our national WEEE legislation. Regarding the classification of waste electrical and electronic equipment, given that the new directive has not yet been transposed into the national legislation of each European country, the following categories are kept in accordance with Directive 2002/96/EC as shown in Table 1 (Colesca, Popescu, 2013).

Table 1. Categories of electrical and electronic equipment (EEE)

Category 1	Large household appliances
Category 2	Small household appliances
Category 3	IT and telecommunications equipment
Category 4	Consumer equipment
Category 5	Lighting equipment
Category 6	Electrical and electronic tools
Category 7	Toys, leisure and sports equipment
Category 8	Medical devices (exception of all implanted and affected products)
Category 9	Monitoring and control instruments
Category 10	Automatic dispensers

Source: www.anpm.ro

Until transposing the Directive 2012/19/EU into national law, The Directive 2002/96/EC remains in force with the current collection rate of 4 kg/inhabitant, following that, according to the new Directive, from 2016, the minimum collection rate shall be 45% calculated on the basis of the total weight of WEEE collected in a given year in the Member State concerned, expressed as a percentage of the average weight of EEE placed on the market in the three preceding years. In the second stage of the Directive, starting from 2019, the minimum collection rate to be achieved shall be 65% of the average weight of EEE placed on the market in the three preceding years in each Member State or, alternatively 85% of WEEE generated on the territory of a Member State (Ecotic News, www.ecotic.ro).

2. WEEE management

2.1. Basic model on waste

In Europe, the framework Directive 2008/98/EC in the field of waste sets the basic concepts and definitions related to waste management, the waste legislation and policy of the EU Member States that shall apply as a priority order the following waste management hierarchy represented in figure 1.



Figure 1. The hierarchy of waste management

Source: <http://ec.europa.eu/environment/waste/framework/index.htm>

According to the EU strategy, the waste management systems hierarchy is based on minimization, reuse, recycling and, in the second stage, on the elimination. The initial principle of hierarchy of waste management systems encourages the adoption of options in the following order of priority (www.pmb.ro):

- Option 1 involves the prevention and minimization at source as much as possible
- Option 2 states that if option 1 is not applicable, the waste must be reused directly or with less work for improving the "quantity"
- Option 3 proposes waste to be recycled or reprocessed in a form that transforms them into a secondary source of "raw materials"
- Option 4 applies where it is not possible recycling (material recovery), the energy embedded in waste must be recovered to be used as "alternative energy"
- Option 5 can be used when waste can't be processed through the options presented above, and the solution is one of disposal through controlled depositing.

2.2. The WEEE management system in Romania

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. The mobile phone, personal computer and TV are examples of EEE with high rate of moral depreciation. The Directive 2002/96/EC allows the users of electrical and electronic equipment from private households to have the possibility of returning WEEE at least free of charge. However, the responsibility for achieving WEEE collection targets goes first of all to the producers, importers and local authorities.

The producers have the role to ensure EEE design so that it fosters the dismantling and recovery operations of the components; to foresee the possibilities of re-using and recycling of WEEE, of their components and materials; to finance and organize the collecting, treatment, recovery and elimination system of WEEE (Ciocoiu, Tartiu, 2009). 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, Tartiu, 2012). The following collective organizations obtained the operating license to take over responsibility for the annual objectives of collection, reuse, recycling and recovery of waste electrical and electronic equipment: ECO TIC Association, Romanian Association for Recycling RoRec, RECOLAMP Association, ENVIRON Association, CCR LOGISTICSSYSTEMSROSRL, ECOPOINT Association, ECOMOLD Association (Colesca, Popescu, 2013).

At the national level, the WEEE collecting system is based on three collection channels, namely (Ciocoiu, Burcea, Tartiu, 2010):

- „single day” collection actions – these actions are organized at fixed dates, previously announced; the main purpose is to collect WEEE from households; the secondary purpose is to inform and educate the citizens regarding proper WEEE management
- the „buy-back” system – this system is a „one-to-one” approach, which means that the returned EEE must be of a similar type or function to the new purchased item. Some retailers, in order to increase their sales, also offer a 10%-15% or even 20% discount when buying a new equipment from the same product line as the old EEE.

The municipal collection centers – the consumers can get rid of their WEEE's, free of charge, by giving them to the municipal collection centers.

In the period 2006-2010, in Romania there was collected a total WEEE quantity of 4,3 kg/capita and there was recycled just 2,7 kg/capita as shown in table 2.

Table 2. WEEE quantities in kg/capita/year 2006-2010

Year	EEE put on the market (kg per capita)	Collected WEEE (kg per capita)	Total recycled and reused quantity of WEEE (kg per capita)
2006	6,5	0,1	-
2007	8,7	0,2	0
2008	11,3	1	0,3
2009	15,8	1,8	1,4
2010	17,1	1,2	1
TOTAL	59,4	4,3	2,7

Source: adapted from Eurostat (epp.eurostat.ec.europa.eu), accessed on 05.02.2014

As mentioned previously, the minimum WEEE collection target remains 4 kg waste/capita/year from private households. Figure 2 underlines that EU countries such as Norway, Sweden, Finland, Ireland, Germany, Belgium, Luxembourg and Austria recorded higher annual WEEE collection rate (over 8 kg/capita), according to Eurostat report for 2010. Romania succeeded to collect just 1,1 kg/capita, this being the lowest level in comparison with the other EU countries.

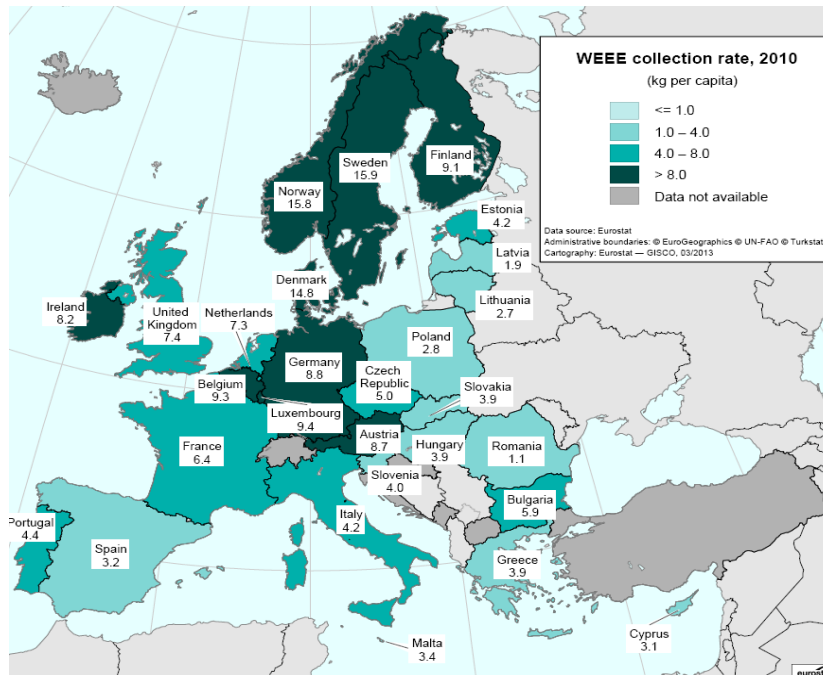


Figure 2. WEEE collection rate in Europe (kg per capita), 2010

Source:

http://epp.eurostat.ec.europa.eu/portal/page/portal/waste/key_waste_streams/waste_electrical_electronic_equipment_weee

The current rate of WEEE collection from private households (4 kg per capita/year as universal rate) does not reflect the economy of each individual Member State and therefore lead to sub-optimal targets for some countries and too ambitious for others (ST17367 Proposal for the Directive of the European Parliament and the EU Council on waste electrical and electronic equipment (WEEE), Brussels, December 8th, 2008). Important to note is that Romania, like other countries from Central and Eastern Europe, will benefit from a transition period, translated by creating, in the first stage (2016-2019), a collection rate between 40% and 45% and delaying the achievement of the collection rate of 65% (applicable in the EU starting with 2019) until a date decided by the Member State, but not later than 2021 (<http://www.ecotic.ro/uploads/original/8d4b99097775110adebcd6b4c26f50d8934d3cb7.pdf>).

3. Conclusions

The waste electrical and electronic equipment management is definitely better in a developed country towards the developing one. In Romania the WEEE management system was adapted to the EU legislative changes as much as possible, but the annual collecting target of 4 kg/capita under Directive 2002/96/EC is not accomplished yet despite the efforts made by public authorities and responsible operators. Although the WEEE collected quantities are far away from the EU proposed goal, the progresses have been made regarding the implementation of an appropriate management system. The lack of infrastructure is a critical factor limiting the collection of WEEE. The Romanian WEEE management system needs improvements to meet the European Directives requirements. A WEEE collection system must be easily to use by consumers and it should provide comfort which will determine them to dispose properly the old electrical and electronic equipment.

References

1. **CIOCOIU, N., TÂRȚIU, V.** (2012). The role of informal sector within WEEE management systems: a Romanian perspective. *Theoretical and Empirical Researches in Urban Management*, Vol. 7, Issue 1, pp. 27-38.
2. **CIOCOIU, N., BURCEA, Ș., TÂRȚIU, V.** (2010). Environmental impact of ICT and implications for e-waste management in Romania. *Economia Journal, Management Series*, Vol. 13, No. 2/2010, pp. 348-360.
3. **CIOCOIU, N., DOBREA, C., TÂRȚIU, V.** (2009). Considerations about implementation of the Waste Electric and Electronic Equipment Directive in Romania. *The Ninth International Conference "Investments and Economic Recovery"*, May 22 – 23, 2009. *Economia, Management series*, Vol. 12, No. 1 special/2009, pp. 211-219.

4. **COLESCA S.E., POPESCU M.L.** (2013). Managing waste electrical and electronic equipment in Romania. Comparative analysis with other countries in Europe. *Proceedings of the 7th International Management Conference "New Management for the New Economy"*, November 7th-8th, 2013, Bucharest, Romania, pp. 704-712, <http://conferinta.management.ase.ro/archives/2013/pdf/80.pdf>.
5. **HUISMAN, J., MAGALINI, F., KUEHR, R., MAURER, C., ARTIM, E., OGILVIE, S., POLL, J., DELGADO, C., SZLEZAK, J. AND STEVELS, A.** (2007). *2008 Review of Directive 2002/96 on Waste Electrical and Electronic Equipment (WEEE). Final Report*, United Nations University, AEA Technology, Gaiker, Regional Environmental Centre for Central and Eastern Europe, Delft University of Technology, for the European Commission, Study No. 07010401/2006/442493/ETU/G4.
6. **MUSSON S.E., JANG Y.-C., TOWNSEND T.G., CHUNG I.H.** (2000). "Characterization of lead leachability from cathode ray tubes using the toxicity characterization leaching procedure", *Environ Sci Technol*, 34, pp. 4376–81.
7. **NNOROM I.C., OSIBANJO O.** (2008). "Overview of electronic waste (e-waste) management practices and legislations, and their poor applications in the developing countries", *Resources, Conservation and Recycling*, 52, pp. 843–858.
8. **SINHA KHETRIWAL, D., KRAEUCHI, P., WIDMER, R.** (2007). Producer responsibility for e-waste management: Key issues for consideration-Learning from the Swiss experience. *Journal of Environmental Management*, XX, 1-13.
9. **SINHA-KHETRIWAL, D., KRAEUCHI, P., SCHWANINGER, M.** (2005). A comparison of electronic waste recycling in Switzerland and in India. *Environmental Impact Assessment Review*, 2005;25:492–504.
10. **WANG, FENG** (2008). *Economic conditions for developing large scale WEEE recycling infrastructure based on manual dismantling in China*, Delft University of Technology, Diploma Thesis for Master Programme of Industrial Ecology.
11. **ST17367 Proposal for the Directive of the European Parliament and the EU Council on waste electrical and electronic equipment (WEEE)**, Brussels, December 8th, 2008
12. **YLA-MELLA Y., PONGRACZ E., KEISKI R.L.** (2004). "Recovery of waste electrical and electronic Equipment (WEEE) in Finland", in Pongracz E. (editor) *Proceedings of the waste minimization and resource use optimization conference*, June 10, Oulu, Finland. pp. 83–92
13. ec.europa.eu
14. epp.eurostat.ec.europa.eu
15. www.ecotic.ro
16. www.pmb.ro