

# THE WEEE MANAGEMENT SYSTEM IN ROMANIA. DIMENSION, STRENGTHS AND WEAKNESSES

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## Abstract

Management systems for waste electrical and electronic equipment (WEEE) have modernized as countries have accumulated experience. They are characterized by a profound dynamism because of the alert pace of growth of waste quantities which have been generated, but also because of the continuous diversification of the range of electronic equipment sold as an effect of the technical progress evolution and of the living standards of population growth. In Romania, the emergence and the development of WEEE management system has been stimulated by the need to align to the European Commission stipulations as a result of the integration into the European Union in 2007. In this context the present paper examines the strengths and weaknesses of WEEE management system in Romania.

**Keywords:** Waste Electrical and Electronic Equipment – WEEE, Romania, management, weaknesses, strengths.

## 1. INTRODUCTION

All around the world, WEEE is the waste with the biggest and the most spectacular growth rate from the entire quantity of waste generated (UNEP, 2007a). This kind of waste represents 1% from the entire quantity of solid waste generated each year worldwide and it has been estimated that until 2010 the percent will get at 2%. In the United States of America WEEE cover between 1 and 3% of the municipal waste generated each year (Pichtel, 2005).

Alarming growth of waste quantities is registered also in the countries members of the European Union, where at each five years WEEE are growing with 16-28%, meaning three time more than the medium growing rate of the municipal waste quantities generated every year (United Nations University, 2008). Inside the community space are generated every year between 5 and 7 million tonnes of WEEE or 14-

15 kg/capita/year, while in countries like China or India the annual quantity of WEEE generated arrives at 1kg/capita (European Comision, 2006).

Visible trends of exponential growth of WEEE quantities are justified by the market penetration profile for the developing countries and the market explosion for the developed countries. Technical progress and increase of living standards are important causes of the high rhythm of growth of WEEE generated every year regionally, in Europe and worldwide (UNEP, 2007b).

The structure and composition of this waste varies from one category to another, but also according to the nature of the products and the electronic goods inside the same category. Generally, WEEE contain over 1.000 substances, which can be both dangerous and non-dangerous in what regards the impact they have over the environment and human health (Tchobanoglous, 2002). We refer here to ferrous and non-ferrous metals, plastic, glass, wood, ceramics, silicone and others. Metals like iron and steel represent aprox.50% from WEEE composition, followed by plastic (21%), non-ferrous metals (13%) and other substances. Among non-ferrous metals found in the structure of these wastes are listed copper and aluminium, but there are few examples of the group of precious metals such as silver, gold, palladium etc. The presence in the composition of WEEE of items such as mercury, arsenic, cadmium and selenium explain the inclusion of these solid wastes in the category of dangerous waste with special diet (Pichtel, 2005).

WEEE was identified as a very important domain which required specific measures and regulations at the European Union level. Directive 2002/96/EC regarding WEEE together with Directive 2002/95/EC regarding the restriction in using dangerous substances inside electric and electronic equipment (EEE) are looking to reduce de impact of WEEE over the environment (European Comision, 2006).

At this moment for the concept of waste from electric and electronic equipment (WEEE; e-waste) literature does not provide a universally accepted definition (Widmer, 2005). The legal system within each country sets its own definition and a number of interpretations and usage of the term WEEE.

At European Union level there is a generally valid definition, the content specified in Directive 2002/96/CE also being undertaken by the E.U. states, but also by several other European countries. According to article 3 (b) waste electrical and electronic equipment represents "electrical and electronic equipment as waste, including components, subassemblies and consumables which are an integral part of the product when they become waste". In Annex 1A of the Directive are given all types of equipment covered by it, falling into 10 categories.

Defining the concept of WEEE together with specific rules regarding on how management is done and its means have been taken and adopted by the legislation of each country member of the European Union, in a phased manner, according to the dynamic of the Community efforts to update the acquis in the field of waste management. Together with the alignment with EU directives, each state has developed its own WEEE management system based on features and national interests.

Managing this category of solid wastes needs a specialized collecting, transport, treatment and final disposal system (UNEP, 2007b). Understanding the mechanisms and functioning principles of this kind of WEEE management systems can only be possible after a careful identification and analysis of life cycle of EEE from production phase until final disposal phase of waste as a result because of physical and moral wear of this equipment (see figure 1).

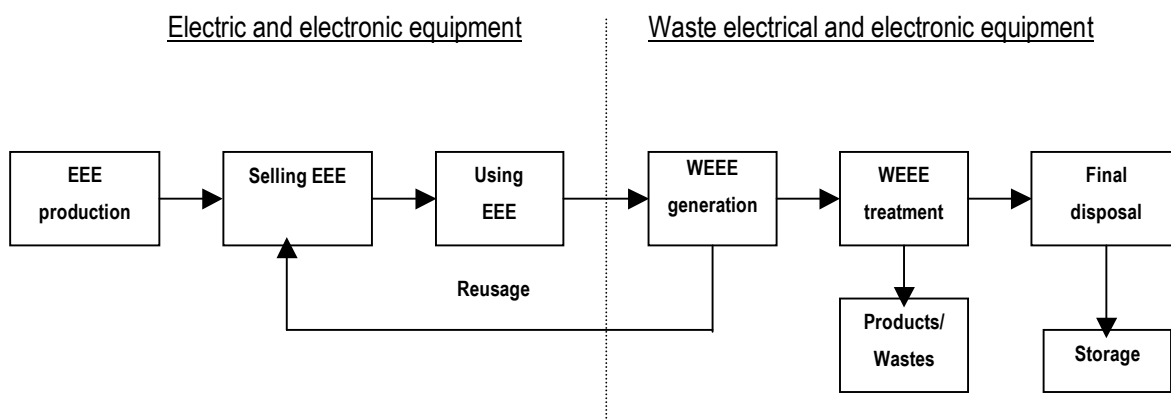


FIGURE 1 – WEEE LIFE CYCLE

As also shown in Figure 1, WEEE management comprises three major components:

- collection, sorting and transport system of WEEE,
- treatment system of WEEE,
- final disposal system of WEEE.

Specialized foreign literature reflects the existence of two types of electronic waste collection systems, one based on monopoly – the collective system, and another one based on competition – the competitive system. The objective of both systems, however, is to provide WEEE collection mechanisms with a low price for consumers and inside the limitations imposed through the national legislation (UNEP, 2007b).

**The collective system** is met inside developed countries that have developed centralized collection, recycling and waste management funding power systems. Statute and operating mechanisms of these systems vary from case to case, but in most cases the collective system is supported by NGO sector or by specialized companies and non-profit organized and specialized according to main categories of WEEE, of which management appears in the object of activity.

**The competitive system** is characterized by the presence of several operators, manufacturers, recyclers and urban sanitation companies providing services in a market governed by free competition. Authorities should ensure the existence of a register of producers and the operation of a coherent system for reporting and monitoring. Thus coordination responsibilities of central authorities are limited to determining the obligations of each producer regarding the WEEE collection, depending on the features and specifications from the national registry and on allocating financial resources as fulfilling WEEE collection graphics by authorized operators.

Whatever type of collection system is being used, it is necessary to establish optimal ways to implement a selective collection and developing an appropriate infrastructure for this (UNEP, 2007b). Practice of developed countries reflects the existence of three main channels of collection, with outstanding results both in terms of effectiveness and efficiency (Figure 2).

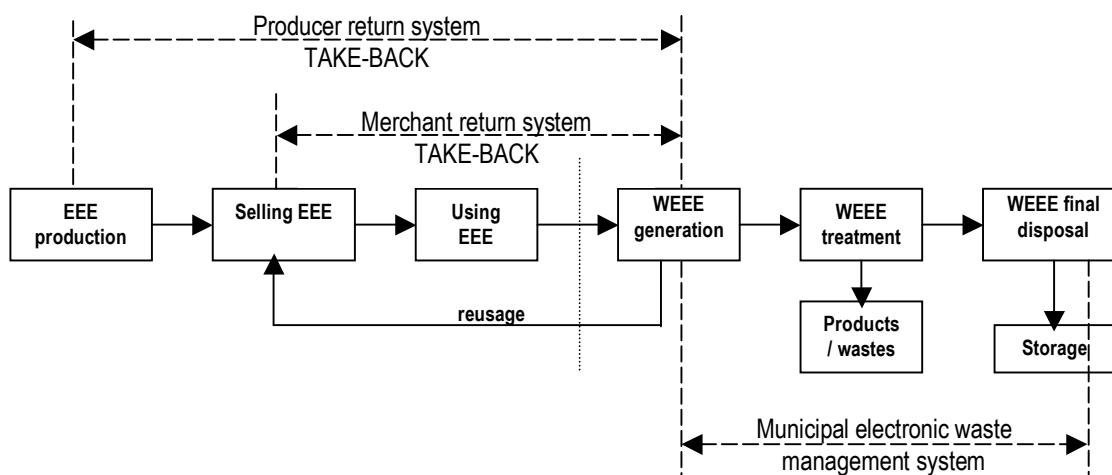


FIGURE 2 – MAIN WEEE COLLECTION CHANNELS

A first collection mechanism is that which gives consumers the possibility to return used electronic equipment to traders who distribute similar products on the market. It's the "take-back" system where the consumer can choose whether or not to purchase a new product from a dealer to whom he gives the electronic equipment already used.

In another version, the "take-back" system targets the consumer-producer relationship, and so, the electronic equipment used is returned or delivered directly to its producer recycling centers, specially arranged by him. Usually this channel for WEEE collection is available for industrial electronic equipment and operates on the principle of replacing worn one with new upper net in terms of technical performance.

A third WEEE collection channel is established through the intervention of local authorities responsible for municipal waste collection. Under this system the consumers give used equipment to the municipal collection centers in special containers for each type of WEEE, according the contracts between the municipality and various recycling companies. Usually the service is free for households and businesses are charged.

In Europe the most common collection channel is based on municipal collection centers, such as ICT Milieu systems in Denmark and ElKresten from Sweden, using exclusively these WEEE collection mechanisms.

Other systems like Recupel from Belgium, NVMP from Netherlands and El-Retur from Norway are based on extensive involvement of distributors in the recovery of electrical and electronic equipment from households and industrial consumers. Very interesting is the case of Switzerland, country which is not part of the community area and which one, through SWICO, obtained remarkable results within WEEE collection. The system is based on take-back mechanisms of used products, to the sellers.

## **2. THE DIMENSION AND SPECIFICITY OF ROMANIAN WEEE GENERATION AND COLLECTION ACTIVITIES**

In Romania, the factors that influenced the evolution of WEEE management system were the geographic and demographic characteristics together with the social issues (income level, consumption behaviour), development degree of regions and E.U. integration commitments (Agentia Națională pentru Protecția Mediului – ANPM, 2009).

The demographic characteristics (total population, density, age structure) play a key role in state of environmental factors. Consumption determines the need for resources, goods and services, directly influencing the exercise pressure on the environment. During 1990 - 2008, Romania's population decreased from 23.211.395 inhabitants, to 21.565.119 inhabitants, thus registering a fall of 7.25%. According to the National Institute of Statistics, in 2008 out of 21.537.563 inhabitants of Romania, 55% were urban, while 45% were rural residents. Highest population density, 1.222,37 inhabitants/km<sup>2</sup> is

recorded in Bucharest – Ilfov region, and the lowest density, 60,07 inhabitants/km<sup>2</sup>, is recorded in the Western Region.

In such a context characterized by fundamental changes in demographic and pronounced regional disparities, sharp dynamics of technical progress combined with a relative increase in living standards significantly contribute to increased sales of electronic products and consumer goods which translate, at the end their lifetime, in an increase in the amount of WEEE generated in Romania. Of course, waste management system must be carefully tailored and well organized, so it would be able to collect, recycle and dispose of electronic used equipment.

WEEE collection from households in Romania is organized through three collection channels: by organizing a collection day at fixed dates from the population, by giving back to the store the old equipment when purchasing a new one (free take-back system) or by giving it directly to the municipal collection centers.

To implement the acquis in the field of waste management of electrical and electronic equipment Romania obtained, following negotiations, a transitional period of 2 years, until 31<sup>st</sup> of December, 2008, to apply paragraph 5 of Article 5 of Directive 2002/96/EC on minimum collection target of 4 kg of WEEE per inhabitant per year. To implement paragraph 2 of Article 7 regarding the objectives of recycling/recovery our country has been approved a grace period of two years. The amount of EEE sold in Romania has increased progressively in recent years, growth rates being slowed after 2008 only by the economic crisis.

Statistics on quantities of EEE and WEEE collected are realized since 2006 and are different depending on the source of information analyzed.

Thus, according to national statistics, in 2006, was put on the market an amount of 140.849,25 tons EEE (data reported by the 564 registered manufacturers) and 1.131 tonnes were collected ([www.deseurielectrice.ro](http://www.deseurielectrice.ro)).

Detailed information on the quantity of WEEE collected by categories in different EU countries including Romania in 2006 can be found on the Eurostat (the latest year for which such information is collected at EU level) (Table 1).

THE WEEE MANAGEMENT SYSTEM IN ROMANIA. DIMENSION, STRENGTHS AND WEAKNESSES

TABLE 1 - QUANTITY OF SOLD EQUIPMENT AND OF WEEE COLLECTED BY CATEGORIES IN ROMANIA IN 2006  
(ACCORDING TO EUROSTAT)

Item	Category	Sold on the market (tones)	Collected (tones)
1	Large household appliances	72.016,48	517,68
2	Small household appliances	3.872,43	51,85
3	Computer and telecommunication equipment	25.198,93	274,24
4	Other consumer equipment	20.661,89	47,04
5	Lighting equipment	6.233,31	7,88
5a	Electrical and electronic tools	-	-
6	Games, sports and leisure equipment	10.535,48	166,27
7	Medical machines and devices	353,46	1,3
8	Monitoring and control instruments	58,09	0,01
9	Printing machines	1.711,26	65,31
10	Large household appliances	207,92	0
	<b>Total</b>	<b>140.849,25</b>	<b>1.131,58</b>

Source: Eurostat, 2006

According to ANPM (National Environment Protection Association) in 2007 was put on the market an amount of 196.459,4 tons of EEE and 3.286,85 tons of WEEE was collected. Distribution of sales of EEE by categories is shown in Figure 3.

Category	EEE (tones)	%
Category 1	98771,8	45,35%
Category 2	8605,777	3,95%
Category 3	62822,53	28,84%
Category 4	38096,6	17,49%
Category 5	2158,467	0,99%
Category 6	5071,159	2,33%
Category 7	1159,55	0,53%
Category 8	94,5356	0,04%
Category 9	540,4548	0,25%
Category 10	490,67	0,23%

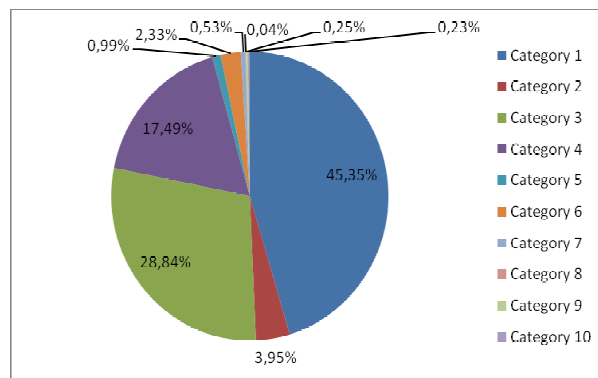


FIGURE 3 – ELECTRICAL AND ELECTRONIC EQUIPMENT QUANTITIES PUT ON MARKET IN 2007

Source: Agentia Națională pentru Protecția Mediului – ANPM (2009)

A number of statistics on the amount of EEE put on the European market in recent years, in which also Romania appears, are included in the report "2008 Review of Directive 2002/96 on Waste Electrical and Electronic Equipment (WEEE)" prepared by United Nations University.

According to it, the amount of IT equipment sold in EU countries during 2003-2007 is presented in Table 2. It was noted that Romania recorded the highest growth rate from one year to the other.

TABLE 2 – TONES OF IT EQUIPMENT SOLD IN EU27

Country	2003	2004	2005	2006	2007
Austria	15.447	16.924	18.384	19.039	19.738
Belgium, Luxembourg	19.487	21.928	24.235	25.693	27.490
Denmark	17.930	19.165	20.978	20.878	19.852
Finland	12.373	13.872	15.661	16.015	16.291
France	119.831	137.949	153.179	161.780	168.048
Germany	193.721	208.072	218.644	223.612	228.264
Greece	8.811	10.024	10.843	11.700	12.591
Ireland	8.729	10.110	11.574	12.424	13.094
Italy	90.074	100.283	108.363	114.503	119.992
Netherlands	36.186	39.593	44.665	47.990	49.681
Portugal	11.931	13.795	15.746	16.832	17.773
Spain	44.762	51.847	55.930	59.447	61.898
Sweden	24.066	24.808	29.644	29.644	29.138
Great Britain	163.741	184.095	197.497	210.389	220.653
<b>EU 15</b>	<b>767.087</b>	<b>852.464</b>	<b>925.342</b>	<b>969.946</b>	<b>1.004.503</b>
Bulgaria	2.946	3.712	5.400	5.202	5.930
Czech Republic	13.321	15.515	17.891	19.423	20.813
Estonia	1.917	2.557	2.944	3.070	3.286
Hungary	10.410	11.990	13.260	14.578	15.894
Latvia	1.937	2.252	2.645	2.893	3.166
Lithuania	2.768	3.428	4.118	4.655	5.017
Poland	34.898	39.693	49.009	55.887	59.276
<b>Romania</b>	<b>8.627</b>	<b>12.198</b>	<b>16.818</b>	<b>18.612</b>	<b>21.470</b>
Slovakia	4.662	6.028	6.478	7.291	8.057
Slovenia	3.502	4.325	4.646	4.949	5.183
<b>EU27 without Malta and Cyprus</b>	<b>852.075</b>	<b>954.163</b>	<b>1.048.551</b>	<b>1.106.504</b>	<b>1.152.594</b>

Source: United Nations University, 2008 Review of Directive 2002/96 on Waste Electrical and Electronic Equipment (WEEE), Final report, Contract No: 07010401/2006/442493/ETU/G4, 05 August 2007, p. 47

According to national sources (Agentia Națională pentru Protecția Mediului – ANPM, 2009), in 2007 were collected nationally 3,286,85 tones of WEEE, meaning less than 1 kg WEEE/inhabitant/year. The distribution by category is shown in Figure 4.

Of the total amount collected, only 8% was treated, the rest being placed, at the end of 2007, in stock at collecting operators (Agentia Națională pentru Protecția Mediului – ANPM, 2009, p.5).



Category	WEEE (tonnes)	%
Category 1	1424,41	43,34%
Category 2	100,72	3,06%
Category 3	1077,53	32,78%
Category 4	505,94	15,39%
Category 5	8,64	0,26%
Category 6	110,58	3,36%
Category 7	15,14	0,46%
Category 8	2,68	0,08%
Category 9	39	1,19%
Category 10	2,2	0,07%

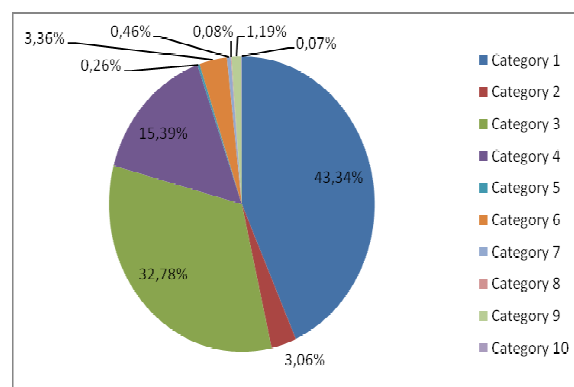


FIGURE 4 – DISTRIBUTION BY CATEGORY OF WEEE COLLECTED IN 2007

Source: Agentia Națională pentru Protecția Mediului – ANPM (2009)

In 2008, ECOTIC, the largest non-profit association in Romania, which is dealing with IT, electronics and appliances waste management, collected and recycled a volume of 9.000 tonnes of WEEE, about 50% of WEEE collected in Romania.

In 2009, through “Marea Debarasare” campaign (“The Big Get Rid of Waste”), Romanians gave away 1.440 tonnes of waste electrical and electronic equipment, during ten stages of this campaign, as it began in March.

Regarding the acquisition trends of EEE and WEEE collection, national studies conducted in 2008 and 2009 on the electronic market revealed the following:

- penetration of small appliances increased;
- there is a tendency to abandon the use of old equipment which are more than five years;
- although the percentage of people who keep in their household non-operational equipment decreased, many of them still keep it because they don't know very well the alternatives. They should be attracted by offering discounts on the purchase of new equipment, or by collecting the old ones from their home.

The survey conducted by the association Daedalus Millward Brown for EcoTic, on the number of EEE held by households shows that in the period September, 2008 – June, 2009, the number of Romanians who have a telephone in the house dropped by 7.5%, while the percentage of those who have MP3 players rose by 7.4% (Daedalus, 2009). Daedalus study was conducted during 29<sup>th</sup> of June – 6<sup>th</sup> of July, 2009 on a sample of 1.000 people in cities with over 50.000 inhabitants.

Compared with similar studies conducted in September, 2008, the percentage of people owning a device to play MP3 audio files has increased from 30,5% to 37,9%, while the percentage of Romanians who have a telephone fell from 86,2% to 78,7%.

Significant increases in 2009 compared to 2008 were recorded also on radio segment (51,3% - 58,9%), DVD (63,5% - 67,3%) and mobile phones (93% - 99 %). For this segment of personal computers (laptop/desktop), the penetration rate increased from 84,8% to 86,9%.

TABLE 3 - FORECASTED WEEE QUANTITIES (COMING FROM HOUSEHOLDS) FOR EU27 (TONES)

Year	2010	2014	2015	2020
Austria	169,968	185,373	189,439	211,144
Belgium	207,787	226,619	231,588	258,118
Denmark	116,567	129,315	132,152	147,295
Finland	102,513	111,803	114,254	127,342
France	1,147,396	1,251,389	1,278,826	1,425,299
Germany	1,588,912	1,732,853	1,770,840	1,973,681
Greece	156,005	170,133	173,860	193,748
Ireland	106,630	116,302	118,854	132,482
Italy	1,081,881	1,179,962	1,205,835	1,343,936
Luxembourg	16,000	17,453	17,836	19,882
Netherlands	315,085	343,636	351,172	391,397
Portugal	129,033	140,699	143,777	160,213
Spain	696,165	759,336	775,99	664,814
Sweden	170,159	185,580	189,649	211,37
Great Britain	1,152,500	1,256,937	1,284,494	1,431,625
Cyprus	11,920	39,643	15,491	20,131
Czech Republic	147,501	161,857	191,635	249,044
Estonia	16,661	20,538	23,408	28,120
Hungary	121,926	150,293	158,368	205,777
Latvia	22,584	27,630	29,323	38,092
Lithuania	34,802	42,689	45,191	58,708
Malta	5,927	7,308	7,701	10,009
Poland	376,652	464,165	489,075	635,319
Slovakia	64,233	79,177	83,431	108,403
Slovenia	31,910	39,345	41,462	53,890
Bulgaria	52,749	64,968	68,446	86,868
Romania	134,670	165,403	174,466	226,702
<b>Total WEEE</b>	<b>8,180,137</b>	<b>9,066,264</b>	<b>9,304,995</b>	<b>10,615,411</b>

Source: United Nations University, 2008 Review of Directive 2002/96 on Waste Electrical and Electronic Equipment (WEEE), Final report, Contract No: 07010401/2006/442493/ETU/G4, 05 August 2007, p. 67

On the other hand, most consumers say that they plan to use electronics they own until they would break down. The percentages vary between 40% and 58% depending on product mix. For example, 45% of respondents who own a laptop say that are not going to change it until it is no longer functional, while only 7% think at an upgrade in less than a year. While most households have a refrigerator, a washing machine, a vacuum cleaner, the number of people who own a microwave has increased (61% -

68,1%), also for those who own a food processor (45,3% - 51,2%) as well as an electric shaver (26,6% - 34,2%). Daedalus study also revealed that over 60% of the Romanian people have in their houses non-functional equipment, most of them say they do not know what to do with it, 26% intend to fix it and only 6% keep it until the collecting period.

The factor that would most motivate the Romanians to renounce at non-functional home electronics and appliances are buy-back campaigns, where consumers receive a discount on the purchase of new equipment when they give in return the old ones. Furthermore, over 90% of respondents admit that selective waste collection activity is important, but still they do not operate in this direction.

They are willing to adopt an ecological environmental behaviour regarding electronic equipment only to the extent that this does not require great efforts on their part.

Regarding the quantity of WEEE generated in Romania, according to United Nations University report (2008) this will continue to grow also in the timeframe 2010-2020. In Table 3 is presented the expected amount of WEEE generated by households in the 2010-2020 timeframe.

The amount of WEEE generated is expected to grow significantly, almost doubling in 10 years. There are no forecasts of WEEE quantities to be collected and treated in Romania, but the existence of an international treatment factory, and the emergence of other private initiatives in this area, is a prerequisite for increasing their recovery.

### 3. STRENGTHS OF WEEE MANAGEMENT IN ROMANIA

One first aspect that should be mentioned about WEEE management system in Romania is the *alignment of legislation in waste management of electrical and electronic equipment (WEEE) under the EU requirements*. Romania has not created a framework for the management of WEEE from own initiative, but as a member of the European Union, transposing European regulations into national law.

Legislation governing waste electrical and electronic equipment includes Government Decision no.448/2005 transposing the European Directive no.2002/96, as amended by European Directive no.2003/108 on waste electrical and electronic equipment, and Government Decision no.992/2005 transposing the European Directive no.2002/95 on the Restriction of certain dangerous substances which are used in electrical and electronic equipment.

The legislative framework in Romania establishes responsibilities for stakeholders in the management of WEEE. Producers are obliged to take WEEE from collection points (municipal, created at distributors or in places other than private households) and to treat it, recycle and store safely. Distributors are

obliged to take old equipment from private households, in a one-on-one system, when new equipment is sold, to take WEEE from collection points (municipality, created in places other than distributors or private households) and to treat, recycle and store safely. Municipalities must organize the collection of WEEE from private households to collection points, from where they must be transported for treatment, in a manner not adversely affecting the environment, as required by law. Users are required to separate WEEE at source sites and leave organized collection systems to carry forward to the points of treatment.

As was natural, once with creating the legislative framework in Romania specific for WEEE management, some organizations appeared which serve either to support the implementation of legislation or act on the consciousness of EEE buyers. They include collective associations which have taken producers EEE responsibilities. Currently in Romania six collective associations are authorized, namely: EcoTic, Environmental, Recolamp, Rorec, CCR Logistics Systems RO SRL and Recycling Ecosys. Joining them are numerous NGOs which regularly organize national information and education campaigns, fundraising galas for environmental projects and waste collection campaigns.

Following the adoption by Romania of the specific *acquis communautaire*, "green stamp" was introduced. This tax, known also as the "visible fee", reflects the costs of waste electrical and electronic equipment management.

The value of the stamp is not a fix one, it being calculated from an estimation of the costs involved in recycling. Each collective organization or authorized manufacturer who is allowed to develop waste electrical and electronic equipment treatment activities does an estimate of acquisition, recycling and recovery costs of these types of waste. Based on this estimate the value of the "green stamp", is established and at this value the production cost of those products is added. This value can not exceed the actual costs generated by collection, treatment and environmentally safe disposal operations.

The "green stamp" is a clear way to inform consumers about recycling costs because it is shown separately on labels and invoices, when selling new products.

The collective association EcoTic first introduced in Romania, on 30<sup>th</sup> of April, 2007, the "green stamp". Net value of the "green stamp" was originally set at 7 lei (LEU represents the Romanian currency), and from March, 2008 decreased to 5 lei for big EEE such as LCD, TVs, copiers, computers, monitors, telephones and at 1 leu for small EEE like mobile phones, DVD players, PDAs, radar detectors etc.. For industrial equipment such as surveillance equipment, antennas, transmitters, a net value of 2 lei is collected per kilogram. There are consumer electronics such as portable radios or CD players which are exempt from the "green stamp" tax.

Reducing the value of "green stamp" aimed to encourage sales of IT equipment and consumer electronics in the financial crisis period. Then, the volume of revenues from "green stamp" in 2007 was higher than the costs of collection and recycling of waste in the eight months since the launch of the integrated WEEE management system. This was due to poor collection infrastructure country-wide and low level of public information.

In addition to the actions of local administrations and of nongovernmental or collective organizations, *private initiatives* have rapidly developed in Romania, especially from the big producers of electrical and electronic equipment.

Currently, the largest investment in WEEE recycling sites, worth 10 million Euros, was made by the group of investors consisting of S.C. Romcarbon S.A. Buzau (72%), two Swiss investment funds (18%) and a private investor (10%), in the South East region of Romania. Factory GreenWEEE International is currently considered the biggest recycling plant of waste electrical and electronic equipment in Romania and Southeastern Europe. The factory has a processing capacity of 50,000 tones/year of WEEE, a total area of 10,795 square meters, of which 6,100 square meters is the production area. It is the first integrated unit which addresses WEEE recycling sites ensuring all stages of their treatment.

Another example is Stena DTM Romania Company. This is part of Swedish group Stena Metall and covers the WEEE collection, disassembly and treatment niche, but also of hazardous waste. Stena DTM Romania currently manages three sites authorized for the collection, treatment and final disposal of waste electrical and electronic equipment and industrial waste.

*Corporate social responsibility* has manifested since the first efforts to align Romania's acquis communautaire, particularly for manufacturers of electrical and electronic equipment well known to have implemented recycling and take-back systems. In Romania they have acted in accordance with honest practices accumulated in other countries.

Projects aiming at *raising awareness of the negative impact* of WEEE on the environment and human health and the need for collection and recycling processes, changing public attitude towards waste electrical and electronic equipment, is in an early stage of development. This can be explained by the fact that before 2007 this was not a priority either for the public sector or private one in Romania, as there was no obligation to align with EU environmental directives.

Romania has benefited from the PHARE technical assistance worth 1.2 million Euros for educating people in the field of waste management and also another PHARE Technical Assistance worth 600,000 Euros, to implement Directive 2002/96 on the management of WEEE which is a special component for

people awareness strictly for this area. Also, in this project were organized information seminars for all stakeholders in this field: environmental authorities, local authorities, manufacturers, waste management companies, etc. Also, a manual was developed containing information about ways of treating and recycling WEEE.

Together with external assistance, in 2007 was initiated a national campaign named "Marea debarasare" (engl. "The Big Get Rid Of Waste") for WEEE collection in cooperation with existing collective organizations, local authorities, health agencies, collection companies, local and regional agencies for environment protection. The effects are seen in the continued growth of WEEE quantity collected at each campaign.

#### 4. WEAKNESSES OF WEEE MANAGEMENT SYSTEM IN ROMANIA

Analyzing the data regarding on how the WEEE management system works, the conclusion drawn is that in Romania WEEE collection and recycling is still a slow process because:

- citizens do not realize yet the importance of recycling electrical and electronic equipment,
- collection infrastructure is poor and there is no market for finished products resulting from recycling,
- informal system of WEEE collection is not regulated,
- there are frequent changes of central and local government help to changing previously adopted decisions and the long-term solutions no longer come to be implemented.

Generally, public awareness from Romania regarding the negative effects of improper waste management can have on the environment is very low. We can say the same about knowledge of the obligations imposed by the law. But there are still major differences between big cities from developed parts of Romania and less developed cities. In big cities people understand the detailed messages regarding waste management and are more ready to contribute to changing their behavior because of reasons of environment protection. In rural areas from less developed parts of the country people do not take into account the impact of random dumping of waste on the environment.

The average operation duration in Europe for large appliances is of 8-10 years, while in Romania the duration is of 13-17 years. In some rural areas there still exist 50 years old household electrical appliances. Using equipment far above the average time recommended by the manufacturer is due to the economic situation (low value of the minimum wage, high percentage of persons below 200 Euros monthly income etc.) and "tradition" from Romania.

Awareness of population regarding the organizations specialized in recycling electrical and electronic equipment (EEE) is also very low. According to survey results conducted by Daedalus Millward Brown in 2008, over 78% of the population can not exemplify such an organization (Daedalus, 2008).

According to a study conducted by IMAS the actual selective collection conduct is triggered in the presence of stimuli, namely the selective collection containers. In the absence of such stimuli it is preceded to a selective collection for reuse (bottles, jars, plastic boxes, etc.), for use at home or transfer to other locations "in the country". (IMAS, 2009)

According to the IMAS study (2009), general information campaigns are effective if accompanied also by selective placement of collection containers, signs and maintenance in proper operating condition.

According to a study conducted by the Electrotechnical Research Institute from Romania - ICPE (2006) "in the situation in which it would be considered that EEE endowment of Romanian population is of 30 kg/capita (estimated maximum possible based on national statistics) and Romanian consumer should behave "almost normal" meaning that each product would be used for a period equal to the operation period (which average is of 8 years - as stated by most manufacturers), the amount of WEEE collected from households would be of 3.75 kg of WEEE per inhabitant per year. In fact, given the economic, geographic and demographic situation, these ideal conditions are not met; it is also impossible to achieve an index of 100% for household collection. (ICPE, 2006)

WEEE collection system in Romania is still lacking. Currently the number of national collection locations is of 2331. According to the legislative framework in force, all EEE producers are required to provide recycling for products they sell. WEEE recycling market in Romania is developing, with many niches. For example, in Romania, at the present time, there is only one operator treating glass and plastics resulting from WEEE dismantling (GreenWEEE International -Buzau). Also, in Romania there is no recycler owning the technology necessary to recycle used light sources.

In general, large WEEE coming from private households are now placed on streets to be collected by representatives of the local municipalities (sanitation companies) or from the informal sector. There are times when WEEE are provided to informal sector representatives for a fee, the emergence of WEEE "black market" becoming a growing phenomenon in Romania.

For finished products resulting from recycling there is no market. GreenWEEE International Buzău, the largest recycling site for waste electrical and electronic equipment from South-East of Europe, exports finished products resulting from recycling in other countries from Europe, one of the major countries in



this respect is Latvia. Also, among international clients who GreenWEEE International Buzău delivers finished products resulting from recycling are Ikea, Mercedes, etc.

Informal recovery process is a special category of WEEE management. Intervention of the informal sector is visible in waste collection (mixed or purchased separately from interested persons), in waste treatment and final storage. In general, informal recovery persons go from house to house and collect WEEE and other recyclable waste before they enter into the formal waste management system. According to the study "Economic Aspects of Activities in the Informal Sector in Waste Management" conducted in 2008 in the city of Cluj-Napoca:

- informal sector recycles 10% of the total waste, representing twice the amount of waste recycled by the formal sector;
- the existence and information activities in the informal sector are ignored when planning waste management;
- informal sector is discriminated by all official important factors involved in waste management.

According to pre-publication presentation of the forthcoming UN-HABITAT report "*Solid Waste Management in the World's Cities*" (2009) the main reasons for which the informal sector needs to be integrated into WEEE management are: increasing coverage of collection, recycling services, etc.; supply with secondary raw materials for the recycling industry; informal sector activities are very effective, people in the informal sector have the ability to react to the market, to adapt quickly to conditions; creating new jobs especially for low income groups and for the very poor people, who have no training, thus contributing to the integration in society of these social categories.

Currently, in Romania there is no database regarding the informal sector in the field of WEEE. 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.

In Romania, changes in central and local administration unfortunately contribute to change of previously adopted decisions and sustainable objectives and long-term solutions do not come to be implemented. One example is the delayed decision of local authorities regarding the selection of lands required to build the recycling targets for WEEE. Developing and implementing a sustainable WEEE management system requires a great time. In many cases, policy makers ignore this and, accordingly, adopt or propose short-term decisions insufficiently substantiated.



## 5. CONCLUSIONS

Waste electrical and electronic equipment is a problem of great actuality due both to continued growth of quantities and their types (which by decay and infestation in the wild represent a threat to the environment and human health), and important quantity of raw materials, reusable energy and materials that can be recovered and placed into the economic circuit. Applying a sustainable WEEE management system involves major changes of current practices. Implementing these changes will require the participation of all society segments: individuals as consumers, private area, social and economic institutions and public authorities.

To the positive and negative aspects of WEEE management in Romania a range of opportunities add, of which exploitation may significantly contribute to improving the system, namely: reducing the size of electrical and electronic equipment (e.g. the phone, to TVs, monitors, etc.) and integration of the eco-design concept in the EEE design, running until 2013 of the Sectorial Operational Program for Environment through which can be developed integrated waste management systems with non-repayable funds from the European Union, the existence of a National Waste Management Strategy and of the National Waste Management Plan.

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