EP

United Nations Environment Programme

UNEP(DEPI)/MED WG. 357/Inf. 11
13 April 2011

ENGLISH

MEDITERRANEAN ACTION PLAN

MEDPOL

Meeting of MED POL Focal Points

Rhodes (Greece), 25 - 27 May 2011

DRAFT

ASSESSMENT OF THE STATUS FOR THE MANAGEMENT OF WASTE FROM ELECTRIC/ELECTRONIC EQUIPMENT (WEEE) - PROPOSALS FOR ACTION

Delegates are kindly requested to bring their documents to the meeting

UNEP/MAP
Athens, 2011

Acknowledgement

The project “Assessment of Electronic, Electric Equipments (WEEE)” is part of the activities of the Basel Convention Regional Centre (BCRC) Slovakia. Its activities fall into the category of “The Environmentally Sound Management of the Basel Convention Priority Waste Streams”. The project was carried out by two experts under the guidance of the BCRC Slovakia in Bratislava and UNEP MAP.

The main goal of the project was to assess the whole Mediterranean region which is composed of twenty one countries. Among these countries, eight is already an EU member and most of them are candidate countries to the European Union. All the involved countries have access to the Mediterranean Sea and, in addition, they are Parties to the Basel Convention. The project has two aspects. The first one is to assess the current situation. The second aspect is to work out a proposal for the regional action plan.

The project is realised thanks to the funding provided by the UNEP/MAP as a donor institution.

The Project Co-ordinator would like to use this opportunity to thank Mr. Fouad Abousamra, MEDPOL Programme Officer, for providing the funds and his professional support for the project.

Simultaneously, the Project Co-ordinator would like to thank to both involved experts mentioned in alphabetical order for their professional approach.

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Project Summary

The present project “Assessment of Electronic, Electric Equipments (WEEE)” has been realised thanks to the financial support provided by MEDPOL. The project is focused on assessment of the status of the management of the waste from electric and electronic equipment (WEEE) through two main project activities. The first one was to prepare a regional assessment of the current situation based on sub-regional assessments. The second task was to develop a proposal for action according to the Basel Convention Guidelines with the aim to develop a region-wide management plan.

The waste from electric and electronic equipment or e-waste is currently growing as one of the most rapidly waste streams, in developed and developing countries and in countries with economies in transition (CET). The e-waste contains valuable materials appropriate for recovery or recycling. For that reason the e-waste management could play a very important role in countries’ economy. The Basel Convention on the control of transboundary movements of hazardous wastes and their disposal, which is ratified by most of the Mediterranean countries, emphasises environmentally sound management with the aim to protect human health and environment. Basel Convention experts worked out some specific guidelines aimed to assist Parties to manage the waste from electrical and electronic equipment in an environmentally sound manner.

Eight of the Mediterranean countries are also members of the European Union. The two Directives related to e-waste have to be implemented into national legislation in that case:
Directive 2002/95/EC of the European Parliament and of the Council of 27 January 2003 on the restriction of the use of certain hazardous substances in electrical and electronic equipment, and
Directive 2002/96/EC of the European Parliament and of the Council of 27 January 2003 on waste electrical and electronic equipment (WEEE)

The present project provides information on the following topics:

- Identification and/or estimation of current and future waste streams: materials composition of current and future flow streams
- Reuse possibilities: current levels of reuse of different WEEE, opportunities for greater reuse of products or parts of products, barriers to greater reuse, example of best and worst practices in re-se schemes
- Collection and collection scheme operation: organization of national collection schemes, cost of the schemes, Economic instruments to facilitate the collection, administrative requirements
- Sorting and sorting scheme operation: organization of national sorting schemes, cost of the schemes, Economic instruments to facilitate sorting, administrative requirements
- Recycling and recycling scheme operation: organization of national recycling schemes, cost of the schemes, Economic instruments to facilitate the recycling, administrative requirements
- Disposal and disposal scheme operation: organization of national disposal schemes, cost of the schemes, Economic instruments to facilitate the environmental sound disposal, administrative requirements
- Technology to treat process or dispose of WEEE: capacities and inputs/outputs for existing technologies for sorting, treatment including recovery, recycling and disposal

In addition, the project proposes the “way forward” or recommendations and actions to be taken. The recommendations varies whether the country is a member state of EU or not. The recommendations are focused on two areas - technical and administrative/

financial. On the top, there should be proper legislation. In case of EU members there are two Directives on WEEE and related regulations. The real implementation should be checked by environmental inspectorates. It is very important:

- to create the national waste management plans with clear targets;
- to create appropriate conditions for the market of recycled and secondary raw materials;
- to generate detailed national WEEE statistics and regularly report comprehensive WEEE data through the one designated body on both regional and international level;
- to improve collection infrastructure especially of WEEE from municipal and household waste stream
- to provide and widen WEEE take-back system for consumers of end-of-life EEE.
- to establish separation facilities and centres covering the main residential and industrial areas of interest.
- to radically reduce a final disposal of WEEE - landfilling;.
- to organize public awareness campaigns;
- to undertake WEEE pilot projects;
- positively motivate consumers to change their habitudes towards WEEE handling.

For accession countries as a most important is to prepare full transposition of new EU Waste Framework Directive (2008) and development of national regulation transposing EU regulation on WEEE. The adoption and implementation of adequate legislation should be considered as the first step. The follows should be aimed at relevant strategic documents, to develop an information system on e-waste, to ensure institutional arrangements systems in e-waste management and development of public awareness programmes. The countries should concentrate their activities on preparation and improvement of their legislation and related documents, on determine of their obligations and responsibilities, on development and implementing of the economic tools in all steps of e-waste management, to build local capacities for e-waste treatment and introduce of subsidies and incentives for establishment of new e-waste treatment facilities. The information system and verification of quality and reliability of dates will play a very important role.

Table of contents

2. Geographical and economic characteristic of the countries concerned

Country	Capital	Total country area [km^2]	Country population	GDP (nominal) /capita [USD]
Albania	Tirana	28,748	3,659,616	3,911
Algeria	Algiers	2,381,741	34,895,000	4,418
Bosnia and Herzegovina	Sarajevo	51,129	4,613,414	4,278
Croatia	Zagreb	56,594	4,489,409	14,243
Cyprus	Nicosia	9,251	870,000	29,619
Egypt	Cairo	1,002,450	77,420,000	2,450
France	Paris	674,843	65,447,374	42,747
Greece	Athens	131,990	11,306,183	29,635
Israel	Jerusalem	22,072	7,587,000	26,796
Italy	Rome	301,338	60,231,214	35,435
Lebanon	Beirut	10,452	4,224,000	9,479
Libya	Tripoli	1,759,541	6,420,000	9,529
Malta	Valletta	316,000	413,609	19,111
Monaco	Monaco	2,020	30,586	88,761
Montenegro	Podgorica	13,812	672,180	6,120
Morocco	Rabat	446,550	31,993,000	4,604
Slovenia	Ljubljana	20,273	2,054,199	24,417
Spain	Madrid	504,030	45,989,016	31,946
Syria	Damascus	185,180	22,198,110	2,579
Tunisia	Tunis	163,610	10,432,500	3,851
Turkey	Ankara	783,562	72,561,312	8,723
Source: http://en.wikipedia.org				
21 COUNTRIES – 21 CAPITOLS		**Σ 8,865,186** [km^2]	**Σ 467,507,722** people	

3. Legal framework of the electrical and electronic waste in the Mediterranean Region

Cyprus, France, Greece, Italy, Malta, Monaco, Slovenia, Spain are countries - Member States (MSs) of the European Union (EU) where the unified legal system had been transposed and now is being implemented.

Albania, Bosnia and Herzegovina, Croatia, Montenegro and **Turkey** are the countries which have been given the perspective of becoming EU member states once they fulfil the necessary conditions.

Furthermore **Croatia** and **Turkey** are now recognized by the European Commission (EC) as the candidate countries for the EU. The rest are the EU's potential candidates.

EU legislation restricting the use of hazardous substances in electrical and electronic equipment (Directive 2002/95/EC) and promoting the collection and recycling of such equipment (Directive 2002/96/EC) has been in force since February 2003. The legislation

provides for the creation of collection schemes where consumers return their used e-waste free of charge. The objective of these schemes is to increase the recycling and/or re-use of such products.

It also requires heavy metals such as lead (Pb), mercury (Hg), cadmium (Cd), and hexavalent chromium (CrVI) and flame retardants such as polybrominated biphenyls (PBBs) or polybrominated diphenyl ethers (PBDEs) to be substituted by safer alternatives.

Despite such rules on collection and recycling only 1/3 of electrical and electronic waste in the EU is reported as separately collected and appropriately treated. A part of the other two thirds is potentially still going to landfills and to sub-standard treatment sites in or outside the EU. The collection target of 4 kg per person per year does not properly reflect the amount of waste from electrical and electronic equipment (WEEE) arising in individual MSs. Illegal trade of electrical and electronic waste to non-EU countries continues to be identified at EU borders.

An inadequately treated e-waste poses environmental and health risks. In December 2008, the EC therefore proposed to revise the directives on electrical and electronic equipment in order to tackle the fast increasing waste stream of such products. The aim is to increase the amount of e-waste that is appropriately treated and to reduce the volume that goes to disposal. The proposals also aim to reduce administrative burdens and ensure coherency with newer policies and legislation covering, for example, chemicals and the new legislative framework for the marketing of products in the EU.

The EC proposes to set mandatory collection targets equal to 65% of the average weight of electrical and electronic equipment placed on the market over the 2 previous years in each MSs. The recycling and recovery targets of such equipment would cover the re-use of whole appliances and weight-base targets would increase by 5%. Targets are proposed also for the recovery of medical devices.

MSs with a high consumption of electrical and electronic equipment would have more ambitious collection targets under the new directive, while others with lower consumption levels would have targets that are appropriately adapted.

3.1 Legislation covering WEEE management in some Mediterranean countries

1. Directive 2008/35/EC of the EP and of the Council of 11. 3. 2008 amending Directive 2002/95/EC on RoHS, as regards the implementing powers conferred on to the Commission
2. Regulation (EC) No 1013/2006 of the European Parliament and of the Council of 14 June 2006 on shipments of waste
3. Directive 2003/108/EC of the EP and of the Council of 8. 12. 2003 amending Directive 2002/96/EC on WEEE
4. Directive 2002/96/EC of the EP and of the EC of 27. 1. 2003 on waste electrical and electronic equipment (WEEE) - Consolidated version
5. Directive 2002/95/EC of the European Parliament (EP) and of the Council of 27. 1. 2003 on the restriction of the use of certain hazardous substances in electrical and electronic equipment (RoHS) - Consolidated version

3.2 Secondary legislation on WEEE implemented in some Mediterranean countries

1. Commission Decision 2010/122/EU of 25. 2. 2010 amending, for the purposes of adapting to scientific and technical progress, the Annex to Directive 2002/95/EC on RoHS as regards an exemption for an application of cadmium

2. Commission Decision 2009/443/EC of 10. 6. 2009 amending, for the purposes of adapting to technical progress, the Annex to Directive 2002/95/EC on RoHS as regards exemptions for applications of lead, cadmium and mercury
3. Commission Decision 2009/428/EC of 4. 6. 2009 amending, for the purposes of adapting to technical progress, the Annex to Directive 2002/95/EC on RoHS as regards the exemption for an application of lead as impurity in RIG Faraday rotators used for fibre optic communication systems
4. Commission Decision 2008/385/EC of 24. 1. 2008 amending, for the purposes of adapting to technical progress, the Annex to Directive 2002/95/EC on RoHS as regards exemptions for applications of lead and cadmium
5. Commission Decision 2006/692/EC of 12. 10. 2006 amending, for the purposes of adapting to technical progress, the Annex to Directive 2002/95/EC on RoHS as regards exemptions for applications of hexavalent chromium (notified under document number C(2006) 4791)
6. Commission Decision 2006/691/EC of 12. 10. 2006 amending, for the purposes of adapting to technical progress, the Annex to Directive 2002/95/EC on RoHS as regards exemptions for applications of lead and cadmium (notified under document number C(2006) 4790)
7. Commission Decision 2006/690/EC of 12. 10. 2006 amending, for the purposes of adapting to technical progress, the Annex to Directive 2002/95/EC on RoHS as regards exemptions for applications of lead in crystal glass (notified under document number C(2006) 4789)
8. Commission Decision 2006/310/EC of 21. 4. 2006 amending, for the purposes of adapting to the technical progress, the Annex to Directive 2002/95/EC on RoHS as regards exemptions for applications of lead (notified under document number C(2006) 1622)
9. Commission Decision 2005/747/EC of 21. 10. 2005 amending for the purposes of adapting to technical progress, the Annex to Directive 2002/95/EC on RoHS (notified under document number C(2005) 4054)
10. Commission Decision 2005/717/EC of 13. 10. 2005 amending, for the purposes of adapting to the technical progress, the Annex to Directive 2002/95/EC on RoHS (notified under document number C(2005) 3754)
11. Commission Decision 2005/618/EC of 18. 8. 2005 amending Directive 2002/95/EC on RoHS for the purpose of establishing the maximum concentration values for certain hazardous substances in electrical and electronic equipment (notified under document number C(2005) 3143)
12. Commission Decision 2005/369/EC of 3. 5. 2005 laying down rules for monitoring compliance of MSs and establishing data formats for the purposes of Directive 2002/96/EC on WEEE (notified under document number C(2005) 1355)
13. Commission Decision 2004/249/EC of 11. 3. 2004 concerning a questionnaire for MSs reports on the implementation of Directive 2002/96/EC on WEEE

3.3 International multilateral environmental agreement - the Basel Convention on the Control of Transboundary Movements of Hazardous Wastes and their Disposal

The Basel Convention was principally devoted to setting up a framework for controlling the “transboundary” movements of hazardous wastes, that is, the movement of hazardous wastes across international frontiers. It also developed the criteria for “environmentally sound management” (ESM) and a Control System, based on prior written notification, the aim of which is to protect human health and the environment by minimizing hazardous waste production whenever possible.

ESM means addressing the issue through an “integrated life-cycle approach”, which involves strong controls from the generation of a hazardous waste to its storage, transport, treatment,

reuse, recycling, recovery and final disposal. It was recognized that the long-term solution to the stockpiling of hazardous wastes is a reduction in the generation of those wastes.

3.3.1 Parties to the Basel Convention from the Mediterranean Region

Entry into force: 5 May 1992, in accordance with article 25 (1) of the Convention
Registration: 5 May 1992, No. 28911

Participant	Signature	Date (*)
Albania		29.06.99 (a)
Algeria		15.09.98 (a)
Bosnia & Herzegovina		16.03.01 (a)
Croatia		09.05.94 (a)
Cyprus	22.03.89	17.09.92
Egypt		08.01.93 (a)
France	22.03.89	07.01.91 (AA)
Greece	22.03.89	04.08.94
Israel	22.03.89	04.12.94
Italy	22.03.89	07.02.94
Lebanon	22.03.89	21.12.94
Libya		12.07.01 (a)
Malta		19.06.00 (a)
Monaco		31.08.92 (a)
Montenegro		23.10.06 (d)
Morocco		28.12.95 (a)
Slovenia		07.10.93 (a)
Spain	22.03.89	07.02.94
Syria	11.10.89	22.01.92
Tunisia		11.10.95 (a)
Turkey	22.03.89	22.06.94

* (a) Accession; (AA) Approval; (d) Succession

3.3.2 Examples of e-waste codes under the Basel Convention

Annex I: Y45: Equipments with organohalogen compounds e.g. CFCs

Annex VIII (hazardous wastes):
A 1090: Ashes from incineration of insulated Cu wires
A 1010: metal wastes and waste consisting of alloys of specific metals e.g. Cd, Pb, Hg, etc.
A 1150: Metal ashes from printed circuit boards
A 1170: unsorted waste batteries
A 1180: waste electrical and electronic assemblies or scrap containing components such as accumulators and other batteries included on List A (A1170), mercury switches, glass from CRTs and other activated glass and PCB-capacitors, or contaminated with Annex I constituents (e.g. Cd, Hg, Pb, PCB)
A 1190: Waste metal cables

A 2010: glass waste from CRTs and other activated glasses

3.3.3 Examples of e-waste types under the Basel Convention

Cathode ray tubes (CRTs)
Printed circuit board assemblies
Capacitors
Mercury switches and relays
Batteries, accumulators
Electron beam generator and getter
Liquid crystal displays (LCDs)
Cartridges from photocopying machines
Selenium drums (photocopier)
Electrolytes, PCBs bearing capacitors
Insulated copper cables and wires

3.4 WEEE Classification and Coding according to the List of Waste (Wastes Catalogue)

1. Commission Decision 2000/532/EC of 3.5.2000 replacing Decision 94/3/EC establishing a list of wastes pursuant to Article 1(a) of Council Directive 75/442/EEC on waste and Council Decision 94/904/EC establishing a list of hazardous waste pursuant to Article 1(4) of Council Directive 91/689/EEC on hazardous waste
2. Council Decision 2001/573/EC of 23.7.2001 amending Commission Decision 2000/532/EC as regards the list of wastes

European List of Waste (ELoW) is meant to be a reference nomenclature providing a common terminology throughout the Community with the purpose to improve the efficiency of waste management activities. The ELoW serves as a common encoding of waste characteristics in a broad variety of purposes like classification of hazardous wastes. Assignment of waste codes has a major impact on the transport of waste, installation permits (which are usually granted for the processing of specific waste codes), decisions about recyclability of the waste or as a basis for waste statistics among the MSs in the EU.

The different types of wastes in the ELoW are fully defined by the six-digit code for the waste and the respective two-digit and four-digit chapter headings. The 401 out of the 839 hazardous wastes codes in the ELoW are considered to be hazardous wastes. WEEE can be classified and coded in a following ways, e.g.:

A) 16 Wastes not otherwise specified in the list

16 02 wastes from electrical and electronic equipment

16 02 11* discarded equipment containing chlorofluorocarbons, HCFC, HFC
16 02 12* discarded equipment containing free asbestos
16 02 13* discarded equipment containing hazardous components other than in 16 02 09 to 16 02 12
16 02 14 discarded equipment other than in 16 02 09 to 16 02 13
16 02 15* hazardous components removed from discarded equipment
16 02 16 components removed from discarded equipment other than in 16 02 15

B) 20 Municipal wastes (household waste and similar commercial, industrial and institutional wastes) including separately collected fractions

20 01 separately collected fractions (except 15 01)

20 01 35* discarded electrical and electronic equipment other than those mentioned in 20 01 21 and 20 01 23 containing hazardous components

20 01 36 discarded electrical and electronic equipment other than those mentioned in 20 01 21, 20 01 23 and 20 01 35
(* means that the waste is classified as the hazardous waste)

3.5 Fifteen hazardous waste properties in the EU legislation

The classification of waste as hazardous waste should be based on the EU legislation on chemicals, in particular concerning the classification of preparations as hazardous, including concentration limit values used for that purpose. Hazardous waste should be regulated under strict specifications in order to prevent or limit, as far as possible, the potential negative effects on the environment and on human health due to inappropriate management.

Furthermore, it is necessary to maintain the system by which waste and hazardous waste have been classified in accordance with the ELoW as last established by Commission Decision 2000/532/EC, in order to encourage a harmonised classification of waste and ensure the harmonised determination of hazardous waste within the EU. Directive 2008/98/EC of the EP and of the Council of 19. 11. 2008 on waste set following hazardous waste properties and their definition.

Acronym	Hazardous Waste Property	Definition
H 1	'Explosive'	substances and preparations which may explode under the effect of flame or which are more sensitive to shocks or friction than dinitrobenzene
H 2	'Oxidizing'	substances and preparations which exhibit highly exothermic reactions when in contact with other substances, particularly flammable substances
H 3-A	'Highly flammable'	— liquid substances and preparations having a flash point below 21 °C (including extremely flammable liquids), or — substances and preparations which may become hot and finally catch fire in contact with air at ambient temperature without any application of energy, or — solid substances and preparations which may readily catch fire after brief contact with a source of ignition and which continue to burn or to be consumed after removal of the source of ignition, or — gaseous substances and preparations which are flammable in air at normal pressure, or — substances and preparations which, in contact with water or damp air, evolve highly flammable gases in dangerous quantities
H 3-B	'Flammable'	liquid substances and preparations having a flash point equal to or greater than 21 °C and less than or equal to 55 °C
H 4	'Irritant'	non-corrosive substances and preparations which, through immediate, prolonged or repeated contact with the skin or mucous membrane, can cause inflammation
H 5	'Harmful'	substances and preparations which, if they are inhaled or ingested or if they penetrate the skin, may involve limited health risks
H 6	'Toxic'	substances and preparations (including very toxic substances and preparations) which, if they are inhaled or ingested or if they penetrate the skin, may involve serious, acute or chronic health risks and even death

Acronym	Hazardous Waste Property	Definition
H 7	'Carcinogenic'	substances and preparations which, if they are inhaled or ingested or if they penetrate the skin, may induce cancer or increase its incidence
H 8	'Corrosive'	substances and preparations which may destroy living tissue on contact
H 9	'Infectious'	substances and preparations containing viable micro-organisms or their toxins which are known or reliably believed to cause disease in man or other living organisms
H 10	'Toxic for reproduction'	substances and preparations which, if they are inhaled or ingested or if they penetrate the skin, may induce non-hereditary congenital alformations or increase their incidence
H 11	'Mutagenic'	substances and preparations which, if they are inhaled or ingested or if they penetrate the skin, may induce hereditary genetic defects or increase their incidence
H 12	Waste which releases toxic or very toxic gases in contact with water, air or an acid	
H 13(*)	'Sensitizing'	substances and preparations which, if they are inhaled or if they penetrate the skin, are capable of eliciting a reaction of hypersensitization such that on further exposure to the substance or preparation, characteristic adverse effects are produced
H 14	'Ecotoxic'	waste which presents or may present immediate or delayed risks for one or more sectors of the environment
H 15	Waste capable by any means, after disposal, of yielding another substance, e.g. a leachate, which possesses any of the characteristics listed above	

(*) As far as testing methods are available

3.6 Hazardous Properties of Chemicals in the EU

Following symbols classifying waste as hazardous waste should be used in the EU legislation based on chemicals and preparations classification as hazardous.

Hazardous Chemical Property	Symbol
Explosive (E)	
Oxidizing agent (O)	
Highly flammable (F)	
Extremely flammable (F+)	

Hazardous Chemical Property	Symbol
Corrosive (C)	
Dangerous for the environment (N)	
Toxic (T)	
Very toxic (T+)	
Harmful (Xn)	
Irritant (Xi)	

3.7 Categories of Electrical and Electronic Equipment

Following categories are covered by the legislation and all procedures must be done mainly in accordance with Directive 2002/96/EC:

Category Number	Description of Electrical and Electronic Equipment	List of products which shall be taken into account for the purpose Directive 2002/96/EC
1.	Large household appliances (LHHA)	Large cooling appliances Refrigerators Freezers Other large appliances used for refrigeration, conservation and storage of food Washing machines Clothes dryers Dish washing machines Cooking Electric stoves Electric hot plates Microwaves Other large appliances used for cooking and other processing of food Electric heating appliances Electric radiators Other large appliances for heating rooms, beds, seating furniture

Category Number	Description of Electrical and Electronic Equipment	List of products which shall be taken into account for the purpose Directive 2002/96/EC
		Electric fans Air conditioner appliances and other fanning, exhaust ventilation and conditioning equipment
2.	Small household appliances (SHHA)	Vacuum cleaners Carpet sweepers Other appliances for cleaning Appliances used for sewing, knitting, weaving and other processing for textiles Irons and other appliances for ironing, mangling and other care of clothing Toasters Fryers Grinders, coffee machines and equipment for opening or sealing containers or packages Electric knives Appliances for hair-cutting, hair drying, tooth brushing, shaving, massage and other body care appliances Clocks, watches and equipment for the purpose of measuring, indicating or registering time Scales
3.	IT and telecommunications equipment (IT&T)	Centralised data processing: Mainframes Minicomputers Printer units Personal computing: Personal computers (CPU, mouse, screen and keyboard included) Laptop computers (CPU, mouse, screen and keyboard included) Notebook computers Notepad computers Printers Copying equipment Electrical and electronic typewriters Pocket and desk calculators and other products and equipment for the collection, storage, processing, presentation or communication of information by electronic means User terminals and systems Facsimile Telex Telephones Pay telephones Cordless telephones Cellular telephones Answering system and other products or equipment of transmitting sound, images or other information by telecommunications
4.	Consumer equipment	Radio sets Television sets

Category Number	Description of Electrical and Electronic Equipment	List of products which shall be taken into account for the purpose Directive 2002/96/EC
	(CE)	Videocameras Video recorders Hi-fi recorders Audio amplifiers Musical instruments and other products or equipment for the purpose of recording or reproducing sound or images, including signals or other technologies for the distribution of sound and image than by telecommunications
5.	Lighting equipment (Lighting)	Luminaires for fluorescent lamps with the exception of luminaires in households Straight fluorescent lamps Compact fluorescent lamps High intensity discharge lamps, including pressure sodium lamps and metal halide lamps Low pressure sodium lamps Other lighting or equipment for the purpose of spreading or controlling light with the exception of filament bulbs
6.	Electrical and electronic tools (with the exception of large-scale stationary industrial tools) (Tools)	Drills Saws Sewing machines Equipment for turning, milling, sanding, grinding, sawing, cutting, shearing, drilling, making holes, punching, folding, bending or similar processing of wood, metal and other materials Tools for riveting, nailing or screwing or removing rivets, nails, screws or similar uses Tools for welding, soldering or similar use Equipment for spraying, spreading, dispersing or other treatment of liquid or gaseous substances by other means Tools for mowing or other gardening activities
7.	Toys, leisure and sports equipment (Toys/Leisure/Sports)	Electric trains or car racing sets Hand-held video game consoles Video games Computers for biking, diving, running, rowing Sports equipment with electric or electronic components Coin slot machines
8.	Medical devices (with the exception of all implanted and infected products) (Medical)	Radiotherapy equipment Cardiology Dialysis Pulmonary ventilators Nuclear medicine Laboratory equipment for in-vitro diagnosis Analysers Freezers Fertilization tests Other appliances for detecting, preventing, monitoring, treating, alleviating illness, injury or disability
9.	Monitoring and control instruments	Smoke detector Heating regulators

Category Number	Description of Electrical and Electronic Equipment	List of products which shall be taken into account for the purpose Directive 2002/96/EC
	(M&C)	Thermostats Measuring, weighing or adjusting appliances for household or as laboratory equipment Other monitoring and control instruments used in industrial installations (e. g. in control panels)
10.	Automatic dispensers	Automatic dispensers for hot drinks Automatic dispensers for hot or cold bottles or cans Automatic dispensers for solid products Automatic dispensers for money All appliances which deliver automatically all kind of products

3.8 Status of implementation of the WEEE provisions in countries of the Mediterranean Region

Algeria, Egypt, Israel, Lebanon, Libya, Morocco, Syria, Tunisia are countries which are brought closer to the EU by e.g. Technical Assistance and Information Exchange instrument (TAIEX) specifically to share the technical experience, understand the legislation, measures and policies which many countries of the Mediterranean Region have adopted to sweep away the technical, regulatory, legal, bureaucratic, and other barriers that stifled free trade and free movement within the EU.

CYPRUS

Administrative Act No. 668/2004 on the management of WEEE, published in Greek in Official Gazette No. 3888, Annex III (I), on July 30, 2004, transposes the WEEE and RoHS Directives. The Act has been in effect since 13. 8. 2005 although full implementation is getting under way, with the establishment of the first collective implementation system. Further amendments of the Act are expected.

The Government of Cyprus' agency in charge of implementing the WEEE obligations is the Environment Service, under the Ministry of Agriculture, Natural Resources and the environment.

Act No. 668/2004 assigns responsibility for managing WEEE on the producer and, locally, on the importer of first instance (as opposed to downstream retailers). Producers and importers are required to comply either individually or collectively. Failure to comply is defined as a criminal offense and draws extra-judicial penalties (i.e. to be determined following legal proceedings initiated by the state).

The government has introduced specific fines for offenders, starting off with out-of-court, on-the-spot fines of Cyprus Pounds (CP) 200 (about USD 420) for minor violations and ranging up to CP 20,000 (USD 42,000) and/or three years' imprisonment for more severe cases. The fine may reach a maximum of CP 2 million (USD 4.2 million) in exceptional cases involving severe environmental damage.

FRANCE

Decree No. 829/2005 on the design of EEE and the elimination of WEEE includes obligations for both producers and retailers.

The Decree is implementing Directives on RoHS, the conditions of approval of B2B systems, approval of B2C systems, visible fees, scope of B2B & B2C EEE, registration requirements, the approvals for collective and individual compliance schemes and collective financial guarantee.

GREECE

Presidential Decree No. 117/2004 of 5. 3. 2004 transposes the Directives WEEE & RoHS and applies the provisions of Waste Law No. 2939/2001 to WEEE. It prescribes that producers or designated third parties must obtain a certificate of alternative management (PED) from EOEDSAP (the National Organisation for the Alternative Management of Packaging and Other Waste).

Joint Decision of the Undersecretaries of Economy and Environment No. 112145 of 12. 12. 2004, published in the Official Journal of the Hellenic Republic 1916B on 24. 12. 2004, on the contribution fee was set.

ITALY

Decree No. 151/2005 of 29. 7. 2005 transposes the WEEE & RoHS Directives. However, several sub-decrees have been delayed because of confusion over new Environmental Code. The sub-decrees might stipulate a transitional period without producer identification until an EU-wide identification system is in place. No date identification required. The bin symbol designates date of placing on market.

MALTA

The RoHS Directive 2002/95/EC been transposed into national law by the Minister for Competitiveness and Communications, acting on the advice of the Malta Standard Authority, by Legal Notice No. 396/2004. This regulation came into force on the 1. 7. 2006. All definitions and regulations of the RoHS Directive apply.

In March 2007, Legal Notice No. 63/2007 has been published and came into force the same day. In order to facilitate the practical implementation it contains the obligation for producers, importers or retailers who put EEE on the Maltese market to be registered at the competent authority and to report regularly about the amount of equipment they put on the market and about the results of recovering WEEE.

MONACO

The Principality of Monaco's policy instigated by HSH Prince Albert II, resolutely determined goals for waste issue.

The environmental charter was stipulated and includes 23 tangible measures which, for the most part, have already been implemented and which will generate new developments before the end of the 5-year period. Unfortunately recycling of WEEE was not fully implemented yet.

SLOVENIA

National WEEE Legislation of Slovenia mainly consists of:

- Decree on the Management of WEEE (Official Journal of RS No. 107/2006, ref. No. 4588);
- Decree on the Manner and Subject of and Conditions for Performing the Public Utility Service of WEEE Management (Official Journal of RS No. 118/2004, ref. No. 4863);

- Decree on environmental tax on the generation of WEEE (Official Journal of RS No. 32/2006, ref. No. 1314)

Other Slovene legislation relevant for WEEE management:

- Environment Protection Act (Official Journal of RS No. 41/2004, ref. No. 1694) and its amendment No. 57/2008 (Official Journal of RS No. 20/2006);
- Decree on Waste Management (Official Journal of RS No. 34/2008, ref. No. 1358);
- Order on the management of separately collected fractions in the public service of urban waste management (Official Journal of RS No. 21/2001, ref. No. 1189).

National WEEE legislation has been prepared in to impose national obligations on the legal persons who are placing products on national market for the first time in case the products originate from third countries or from other MSs.

Provisions put in place allowed authorities to identify these persons and gave the possibility to ask these persons to provide the financing of the management of WEEE arising from their sales. In accordance with national WEEE legislation these legal entities must register as producer. In accordance with national WEEE legislation all the responsibilities are on the Slovene legal person who is placing EEE on the national market and only Slovene legal entities can register. Foreign producers can register just through their representative/importer in Slovenia.

SPAIN

Royal Decree No. 208/2005 of 25. 2. 2005 came into force on 13. 8. 2005 and transposes both WEEE & RoHS Directives. Its goal is to regulate within many operators involved the collection and recycling of EEE at the end of their lifespan and to comply with the WEEE obligations for EEE categories, compounds and their treatments.

Spanish Law No. 50/2002 on Foundations, of 26. 12. 2002 and Royal Decree No. 106/2008 on the environmental management of batteries, used batteries and portable storage cells, are acting together with the Decree No. 208/2005.

Based on the Spanish law duties of municipal authorities are to:

- offer sufficient WEEE collection places;
- provide collecting services at municipal amenities;
- sign agreements with take-back systems;
- receive a compensation of extra cost for collection from take-back systems operators.

Legal conditions for take-back systems in Spain:

- introduce a guarantee of 4% of sales volume;
- cover all the territory of each region;
- comply with the proximity principle at regional level;
- obtain an authorisation by the government for a 5-year period;
- report information to the environmental authority;
- inform about which are the joined producers;
- coordinate themselves through an agreement and create special office for logistic coordination.

Duties of regional governments:

- authorize the take-back systems;
- authorize all the agents;
- report information to the central governments;
- coordinate different involved agents through the logistic office.

Sanctions

Manufacturers' non-compliance of WEEE legislation implies penalization through fines or other sanctions, such as temporary professional disqualification or closure of its facilities.

Economic sanctions are divided into minor, serious and very serious, as the following table 1 illustrates

Table 1 – Economic sanctions

Seriousness of Sanction	Type of Infraction	Fine
Minor	Abandonment, dumping or uncontrolled elimination of waste without serious damage.	*From 600 to 6,000 €*
Serious	The entry or departure of waste to third countries without administrative authorization and compliance of the Law. Products not marked or marked incorrectly.	*From 600 to 30,000 € (from 6,000 to 300,000 € when there is dangerous waste)*
Very Serious	Abandonment, dumping or uncontrolled elimination of dangerous waste or which have produced serious environmental deterioration or damage. The malicious concealment of data.	*From 30,000 to 1,202,000 € (from 300,000 € when there is dangerous waste)*

Legislation covering WEEE management

Albania, Bosnia and Herzegovina, Croatia, Montenegro and **Turkey** are the countries which have been given the perspective of becoming EU members once they fulfil the necessary conditions. They are the EU's potential candidates.

Furthermore **Croatia** is now recognized by the European Commission (EC) as the candidate country for the EU.

Waste management issues belong among major environmental priorities in the countries - EU's potential candidates and the candidate countries for the EU.

The analysis of state-of-the-art laws related to waste management in **Albania** outlines, that some theoretical foundations exist for a potential future WEEE management. The problem is that the WEEE is mentioned nowhere as such, and obviously not being considered at all by the current Albanian legislation. The national Law No. 9010 on environmental treatment of solid waste identifies 6 different categories of solid wastes: 1. agricultural and stockbreeding waste; 2. industrial waste; 3. hospital waste; 4. construction waste; 5. bulky waste; and 6. urban waste. **None of these categories mentions the WEEE type of waste, as such.** WEEE can fall either under the bulky or as municipal waste defined as household waste, waste from administrative, social and public facilities. **Nevertheless, it is not clear, in which waste category of the Albanian legislation the WEEE is included.** In the short run (until 2010), a new Waste Management Law will be drafted, fully transposing the new Waste Framework Directive (2008). It is meant to give the main principles for waste management and open the way to the transposition and implementation of different directives on different waste streams, including the WEEE. The WEEE will be transposed through a special regulation, but according to the current approximation plans of the Ministry of Environment, that is not expected to happen before the end of 2010. A National Waste Management Plan and a Regional Waste Management Plan for Tirana-Durres area will be drafted and approved within 2010. It will deal with all kinds of waste streams in particular and in a specific way. WEEE will be part of those streams.

A good environmental legal framework was established in **Bosnia and Herzegovina**. Laws on Waste Management were adopted by each of the two Bosnia and Herzegovina entities (Federation of Republic of Bosnia and Herzegovina and Republic of Serbia) that are more or less harmonized with each other. Neither of the two Laws on Waste Management explicitly defines **electric and/or electronic waste** as such. Strategic documents - Solid Waste Management Strategy (2000) and Mid-Term Development Strategy (2003) also do not deal directly with e-waste handling. Regulations on waste categories with lists valid in Federation of Bosnia and Herzegovina and Republic of Serbia introduce within the group 16 "**waste not specified in some other catalog**" a sub-group "**wastes from electric and electronic equipment**" and the group 20 - communal waste and similar waste from industrial and craft plants, including separate collection of fractions as a sub-group contains two types of wastes "**dumped electric and electronic equipment**" and "**dumped electric and electronic equipment which contains hazardous components**" resulting from households, industries and institutions; but which are not otherwise specified in the list. There is no further explanation on how these wastes are collected and handled. **At present the Regulation on electric and electronic waste is in phase of preparation**.

In the process of accession to EU, the Ministry of environmental protection, physical planning and construction in **Croatia** has adopted the Ordinance on WEEE that came into force in July 2007. The Ordinance set up system of separate collection, treatment and environmentally sound disposal/recovery of WEEE, etc. The further important legal documents are Strategy of waste management in the Republic of Croatia (OG 130/05), Waste management plan in the Republic of Croatia for the period from 2007 to 2015 (OG 85/07) as well as Waste Act (OG178/04, 111/06, 60/08).

The general legal framework for waste management is provided by the 2007 Constitution of **Montenegro,** the 2008 Environment Law, the 2005 Law on Waste Management and the 1991 Law on local self-management. The adoption of the Law on Waste Management in Montenegro established a normative framework in accordance with the standards and directives of the European Union. During the period of enactment of this Law, until the day when its application started several factors indicate of the need to come into the process of its changes and amendments. The one reason of updating the Law was that it has been necessary in the process of European integration to harmonize national legislation with the European Union legislation in certain areas. Since enactment of the Law on Waste Management five important waste management directives of European Union were developed and entered into force. They were: consolidated version of the Framework Directive on Waste (2006), Directive on packaging and packaging waste, Directive on end-of-life vehicles; Directive on waste from electrical and electronic equipment; Directive on batteries and accumulators and waste batteries and accumulators. Government of Montenegro, initiated by the Ministry of tourism and environment protection adopted the **Law on amendments to the law on waste management** published in the Official Gazette of the Republic of Montenegro (OGM 73/08). This Law defines development of secondary legislation (legal act) that will regulate the procedure of marketing EE products, establishment of a system of taking over, collection and treatment of e-waste and working of such system. The legal act should also legislate the way of e-waste treatment and all obligations for manufacturers, importers, vendors and other subjects that produce or use EE products. Such act is planned to be proposed in the second quarter of the year 2009. At present e-waste is a relatively new concept in Montenegro, hence there is no specific legislation governing its handling or recycling (e.g. minimum requirements for handling or recycling of e-waste and specifications for the extraction of hazardous components from the e-waste stream).

E-waste legislation in **Turkey** follows the main two Directives of EU focused on electrical and electronic goods and wastes. The concerned Directives of EU are: Directive 2002/95/EC "The restriction of the use of certain hazardous substances in electrical and

electronic equipment-RoHS" and Directive 2002/96/EC "Waste electrical and electronic equipment-WEEE". The national regulations No 26891 on **restriction of the use of certain hazardous substances in electrical and electronic equipment"** was issued in parallel with the RoHS Directive 2002/95/EC and published in the Official Gazette dated 30.05.2008. On the other hand, the efforts for the **draft regulations issued within the scope of WEEE Directive 2002/96/EC is in progress**. It is expected that the draft regulations will be completed and enforced by late 2008. The national classification of electrical and electronic goods is in compliance with European Union classification. Such main classifications are as follows:

1. Large household goods
2. Small household goods
3. IT and telecommunication equipment
4. Consumer equipment
5. Lighting equipment
6. Electrical and electronic tools (except for large and fixed industrial tools)
7. Toys, entertainment and sports equipment
8. Medical devices
9. Monitoring and control equipment
10. Automatic machines

There is an absence of national waste management legislation including e-waste managemen in **Algeria, Egypt, Lebanon, Libya, Morocco, Syria and Tunisia, in addition to the territories under the sovereign of the Palestinian authority** in general. As for measures towards sound management of e-waste in the countries concerned, it seems that most of the countries did not yet take any measure to impose e-waste management and all of them are yet in the process of assessing the problem. There are some **initiatives** appeal towards sound management of e-waste such as:

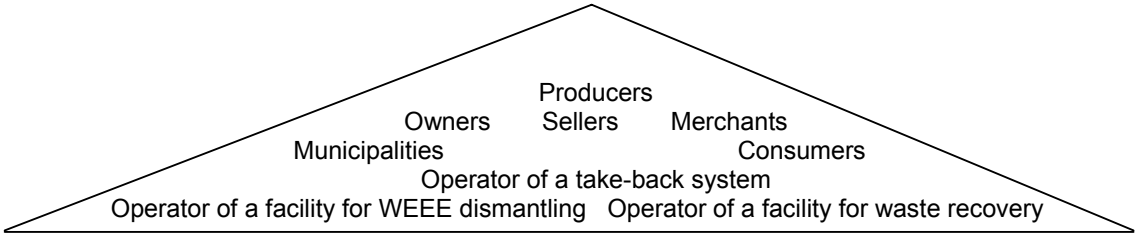
- GeSI is a global partnership of Information and Communication Technology (ICT) companies that promotes technologies for a sustainable development,
- StEP – an initiative of various UN organizations with the overall aim to solve the e-waste problem. Together with prominent members from industry, governments, international organizations, NGOs and the science sector actively participating in StEP,
- UNESCO Computer equipment recycling guidelines for Africa,
- Partnership on used and end of life Mobile Phones (MPPI) - Basel Convention,
- Partnership for Action on Computing Equipment (PACE) - Basel Convention.
- TAIEX

The initiatives focused on mobile phones and computing equipments implemented within the Basel Convention are helpful and useful tools for developing countries - Parties of the Basel Convention. Also NGOs are concerned with the problem of e-wastes and work with the governments and with the public towards their sound management, e.g. Basel Action Network (BAN), a very active international NGO concerned with transboundary movement of e-wastes from developed to developing countries.

Algeria, Egypt, Israel, Lebanon, Libya, Morocco, Syria, Tunisia are countries which on the other side are brought closer to the EU by the EU's e.g. Technical Assistance and Information Exchange instrument (TAIEX) specifically to share the technical experience, understand the EU legislation, measures and policies which the EU and its MSs have adopted to sweep away the technical, regulatory, legal, bureaucratic, and other barriers that stifled free trade and free movement within the EU.

4. Identification and/or estimation of current and future waste streams: materials composition of current and future flows streams

Main Players in the Life Cycle of the EEE



Common EEE Management Steps and Targets

The main target within the framework of the EEE is to increase recovery of wastes with preference for recycling. However it can be reached only if the approved implementation programmes exist and which were worked out on the base of analysis of WEEE situation in each country. Second step then is the creation of conditions for achieving the targets. For instance in the EU the milestones:

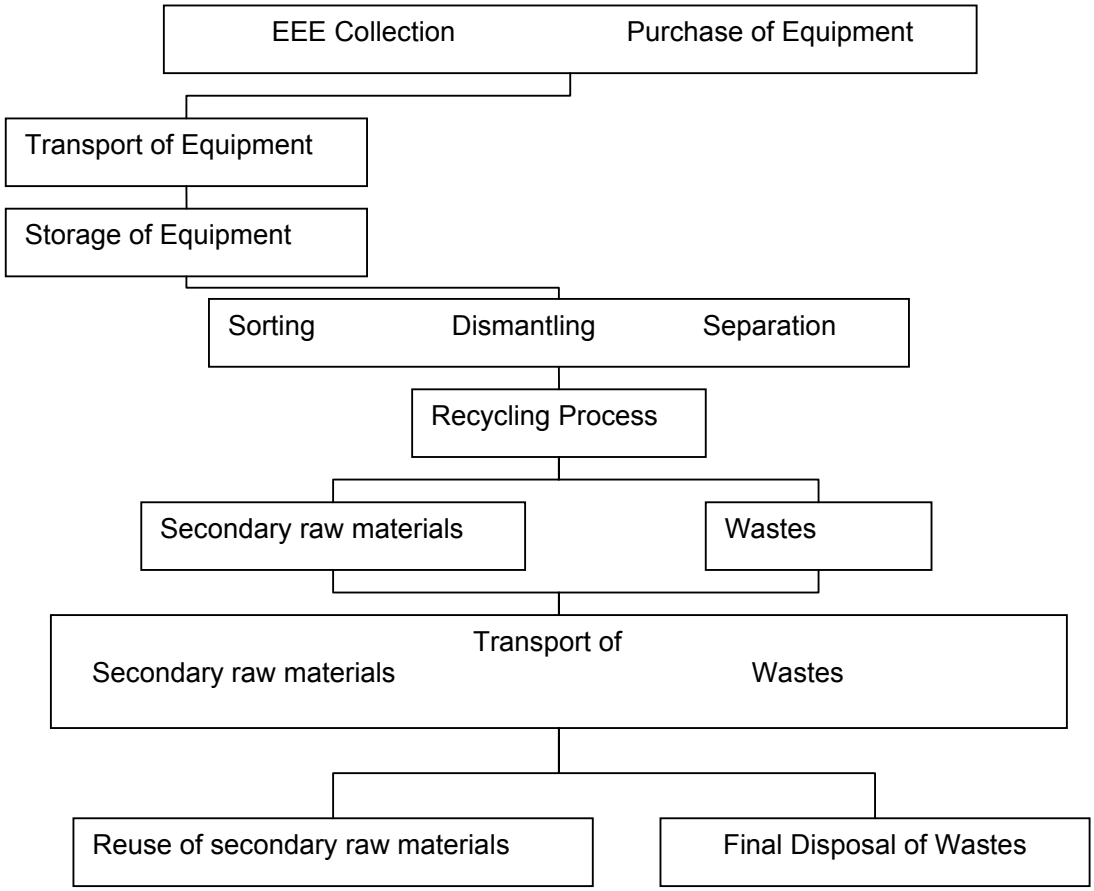
- to increase the level of collection of separated WEEE from households to 4 kg per person per year by 31.12.2008 - has been accomplished in many EU MSs;
- for small domestic appliances, lighting equipment, electrical and electronic tools, toys and instruments for monitoring and regulation
    - reach the recovery of at least 70% of the average weight of the used appliance,
    - and re-use or recycle materials, substances and components to a degree of at least 50 % of the average weight of the used appliance by 31.12.2008;
- for equipment in information technology and communications and consumer equipment
    - reach the recovery of at least 75% of the average weight of the used appliance, and
    - re-use or recycle materials, substances and components to a degree of at least 65% of the average weight of the appliance by 31.12.2008.

Many countries in Europe have to set measures to prevent waste production and reduce the amount and hazardous properties, to do so, among others they have to:

- initiate and support low-waste to no-waste technologies
- replace harmful materials used as raw materials by less harmful ones
- minimize the volume and weight of products
- support returnable, reusable packaging
- change the behaviour of the business and civilian sphere.

These are just examples of steps needed to be done in the overall waste management. Specifically in the WEEE there are targets already being implemented in the EU e.g. EEE producers shall ensure that EEE and spare parts intended for repair or reuse of EEE, which was placed on the market after 30.6.2006, does not contain Pb, Hg, Cd, Cr(VI), PBBs and PBDEs.

Common EEE Management Steps and general WEEE streams



4.2 WEEE Amounts and Flows Estimation

4.2.1 World's Aspects

Electronic waste - e-waste - is an emerging problem as well as a business opportunity of increasing significance, the volumes of e-waste being generated and the content of both toxic and valuable materials in them. The e-waste fractions include iron, copper, aluminium, gold, other metals and also unwanted pollutants. When e-waste is disposed of and recycled, or landfilled with domestic waste without any controls, there are predictable negative consequences for the environment and human health.

The Basel Convention has identified e-waste as hazardous, and developed a framework for controls on transboundary movement of such waste under the List A of Annex VIII.

The use of electronic devices has proliferated in recent decades, and proportionately, the quantity of electronic devices, such as PCs, mobile telephones and entertainment electronics that are disposed of, is growing rapidly throughout the world. In 1994, it was estimated that approximately 20 million PCs (about 7 million tons) became obsolete.

By 2004, this figure was to increase to over 200 million PCs. Cumulatively, about 500 million PCs reached the end of their service lives between 1994 and 2003. In addition, PCs will soon only make up a fraction of all e-waste (others are mobile phones including their hazardous batteries, electronics in cars, etc.). It was estimated that in 2005 approximately 130 million mobile phones were retired.

Similar quantities of electronic waste are expected for all kinds of portable electronic devices such as PDAs, MP3 players, computer games and peripherals.

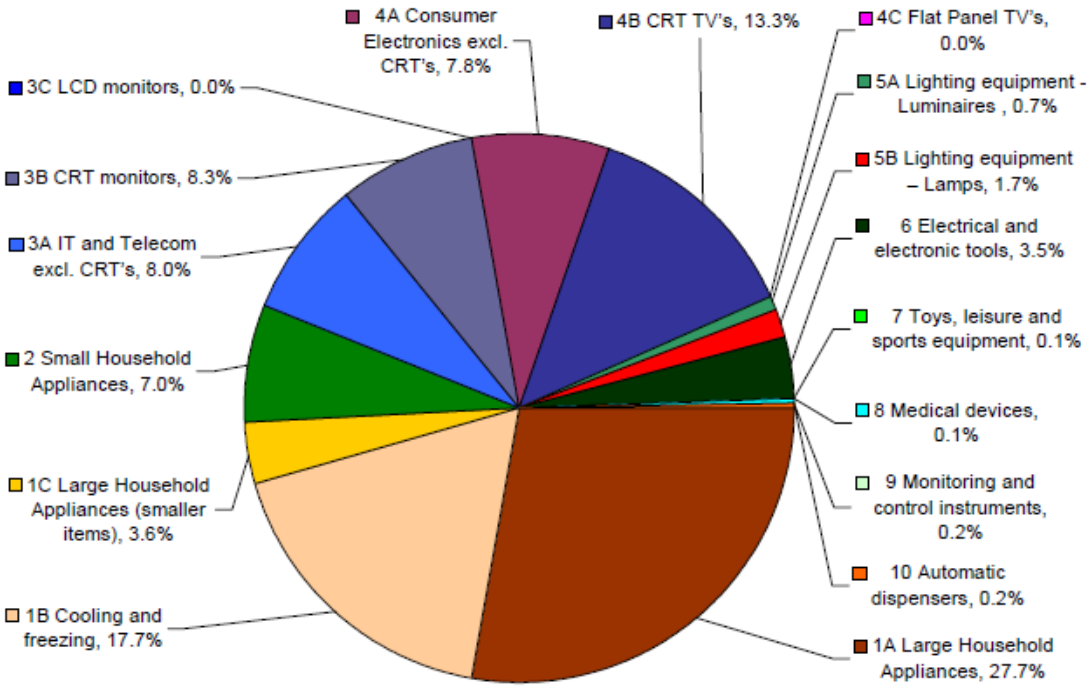
4.2.2 EU's Aspects

Predictions made during the 1990's estimated the tonnage of EEE put on the EU15 market at 7 million tonnes. With the expansion from EU15 to EU27 and based on many sources and different estimation techniques, this study points out that the amount of new EEE put on the EU27 market in 2005 is estimated at 10.3 million tonnes per year.

The estimate of the current WEEE arising across the EU27 was between 8.3 and 9.1 million tonnes per year for 2005. This increase is due to expansion of the EU, growth in the number of households and inclusion of items that may have been excluded previously (B2B). A number of forecasting assumptions were applied which predict that by 2020, total WEEE arising will grow annually between 2.5% and 2.7% reaching about 12.3 million tonnes.

The average compositional breakdown for the EU has been calculated and shown in the figure 1.

Figure 1 – Breakdown of WEEE arising in 2005



The EU15 Member States' average collection performance is roughly half that of Switzerland and Norway. This is mainly due to lower performance in the collection of categories other than category 1 - Large household appliances. In spite of this, the WEEE Directive collection target can be easily met by EU15 Member States, but remains a very challenging target for the New Member States. The figure 1 shows the estimated amount of WEEE currently collected and treated as a percentage of the amounts of WEEE arising for the EU27 in 2005. The current amounts are roughly in between 25% for medium sized appliances till 40% for larger appliances, showing substantial room for improvement. Based on the assessment of data from various compliance schemes, it must be possible to collect around 75% of the large and 60% of the medium sized appliances in the long-term future.

The analysis shows that returns of appliances lighter than 1 kg are very low for all systems. In addition, the composition of EEE put on the market currently is different from that of WEEE arising due to changing product composition overtime. This is especially the case for flat panel displays instead of CRT screens as well as the phase out of CFC's from fridges, NiCd from battery packs and PCBs in capacitors.

4.3 WEEE waste streams - collected and treated categories of EEE

Details of each category of EEE are described in chapter 3.7, however, the **Current amount of WEEE collected & treated as percentage of WEEE Arising, 2005** is given in table 2.

Table 2 – Current amount of WEEE collected as % of WEEE arising

#	Treatment category	Current % collected of WEEE Arising
1A	Large Household Appliances	16.3%
1B	Cooling and freezing	27.3%
1C	Large Household Appliances (smaller items)	40.0%
2,5A,8	Small Household Appliances, Lighting equipment – Luminaires and 'domestic' Medical devices	26.6%
3A	IT and Telecom excl. CRT's	27.8%
3B	CRT monitors	35.3%
3C	LCD monitors	40.5%
4A	Consumer Electronics excl. CRT's	40.1%
4B	CRT TV's	29.9%
4C	Flat Panel TV's	40.5%
5B	Lighting equipment – Lamps	27.9%
6	Electrical and electronic tools	20.8%
7	Toys, leisure and sports equipment	24.3%
8	Medical devices	49.7%
9	Monitoring and control instruments	65.2%
10	Automatic dispensers	59.4%

The detailed data per environmental impact category grouped for all treatment categories is displayed in the table 3 illustrating the environmental benefits of the EU Directives for all WEEE per year in 2011 compared with 2005 (base year) levels. One important assumption here is that the 2011 values are based on the 2005 impacts without taking into account the changes in product and thus waste stream compositions over time.

Table 3 - Estimated Environmental improvement due to the WEEE Directive 2011 versus 2005

Indicator	Environmental benefit	Number*	Unit
2005 WEEE: Arising: 8.3 Mt Collected: 2.2 Mt		**2011 WEEE: Arising: 9.7 Mt Collected: 5.3 Mt**	
Weight	Growth in WEEE arising	1,359	kt WEEE Arising
Eco-indicator 99 H/A v203**	Total environmental load per year of	643,591	Europeans
Idem, Human Health**	Total environmental load per year of	423,125	Europeans
Idem, Ecosystem Quality**	Total environmental load per year of	46,038	Europeans
Idem, Resource Depletion**	Total environmental load per year of	174,589	Europeans
Cumulative Energy Demand	Equivalent with:	-75	million GJ
Abiotic depletion	Equivalent with:	-40	kt Sb
Global warming (GWP100)****	Equivalent with:	-36****	Mt CO2
Ozone layer depletion (ODP)	Equivalent with:	-4.8	kt CFC11
Human toxicity	Equivalent with:	-4,047	kt 1,4-DB***
Fresh water aquatic ecotox.	Equivalent with:	-404	kt 1,4-DB***
Marine aquatic ecotoxicity	Equivalent with:	-3,551	Mt 1,4-DB***
Terrestrial ecotoxicity	Equivalent with:	-74	kt 1,4-DB***
Photochemical oxidation	Equivalent with:	-3.0	kt 1,4-DB***
Acidification	Equivalent with:	-50	kt SO2
Eutrophication	Equivalent with:	-1,493	t PO4---

*Negative means avoided environmental impact
** Meant as a rough illustration only: 1 Pt roughly equals 1/1000 of the environmental load of one European p.year (Goedkoop,1999)
***kg 1,4-dichlorobenzene
**** Under the assumption of unchanged 80% presence of CFC fridges in the WEEE stream

4.4 WEEE waste streams – the connection and the impact on other wastes streams

There are a few important assumptions. A key aspect here is the changing waste stream composition over time is not taken into account. There is not enough information available yet to assess the influence of the future decline in CFC appliances returning. From the estimated 36 million tonnes of avoided CO_2 emissions, 34 million tonnes results from removing CFC based cooling agents. Without CFC fridges and LHHA (these are collected anyway due to a positive net value after collection) the benefits of the EU Directive equal 2.3 million tonnes of CO_2 emissions prevented per year.

4.5 WEEE waste streams – focus on the various types of wastes streams

Given the diverse range of materials found in WEEE, it is difficult to give a generalized material composition for the entire waste stream - figures 2, 3, 4. However, most studies examine five categories of materials: **ferrous metals, non-ferrous metals, glass, plastics and other**.

Figure 2 – PC/servers - material composition

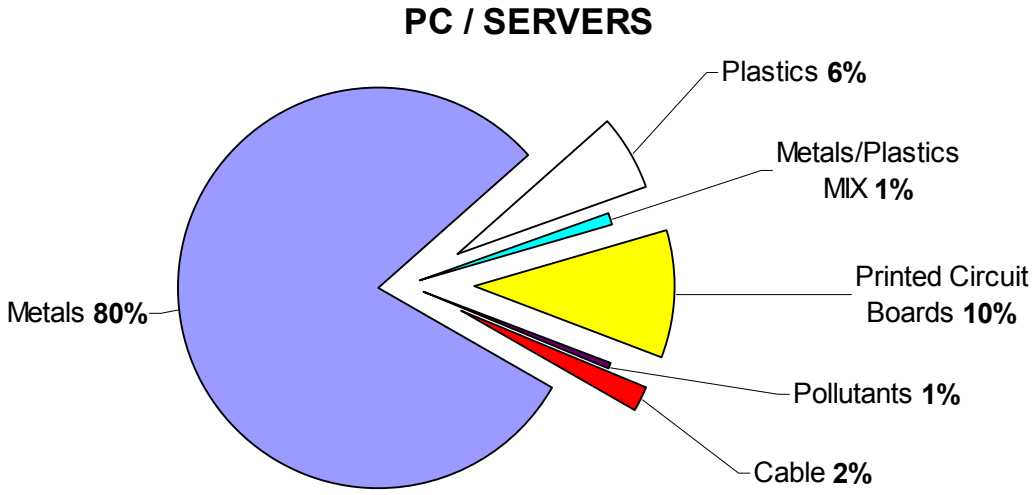


Figure 3 – Laptops – material composition

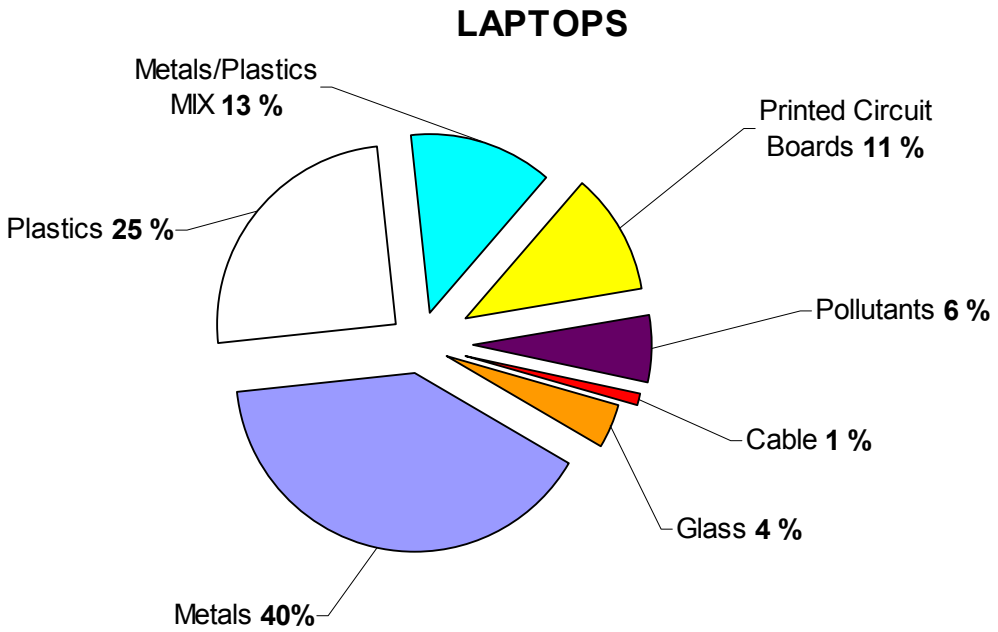
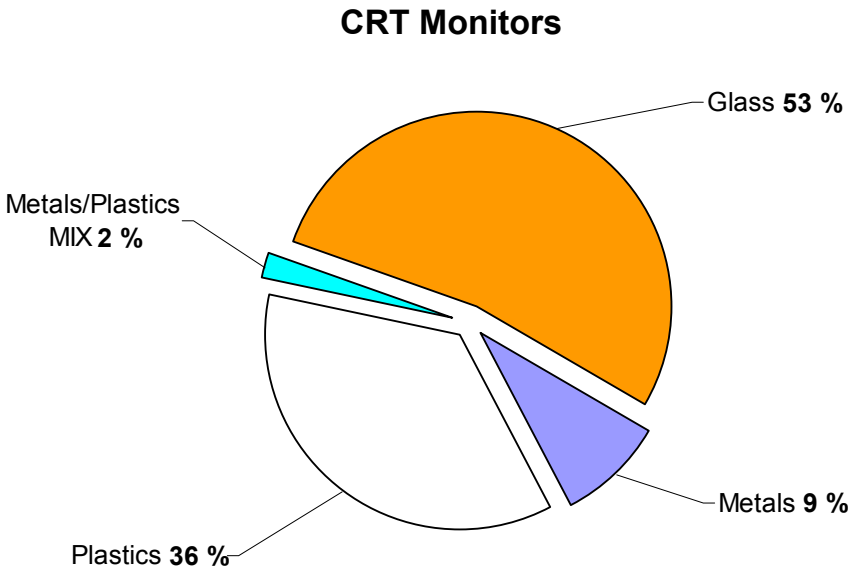


Figure 4 – CRT monitors – material composition



4.5.1 Metals

There are stable markets for metal recycling from WEEE given the ability to easily extract the metal and reuse to a comparable quality to virgin metal ores.

Currently, targets for mixed metal and plastic dominated streams can discourage recyclers from trying to properly separate plastic parts for recycling.

According to the European Topic Centre on Resource and Waste Management (ETC/RWM), iron and steel are the most common materials found in electrical and electronic equipment and account for almost half of the total weight of WEEE.

Non-ferrous metals – copper (7 %), aluminium (4.7 %) including precious metals - gold, platinum, represents approximately 13 % of the total weight of WEEE, but still there is significant amount of toxic and hazardous material.

Recovering metals from e-waste has become a profitable business, resulting in global, transboundary trade in e-waste. For instance, early PCs each contained up to 4 g of gold; however this has decreased to about 1g today.

There appear, in future, to be no major difficulties concerning the recovery and recycling of metals from WEEE. There are ample capacities and markets available.

4.5.2 Glass

The main source of glass in WEEE is in displays (both CRTs and Flat Panel displays). EEE contents is about 5.4 % of glass - CRTs, glass from cathode tube, typed of activated glass, other glass fractions - pure or cleaned.

The glass used to make other glass products such as containers and the end pieces (normally consisting of either brass or aluminium) of the luminescent tubes sold on to scrap metal merchants to be reprocessed.

Whilst closed-loop recycling of CRT glass is preferable, there are declining markets for new CRTs. Alternative outlets will be necessary.

4.5.3 Plastic

Information on the plastic content of the different WEEE categories and the specific targets set in the WEEE Directive can be used to calculate that on average a recovery of 10 % of total equipment weight could be achieved through the recovery of plastic polymers.

Plastics are the second largest component by weight representing approximately 21 % of WEEE.

For plastics, the role of the existence of secondary markets for energy and materials recovered from WEEE Plastics treatment is crucial in the successful application of such processes. In practice there are difficulties in environmental and cost efficient recovery of plastic fractions due to the heterogeneity of the polymers present in small volumes in each unit.

Current monitoring of the flows of WEEE plastic fractions, some estimates of potentially achievable recycling and recovery capacities are offered. Plastic dominated categories such as SHHA, CE and toys should rely on substantial plastic recycling and recovery to attain the targets set in the Directives.

4.5.4 Other fractions

Special attention is given to control, that within waste plastics from mechanical treatment – sorting there is no plastic casings of WEEE, containing brominated flame retardants. In the procedures of sorting and visual control also waste glass, textile, wood arisen as well as printed circuit boards, cables and combined components metal/plastic. The rest which can be found in the WEEE after the dismantling of separating process forms pollutants (comprising about 2.7%).

Separate sorting of this waste is done within the process of sorting of WEEE. E-waste contains more than 1,000 different substances, many of them toxic, including Pb, Hg, As, Cd, Se, Cr(VI), and flame retardants PBDEs that create dioxin-like emissions when burned. These toxic heavy metals and organic compounds can cause human health damage, allergic reactions and cancer.

<u>Examples from the Basel Convention</u>:

- 500 million PCs contain approximately 2.872.000 t of plastics, 718.000 t of lead, 1363 t of cadmium and 287 t of mercury.
- 1 ton of e-waste contains up to 0.2 tons of copper, which can be sold for about 500 Euros at the current world price.

Table 4 – An estimation of material composition in WEEE

Material type	Composition (wt%)	Estimation of material arising from WEEE collected in 2007 (t)
Iron and steel	47.9	2547,32
Aluminum	4,7	249,95
Copper	7,0	372,26
Other non ferrous metals	1,0	53,18
Metals total	**60.6**	**3222,71**
Plastics with flame retardants	5,3	281,85
Plastics without flame retardants	15,3	813,65
Plastics total	**20,6**	**1095,51**
Glass	5,4	287,17
Rubber	0,9	47,86
Wood	2,6	138,27
Concrete & Ceramics	2	106,36
Printed circuit boards	3,1	164,86
Other	4,8	255,26
Total	**100**	**5318,00**

The following part deals with e-waste situation in the Southern and Northern Mediterranean countries, which is considerably different from that in EU countries (bordered by the Mediterranean Sea). The discrepancies result from unified waste management legislation applied in the EU countries, very similar economy and development of the environment.

The situation in the spotted countries is rather varied as regards waste flow monitoring in general, including e-waste and material composition. The state of implementation of regulations, respectively, the missing legislation in the field of waste monitoring manifested itself in assessment of these countries. Data on waste generation amount and its handling are available from surveys realized by different institutions for certain purposes e.g. in Albania, Arab countries, from estimations in Montenegro, Arab countries, statistical assumptions in Turkey, projects realized in Bosnia and Herzegovina, and also from data collection processed within the framework of IS in Croatia. In most cases data are estimated or coming from statistical assumptions. Every country in the region has its own specificities and therefore it is necessary to evaluate e-waste situation individually rather than globally.

A lack of financial resources and other obstacles are the main reasons leading towards the present situation - a very poor waste monitoring in **Albania** in general though the legal bases is established for waste monitoring by two regulations - Act No. 9010/2003 on environmental treatment of solid waste and Decision No.103/2002 concerning environmental monitoring in the Republic of Albania. According to the Act, Article 30 it is stated that waste monitoring is part of the National Environmental Monitoring and each type of waste and its management must be monitored separately. Also natural and legal entities are required to organize their own monitoring at their own expense and publish the data every three months. Decision calls for the monitoring of solid urban waste.
Some indicators were developed such as: a) annual waste generation; b) distribution of waste according to municipalities and regions; c) content in percentage of polluting ingredients; d) merceological composition. Data on annual waste generation and distribution of waste according to municipalities and regions are estimated, through desk work, by the Ministry of Public Work Transport and Telecommunications (MPWTT), by adding up information collected from local authorities. Nevertheless, the data is a total of every waste type, which is hardly reliable.

The following table 5 shows annual waste amounts for urban waste and inert waste.

Table 5 Population and annual waste amounts - urban and inert waste

Year	Population of Albania	Annual amount urban waste tonne/ inhabitant	Annual amount urban waste/tonne	Annual amount inert waste/tonne
2007	3,149,705	0.22946	722,731	506,540
2006	3,149,705	0.22946	722,729	506,540
2005	3,231,000	0.1926	622,400	591,000
2004	3,231,000	0.1926	622,400	591,000

Source: MWPTT

These two types of waste (urban and inert) are landfilled together with hazardous waste, hospital waste, WEEE, etc. without any distinction, at the same landfill sites. **As a matter of fact, no data for WEEE are available.**

Two indicators c) and d) are not monitored, or simply monitored/estimated in few occasions. The study of Institute of Public Health provided data on merceological content of waste based on the monitoring in 2001 and 2002. The study classifies waste under the following categories: vegetation and soils; plastic; paper; textile; metal; glass; wood; stones and construction waste. WEEE does not appear as a category. It could be caused that either they didn't find any such waste, or they are included under the category of metal.

The next table 6 shows annual average of waste categories (in %) classified under the study of Public Health Institute (PHI) and recent estimate made under the IFC PEPSE project (2007).

Table 6 - Annual average of waste categories (under the study of PHI) and recent estimate (under the IFC PEPSE project)

2001-2002									
Waste category	Vegetal (%)	Paper (%)	Textile (%)	Plastic (%)	Metal (%)	Stones/inert (%)	Glass (%)	Woods (%)	Total average kg/day
Annual average Albania	51	8.97	7.33	10.72	5.66	7.8	4.55	3.42	921
Source: PHI									
2007									
Recent estimate IFC PEPSE	N/A	17	N/A	10.5	7	N/A	4.5	N/A	N/A
Source: IFC PEPSE									

The result of the IFC PEPSE project shows an increase of waste paper by two times as compared to the time period 2001-2002. The % of the rest of the waste content remains more or less stable.

Data on generated waste / WEEE in **Bosnia and Herzegovina** (B&H) are presented by two conceptual documents, namely the Solid Waste Management Strategy for B&H (2000) elaborated within EU PHARE project and Mid-Term Development Strategy (2003). The further data were obtained from assessments of CARDS Waste Recycling Pilot Project implemented in period 2004-2006.

According to the Solid Waste Management Strategy for B&H (2000), the most recent available data was for the year 1999, when B&H produced a total of 1,764,893 tons of municipal waste was generated, i.e. 452 kg per capita, which is about average for countries in transition. An industry generated 863,632 tons of waste in 1999. Estimates given in the Solid Waste Management Strategy are based on the assumption that hazardous waste comprises 1% of industrial waste.
According to the Mid-Term Development Strategy (2003), B&H annually produces 2-3 million tons of all categories of solid waste which is disposed in about 1,100 non-sanitary landfills.
According to assessments of CARDS Waste Recycling Pilot Project (2004-2006), annual production of e-waste in B&H is 15-20 kg/capita. However, with some corrections made in accordance with the B&H GDP and pursuing power of population in B&H, it was assessed that production of e-waste is actually 4 kg/capita, that is, 16,000 t/year for the whole country. Experiences in EU show that the usual distribution of e-waste is: 25% of household and office appliances, and 75% of big appliances like laundry machine, refrigerators, etc. Applying this distribution scheme on e-waste in B&H, it would be:

- 4,000 t of household and office appliances (TV, computers, office appliances, mobile phones, etc.), and
- 12,000 t of big household appliances.

Statistics on waste/municipal waste generation are available too little because there is no regular nationwide reporting system in Bosnia and Herzegovina at present. The two statistical entities Federal Statistical Institute and Republican Institute for Statistics Republic of Serbia do not fulfil the obligation sufficiently in term of the need for improving data collection and data processing methodology. Most of public communal enterprises that have an obligation to provide the institutes with data on waste do not fulfil this duty. This fact can influent the collected data quality.
Mainly municipal waste contains different types of waste among others hazardous components from electric and electronic equipment, mercury switches, glass from cathode tube and other typed of activated glass, etc.

Waste Management Information System (WMIS) represents an important tool for waste flow monitoring in **Croatia**. WMIS is an integrated part of the environmental information system whose contents, procedures for data submission and data keeping, deadlines and forms on which data are submitted are defined under the Waste Act and subordinate regulations. The maintenance of the WMIS is entrusted to the Croatian Environment Agency (CEA), while supervision over the operating of WMIS is under the competence of the Ministry of Environmental Protection, Physical Planning and Construction (MEPPPC). The waste management belongs among national priorities given in the Environmental Protection Strategy of the Republic of Croatia.
At present the information system operates following registers/databases/data:

a) Environmental Pollution Register/Waste[1] - part of the Environmental Pollution Register and basis for international reporting;
b) Data on annual generated/collected/treated waste quantities registered by types on the registration forms; forms are gathered at the county level in county administration offices, where data input is carried out and delivered in electronic form to the CEA to be combined;
c) Register of waste management permits and certificates of entry into the registers; an on-line database is available at the CEA web site;
d) Landfill Cadastre – on-line GIS database on existing locations of landfills; database of photographs and all important data for every landfill location;
e) Data on transboundary movement of waste – data is kept on the basis of permits, certificates and annual reports on the transboundary movement of waste;
f) Databases on special waste categories – competence is divided between the Environmental Protection and Energy Efficiency Fund (EPEEF) and the CEA;
g) Accompanying forms for hazardous waste;

h) Waste management plans of producers;
i) Monitoring the implementation of waste management plans of counties, cities and municipalities;
j) Data on laboratories, regulations and other information relevant for the field of waste.

1Former *Waste Cadastre* is changed to *Environmental Pollution Register / Waste* according to Ordinance on Environmental Pollution Register (Official Gazette 35/08)

The total generated waste amount is estimated at about 13.2 mil. t/year or approximately 2.97 t of waste annually per inhabitant. The table 7 gives an estimation of annual waste amounts for different waste types.

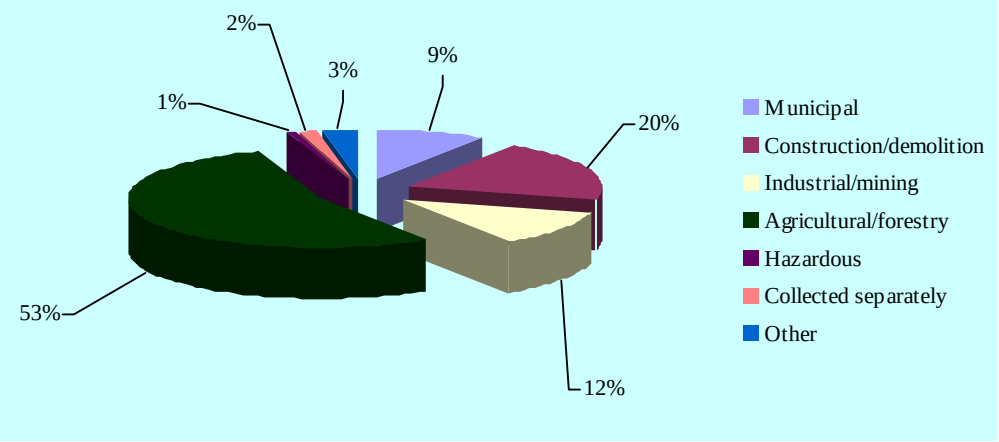
Table 7 - Estimation of annual waste amounts

Type of waste	**Amount** (in millions of tons/year)
Municipal waste	1.2
Construction and demolition waste	2.6
Industrial and mining waste	1.6
Agricultural and forestry waste	7.1
Hazardous waste	0.1
Separately collected waste	0.2
Other waste	0.4
Total	**13.2**

Source: National Waste Management Strategy, September, 2005

The figure 5 shows an estimate of waste amount/year in percentages.

Figure 5 - Estimation of annual waste amount (%)



Electrical and electronic waste (EE waste) is generally classified as hazardous waste because of its components. According to data from the national Strategy this waste has the highest rates of increase - between 30 000 to 45 000 t/year, or 6.67 to 10.11 kg/per capita, and that these quantities are increasing by 10 % annually. The Ordinance collection target (Ordinance on WEEE, OG 74/07) was 4 kg of waste per year per capita by 31 December 2008 and a corresponding increase in the years to come.

Established monitoring system of WEEE via reporting obligation for entities concerned is assured by the Ordinance on WEEE (OG 74/07). The different reporting forms are proposed

by the national Ordinance on WEEE to prepare reports by producer, importer, collection operator, treatment operator and also WEEE delivery receipt when WEEE from household is collected. A producer/importer has to keep records for each calendar year on the quantities of manufactured or imported EE equipment according to the category of EE equipment. Recorded data are submitted to the Environmental Protection and Energy Efficiency Fund (EPEEF) on monthly basis on prescribed form and the total data to the Croatian Environment Agency (CEA) on annual basis. A holder, a collection operator and a treatment operator have to keep a Register of waste generation and flow pursuant to special regulation. The collection operator has to maintain records on the quantities and categories of collected household WEEE using the specified form and another form relating to the total quantities and categories of WEEE delivered to the treatment facility. Data from collectors are submitted to the EPEEF on a monthly basis, and the total data to the CEA on annual basis. Also the treatment operator has to submit to the EPEEF once a month the data on the quantities of waste taken over from the collection operator, treated and exported using two different forms, and to the CEA total data on annual basis.
The CEA carries out an annual Report on the implementation of this Ordinance (hereinafter „Report“) using prescribed forms based on collected data. As the new collection system started last autumn, the first CEA Report involves results for November and December 2008. The new one should be issued till the end of March 2009. The CEA submits the Report to the Ministry (MEPPPC) in electronic and written format.

In 2008, 71 225.9 t of EE equipment was placed on the market (production and import). During the year, 5 718.6 t of EE waste was collected and 5 420.7 t treated. Twenty counties in Croatia collected 12.5% of the total quantity of EE waste.
Large household appliances accounted for almost 50% of the total quantity of EE waste collected, while IT and telecommunication equipment accounted for 30%.
In 2008, an amount of 1.29 kg of EE waste per capita was collected.

Due to the relatively small number of users of Information Computer Technology equipments in **Montenegro**, it can be said that currently e-waste seems to be minor problem. In Montenegro a substantial increase in the general population’s access to electronic goods has been particularly mobile phones and PCs in the last decade. Similar quantities of electronic waste are expected for all kinds of portable electronic devices such as PDAs, MP3 players, computer games and peripherals. E-waste is a relatively new concept in Montenegro at present, hence there is no specific legislation governing minimum requirements for e-waste management and specifications for the extraction of hazardous components from the e-waste stream.

In 2007, the national Agency for telecommunications ordered a survey on the number of people using computers, Internet, fixed and mobile phones in Montenegro. Some of the results are presented in figures below.

Figure 6 - Percentage of people using Internet

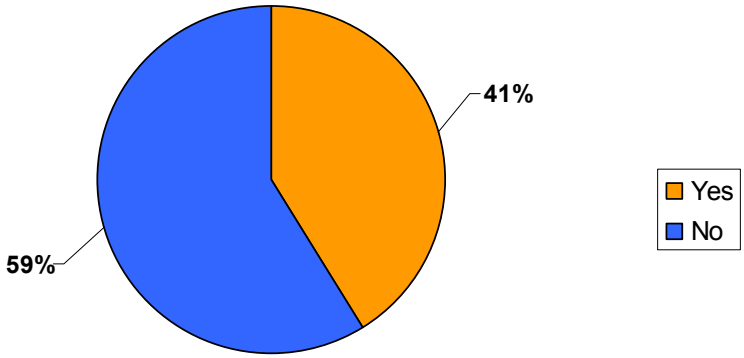
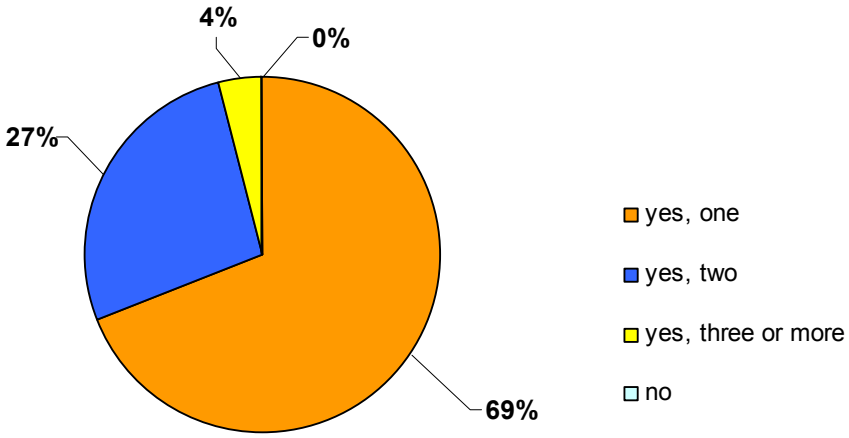


Figure 7 - Percentage of people having mobile phone



In 2006 the survey monitored households with regards to TV sets, satellite, cable TV, fixed telephone lines, computers, printers, scanners and other IT additional equipments.
The following results were obtained:

- 97.8% of households own a TV; among them 24.8% own a satellite and 6.5% a cable TV;
- 91.6% of households own one computer, while only 8.4% own two or more;
- 58.8% of the total number of households that own a computer also own a printer as additional equipment; 24.2% own a scanner, while 12.6% own something else such as writer, photocopier, external modem, and other peripherals;
- 13.3% of households own video games (console) or something else (2.1%).

Montenegro had 1 150 459 of mobile phone users that represented 185.51% of population at the end of December 2008. The mobile phones are potential e-waste in a close future. The average lifespan of mobile phones is estimated to 2-4 years.
There are **no data on number of electrical household appliances in Montenegro**, and duration of their usage on the present.

Provided data on amount of electrical and electronic wastes result from statistical assumptions and estimations in **Turkey**. There is no data collection system established on e-waste. Reported data issue from the following sources:

- the assumptions given in the 2008 Review of Directive 2002/96 on Waste Electrical and Electronic Equipment (WEEE) - Final Report (August 2007) issued by United Nations University;
- OECD Economic Survey Turkey - 2008.

The calculations are based on:

- data of the Statistical Institution of Turkey (TÜİK);
- unit costs given in WEEE FORUM Key Figures 2006 report.

The estimated waste amounts calculated for year 2007 (according to final data provided by TÜİK) relating to data on new purchases and exchanges in the white goods market are stated below. The waste amounts estimated for Turkey according to the category 1 in Directive 2002/96/EC Annex-1B - Large Domestic Appliances are obtained from such data.

Table 8 - Estimated waste quantities for large household appliances for 2007

Product	Sale quantity in 2007	Waste amount (t)	Waste amount per capita (kg)
Refrigerator	1,899,774	76,117	1.1
Washing machine	1,534,769	45,995	0.7
Dishwasher	983,600	11,488	0.2
Oven	735,411	20,056	0.3
Air-conditioner	1,300,000	2,470	0.0
Other white goods	500,000	360	0.0
Total large white goods (WEEE category 1)	6,953,554	156,486	2.22

On the other hand, waste amounts originating from the other products and product categories are calculated using the WEEE distribution data for European Union in 2005 included in 2008 Review of Directive 2002/96 on Waste Electrical and Electronic Equipment (WEEE) - Final Report.

Table 9 - Estimated Waste Amounts for Year 2007 by EEE Categories

Product class	Waste amount (t)	Waste amount per capita (kg)	Rate in total WEEE (%)
Large household appliances	156,486	2.22	49.00
CRT TV's	42,475	0.60	13.30
CRT monitors	26,507	0.38	8.30
IT and Telecom (except CRT)	25,549	0.36	8.00
Consumer electronics (except CRT)	24,910	0.35	7.80
Small household appliances	22,355	0.32	7.00
Electrical and electronic equipment	11,178	0.16	3.50
Lighting equipment	7,665	0.11	2.40
Observation and control tools	639	0.01	0.20
Automats	639	0.01	0.20
Toys, hobby and sports equipment	319	0.00	0.10
Medical devices	319	0.00	0.10
LCD monitors	0	0.00	0.00
Flat panel TV's	0	0.00	0.00
Total WEEE	319,359	4.52	

Table 10 shows projection for WEEE amounts in Turkey until year 2015. The projection is based on the assumption that the growth in the market for electrical and electronic goods will increase each year by 2% as compared to the past year.

Table 10 - Projection for WEEE amounts

Product class/year	Waste amount (t)								
	2007	2008	2009	2010	2011	2012	2013	2014	2015
Large household appliances	156,486	159,616	162,808	166,064	169,385	172,773	176,229	179,753	183,348
CRT TV's	42,475	43,324	44,191	45,075	45,976	46,436	44,114	33,085	16,543
CRT monitors	26,507	27,037	27,578	28,129	28,692	28,979	27,530	20,647	10,324
IT and Telecommunication (except CRT)	25,549	28,104	30,914	34,005	37,406	41,146	45,261	49,787	54,766
Consumer electronics (except CRT)	24,910	25,408	25,916	26,435	26,963	27,503	28,053	28,614	29,186
Small household appliances	22,355	22,802	23,258	23,723	24,198	24,682	25,176	25,679	26,193
Electrical and electronic equipment	11,178	11,401	11,629	11,862	12,099	12,341	12,588	12,840	13,096
Lighting equipment	7,665	7,818	7,974	8,134	8,296	8,462	8,632	8,804	8,980
Observation and control tools	639	651	665	678	691	705	719	734	748
Automats	639	651	665	678	691	705	719	734	748
Toys, hobby and sports equipment	319	326	332	339	346	353	360	367	374
Medical devices	319	326	332	339	346	353	360	367	374
Flat panel TV's	0	0	0	0	0	23,460	24,633	30,791	46,187
Total WEEE	**319,040**	**327,464**	**336,262**	**345,460**	**355,090**	**387,897**	**394,372**	**392,202**	**390,868**

According to the given data, it is expected that the total WEEE amount for all categories will increase from 319 thousand to 327 thousand during the time period 2007 - 2015.

Generally it can be said, that there is a lack of data and reliable information on hazardous wastes (including e-wastes) in the **Arab countries**. Also the lack of responses to the questionnaire developed by BCRC-Egypt for the purpose of assessment e-waste in the countries concerned and initiatives to generate data and information on e-waste towards to following conclusions:

- either the data on e-wastes does not exist or
- data does exist but not accessed or shared and a lot of work is needed for its compilation into data bases and for its publication.

World Bank reports, national reports and information of the International Telecommunication Union - used data sources regarding e-waste for Arab countries - were applied for assessment. World Bank reports, national reports monitored three selected electrical and

electric equipments - PCs, TV sets, mobile phones and the International Telecommunication Union (ITU) provided data regarding mobile phone subscribers, and internet subscribers. Other electrical and electronic equipment as copying machines, VCRs, DVDs, fixed telephone sets, etc, were not dealt with in the assessment as they constitute only minor portion of the e-waste stream.
Data from the World Bank reports were utilized and interpolated and or extrapolated, and constrained with data obtained from other sources (although very few) to estimate figures of those equipment and their rate of increase annually.

Table 11 shows development indicators of three e-commodities in Mediterranean Arab countries - retrieved from World Bank reports.

Table 11 - Development indicators of three e-commodities in Mediterranean Arab countries

Commodities	**Personal Computers[2] (PCs/1000 persons)**			**Mobile Phone[1] (lines/1000 persons)**			**TV sets [1] (TV sets/1000 households)**		
Country/Year	*1996*	*2000*	*2002*	*1996*	*2000*	*2002*	*1996*	*2000*	*2002*
Egypt	5.8	16.6	22.1	0	21	67	126	189	229
Libya	-	-	23.4	0	7	13	137	137	143
Tunisia	6.7	22.9	30.7	1	6	52	156	198	207
Algeria						30			
Morocco	1.7	12.3	23.6	2	83	209	145	166	167
Lebanon	4.3	50.1	80.5	65	212	227	355	335	357
Syria	1.4	15.4	19.4	0	2	23	91	76	182
Palestinian authority						5			

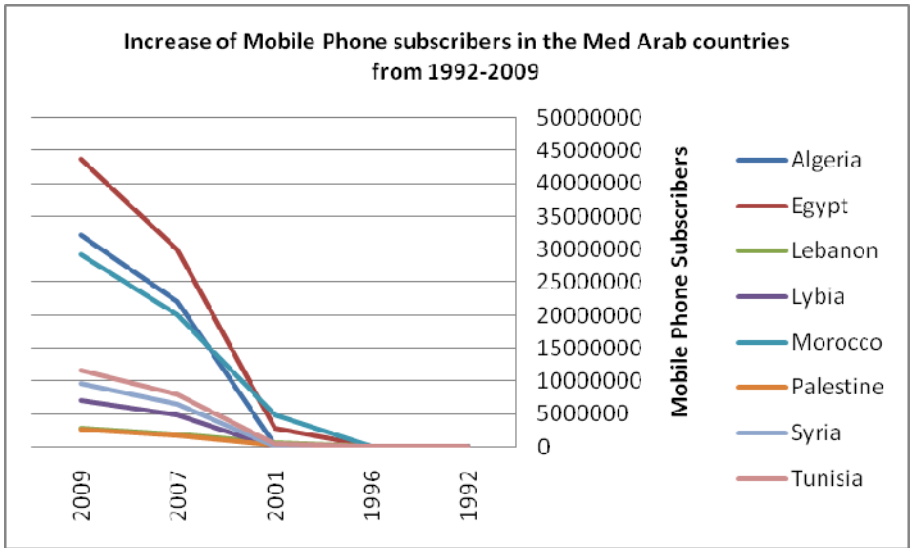
[1]World Bank „International Development indicators 1998-1999-2002 and 2004"
[2] World Bank „Africa Development indicators 2002"

The use of information technology represented by the use of personal computers and mobile phones in the **Med Arab countries** - **Algeria, Egypt, Lebanon, Libya, Morocco, Syria and Tunisia, in addition to the territories under the sovereign of the Palestinian authority** - have witnessed a tremendous increase in the last decade. Data on mobile phone subscribers are available from records. The following progress in a number of subscribers was found:

- 14,600 subscribers in 1992
- 290,500 subscribers in 1996
- 9,400,000 subscribers in 2001
- 139,000,000 subscribers in 2009.

The following figure 8 illustrates the increase of the number of mobile phone subscribers in the Mediterranean Arab countries over the period 1992-2009 as retrieved from ITU statistics website as of end June 2009.

Figure 8 - Mobile phones subscribers from 1992 – 2009



Also an increase in the use of PCs and use of TV sets by households is expected.

The next two figures (9 and 10) show relevant data sets retrieved from the ITU websites. Data refer to the year 2007. Egypt, Morocco and Algeria that have more population and more access to e-technology of mobile phones and internet are expected as main e-waste stakeholders in the Mediterranean Arab Countries.

Figure 9 - Mobile phone subscribers for 2007

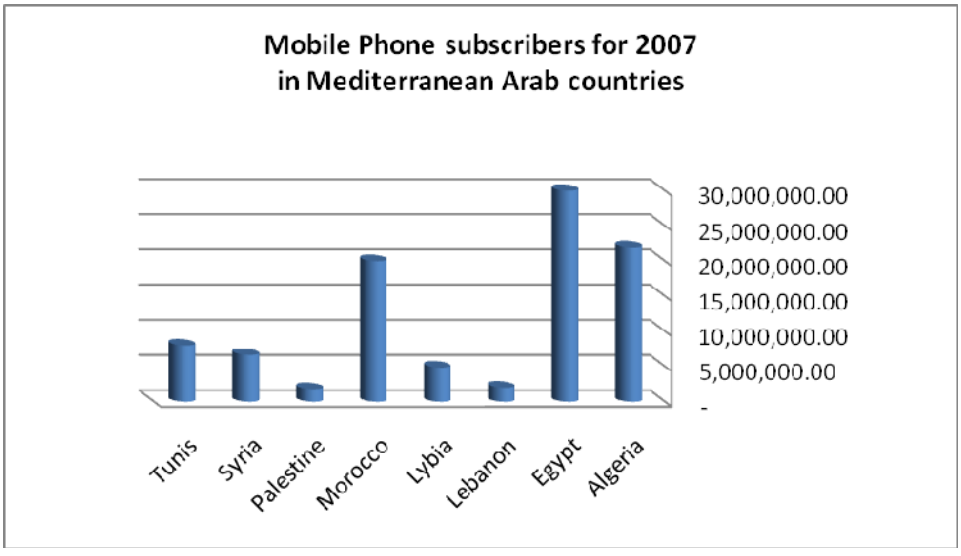
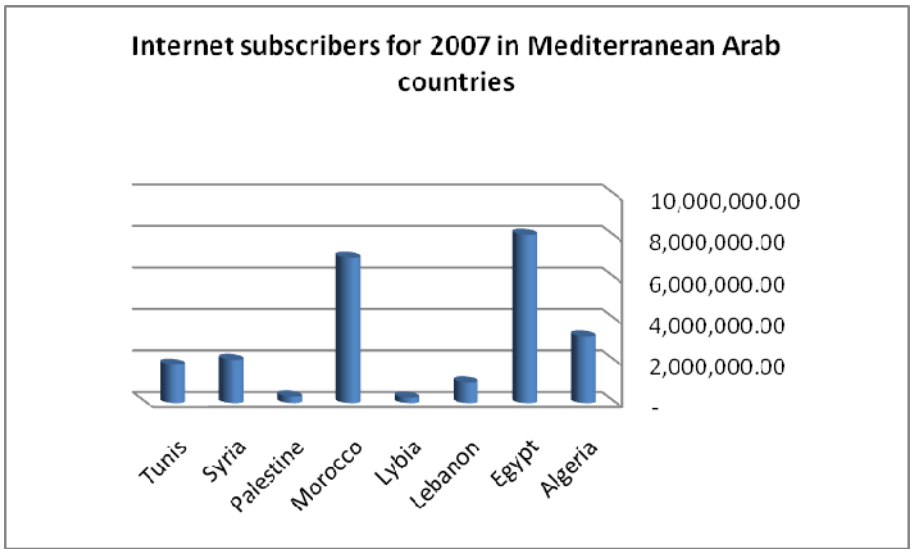


Figure 10 - Internet subscribers for 2007



Data on population (table 12) of the concerned countries retrieved from government official websites are listed along with number of households extrapolated to 2009 utilizing latest published population growth rates. These data are convolved with all other data to estimate quantities of e-wastes virtually generated.

Table 12 - Population of the Mediterranean Arab countries as of 2007 extrapolated to 2009 utilizing latest published population growth rates

Country	**Population (in millions)** (2007 census)	**Estimated number of households (in millions)**	**Estimated Population for 2009 (in millions)**
Egypt	74.4	15.0	77.10
Libya	6.3	1.5	6.50
Tunisia	10.5	2.6	10.80
Algeria	34.0	7.0	34.96
Morocco	30.5	6.2	31.36
Lebanon	4.6	1.2	4.74
Syria	19.3	4.0	19.92
Palestinian authority	2.4	0.5	2.48
Total	**182**		**187.86**

Source: government official websites

To be able to calculate the amounts of waste that can be generated annually it had to be proposed obsolescence rate for the three selected equipment in the concerned Arab countries. The values indicated in table 13 are based on interviews with respective countries representatives to BCRC-Egypt events. However, Egypt indicated factors are inferred from a survey over a representative sample including individuals and service centres.

Table 13 - Obsolescence rate (years) for mobile phone handsets, PCs and TV sets in Mediterranean Arab countries compared to Europe and the US

	Mobile Phone handsets		Personal Computer		TV sets	
	Individuals	Service centres*	Individuals	Service centres	households	Service centres
Egypt	3.5	2	5	3	12	5
Libya	3		4.5		8	
Tunisia	3		4.5		9	
Algeria	3		4.5		9	
Morocco	3.5		4.5		9	
Lebanon	3		4		8	
Syria	3.5		5		10	
Palestinian authority	3		4.5		12	
US	**2**	**-**	**3**	**-**	**5**	**-**
Europe	**1.5**	**-**	**3**	**-**	**5**	**-**

*service centres include internet coffee, coffee shops, social clubs, social centres, etc.

Some surveys on the current practices regarding management practices of the end of life of the concerned electrical and electronic equipment were conducted in Egypt.
The following weight assumptions were made in order to evaluate the quantities of e-wastes in tonnes:

- Mobile phone –75 g
- Computer (CPU) – 11.8 kg
- Cathode ray tube (CRT) monitor - 13.6 kg
- Flat-panel monitors, like LCD (Liquid Crystal Displays) - 4.5 kg
- Laptop computer - 3.2 kg
- TV set - 22.7 kg.

Based on the available information and data sources it was possible to estimate and assess the quantities of wastes generated for each country from the TV sets, personal computers and mobile phone handsets. The estimates are done for the year 2009, taking obsolescence rates indicated in table 13. Figures represent minimum estimates and takes into consideration only equipment owned by individuals or households. There are not included equipment from service centres, banks, companies, universities, schools, and other sectors that eventually use TV sets, computers or mobile phones.
The table 14 shows the subset of data on e-waste generated - end of life TV sets in the Mediterranean Arab countries.

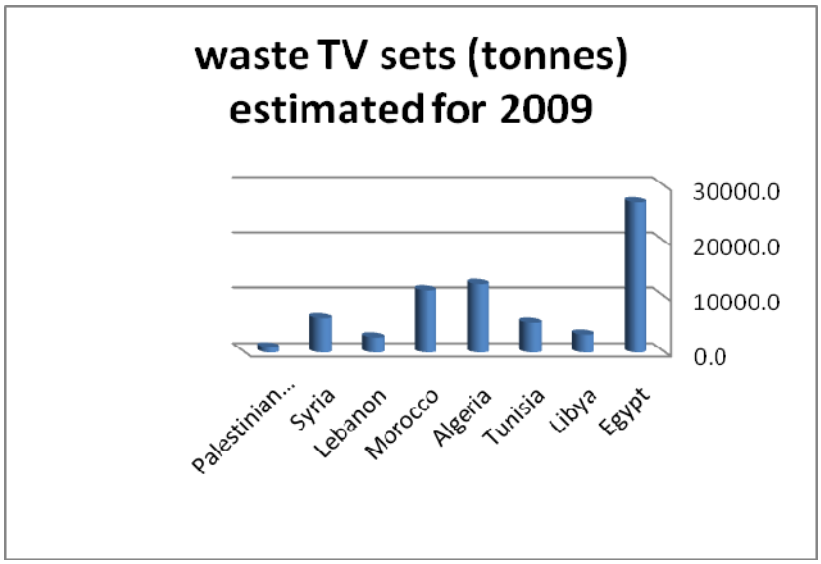
Table 14 - Partial data on e-waste generated due to end of life TV sets in the Mediterranean Arab countries

Country	Population for 2009 (in millions)	Estimated number of households (in millions)	TVs processing (%)	Unit TV wastes (in millions)	Weight of wastes TV units (in tonnes)
Egypt	77.10	15	96	1.2	27240
Libya	6.50	1.5	93	0.1395	3166.65
Tunisia	10.80	2.2	92	0.2024	4594.48
Algeria	34.96	7	94	0.548333	12447.17
Morocco	31.36	6.2	95	0.490833	11141.92
Lebanon	4.74	1.2	98	0.1176	2669.52
Syria	19.92	4	82	0.273333	6204.667

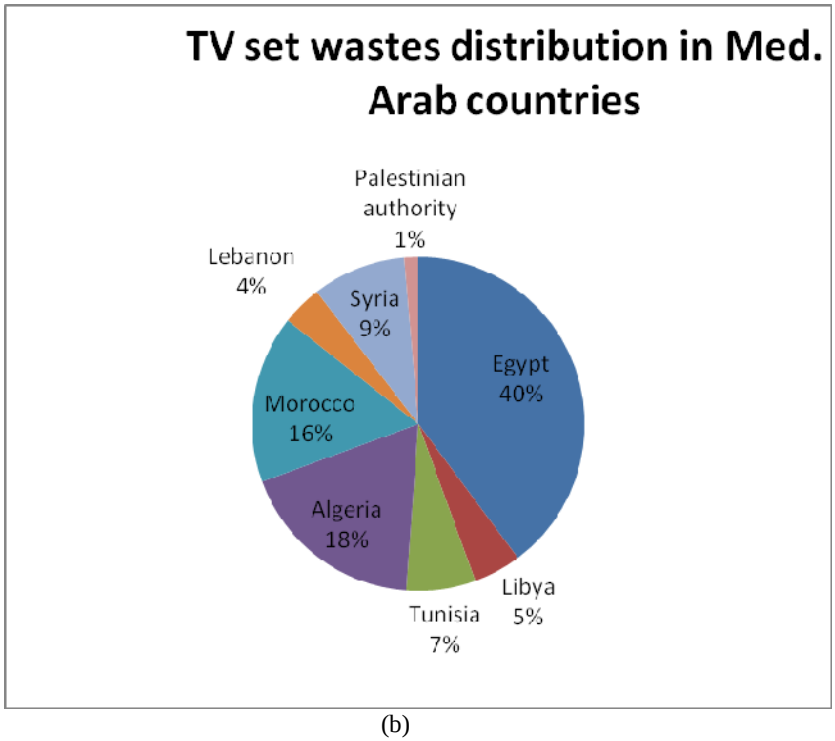
Country	Population for 2009 (in millions)	Estimated number of households (in millions)	TVs processing (%)	Unit TV wastes (in millions)	Weight of wastes TV units (in tonnes)
Palestinian authority	2.48	0.5	82	0.04	930.7
Total	**187.86**	**37.6**			**68395.1**

The following charts illustrate data given in the table 14 above.

Figure 11 - (a) Waste TV sets estimated for 2009 (in tonnes), (b) distribution of TV set wastes in Mediterranean Arab countries



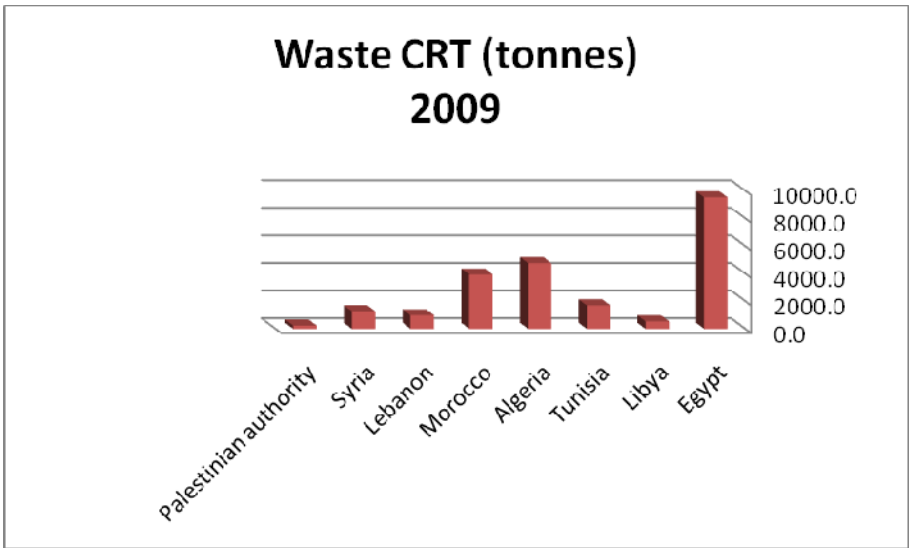
(a)



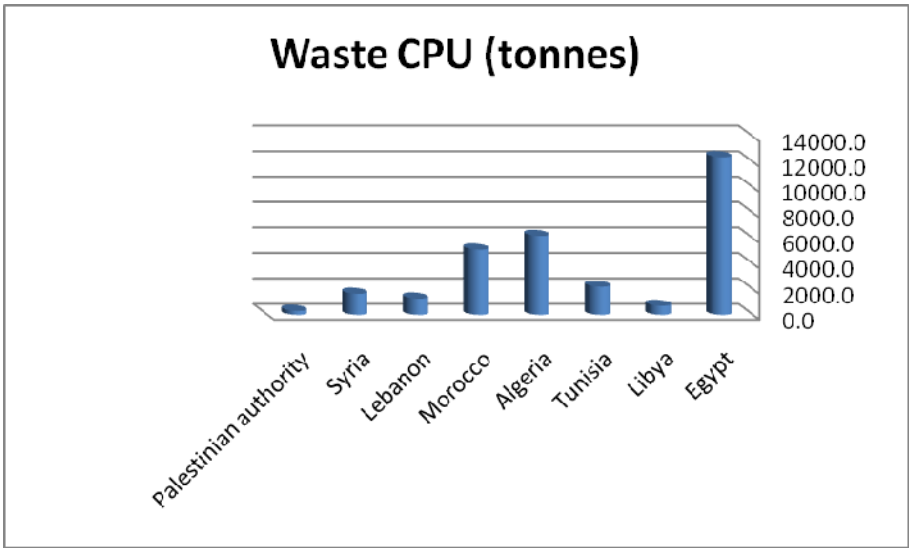
(b)

Moreover, the waste mobile phones and personal computers were estimated. Summarised results are depicted in the graphic chart 12.

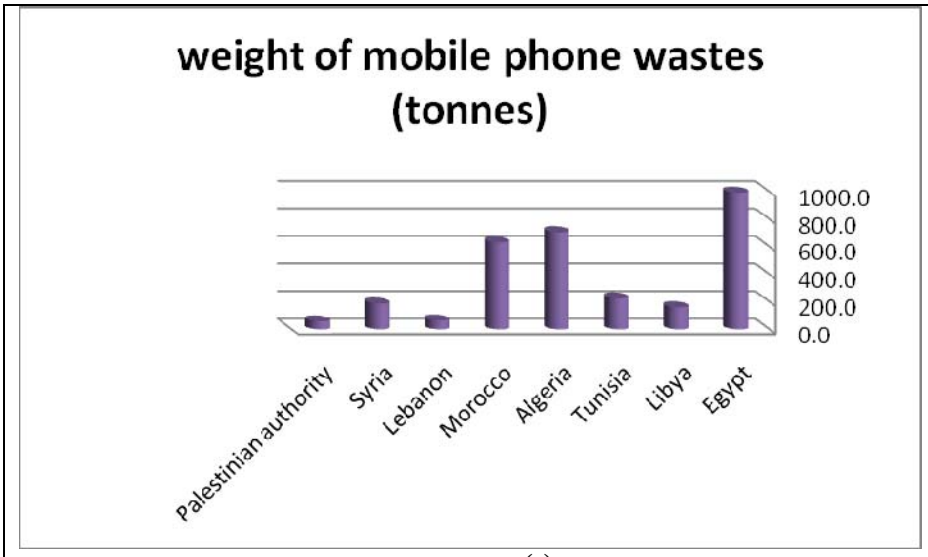
Figure 12 - (a) CRT waste for 2009; (b) CPU waste; (c) weight of mobile phone wastes - in tonnes



(a)



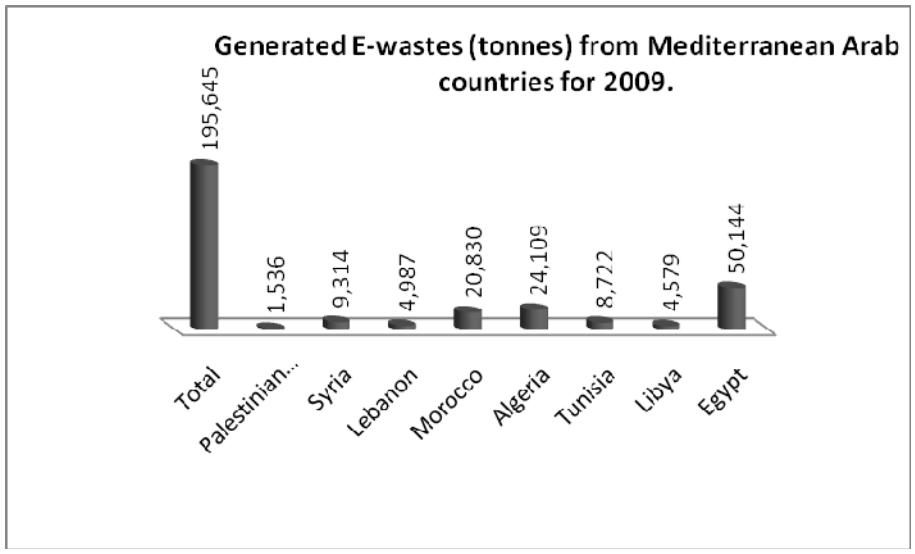
(b)



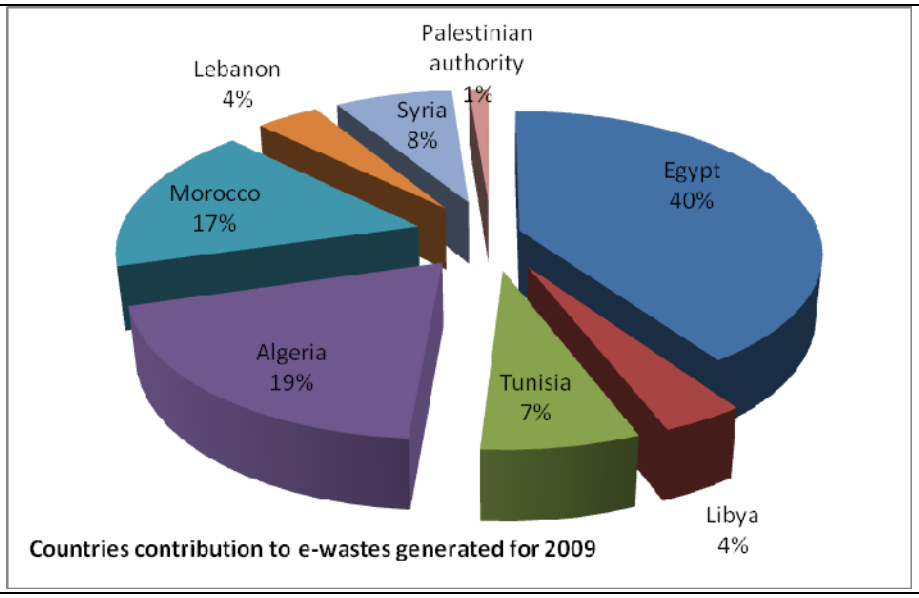
(c)

The total weight of wastes due to TV sets, PCs and mobile phones are calculated at 2009 indicators.
The following charts summarize the results from the point of view of (a) generated e-waste (in tonnes) from Mediterranean Arab countries for 2009 and (b) contribution of the countries to e-waste generated (%) for 2009. The total estimated weight of e-wastes for 2009 from the Mediterranean Arab countries was estimated at 196,000 tones.

Figure 13 - (a) generated e-waste (in tonnes) from Mediterranean Arab countries for 2009; (b) contribution of the countries to e-waste generated (%) for 2009.



(a)



(b)

Egypt, Algeria and Morocco contribute more than 75% of the total e-wastes generated for 2009 in the Mediterranean Arab countries and therefore, should be a priority for development assistance towards e-waste management.
It is necessary to mention that the given figures represent rough estimates. Also, it is expected that true figures could be double or more of the estimation. An important note is that only TV sets for households and personal computers were subjects of the investigation. Any similar equipment generated from the services sectors have been taken into consideration.

5. Collection and collection systems, sorting and sorting systems: organization of national collection and sorting schemes, cost of the schemes, economic instruments to facilitate the collection and sorting, administrative requirements

Manufacturer's Liabilities towards WEEE Collection and Sorting Systems in the Mediterranean Region

Minimum recovery percentages of WEEE which are between 70 and 90 %, according to the category are already set in the Mediterranean Region. The manufacturer's sector must assume greater responsibility in this recovery.
Manufacturers must comply with responsibilities with respect to WEEE management, to the EEE market and consumer information, as well as carry out a series of administrative procedures.

KEY MANUFACTURER'S OBLIGATIONS	
Registration	Register in the electrical and electronic device manufacturers' register in the Autonomous Community where the manufacturer's headquarters are located. Register in the industrial establishment register in the WEEE section that is under the nationally chosen Ministry or other Institution.
EED Stamp	All the devices must be stamped to identify the manufacturer and to prove that they were placed in the market after 13. 8. 2005. In addition, home devices must be stamped with the following symbol:

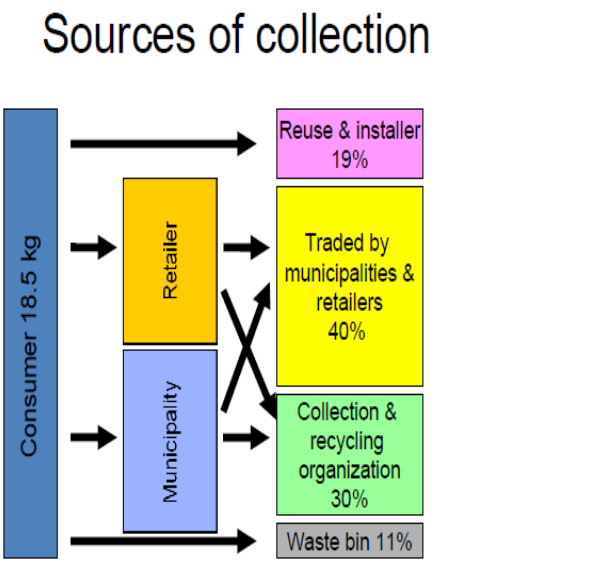
KEY MANUFACTURER'S OBLIGATIONS	
	
Production Report	Quarterly declare of the EEE put in the market by the producer. Quarterly report of EEE the manufacturer places in the market. Reach agreements with distributors and local entities that act as temporary WEEE reception agents in the reverse logistics process.
EEDR Management	Establish Integrated Management Systems (IMS) for selective WEEE collection. Pay management expenses, including collection from the exact local points and grouping/collection centres established by local entities or from distributors of WEEE that are produced after using EEE that have been placed in the market as of 13. 8. 2005. Manufacturers can do this individually or by being a member of an Integrated - Collection and Sorting Management System.

Collection systems in the Mediterranean Region are mostly served as:
- public profit eco-organizations or non-profit oriented organizations,
- run on behalf of producers of EEE,
- involved in both collection and recovery of WEEE,
- officially recognized by national authority to provide the system,
- the part of "WEEE Forum" standards.

Legislative and administrative requirements set by:

1. Directive 2002/95/EC on the restriction of the use of certain hazardous substances in electrical and electronic equipment (RoHS)
2. Directive 2002/96/EC on waste electrical and electronic equipment (WEEE)

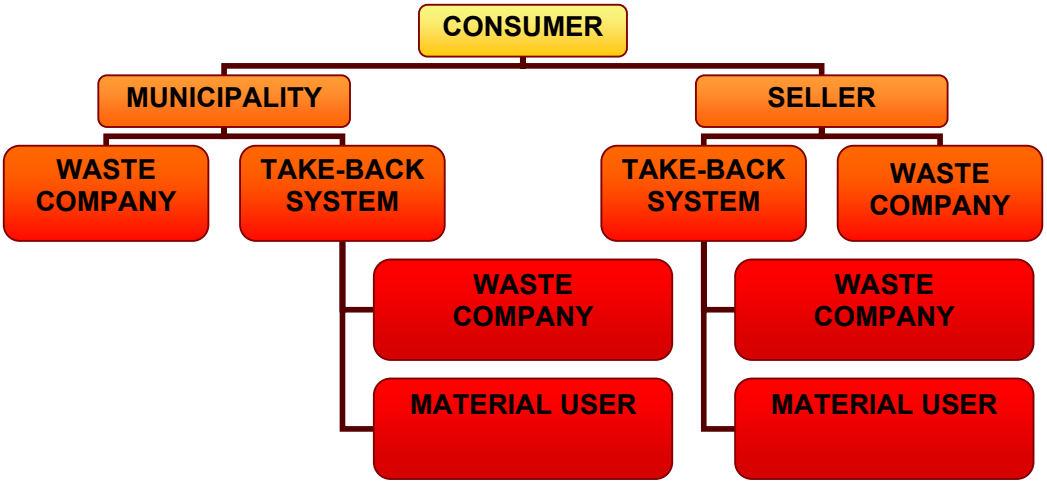
Source: WEEE Forum



Source: Witteveen+Bos, Onderzoek naar complementaire afvalstromen voor e-waste in Nederland, 10 April 2008

The following figure outlines the most typical financing system of WEEE management in the Mediterranean Region:

Figure 14 – an outline of a typical financing system of WEEE in the Mediterranean region



CYPRUS

Administrative requirements

Legislation
Regulation Act No. 668/2004 on the management of WEEE transposes the WEEE and RoHS Directives. Further implementation and amendment of regulations are expected.

Registration

National register	Statistical Service and the Environment Service of the Ministry of Agriculture, Natural Resources and Environment
Deadline	31. 10. 2005
Obligated parties	Only producers or importers based in Cyprus can register. Members of collective system must register separately. Local Authorities (Municipalities and Communities) are responsible for the collection of waste within the areas of their jurisdiction.
Number of shareholders and registered members	> 500
Collection systems	1

Companies registered in Cyprus importing or retailing EEE are required to register with the Environment Statistical Service. Registration is completed once the Environment Service conducts an investigation and assessment of each individual company to determine compliance. Foreign firms without some form of legal representation in Cyprus cannot register. Instead, the foreign firm's local agent, distributor, or representative must register.

Cost of the schemes and economic instruments to facilitate the collection and sorting

Financing

Financing WEEE from households	Producers have to organize and finance separate collection. Municipalities are not obliged to collect.
Historical WEEE	B2C: financed according to market share, visible fee optional but if used must be shown throughout the supply chain B2B: 1:1 replacement basis
New WEEE	Financial guarantee unclear - required from all producers, but not adhered to while applications pending

WEEE Electrocyclosis Cyprus, which is accredited by Cypriot authorities, has issued tenders for outsourcing waste collection and transportation services.

B2C take back system started in summer 2007. The Cyprus Chamber of Commerce and Industry was expected to present a proposal for a joint system but preparations had not advanced in mid January 2009. Importers, retailers and transporters of EEE and Packaging are involved in the development of the appropriate schemes for the management of WEEE and Packaging Waste.

Organization of national collection and sorting schemes and systems

Collective compliance
Systems must be approved by the Environment Committee with representatives from several ministries and by The Cyprus Chamber of Commerce and Industry (CCCI). The CCCI is a private corporate body representing Cypriot businesses and was the initiator of both Green Dot Cyprus and WEEE Electrolysis Cyprus organizations.

Individual compliance
Individual compliance for B2B EEE requires an approved waste management plan for the individual system.

Collective system

WEEE Electrocyclosis Cyprus Ltd

Green Dot Cyprus was accredited of 1. 6. 2008 and had undertaken in November 2006 to set-up and manage the WEEE Collective System for the organization WEEE Electrocyclosis Cyprus Ltd. - collective system for the management of household WEEE and dry cell batteries for the organization AFIS Cyprus Ltd.

As of August 2009 the entity had around 150 shareholders and registered members.

Example of companies joint in the Green Dot Cyprus system: A & P Andreou Bros Ltd, Amsteso Ltd, Andreas Charalambous (Electrosyskeves) Ltd, Aplan Electroline Limited, Asepa Trading Ltd, Cyprus Trading Corporation Public Ltd, E & G Electricplus Ltd, Fournaris M&J Imports Exports Ltd,
Fysair Ltd, Hadjikyriakos And Sons Ltd, Ideal Graphico Ltd, Lbm (Lillytos) Ltd, Logicom Public Ltd, Matero Ltd, Olitech Ltd, P.G.S Electrical Supplies Ltd, Podium Engineering Ltd, Printec (Cyprus) Ltd, Rovanias Ltd, Savvigel Services Ltd, Thermocold Ltd, Thetaco (Traders) Ltd, Tsiakkastel Office Line Ltd, Vassos Eliades Ltd, Visionhire Ltd, Zartaco Ltd

Figure 15 - WEEE System of Electrocyclosis Cyprus

Contact
Green Dot Cyprus
41-49 Ayiou Nicolaou Str.
Nimeli Court, Block B, Office B21
Engomi, 2408 Nicosia
http://www.greendot.com.cy
http://www.electrocyclosis.com.cy
admin@greendot.com.cy

FRANCE

Administrative requirements

Legislation
Decree No. 829/2005 on the design of EEE and the elimination of WEEE.
Decree is implementing regulations on RoHS, the conditions of approval of B2B systems, approval of B2C systems, visible fees, scope of B2B & B2C EEE, registration requirements, the approvals for collective and individual compliance schemes and collective financial guarantee.

Registration

National register	Adème (French Environmental Agency) administers register and determines market share
Deadline	30. 11. 2006
Obligated parties	French producer, importers, 'introducers' of EEE (from other EU member states) Foreign entities only if selling directly to French households Collective systems may register their members
Number of shareholders and registered members	~ 3,000
Collection systems	4

Collection of B2C WEEE - producers have to specify which WEEE municipalities should collect on behalf. Provided municipalities agree, producers to compensate them for investment and operational costs – through a Clearing House (Coordinating Organisation).

Cost of the schemes and economic instruments to facilitate the collection and sorting

Financing

Financing WEEE from households	Financing principle is done by market share Visible fee is mandatory throughout the supply chain B2C from 16. 11. 2006 Retailers have to take back WEEE from household free of charge on a one-to-one basis. On a voluntary basis, local authorities and municipalities can organize a selective WEEE collection.
Historical WEEE	B2C: no distinction between historical and new WEEE, visible fee mandatory throughout distribution chain B2B: final user responsible even when a replacement is purchased
New WEEE	Guarantee required from B2C producers complying individually The final consumers pay the fee while buying an EEE. Therefore retailers and wholesalers transfer this fee to the producers. Producers define their collective or individual scheme and affect the fee to this non lucrative scheme.

Producers have to finance the take-back and the ecological treatment of WEEE according to their current market share for historical WEEE. Producers have to, among others, guarantee

the financing of the take-back and treatment of products put on the market after August 13th 2005.

EcoLogic System e.g. is financed by a fee levied on producers in respect to their annual household “put on the market”. This fee is financing the collection, recovery/treatment of the products at their end of lifecycle. First collection began in late 2006.

Table 15 - Applicable Tariff Grids (the example of The European Recycling Platform System - ERP Recycling France)

	Weight bands	Visible Fee with VAT	Visible Fee without VAT
LDA	LDA < 20 kg	2 €	1,67 €
	LDA >= 20 kg	6 €	5,02 €
COLD	COLD	13 €	10,87 €
TV and Monitors	TV and Monitors < 9kg	1 €	0,84 €
	TV and Monitors >= 9kg et < 15kg	2 €	1,67 €
	TV and Monitors >= 15kg et < 30kg	4 €	3,34 €
	TV and Monitors > 30kg	8 €	6,69 €
SDA	SDA < 0,2kg	0,01 €	0,0084 €
	SDA >= 0,2kg et < 0,5 kg	0,03 €	0,025 €
	SDA >= 0,5kg et < 1 kg	0,05 €	0,042 €
	SDA >= 1kg et < 2 kg	0,15 €	0,125 €
	SDA >= 2kg et < 4 kg	0,25 €	0,21 €
	SDA >= 4kg et < 8 kg	0,50 €	0,42 €
	SDA >= 8kg et < 15 kg	1 €	0,84 €
	SDA >= 15kg et < 20 kg	1,50 €	1,25 €
	SDA >= 20kg et < 30 kg	2,25 €	1,88 €
	SDA > 30 kg	4 €	3,34 €

SDA – Small Domestic Appliances
LDA – Large Domestic Appliances
COLD – Large Domestic Appliances such as fridges, air-conditioners etc.

Organization of national collection and sorting schemes and systems

Collective compliance

Producers can fulfil their obligations by joining a collective system. 4 B2C systems have been approved Eco-Systèmes, ERP Recycling France, Récylum and EcoLogic.

Individual compliance

B2C: individual systems were already approved.
B2B: individual systems do not need approval.

Collective systems

Eco-Systèmes

Eco-Systèmes is the association of large household appliance, white and brown goods, incl. TVs and lightings.

Table 16 - Data collected by Eco-Systèmes

	2008	2009
WEEE collected	191,000 T	270,000 T
Collection WEEE/cap./y.	4 kg	5.7 kg

In 2008 more than 500 local companies became partners of the collection EEE system for 27 million inhabitants which was nearly 36% of the markets (in value) of logistics to the networks. In addition, 1,600 employment were assigned to the operations re-employment at Emmaüs and Envie.

In 2009, Eco-Systèmes invested and will invest each year 1.5 million EUR in the Research and the Development.

Contact
Eco-Systèmes
17 rue de l'Amiral Hamelin
75 783 Paris Cedex 16
http://www.eco-systemes.com/
http://www.eco-systemes.com/contact.php

The European Recycling Platform - ERP Recycling France

ERP France was created in 2004. In August 2006 they received its permit agreement from Local Authorities. This agreement was renewed by Local Authorities for additional 5 years by decree, 23. 12. 2009 and it shall ensure full compliance of its members to the WEEE and RoHS regulations and at the lowest cost. Eco-organization approved for all the 10 categories of WEEE and in 2010 started the take-back system of batteries.

4 founding members of ERP France System: Braun, Electrolux, Hewlett-Packard, SONY and others: ALCATEL-LUCENT, ARRIS Group, Inc., Europe Plus, Bio-Medical Research Ltd., Braun - P&G, Dialogic Corporation, EA Swiss Sarl, Europe Plus, Electrolux France, Elica, Funai, Hewlett-Packard, Husqvarna A.B., Inda Group, Konica, Lavazza, Lexibook LES, Logitech, Medion, MGI Luxury Group, Omron, Peltor AB, Saeco, Samsung, Sony Europe Holding BV, Spectrum Brands (Varta Consumer Batteries/Remington), Toshiba, Via Michelin and many others.

ERP France System is working together with **29 European member states** and having more than 1417 members.

ERP´s Results in 2007

– cooperation with 136 collective members of the system
– 26,481 T of WEEE collected by the ERP Platform and French distributors

Figure 16 - WEEE collected by the ERP Platform and French distributors

WEEE COLLECTED (T)				
WEEE type	Collective compliance	Distributors	Indiviual compliance	Other ways
LHHA, incl. COLD-EEE	5 275	72	na	na
LHHA, except COLD-EEE	8 077	209	na	na
SCREENS – TV, monitors	6 713	8	na	2
SHHA	6 416	60	na	2
TOTAL – 26,833	26 481	348	na	3
	99 %	1 %		
	of TOTAL volume collected			

CONTACT
The European Recycling Platform - ERP Recycling France
ERP France SAS
17, rue du Parchamp
92100 Boulogne Billancourt
http://www.erp-recycling.fr/
http://www.erp-recycling.org/
mathieuvianey@erp-recycling.org

Récylum – régénérans la lumiére

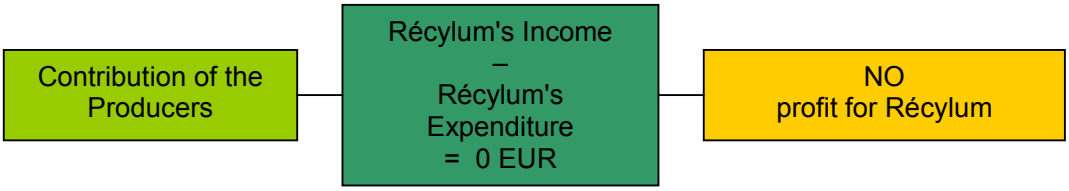
Récylum was created in May 2005 by several lamps producers, manufacturers, importers, distributors having their own mark wishing to intensify their efforts in favour of environmental protection. The new approval of Récylum was granted by decree of 23. 12. 2009 for 5 years renewable duration.

Récylum organizes in France the collection and the recycling of the used lamps held by the private individuals and the professional companies; all the sources of light are concerned, except the bulbs with filament.

Figure 17 - Récylum´s collection points and places of used lamps within France

Récylum respects principles of sustainable development and the general interest:
- environmental performance and ecological assessment;
- economic performance by limiting the impact of the cost of the collection and recycling of the lamps on the purchasing power of the consumers;
- social performance by developing of employment related to the activity of the e-waste.

Figure 18 – An economic performance in light of Récylum



Récylum must regularly give an account of its activity to the Public authorities. In the event of failure upon its engagements, Récylum can be seen withdrawing its approval by the Ministry for Ecology, Energy, Sustainable development and Town and country planning, after consultation of the ministers in charge for Industry and the Local government agencies.

Contact
Récylum – régénérans la lumiére
17 rue de l'amiral Hamelin
75116 Paris
http://www.recylum.com/
info@recylum.com

EcoLogic

Ecologic is a non profit company founded in December 2005 by 13 stakeholders, and supported by both FICIME (Federation for Mechanic and Electronic International Companies) and ALLIANCE TICS (an Information and Communication Technologies Union) Federations. EcoLogic obtained an agreement from the French Ministry for Ecology, Energy, Sustainable development. The system has been initiated by 30 producers from large household appliances, IT, office appliances, photo, consumer equipment, and telecommunication.

EcoLogic is developing its network in local authorities, municipalities and retailers and is setting up solutions for B2B activities. By the end of 2007, 12 operators were chosen through a national call for improving its operation structure for more than 2000 WEEE collection points channelling the e-waste to treatment and recovery centres.

Results reached by EcoLogic
As EcoLogic provides a customized approach to its clients, it copes with clients expectations and promotes an efficient approach, the integration of the social and local economy in respect the sustainable development principles.

Table 17 – WEEE collected/treated and number of citizens covered

	2007	**2008**
WEEE collected and treated	25,000 T	47,720 T
Number of citizens covered	12,000,000	15,775,000

In 2008, EcoLogic had 964 members and 289 collection partners in their system which was 15,8 % market shares (in tonnes) and 178,000,000 EEE put on the market by the members.

CONTACT
EcoLogic
41 boulevard Vauban
78280
Guyancourt
http://www.ecologic-france.com/
rletenneur@ecologic-france.com

Alliance Tics

Alliance Tics, established in 2003, is an umbrella organisation of the telecommunications and IT sector considers setting up a collective system for its members.
Alliance Tics represents professional Union which gathers two trade unions SFIB (Information Technologies) and GITEP TICS (Telecommunications).
Main players of the system: HP France, Ericsson and Alcatel-Lucent

Contact
Alliance Tics

43-45 rue de Naples
75008 PARIS
http://www.alliance-tics.org/index.htm
info@alliance-tics.org

Syndicat de l'Eclairage

Syndicat de l'Eclairage is mainly carried by the activity of the building and public works in interior lighting - not the professional products.

Lighting enterprises represented by Syndicat de l'Eclairage: 3E INTERNATIONAL, ABEL, abi, ansorg, aric, ATEA, Atelier Sedap, Aubrilam, Comatelec, Conimast, debbas France, Eclatec, ERCO, ETAP Eclairage, FLOS France, GE Lighting, GHM, Harvard Electronics Sarl, Havells Sylvania, HOlight, Honeywell, iGuzzini, KRS, LEC, Legrand, Lenzi, Lledo France, Ludec – Groupe Se´lux, Mazda, Osram Sasu, Petitjean, Philips, Radian, regent Lighting, Seae, sammode, Sarlam, Securlite, Sogexi, Targetti, Technilum, Thorn, Toshiba France, Trato Industries, Tridonic-ATCO, Trilux, Valmont Sermeto, Waldmann Eclairage

Contact
Syndicat de l'Eclairage
17, rue de l´Amiral Hamelin
75783 Paris Cedex 16
http://www.syndicat-eclairage.com/
syndicateclairage@syndicat-eclairage.com

GREECE

Administrative requirements
Legislation

Presidential Decree No. 117/2004 of 5. 3. 2004 transposes the Directives WEEE & RoHS and applies the provisions of Waste Law No. 2939/2001 to WEEE.
Decree triggers the application to EEE of Law No. 2939/2001 on Packaging and Other Waste. It prescribes that producers or designated third parties must obtain a "certificate of alternative management" (PED) from EOEDSAP (the National Organisation for the Alternative Management of Packaging and Other Waste).
Joint Decision of the Undersecretaries of Economy and Environment No. 112145 of 12. 12. 2004, published in the Official Journal of the Hellenic Republic 1916B on 24. 12. 2004, on the contribution fee was set.

Registration

National register	The Unit of Alternative Management of Packaging Waste and Other Products (EOEDSAP), part of the Greek Ministry of Environment, Planning and Public Works responsible
Deadline	1. 7. 2004
Obligated parties	Greek producers and importers, foreign entities that sell directly to Greek end users. The Greek producer or an authorized representative / seller who making the product available for the first time on the Greek market has to be registered in the producers register. In case that the manufacturer ships its products from abroad directly to an end user in Greece, the manufacturer is considered "the producer" and should register directly in the producers register. The producers which are affiliated in an approved collective scheme, they have the right to apply to the Greek ministry of Environment in order to obtain their WEEE registration number. The producers are obliged to display their WEEE registration number on invoices, delivery documents, etc. (as a proof of compliance with the law) by 1. 1. 2006 at the latest.
Number of shareholders and registered members	> 200
Collection systems	1

The Greek ministry of Environment imposes national obligations on the natural or legal persons who are placing products into Greek market for the first time, whether the products originate from third countries or from other EU Member States.

Cost of the schemes and economic instruments to facilitate the collection and sorting

Financing

Financing WEEE from households	Producers have to organize and finance separate collection through Appliances Recycling SA.
Historical WEEE	B2C: according to market share, visible fee mandatory throughout distribution chain except to final consumer B2B: producer responsible on a 1:1 basis, may shift financial responsibility to the end user
New WEEE	No distinction between historical and new WEEE

Table 18 - Catalogue of the financial contribution for the alternative management of EEE

Category of E.E.E (*)	Kind of Product	Contribution per unit of weight (€/tonne) without V.A.T	V.A.T. (23%)	Contribution per unit of weight (€/tonne) including V.A.T
1	Large household appliances	72,03	16,57	88,60
2	Small household appliances	80,51	18,52	99,03
3	IT and telecommunications equipment	254,24	58,48	312,72
4	Consumer equipment	254,24	58,48	312,72
5	Lighting equipment	125	28,75	153,75
	Lamps	0,101 (per piece)	0,02	0,124 (per piece)
6	Electrical and electronic tools (excluding the stable industrial tools of large scale)	101,7	23,39	125,09
7	Toys, leisure and sports equipment	152,54	35,08	187,62
8	Medical devices	50	11,50	61,50
9	Monitoring and control instruments	152,54	35,08	187,62
10	Automatic Dispensers	76,27	17,54	93,81

(*) According to the categories of the P.D 117/2004.

Date of coming into force the above catalog: 01/02/2005

THERE IS A FLAT FEE OF 50 EURO PER TONNE (PLUS VAT) FOR ALL SALES OF THE PERIOD FROM 1/7/2004 UNTIL 31/1/2005 FOR ALL CATEGORIES.

Affiliation in “Appliances Recycling S.A.” is free of charge. Producers of EEE sign the Entry Agreement, regularly declare the quantities of products marketed in Greece and pay the legally required financial contribution to “Appliances Recycling S.A.”. First collection began in 2005, first treatment plant opened only in mid-2006.

Organization of national collection and sorting schemes and systems

Collective compliance

Appliances Recycling SA, was set up to collect WEEE for both B2B & B2C WEEE in all categories.

<u>B2B collection can be implemented by:</u>

- lamp producers subscription into the system,
- private and public works contracting companies that undertake building renovations or lamp replacement,
- large end users of the private and public sector.

Appliances Recycling S.A. aims at the achievement of the National Targets, as these are set by the European Union and the Greek Government, as well as the effective control of the cost of the Alternative Management of WEEE. These quantitative and qualitative targets include the separate collection of at least 4 kg of WEEE of domestic origin on average, per resident per year and specific objectives as far as re-use and recycling of WEEE is concerned. The percentage of re-use and recycling varies from 50 % up to 80 % - minimum, the average weight per appliance (depending on the category of equipment).

Individual compliance
No individual system has been approved but in case it must be approved by EOEDSAP (approval valid for six years).
However, administrative requirements and high registration fees make individual compliance unattractive.

Collective system

Appliances Recycling SA

Appliances Recycling SA is the collective system for the operation of the Alternative Management of the WEEE in Greece. The role of the company is to organize, control and coordinate all the stages of the WEEE management. It functions on a non-investment and non-profit basis.

Registration with Appliances Recycling S.A. is free of charge. Producers of Electric and Electronic equipment sign the Entry Agreement, regularly declare the quantities of products marketed in Greece and pay the legally required financial contribution to "Appliances Recycling S.A." As a result of that, companies that are registered with the collective system benefit from their exemption from the obligations that are imposed by Law No. 2939/2001 and the Presidential Decree No. 117/2004 regarding the Alternative Management of WEEE that concerns their activity and have the right to mark their products with the Special Symbol as a proof of registration with the Collective System for the Alternative Management of the WEEE.

Appliances Recycling SA is developing the necessary infrastructure for the WEEE collection and treatment including:
- Collection Points Network done through the Municipalities and the Retailers of EEE, as well as supermarket chains;
- WEEE Transport and Temporary Storage Network done together with the Licensed WEEE Transportation Companies based on the contracts and agreements
- WEEE Treatment Facilities with help of 8 waste treatment facilities which are already in operation. One more is waiting to start operating.

In 2009 Appliances Recycling SA recycled 66,000 tonnes of appliances.

Collected lamps: straight fluorescent lamps, compact fluorescent lamps, high intensity discharge lamps, including pressure sodium lamps and metal halide lamps, low pressure sodium lamps, other lighting or equipment for the purpose of spreading or controlling light with the exception of filament bulbs

Lamps should be placed in the special bins:

- with caution for not breaking and without their packaging,
- all straight lamps should be placed separately at the back compartment of the special bin found in retail stores.

Contact

Appliances Recycling S.A.
196 Sygrou av. & 2 Harokopou str.
Kalithea
17671
http://www.electrocycle.gr/new/
info@electrocycle.gr

ITALY

Administrative requirements

Regulation & Legislation:
Legislative Decree No. 151/2005 of 29. 7. 2005 transposes the WEEE & RoHS Directives
Several sub-decrees have been delayed because of confusion over new Environmental Code.
A sub-decree might stipulate a transitional period without producer identification until an EU-wide identification system is in place. No date identification required. The bin symbol designates date of placing on market.

Registration

National register	Ministry of Environment with cooperation of the Chamber of Commerce. The local Chambers of Commerce will report producers' activity codes to the national register.
Deadline	1. 7. 2007
Obligated parties	Producers & importers based in Italy and Italian producers who export to other EU member states
Number of shareholders and registered members	> 1200
Collection systems	4

Cost of the schemes and economic instruments to facilitate the collection and sorting

Financing

Financing WEEE from households	Financial guarantee is not clear; no explicit exemption for collective compliance or B2B Tax-financed municipal collection centres to accept WEEE from retailers and consumers free of charge. 1:1 take back at retailers. Producers to finance from collection centres onwards.
Historical WEEE	B2C: by market share; visible fee optional, will be used by collective systems for some products B2B: producers must finance on a 1:1 basis
New WEEE	B2C: producers must finance WEEE from own products B2B: producers to finance from end user onwards

The following prices of eco-contribution of consumers have been calculated in function on the singular treatment costs of every type of household appliance.

Table 19 - The example of one of the WEEE Eco-contribute values – Ecodom System (values in €/piece VAT included)

Cold (fridges and freezers):	10
Air-conditioners	0
Water-heater small up to 30 litres	0
Water-heater bigger than 30 litres	3
Washing machine	3
Dryer	3
Dishwasher	3
Ovens and cooking	0
Hobs	0
Hoods	0
Various small household appliances (including microwaves):	0

Organization of national collection and sorting schemes and systems

Collective compliance
B2B take back systems do not require approval. Collection systems started in the second half of 2007.

Individual compliance
Collective systems operate based on the WEEE Decree valid in Italy.
Clearing house to be financed & managed by producers.

Collective systems

ECODOM
Consorzio Italiano
Recupero e Riciclaggio
Elettrodomestici

ECODOM Italy

Ecodom is an Italian consortium for the recycling and recycling of WEEE - household appliances. It is a national collective non profit-making organization which manages the transportation, treatment, recycling and the disposal of historical WEEE.

Ecodom first started out as a voluntary basis in 2004 thanks to the leading producers of hoods and boilers present on the Italian market. The main aim of the consortium is to prevent polluted substances from damaging the environment and to maximize recycling, thus reintroducing cycled waste into the productive cycle. Having regard to the treaty which establishes the disposing and recycling of WEEE. With a consortium of 35 companies and a share of 65 % in the market of large household appliances, every year Ecodom manages around 39 % in terms of weight, of all WEEE products in Italy.

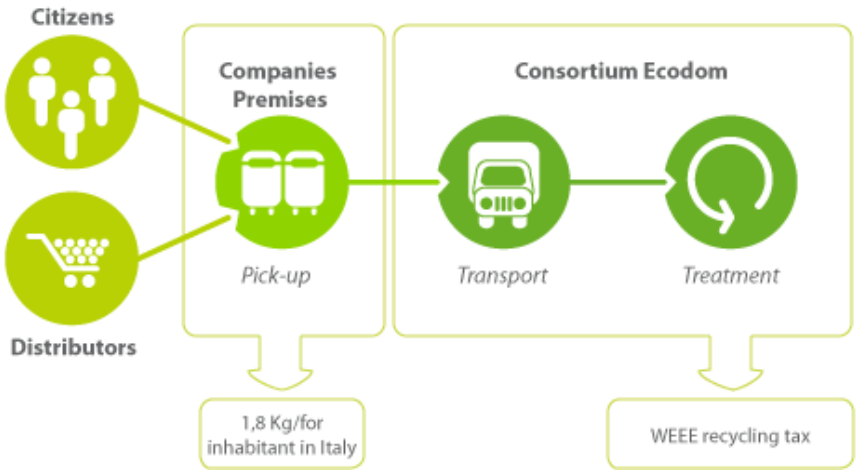
WEEE share run by Ecodom
Group R1 - cold and air conditioners, fridges, air conditioners and water heaters
61 %
Group R2 - large household appliances, washing machines, dishwashers, ovens, hobs etc.
67 %
Group R3 - TV and monitors
Group R4 - small household appliances, consumer electronic and electric, lighting etc.
1 %
Group R5 - fluorescent heat source

Around 4 million of refrigerators, washing machines, hoods, water-heaters and dishwashers are collected every year. This is the number of household appliances that Ecodom manages every year, which in weight can be translated into 70,000 tonnes of iron, copper, aluminium and various plastic products which if they weren't treated in the correct way would end up filling up the rubbish dumps along with all the other urban waste.

Based on a sophisticated informative system supplemented with data from everything that is involved in the management of WEEE (Pick-up Points, logistic and plant operators) thorough qualitative standard, the Ecodom model, allows hi-tech rubbish that is the responsibility of the consortium is to be completely retraced. WEEE is followed step by step, from the Pick-up Points to the treatment plants.

Ecodom can proceed to the constant monitoring of the retrieved material and the material to be disposed.

Figure 19 – An operating system of Ecodom



The cost
Before WEEE's existence the total cost regarding the disposal of WEEE was covered by the towns/municipalities which in turn made their citizens pay through the waste tax.
Since a decree law stated the eco-contribute on household appliances, electronic consumer products, TVs and light-bulbs, consumers are now held partially responsible for the right form of recycling of the products the purchased.

Companies joint in the Ecodom System:
Antonio Merloni, BSH, Candy, Faber, FRANKE, HAIER, Hoover, Indesit, Ariston, Miele, nardi, smeg, Tecnogas, Whirlpool, Liebherr, BAXI, gorenje, best, Fratelli Onofri, Brandt Italia,

falmec, frigo 2000, Daewoo Electronics, Bompani, Blanco Italy, elco, la Germania, boschetti-indmec, Solisa, Tecnowind, elco, DIXE, Barazza, BEKO, Baumatic, Gielle – Europa 2000.

Contact
ECODOM Italy
Corso Italia, 39
21047 Saronno (Varese)
http://www.ecodom.it
info@ecodom.it

EcoR'It

EcoR'It was announced on 1. 3. 2005 as a consortium for the management for domestic and professional WEEE by Ecoqual'It, a voluntary consortium of the major office equipment manufacturers. EcoR'It is a multi-sector collective scheme for the correct management of professional and household WEEE which also operates in the management of waste batteries and accumulators.

The Consortium, which is a not-for-profit organization and international system, currently has more than 600 member companies in the ICT, consumer electronics, small household appliances, lighting and IT sectors. As an integrated collective system for the collection and treatment of WEEE professional (B2B) and household (B2C) and Waste Batteries it is in compliance with Italian legislation.
EcoR'it is a simple system which arranges the possibility of signing up to the consortium's purposes by means of a one-off enrolment fee a single annual fee to cover the costs of the company structure.

Companies joint in the EcoR'It System:
Acer, AlpianItalia, brother, Canon, CHERRY, CPF, Dedem, DPS Promatic, EPSON, FUJITSU, KYOCERA, LEXMARK, Metrologic, Olivetti, RICOH, TA-Triumph-Adler, TOSHIBA TEC, XEROX

Fridges, fans, small and large household appliances, TVs, computers, audio/photo/video devices, energy saving light bulbs, electronic games and electric tools are all equipment present in all the activities of day to day lives which depend on electrical currents or electro-magnetic fields in order to function.

Table 20 - Data collected by EcoR'it

2009 – 2010	**Household (B2C) WEEE**	**Professional (B2B) WEEE**
Withdrawal (collection) points served	505	1,632
Number of accomplished missions	7,624	1,409
WEEE withdrawn (collected)	12,838 T	1,152 T

Large scale EEE users generate quantities of WEEE greater or equal to:
- 10 tonnes/year for the R4 grouping (SHHA, consumer electronic and electric, lighting);
- 1.2 tonnes/year for the R5 grouping (fluorescent heat source).

150 EUR contribution must be paid by the large scale user's as a necessary condition for the activation of the EcoR'it service.

Contact
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http://www.ecorit.it
info@ecorit.it

Ecoped – Ridomus CONSORZIO NAZIONALE RICICLO PICCOLI ELETTRODOMESTICI

Ecoped, the National Compliance Scheme for the recycling of Small Appliances, was founded in January 2006 as a non-profit Consortium by 14 Producers within CECED Italia. Ecoped has been set up in the context of ANIE - the National Association of household and professional appliances manufacturers - member of the Confederation of Italian Industry.

Ecoped:
500 associates producers, leader of market in the following fields,
- household-electric small EEE (approximately 80% of market to share),
- sport and free time equipment, fitness & body care (approximately 70% of market to share),
- garden & hobby equipment (approximately 20% of market to share),
- portable batteries (approximately 25% of market to share),
- car - lead accumulators and manufacturers (approximately 20%).

Ridomus:
National consortium for the collection system of the air conditioners, with more than 60 associates producers, for a market to share of 60% in the field of the air conditioning

Ecoped - Ridomus: 30,000 dependent occupied places within the system's chain in Italy 12 billion EUR of total turnover.

Ecoped collects currently B2C WEEE only from municipal collection facilities assigned annually by the Clearinghouse and on demand for members and other customers. Currently take back of B2C WEEE from distributors is still delayed by-law, as they are not accepting WEEE from final users.
WEEE are collected within the Country in 5 waste streams:
R1 - C&F R2 - LHHA R3 - CRT/FPD appliances R4 - Any other appliance R5 - Lamps

Main founding associates of Ecoped:
Ardes, Argo, Ariete, Carrier, DeLonghi, Girmi, iMetec, Krups, Moulinex, Olimpia Splended, Polti, Riello, Rowenta, Tefal, Termozeta, Vaillant, Vortice, Vorwerk, Vorwerk Contempora, Zobele Group

Table 21 - ECO Contributions RAEE – Consorzio Ecoped – Ridomus (valid from 1. 2. 2009)

Consorzio Ecoped – Ridomus			**amount vat excluded**	**included 20 % vat amount**
Italian Code	**EEE**		*EUR / piece*	*EUR / piece*
R1	cold and air conditioners, fridges		4.17	5.00

R2	household appliances	< 10 kg	0.42	0.50
R3		< 30 kg	1.25	1.50
R4		> 30 kg	4.17	5.00

Contact
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20149 Milano
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info@ridomus.org
giuliano.maddalena@ecoped.org

Consorzio RE.MEDIA

ReMedia is one of the most important Italian WEEE multi-chain Collective Compliance Systems in the fields of consumer electronics, air-conditioning, SHHA and ITC.

Consorzio ReMedia looks after the entire WEEE chain from pre-sorted collection, collecting site, recycling system to transport to the treatment centres for EEE. It supplies all services for all 10 categories of both household (B2C) and professional (B2B) equipment.

Table 22 - Collection of WEEE data of ReMedia

01/2008 – 07/2010	**Household (B2C) WEEE**	**Professional (B2B) WEEE**
Withdrawal (collection) points served	2,500	
Number of accomplished missions	63,584	1,842
WEEE withdrawn (collected)	105,133 T	3,182 T

Members of ReMedia system must ensure separate WEEE collection through the consortium, as provided in Italian legislation. At civic collecting sites all WEEE have to be collected in different groupings as following Groups:

Group	WEEE Type and Classification
R1	cold & air conditioners, fridges, air conditioners and water heaters
R2	LHHS, washing machines, dishwashers, ovens, hobs etc.
R3	TV and monitors
R4	SHHA, consumer EEE, lighting etc.
R5	fluorescent heat source

Visible Eco-Fees of ReMedia for different kinds of WEEE are shown in the table.

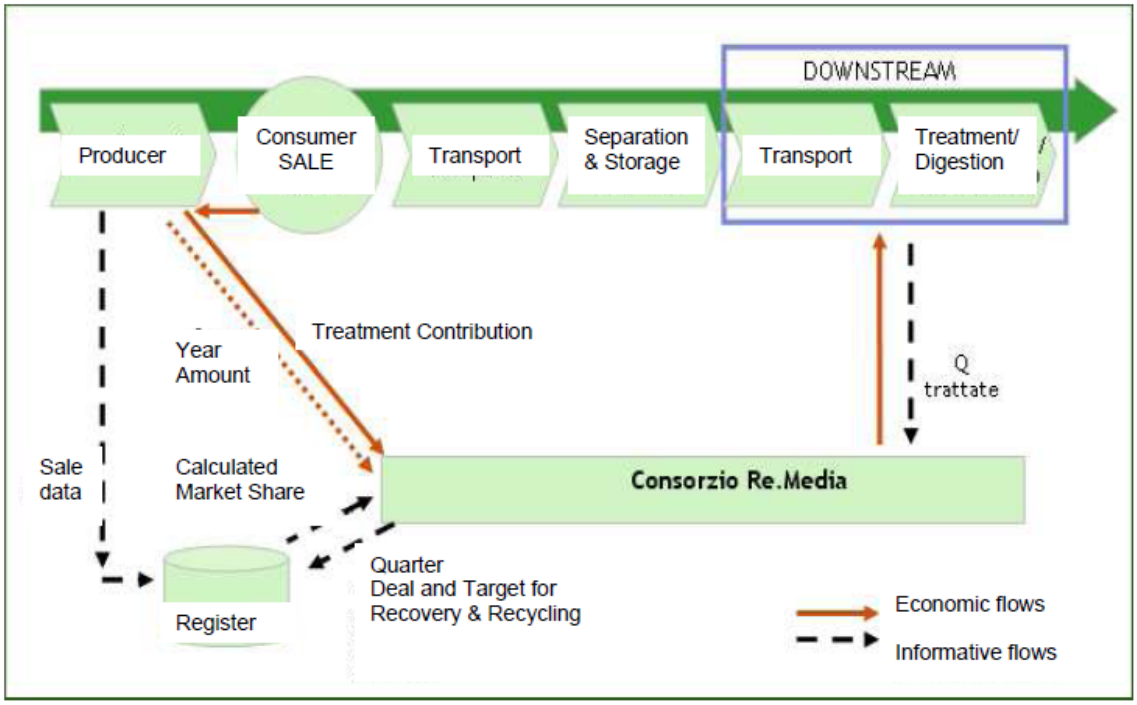
Table 23 - WEEE Eco-contribute values (values in EUR/piece VAT included; valid from October 2009)

Air-conditioners and LHHA	
Ovens and cooking	0
Air-conditioners > 30 kg	3
Dishwasher/ Washing machine	3
Cold (fridges and freezers)	10
Common Consumption EEE	
Luminous sources	0.20
Audio, TVs, video, little TVs, monitoring screens	0.30
TVs (12´´ – 32´´)	2
TVs (> 32´´)	6.50
SHHA	
PED (personal electronic devices) < 2 kg	0.20
PED (2 – 10 kg)	0.50
PED (10 – 30 kg)	1.50
Medical devices	0.30

After the collection WEEE are cleared away by ReMedia using authorized transport vehicles to their selected treatment systems using excellent technological solutions and process standards on their behalf.

The partners of Consorzio ReMedia are therefore required to work in full compliance with existing standards under the applicable law, including environmental law, assuring that the work is performed by experienced personnel trained specifically for this purpose and with the appropriate and efficient equipment.

Figure 20 - The flowchart of the national collection and sorting schemes by ReMedia



Contact
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via Messina, 38 Torre B
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info@consorzioremedia.it

ANIE, the Federation of the Electrical and Electronics Industry

ANIE is a Confindustria member which represents electrotechnical and electronics companies operating in Italy, whose overall turnover is above 50 million EUR.

Federation ANIE, supporter with Confindustria, represents 11 Associations - strategic sections of the Italian industry of the electrotechnical and electronic enterprises which operate in Italy in order to assure transparent rules.

Contact
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20158 Milano
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segreteriadirezione@anie.it

MALTA

Administrative requirements

Legislation

The RoHS Directive 2002/95/EC been transposed into national law by the Minister for Competitiveness and Communications, acting on the advice of the Malta Standard Authority, by Legal Notice No. 396/2004. This regulation came into force on the 1. 7. 2006. All definitions and regulations of the RoHS-Directive apply.

In March 2007, Legal Notice No. 63/2007 has been published which entered into force the same day. This regulation enacts the EU-WEEE-Directives into national law. In order to facilitate the practical implementation it contains the obligation for producers, importers or retailers who put electric or electronic equipment (EEE) on the Maltese market to be registered at the competent authority and to report regularly about the amount of equipment they put on the market and about the results of recovering WEEE.

Registration

National register	Maltese Environment and Planning Authority (MEPA) responsible for setting up register
Deadline	1. 9. 2004
Obligated parties	Producers & importers placing EEE on Maltese market.
Number of shareholders and registered members	< 100
Collection systems	1

Cost of the schemes and economic instruments to facilitate the collection and sorting

Financing

Financing WEEE from households	Since producers and importers are liable to pay an eco-contribution (a tax) on certain EEE placed on the market. Currently no possibility of exemption foreseen. Government will consider revising the Eco-Contribution Act if the producer fails to shoulder part or all of its waste management responsibility. The VAT Department has been entrusted with the role of managing and monitoring Eco-contribution. This body acts as a reference point on matters relating to eco-contribution in order to reduce the number of free-riders.

Organization of national collection and sorting schemes and systems

Collective & Individual compliance

Several companies have expressed interest in setting up individual and collective systems but none has been established yet. Due to the small size of Malta and high population density, individual systems for B2C EEE might be feasible.

WEEE is currently collected by WasteServ, a company established by the Government in 2003, which is planned to operate until producers set up their own systems.

WEEE is collected from households further on voluntarily by retailers (take back an old equipment when delivering a new one) or by local councils together with domestic waste or with bulky waste.

In February 2006, Malta has started the EU-Twinning Contract with Germany (MT04-IB-EN-04), which gave advice for the implementation of EU-regulations on producer responsibility. German experts together with representatives from the former Ministry for Rural Affairs and the Environment, the Maltese Environment and Planning Authority, WasteServ Malta and the most affected associations of industry, trade and commerce proposed recommendations for WEEE System in Malta.

Proposals for schemes have been developed and applied for authorization from MEPA. Such schemes intend to act on behalf of the individual producers/importers and must give evidence that they collect and recycle/recover WEEE as requested by the legal notice and monitor all their activities to the responsible authority.

Also Eco-contribution and recycling and recovery targets have been proposed into the new regulation. It is intended that the new regulation will create flexible means of collection of WEEE from private households:
- by modified kerb side collection of bulky waste by local councils,
- by the new Civic Amenity Sites, and
- by taking back WEEE by retailers (when selling a new product).

Estimates and comparisons with other European states have indicated that the minimum collection rate of 4 kg per inhabitant and year will be achieved and over passed rather easily. The total amount of collected WEEE per year could be raised to several thousand tonnes (based on the experience in many other European countries an amount of up to 4,000 t per year from Maltese households); most of this amount will come from LHHA.

MEPA will decide on existing applications for schemes to collect, transport, sort, dismantle, pre treat and recover in Malta or abroad. Such system(s) should be lean in order to avoid unnecessary costs for overheads. All mayor activities should be regularly tendered in order to allow competition. Start up of such scheme(s) is estimated to take place soon.

As exports for large appliances are rather expensive, it is envisaged to encourage investments into the creation of dismantling and pre-treatment facilities in Malta. This will allow concentrating exports to more homogeneous waste streams like steel, non ferrous metals, different kinds of plastic, glass and others.

Collective system

WASTESERV MALTA LIMITED

WasteServ Malta Ltd.

WasteServ, a state-owned company, operates integrated waste management systems, including one for WEEE. WasteServ Malta Ltd. was established in November 2002.

Civic Amenity Sites are supervised facilities where members of the public can bring and discard a variety of household bulky waste for separate disposal of refrigerators, electronic products - computers, monitors, mobile phones, printers, toys, transmitters, electronic tools.

The purpose of these centres is to establish service facilities to optimise the collection of certain types of waste and increase the recovery of secondary materials.

Contact
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http://www.wasteservmalta.com/
info@wasteservmalta.com

MONACO

Administrative requirements

The Principality of Monaco, with its idyllic Côte d'Azur location, became one of the most environmentally sensitive countries in Europe and one of the first nations to use reforestation to preserve its spectacular mountainous backdrop.
Monaco as an UNECE country is also a party to the Basel Convention on the Control of Transboundary Movements of Hazardous Wastes and their Disposal.

The Monte-Carlo SBM's Environmental Charter
The list of the 23 measures on the SBM Environmental Charter, in 2007, the Board decided to adopt a new charter to protect the environment, including 23 tangible measures which, for the most part, have already been implemented and which will generate new developments before the end of the 5-year period stipulated by the charter.
In keeping with the Principality of Monaco's policy, instigated by HSH Prince Albert II, the Monte-Carlo SBM's resolutely determined goals for waste management - Recycling of EEE - which was not fully implemented yet.

Organization of national collection and sorting schemes and systems

S.M.A. - Société Monégasque d'Assainissement

The Company Monegasque of Waste Management was created in October 1938 to ensure the public services of cleaning of the public highways of the Principality, of collection of the household waste, the realization and the exploitation of a factory of incineration of the urban and industrial residues of Monaco.

S.M.A. public service comprises:
- general service of collection composed of the principal collection of the household refuse in all the city, and
- selective collections for recycling of certain waste - scrap of electrical equipment and electronic, data processing, TV,
- collection of the ink cartridges for photocopier and printers,
- collection of the neon tubes and other lamps and bulbs.

Columbus Monaco, a Pioneer in Waste Sorting and Recycling (hotel chain in Monaco)

Columbus Monaco has a longstanding commitment to sustainable development in the area of waste management. In 2005, the hotel signed a partnership with SMA, a local company specializing in decontamination, for waste sorting and recycling.

They collect used printer cartridges which are sent to charities supporting children's care. A new system for breaking down fats, using an environmentally-friendly process, will soon be implemented (www.columbusmonaco.com).

Contact
S.M.A. - Société Monégasque d'Assainissement
B.P. 498

98012 MONACO CEDEX
http://www.sma.mc/collecte.html
sma@sma.mc

SLOVENIA

Administrative requirements

Legislation

National WEEE Legislation:
- Decree on the Management of WEEE; Official Journal of RS No. 107/2006, ref. no. 4588 (Decree repealed Rules on the WEEE Management; Official Journal of RS No. 118/2004, ref. no. 4871)
- Decree on the Manner and Subject of and Conditions for Performing the Public Utility Service of WEEE Management 17; Official Journal of RS No. 118/2004, ref. no. 4863
- Decree on environmental tax on the generation of WEEE; Official Journal of RS No. 32/2006 (28.3.2006), ref. no. 1314

Other legislation relevant for WEEE management:
- Environment Protection Act; Official Journal of RS No. 41/2004, ref. no. 1694 (amended Official Journal of RS No. 20/2006, No. 57/2008)
- Decree on Waste Management; Official Journal of RS No. 34/2008, ref. no. 1358
- Order on the management of separately collected fractions in the public service of urban waste management; Official Journal of RS No. 21/2001, ref. no. 1189

Registration

National register	Environment Agency, Ministry of Environment and Spatial Planning
Deadline	30. 6. 2005
Obligated parties	Slovene based producers, importers, 'dealers' (from another EU member states) Registration of the producers is necessary for ensuring the fulfilment of requirements of WEEE management Decree - take back of WEEE from distributors, public service providers and final users without a supplier (B2B), etc. Approval of producer's WEEE management plan must be before 31. 12. 2006 by Ministry of Environment and Spatial Planning.
Number of shareholders and registered members	> 450
Collection systems	3

The application for registration has to contain the following data:
- name and address of the producer,
- annual amount of EEE placed on the market in kg and its type,
- number of the waste management plan (register of WEEE management plans is managed by the Ministry of Environment and Spatial Planning),
- name and address of the company operating the waste management plan.

Cost of the schemes and economic instruments to facilitate the collection and sorting

Financing

Financing WEEE from households	Officially set for 14. 8. 2005, in practice February 2007
Historical WEEE	B2C: set by market share, visible fee is optional and some producers will use it from March 2007. B2B: producers responsible on a 1:1 basis.
New WEEE	B2C: set by market share B2B: individual take back systems requires permit

ZEOS is financed by a contribution levied on producers. This contribution is calculated on the basis of products put on the Slovene market (EUR/piece). There is no ZEOS distinction between historical and new waste. A National Register is run by the Government. For the administrational costs for the register, producers have to pay an environmental tax to the custom department. First treatment plants approved in February 2007 and collection started from March 2007.

Table 24 - The example of WEEE Eco-contribute values in ZEOS system in Slovenia (values in EUR/piece VAT incl., valid from 2009)

LHHA	1.67
Cooling and Freezing equipment	10.00
SHHA	0.17
TV appliances / Monitors	4.17
Gas discharge lamps	0.25
Air conditioning equipment	6.67
Other EEE	0.30
Other small EEE articles	0.04

Eco-contribute values collected are the income of national budget and used for administrative procedures, data base of data sales and register of producers.
On annual level this payments amounts cca 250.000 €.

Table 25 - Financial report on the ZEOS compliance scheme - WEEE management cost in 2007

WEEE management total cost	**74.69 %**	Pre – treatment	3.5 %,
		Treatment	16.06 %
		Collection, storage and transport	80.44 %
Other costs, including PR and information campaigns	**25.31 %**		

Organization of national collection and sorting schemes and systems

Collective compliance

3 WEEE management systems are being set up, one controlled by EEE producers, approval pending. No legal specific requirements on WEEE systems were set.
Municipalities have to operate collection points and producers have to provide containers for collection points and large retailers.

Individual compliance
Approved waste management plan is required but it means difficult in practice. No application so far in Slovenia.

Collective Systems

ZEOS – Slovenia

ZEOS is a non-profit company founded on 20. 7. 2005 by main Slovene producers and retailers of EEE to comply with the obligations given by the WEEE Directives. Shareholders are the 9 companies which themselves represent about 65 % of the Slovene market in all 10 EEE categories.

ZEOS, since March 2007, is in charge of the developing, implementing and managing a collective take-back system, including the treatment of WEEE. ZEOS is representing producers also for other issues like visible fee, financial guarantee, WEEE marking, public relations, etc.

ZEOS members are registered in the national evidence. They have got environmental permits. Main companies covered by ZEOS: Mercator, LTH, gorenje, MIKROpis Holding, Electrolux, BSH, PHILIPS, OSRAM, Avtera, Merkur, SONY, Whirlpool, SAMSUNG, Sylvania, LG, Avtotehna, LOŠKE TOVARNE HLADILNIKOV ŠKOFJA LOKA, Ekosij.
At present ZEOS have more than 160 members, which represent together with shareholders about 75 % of the Slovene market of EEE put on the market (in weight).

Collection system

ZEOS is organizing its collection system based on the 3 types of collection points:
1. municipal collection points („container parks") - **70 points**,
2. producer collection points run by waste management companies - **50 points**, and
3. distributor/retailer collection points - more than **200 points**.

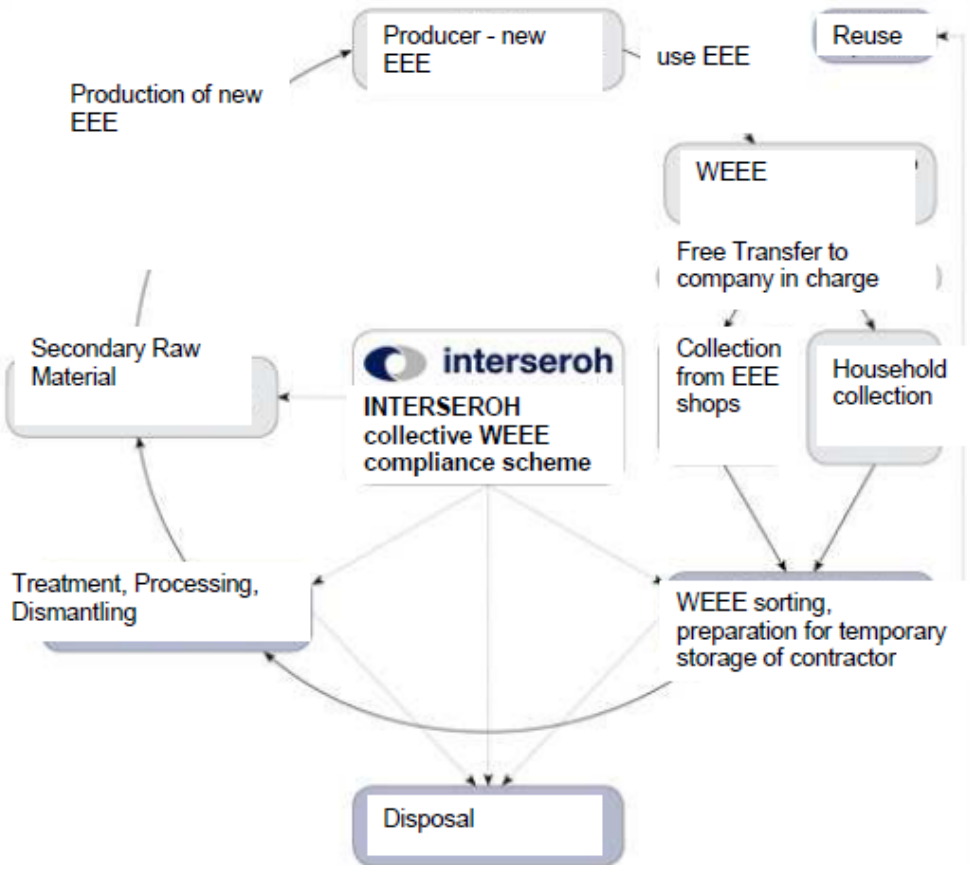
ZEOS - objectives of an organised approach
- the fulfilment of statutory obligations,
- transparency of the operation of the system,
- the representation of the interests of producers and other liable parties,
- optimal management costs,
- communication with the liable parties and the public,
- utilisation of the European practice of WEEE management.

interseroh

INTERSEROH d.o.o - collective WEEE compliance system in Slovenia

Interseroh has a holistic system for the disposal and utilization of WEEE.
Profit from Interseroh advantages:
Planning and production of a holistic concept to handling WEEE;
Collection and utilization of the electrical old devices;
Entry of the manufacturers and owners of the WEEE at the Federal Office for Environment; Protection of the Republic of Slovenia;
Assistance with the reporting of the collected quantities of the WEEE to the Federal Office for Environment Protection of the Republic of Slovenia;
Payment of the environmental pollution fees;
Providing the report on handling of WEEE in the previous year;
Information of final consumers over correct handling of WEEE: separate collection, recycling as regulated, and transport of used electrical old devices in retail businesses and collecting centres.

Figure 21 - INTERSEROH d.o.o collective WEEE compliance system



As of 5. 6. 2007 150 Slovene producers were covered by the Interseroh System which meant 25 % of market share.

Contact
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Brnčičeva ulica 45
1000 Ljubljana
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http://www.interseroh-slo.si
info@interseroh-slovenija.com

SLOPAK d.o.o. Slovenia

As of 25. 10. 2007 220 Slovene producers were covered by the Slopak System which meant 5 % of market share.

Contact
SLOPAK, DRUZBA ZA RAVNANJE Z ODPADNO EMBALAZO D.O.O.
ODOVODNA CESTA 100

1000 Ljubljana
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slopak@slopak.si

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http://www.zeos.si/
info@zeos.si

Table 26 - EEE put on the market of Slovenia in 2007

EEE PUT ON THE MARKET - SLOVENIA				
Year: 2007	**Categories acc. to the Directive**	**[tons]**		
		B2C	**B2B**	**Together**
Quantities of EEE put on the Market				
LGA - Large Household Appliances	**1**	12.396	172	12.568
LGA - Cooling and Freezing Appliances	**1a**	4.829	869	5.698
SHA - Small Household Appliances	**2**	2.930	19	2.949
IT & Telecomunications	**3**	3.957	438	4.395
Consumer Electronics	**4**	4.141	2	4.143
Lighting Equipment	**5**		1.428	1.428
Gas Discharge Lamps	**5a**	480		480
Electric and Electronic Tools	**6**	1.661	364	2.025
Toys, Leisure and Sports	**7**	123	529	652
Medical devices	**8**	361	5	366
Monitoring and Control Instruments	**9**		170	170
Automatic Dispensers	**10**		331	331
	Total	**30.878**	**4.327**	**35.205**

Table 27 - Number of WEEE collected in Slovenia in 2007

WEEE COLLECTED - SLOVENIA		
Year: 2007	**Categories acc. to the Directive**	**[tons]**
Quantities of EEE put on the Market		
LGA - Large Household Appliances	**1**	1.709
LGA - Cooling and Freezing Appliances	**1a**	1.542
SHA - Small Household Appliances	**2**	238
IT & Telecomunications	**3**	1.237
Consumer Electronics	**4**	346
Lighting Equipment	**5**	10
Gas Discharge Lamps	**5a**	60
Electric and Electronic Tools	**6**	46
Toys, Leisure and Sports	**7**	23
Medical devices	**8**	5
Monitoring and Control Instruments	**9**	20
Automatic Dispensers	**10**	81
	Total	**5.317**

WEEE collected in 2007
2.7 kg / per capita (5,317 t)

As one of the key environmental goal in accordance with Operational Program, WEEE management system should ensure reaching at least WEEE Directive target for separate collection (4 kg per capita = 8,000 t of WEEE per year).

Table 28 - 2007 WEEE waste stream

%	WEEE Type and Classification	Average cost assessment
32.14	large household appliances	costs of collection, storage, treatment and recycling is from 0.31 EUR/kg for LHHA and to 0.88 EUR for lighting equipment
29.00	cooling and freezing equipment	
23.26	IT and telecommunications products	
5.51	appliances from consumer equipment	

SPAIN

Administrative requirements

Legislation

Royal Decree No. 208/2005 of 25 February 2005 came into force on 13. 8. 2005 transposes both WEEE & RoHS Directives.
Its goal is to regulate the collection and recycling of EEE at the end of their lifespan and to comply with the obligations established by the Royal Decree.
Spanish Law No. 50/2002 on Foundations, of 26th December 2002.
Royal Decree No. 106/2008 on the environmental management of batteries, used batteries and portable storage cells.

Registration

National register	The Department of Quality and Industrial Security of the Ministry of Industry, Tourism and Commerce
Deadline	1. 1. 2006
Obligated parties	Producers & importers with a Spanish fiscal identification number. Foreign producers wishing to register must appoint legal representative in Spain. Producers must also register with Autonomous Community where headquarter is situated. The same is also the case of individual B2B schemes.
Number of shareholders and registered members	> 2,000
Collection systems	9 (mostly Foundations)

All producers of EEE and others interested Parties to join the Foundation shall follow the following steps:

1. Fulfil the application form, and send it by fax or mail, addressed to the Foundation;
2. When the Foundation receives the application it will send back the Joining Contract to be signed by the producer or any other interested Party.
3. After signing the contract, the Foundation will add the new producer to the Spanish Registration Bureau of Producers of EEE in the Spanish Ministry of Industry, Commerce and Tourism. Then a keyword and password will be given to the joined producer or Party for accessing their private section in the appointed website.

Cost of the schemes and economic instruments to facilitate the collection and sorting

Financing

Financing WEEE from households	Quite slow start from 14. 8. 2005
Historical WEEE	B2C: According to market share, visible fee mandatory B2B: producers to finance on a 1:1 basis
New WEEE	B2C: producers responsible for own WEEE B2B: producers responsible for own WEEE, may shift obligation to end user Individually complying producers (B2B & B2C) to provide guarantee, requirements on case by case basis.

Organization of national collection and sorting schemes and systems

Collective compliance
Collective systems must be approved in every autonomous community where they operate. 9 collective systems have been set up. Several systems will cooperate on logistics.
Collection started in 2006, gradual addition of autonomous communities.
In 2009 collection systems - TRAGAMÓVIL, ECOFIMÁTICA, ECOASIMELEC and ECOPILAS have managed 20,000 T.
An average ratio of reuse and recycling of WEEE was 77 % so the objectives demanded by the Directives for the WEEE management were met.
In the first years with more than 800 member companies almost 70,000 T of WEEE were treated.

Individual compliance
Individual systems approval from and report to each autonomous community in which they operate.

Collective Systems

Ambilamp

AMBILAMP is a non-profit association which aim is to promote the protection of the Environment by means of the setting up and put into operation of an IMS of the waste lamps. Norm RAEE establishes that all the companies/members who take part throughout the service life of the lamp share the environmental responsibility. The responsibility of end users is, basically, to bring used lamps into collection points where AMBILAMP takes care of lamps sorting and recycling.

Table 29 - Used Lamps collected by AMBILAMP

2008	1.460 T
2009	1.730 T
2010 (I – VII)	936 T

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www.ambilamp.com
comunicacion@ambilamp.com

TRAGAMÓVIL

Foundation TRAGAMÓVIL was established in 2003 by the main manufacturers of mobile phones, conscious of the necessity to find a specific solution for their recycling and material recovery.
90 % of the components of mobiles are recyclable so there is a great importance of bringing them back from million of users.
TRAGAMÓVIL provides more than 1,000 containers located in stores of mobile phones, technical services, Clean Waste Points, City councils, Universities, warehouses, commercial areas and commercial centres all around Spain.
Being the pioneer in Europe, TRAGAMÓVIL is today among the top world-wide level in the collection and recycling of mobiles.
European and Latin American countries have expressed their intention to develop similar initiatives.
Main Points of Collection are shown in the following map.

Collection Points of Foundation TRAGAMÓVIL in Spain

Table 30 - Mobile Phones collected by TRAGAMÓVIL

2004	74.647 T
2004 – 2009	201.193 T
Mobiles	~1.5 million pieces

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28020 Madrid
http://www.tragamovil.es
medioambiente@asimelec.es

Fundación ECOFIMÁTICA

The Foundation ECOFIMÁTICA started to operate in 2002 as the specific solution in the EEE sector to pick up, manage and recycle WEEE produced by 90 % of the manufacturers of office equipment.
ECOFIMÁTICA is a system adapted to the peculiarities of a sector of large copy equipment, professional B2B, smaller equipment and daily used home appliances. In addition, it is a sector in which the figure of the distributor plays a fundamental role. In order to facilitate the delivery of the office EEE at the end of their lifespan, ECOFIMÁTICA collaborates with more than 700 located points of collection in the channels of distribution of office equipment.

ECOFIMÁTICA is the part of the Clean Points which allow the citizen to give their WEEE obsolete equipment from these companies in the ECOFIMÁTICA system: Canon, Xerox, Minolta, brother, OKI, Ricoh, Fujitsu, infotec, Konica Minolta, Sharp, Panasonic, Olivetti, Hewlett-Packard, Philips, Kyocera, océ, Mastertec, Epson and others.
ECOFIMÁTICA collected and managed suitably at the moment more than 300 tonnes of office WEEE.

Contact
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ECOTIC FUNDACIÓN - consumer electronics system

The ECOTIC foundation is a non-profit private organization, whose establishment has been promoted by the main Consumer Electronics companies and promoted in the framework of the Spanish Electronics, Information Technology and Telecommunications Business Association (AETIC) by the following enterprises of the Consumer Electronics Sector: Beko Electronics España, Gaplasa, Grundig España, Hitachi Europe, JVC España, Kenwood Iberica, LG Electronics España, Panasonic, Philips Iberica, Pioneer Electronics Iberica, Samsung Electronics Iberia, Sanyo España, Sharp Electronica, Daewoo Electronics Europe GmbH, Mitsubishi Electric Europe, Thomson Multimedia Sales Spain, Vestel Iberia

The WEEE from domestic users will be no charge for the last keeper and may effect on the collection points set out in its geographic area:

Green Points Map Distribution (Points Clean, Green Point, Garbigunes, Ecoparque)

Consumers have two options to deliver WEEE:
- in the shops, provided they buy a machinery of features or similar functions.
- in the Clean points.

Since 7. 3. 2005 ECOTIC works towards environmental protection and sustainable development through the awareness and training of manufacturers, distributors and users of EEE.

Its mission in ECOTIC is not only to conveniently recycle the wastes that are generated by its affiliates after the use of these devices but also to do it in the most efficient and economically feasible way so that the WEEE system is environmentally and economically sustainable to guarantee its durability.

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ecolec FUNDACIÓN — Sistema Integrado de Gestión para el reciclado de aparatos eléctricos y electrónicos

ECOLEC FUNDACIÓN

ECOLEC Foundation has been created as a collective management system set up by the business associations that represent the manufacturing sector and importers of LHHA and SHHA:
- Asociación Nacional de Fabricantes de electrodomésticos de Línea Blanca (ANFEL);
- Asociación Española de Fabricantes de Pequeño electrodoméstico (FAPE)

The aim of the ECOLEC Foundation is to be a leader in the management of WEEE and to be the most important collective funding system for waste management in Spain.

By taking advantage of existing structures and markets, the ECOLEC Foundation offers a model of management for WEEE which encourages and guarantees strict compliance with the new regulations. The proposal places special emphasis on the specific treatment of this kind of waste in order to avoid the dispersal of contaminants in recycled material, as well as on the use of the best treatment, evaluation and recycling techniques available.

The Ecolec Foundation does management for WEEE following the criteria established in Royal Decree No. 208/2005 and owns ISO certifications in quality and environment.

Access the "puntos limpios" waste collection and recycling point system

The crisis gives a small breathing to the Spanish industry of EEE which meant an increase of the invoicing of the 6.1 % and an increase of units of 5.3%.

In terms of volume, in 2010 (I – IV), 111,611 units of EEE were sold more than in the same period of 2009, indicating in numbers bought by citizens:

Dryers	> 29.8 %
Dishwashers	> 10.5 %
Ceramic/glass hob	> 9 %
Refrigerators	> 9 %
Kitchen EEE	< 29 %

However, and although the balance begins to be positive there were reductions of the EEE put on the market around the 30 %.

Contact
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28003 Madrid
http://www.ecolec.es
ecolec@ecolec.es

Fundación ECO-RAEE

Fundación ECO-RAEE's is the environmental, non-profit organization, founded by manufacturers and importers of EEE. Foundation accomplishes the requirements of Spanish Foundation Law, the take-back liability within the take-back system of WEEE.

Batteries take-back collection system of Fundación ECO-RAEE's:
- Button batteries (zinc air, silver oxide, manganese oxide, lithium, etc.)
- Battery sticks (alkaline, carbon zinc, lithium AAA, AA lithium, lithium)
- Laptop Batteries

The National Association of Distributors of Electric home appliances hopes to pick up in 2010 around 85,000 WEEE for its management and later recycling once finished its lifespan.

The network of almost 800 establishments associated to ADEN in the communities of Galicia, Asturias, Cantabria, Castile and Leon, Navarre and Basque Country, will user Fundación ECO-RAEE's service of LHHA and SHHA, PC, IT and other consumption WEEE together with tools.
These residues represents environmental problem but with collection and treatment – esp. recycling and recovery of metals, plastics and glass, it is minimise and those streams enter the production chain again.

Contact
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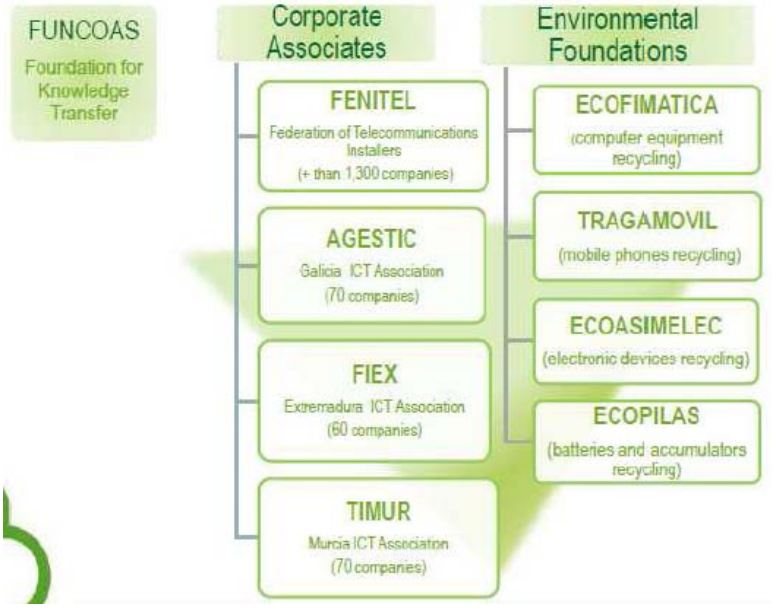
Eco-Asimelec

Eco-ASIMELEC, the Multi-sector Association of Companies of Technologies of the Information, Communications and Electronics was established in 1984. It has become the only industry association in Spain which is grouping manufacturers, traders and distributors.
Foundations of ASIMELEC – Ecoasimelec's objective is the collection, recycling and later treatment of the WEEE and electronic residues and the used EEE and batteries.

Figure 22 – An operating system of Eco-Asimelec



Its main goal is the promotion and support of the ICT and consumer electronics industry in Spain, by promoting the interests of their members.

ASIMELEC represents over 3,000 companies which directly employ 430,000 workers; its revenues account for almost 7 % of Spain's GDP.

Territorial Offices

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ASIMELEC

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medioambiente@asimelec.es
mastersecretaria@asimelec.es

FUNCOAS

Foundation Funcoas is the transfer of the knowledge of ASIMELEC.
FUNCOAS is a private non-profit organization according to agreement of the Board of directors and the General Assembly of the Association.
Once formally constituted before notary the 16. 1. of 2007 with the name of FUNCOAS and in March of 2007, it was registered in the Registry of Foundations of the Ministry of Education and Science, under the Protectorate of the Ministry of Industry, Tourism and Commerce.

The Strategic Axes of FUNCOAS are the following:
AXIS 1 Transfer and diffusion of the Knowledge of ASIMELEC to the society.
AXIS 2 Promotion of the technological innovation and generation
AXIS 3 Cooperation and Participation
AXIS 4 Methods, platforms and tools
AXIS 5 Original development and management of quality

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Fundación Ecopilas

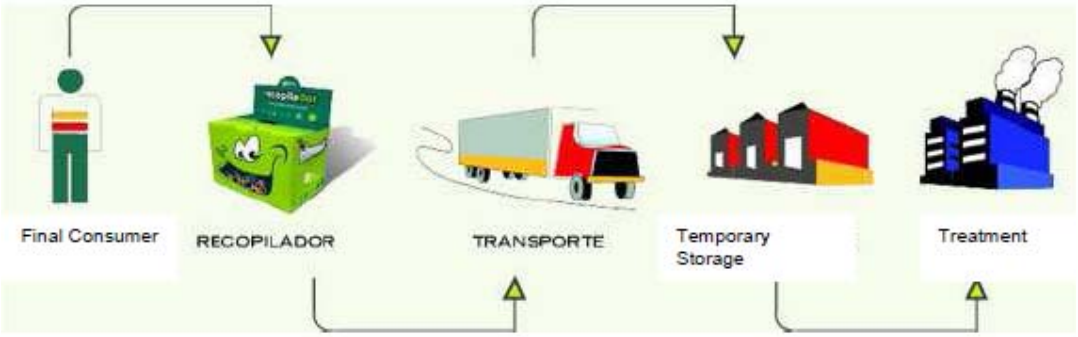
Finally, Foundation ECOPILAS, created in 2000, gives answer to Royal Decree No. 106/2008 on the environmental management of batteries, used batteries and portable storage cells.

Since 2008, Foundation Ecopilas has already located 4,000 of the 30,000 containers for batteries and used batteries, called “Compilers”, and that it has predicted to locate by all around Spain until 2011, with the aim of reaching in 2011, a 25 % of the total of put batteries and battery in the market, as it stands in the new law.

The ECOPILAS founders represent 70 % of the sector in Spain. The ECOPILAS membership is formed by the following companies and organizations: Energizer, Cegasa,

Philips, Sony, Kodak, Anged, ASIMELEC. They constitute active part in the environmental and economic optimization of the management of the batteries and WEEE.

It establishes the basic mechanisms necessary to make possible that the residues flow from the consumer, to their final treatment in the recycling plants, using in each step, the more efficient systems available.



The logistic model considers, as much the professional origin as domestic and establishes the different ways to follow in each case.
Waste of domestic origin may be collected – B2C:
Periodic collections in Clean Points, municipal containers, big distribution/supermarket and small stores.

Collections of professional origin – B2B:
Collections of material demand a minimum storing of waste. Once waste is picked up it is transported to the centres of temporary storage, for later transfer into plants of separation and final treatment of the batteries.

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ALBANIA

Collection issue

The issue of collection and collection systems as well as sorting and sorting systems is still „opened“ in **Albania**. There are no executed such systems. An article 9 of the Law No 9010/2003 on environmental treatment of solid waste states that waste generators are obliged inter alia to separate waste at the source and collect it separately.
So far, no interest on WEEE has been shown except through IFC/PEPSE Recycling Linkages Project. In the frame of this project a rough estimate of number of collection points was lately made by experts. Considering an average of one collection point for 30,000 inhabitants, the total approximate number of collection points needed for Albania is about 100. Calculation of numbers of pickups is made on the basis of 38 m^3 containers.

There are available some information about the present situation on waste collection of metal scrap based on the survey. Two questionnaires were addressed to 53 individual collectors of metal scrap. The following findings were derived from respondents:

a) social-economy aspects:
- 100% of them have Albanian nationality;
- 100% of them are registered as unemployed;
- 92% of them belong to the Roma community;
- the average age of people involved in metal scarp collection is 31 years old; the average age of first engagement in this business is 12 years old;
- 92% of them (the Roma people) have no education at all, the rest is still going to school (middle school);
- 96% of them work on their own or with other family members;
- they work daily for 8.5 hrs/day and walk about 12 km/day to collect;
- their monthly income is 14,000 ALL/month, living area 6m^2/person;
- all of them are poor or very poor;
- this is the only business they are engaged;

b) transportation means of metal scrap:
- 43% of them carry scrap on a bicycle,
- 2% on a horse cart, 36% on a push cart, and
- 19% carry scrap on themselves;

c) contract with purchaser:
- None of them have an agreement with the scrap buyers;

d) available information about scrap occurence, location, etc.:
- 88% of information about scrap come from their collaborators;
- 12% from buyers and others;

e) collected area:
- 15% of it is collected near the inhabited areas,
- 5% at the industrial sites,
- the rest of 80% anywhere dispersed in the environment;

f) frequency of collection:
- Scrap is collected on a daily bases;

g) requirements of collectors:

- in general there is a need on training in waste handling;
- 100% declare a need of safety tools as are gloves and cutting instruments;
- 26% declare a need of push carts;
- 21% declare a need of mot-carts;
- 100% declare the demand for information from professional organizations about new recyclable waste in the market as well as training on how to identify recycling material.

There are about 12,000 individual scrap collectors (i.e 0,6% of the total population of Albania or 1% of the urban population) informally organized in Albania (except for the Korca Eco-Service). The individual scrap collectors collect 2,500 kg/week steel scrap and 200 kg/week aluminium scrap. This amount of metal/scrap waste is transported to more than 100 sites near the waste recycling companies and/or the exporting ones.
The municipality of Korca offered 3 segregation sites (municipality property). The current goal for waste segregation at Korca regional level is 40%.

General barriers were identified e.g. for metal waste collection:

- low financial power of the scrap collectors: individuals and companies;
- non segregation at source;
- a lack awareness at the public, administration and business level;
- a lack of training on waste segregation at the different levels of value chain;
- difficulties to access financial sources to develop such businesses.

There is not interest on the WEEE as such, although they are considered as another potential source of metal, but nothing else yet.

Sorting issue

The Law No 9010/2003 on environmental treatment of solid waste, Article 7/d speaks about **sorting out and treatment of waste separately** in every stage of management, avoiding mixture with hazardous and solid waste. Unfortunately, this is not yet the case in practise. Enforcement of legislation, remains still very weak. Weakness of enforcement, is also due to the vague legislation requirements.
WEEE are sorted by waste collectors and scavengers to some extent, in that their metal scrap is taken away and sold to metal recycling companies. But this is made just occasionally. **No national sorting system has been organized**.
This is due to the fact that the current waste legislation has not dealt explicitly with the WEEE. The **WEEE directive has not been transposed yet, so there is no clear legal requirement for establishing a specific sorting system in place, although sorting is accepted in principle. Under these circumstances, no cost of sorting scheme has been estimated.**

An experience regarding sorting systems must be evaluated of different member states except for the WEEE directive primary. Basic criteria for selection of sorting system that could be used in Albania has to fullfil following:

- to fit the local circumstances and national economic standards,
- to be simple,
- to be not very costly.

An establishment of collective system with setting up a system of local collection points at municipalities with pick up organised by the collective systems could be one of possibilities in this area. A designation of neutral body acting as a clearing house, to aggregate the data and report to authorities, could be also very useful.

Economic instruments

A national legislation coveres financial issues related to waste management. As a matter of fact, the idea of environmental charges and taxes, and waste taxes were approved earlier by Law No 8934/2002 on environmental protection, article 25 and by Law No 9010/2003 on environmental treatment of solid waste, an Article 6, which states that physical and legal entities, foreign or legal, whose activity creates waste, are obliged to pay taxes for creating waste and discharging it in the environment. The kind and amount of tax to be paid, manner of payment, collection authority, criteria of expenditure of the tax revenue, are subject to regulation by law.
Waste holders bear expenses inter alia for collection of waste. This statement also fits with the one made in bullet 20 of the WEEE pre-ambula that producers should therefore finance inter alia collection from collection facilities of WEEE. **In order to give maximum effect to the concept of producer responsibility, each producer should be responsible for financing the management of the waste from his own products. The producer should be able to choose to fulfill this obligation either individually or by joining a collective scheme.**
In general, the Law No 9537/2006 on hazardous wastes administration, an Article 4/3 states that the producer of hazardous waste shall be responsible e.g. for the costs of the transport, recovery or disposal. This Law also introduces the concept of the financial guarantees (Article 14), contracting between parties (Article 22/1), fines and levies (Article 22/2). Although the object of the finanicial guarantee is different - the hazardous waste site permit, in the case of the Albanian Law No 9537/2006 vs. the producer in the WEEE directive. The concept fits with WEEE directive bullet 20 of the pre-ambula, saying that...Each should, when placing a product on the market, provide a financial guarantee to prevent costs for the management of WEEE from orphan products from falling on society or the remaining producers….

The economic instruments to facilitate sorting have been accepted by legislation in force in principle:

- Law No 8934/2002 on environment protection", between others is based on the principles of **polluter pays**, **environmental liability**, etc., and an Article 25 of this law is dedicated to "Environmental charges and taxes";
- Law No 9010/2003 on the environmental management of solid waste, an Article 6 is dedicated to"Waste taxes" where is stated that natural and legal persons producing waste pay a tax for the right of discharging it to environment;
- Law No 9537/2006 on hazardous wastes administration, an Article 22 - Fees and levies states that: the financial relations, among the subjects of the hazardous wastes management, shall be regulated on the contractual bases, according to the legislation in force.

Obviously, no economic instruments have been approved for collection or sorting of WEEE in Albania.

BOSNIA AND HERZEGOVINA

Collection issue

The Federal Law on Waste Management (Federation of Bosnia and Herzegovina), an Article 24 and the Law of the Republic of Serbia, Article 31 state that producers and owners of the waste are obliged to collects, ensure the reuse and recycling or disposal of waste produced by their activities or waste owned by them.
According to the Strategy for Environment Protection FB&H, there is no data on collection and proper disposal of e-waste. Individual initiatives attend some 5% of produced e-waste. Institutions and companies which own computers or other electric and electronic equipment, should be responsible for its collection and disposal, once this equipment becomes e-waste. However, there is no monitoring of such e-waste and, in most cases, it is not officially known how it is handled with this waste.
KEMIS is the only known company that collects e-waste in B&H. The KEMIS company has two collection centers, in towns Lukavac and Doboj. This company is the biggest exporter of hazardous waste from B&H into EU countries. During 2007, it has exported 648,695 tons of hazardous waste including e-waste. **E-waste is exported** due to the fact that there is **no market for such secondary raw materials in B&H.**

Considering that B&H does not yet have regulations for electric and electronic waste, there are no established systems for organized collection of e-waste in Bosnia and Herzegovina. However, the process of preparation of this legislation has begun.

In general, collection of municipal waste is performed by responsible companies - Public Communal Companies - established in each municipality in B&H. Entrusting the management of communal services to private companies is not yet a spread practice in B&H. Communal companies collect municipal waste from households, construction material, and also some industrial waste which is similar to municipal waste. Municipal waste in B&H contains e.g. organic material, durable and non-durable goods, packaging plastics, textiles as well as small quantities of hazardous waste like paint, motor oil, batteries, household appliances, agrochemicals, etc. originated from households, shops, small enterprises, workshops, garages, light industry and heavier industry. **There is no system for waste separation in general.**

Sorting issue

While Law No 33/2003 (Official Gazette FB&H) and Law No 53/02 (Official Gazette RS) on Waste Management prescribes handling the hazardous waste, in accordance with the EU legislation the absence of specific by-laws and regulations makes it very difficult to implement in Bosnia and Herzegovina. However, relevant ministries in B&H are engaged in the process of preparation of legislation which will determine behavior of producers, dealers and citizens regarding managing of electric and electronic waste.

There are no regulations which prescribe obligations and liabilities regarding e-waste, and accordingly sorting of e-waste at present. Separate collection and sorting of hazardous waste, including e-waste, is not implemented in practice. E-waste is handled in practice as if it will be a municipal waste, because it is collected together with other wastes.

Sorting of solid waste, in general, is not regulated by by-laws and there is hardly any market for the secondary raw materials. There is no determined economic policy covering this issue, and **there are currently no incentives for development of sorting systems.** Another problem is that there are missing capacities and facilities for additional handling with sorted waste in Bosnia and Herzegovina.

Considering that there are no regulations on e-waste, there is also no organized sorting scheme operation for this waste.

Economic instruments

One of the proposed measures for the future management of waste given in the Strategy for Environment Protection FB&H, is introduction of special taxes on produced and imported goods, including electric and electronic equipment. The taxes would be directed into the Fund for environment protection, and then be earmarked for establishing a necessary system for waste handling (including e-waste), e.g. collection, sorting, etc. The following proposals of option measures where presented regarding financing the waste handling:

- an introduction of subsidies or incentives for collectors of waste and operators responsible for its reuse and proper care; the subsidies can also be finances through Fund for environment protection;
- a model for improvement of collection and disposal of different waste types (including e-waste) - an introduction of responsibility principle of producers, through regulations prescribing percentages of waste which needs to be collected and refunded; this way, producers and importers of goods would organize themselves in the most efficient way in order to fulfill the prescribed obligations;

All these measures would be accompanied by the mechanism of reporting to the Federal Ministry of Environment and Tourism for the purpose of control.

According to the Strategy for Environment Protection FB&H the elaboration of the Roof Feasibility Study for determining acceptable alternatives for collection and disposal of various waste categories should be carried out until 2010.

User charges for collection of municipal waste are the only economic instrument for solid waste collection applied in Bosna and Herzegovina. In relation to hazardous waste, user charges are not exercised.

Refund systems are not expanded enough in B&H. Some companies use refund schemes but only for glass material, not for e-waste.

CROATIA

Collection issue

The first pilot project aimed at separate collection of electronic waste from households was initiated by the City of Zagreb in late 1998.
In the process of accession to EU, Ministry of Environmental Protection, Physical Planning and Construction has adopted the Ordinance on WEEE that came into force in July 2007. A new system of separate collection as well as environmentally sound management of WEEE was set up after adoption of the Ordinance. The objective of the system is annual collection of at least four kilograms of household e-waste per capita.
The main participants in the system are collectors, treatment facilities and the Environmental Protection and Energy Efficiency Fund (hereinafter „EPEEF“).

Each collector has to fullfil following obligations:

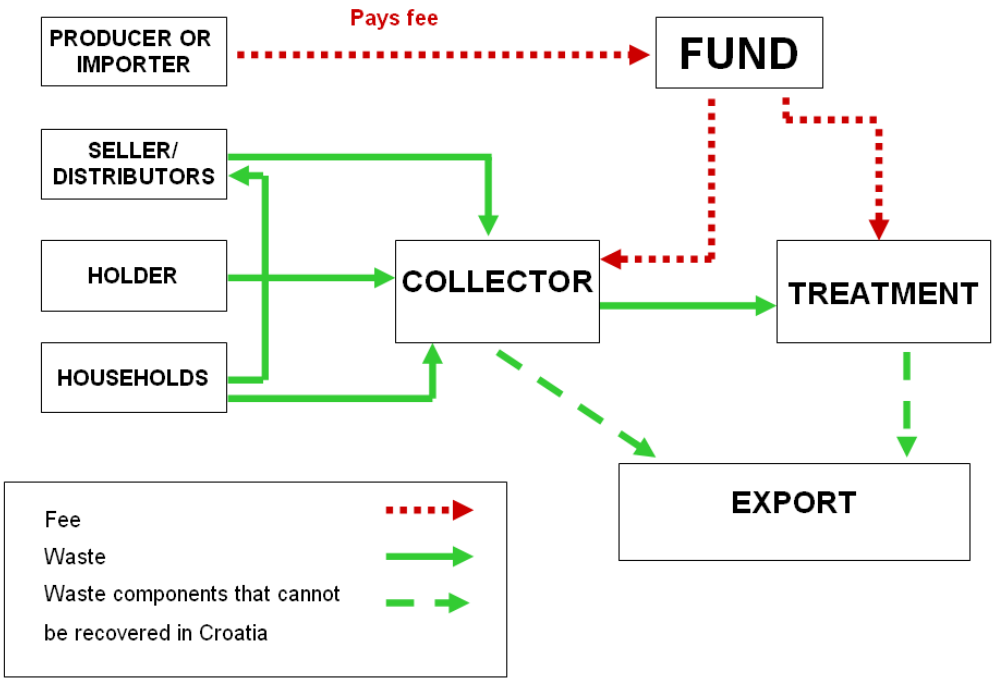
- acquire a permit according to Article 41 of Waste Act (OG 178/04, 111/06, 60/08) and sign a concession contract→**licensed collector**;
- take over waste from holder without any charges;
- transfer waste to treatment facility or export it if there are no possibilities for environmentally sound recovery or disposal in Republic of Croatia;
- keep register waste origin and waste flow;
- deliver data from the register to EPEEF and Croatian Environmental Agency (CEA).

Possible ways for WEEE collection and household WEEE collection are identical. The collection system of WEEE enables following possibilities for holders and households:

- “One-to-one” basis - when supplying a new product, distributors/sellers have to ensure free -of-charge return of WEEE as long as the equipment is of equivalent type and has fulfilled the same functions as the supplied equipment;
- Recycling yards;
- Phone call - if a household or a company has EE appliance or equipment with mass of ≥ 30 kg, the holder can call a free phone number and the licensed collector will come and take it free of charge within 30 days.

A collection/treatment scheme and outlined payments applied in Croatia are illustrated on the following figure:

Figure 23 – Collection/treatment waste system and payments in Croatia



Sources:
1. Strategy of waste management in the Republic of Croatia (OG 130/05)
2. Waste management plan in The Republic of Croatia for the period from 2007 to 2015 (OG 85/07)
3. Waste Act (OG 178/04, 111/06, 60/08)
4. Ordinance on WEEE (OG 74/07)

As the Republic of Croatia is a small country with rather small quantities of separately collected WEEE there's no need for a big number of collectors. There are **three companies licensed for collection**. Since the new WEEE management system is established in Croatia, collectors are obliged to deliver all quantities of collected WEEE to treatment operator. Licensed collectors have spread the collection network over the whole country according to the following map:

Collection network

Each WEEE collection operator prepares report for for month/year using national form ISOEEO that contains:

- Identification data about collection operator
- Report on quantities of collected WEEE from household/other (in kg)
- Submitted to treatment operator – company name
- Treatment operator address
- WEEE according to EE equipment category (in kg)
- Total amount
- Location, date, signature

An example of form ISOEEO is given below.

ISOEEO

REPORT OF THE WEEE COLLECTION OPERATOR for month:_____ year: _____			
COLLECTION OPERATOR INFORMATION			
Collection operator's name (company):			
Address:			
Contact person:			
Telephone:		Facsimile:	
e-mail address:			
Registration number:			
REPORT ON QUANTITIES OF COLLECTED WEEE			
COLLECTED:		**from households**	**other**
	WEEE according to EE equipment category	**kilograms**	**kilograms**
1.	Large household appliances		
2.	Small household appliances		
3.	IT and telecommunication equipment		
4.	Consumer equipment		
5.	Lightning equipment (except gas discharge lamps)		
5.a	Gas discharge lamps		
6.	Electrical and electronic tools (except large-scale stationary industrial tools)		
7.	Toys, leisure and sports equipment		
8.	Medical devices		
9.	Monitor and control instruments		
10.	Automatic dispensers		
TOTAL:			
SUBMITTED TO TREATMENT OPERATOR – company name:			
Treatment operator address:			
	WEEE according to EE equipment category	**kilograms**	**kilograms**
1.	Large household appliances		
2.	Small household appliances		
3.	IT and telecommunication equipment		
4.	Consumer equipment		
5.	Lightning equipment (except gas discharge lamps)		
5.a	Gas discharge lamps		
6.	Electrical and electronic tools (except large-scale stationary industrial tools)		
7.	Toys, leisure and sports equipment		
8.	Medical devices		
9.	Monitor and control instruments		
10.	Automatic dispensers		
TOTAL:			
Location:		Signature:	
Date:			
To be delivered to: Environmental Protection and Energy Efficiency Fund 10 000 Zagreb Ksaver 208		LS	

WEEE delivery receipt is used while collecting WEEE from households – national form PPEEO see below an example.

PPEEO

WEEE DELIVERY RECEIPT				
WEEE taken over by the collection operator:				
WEEE delivered by:	Name and surname:			
	Address:			
No.	WASTE NAME		Quantity/pcs.	
1.				
2.				
3.				
4.				
5.				
6.				
7.				
8.				
9.				
10.				
Owner's signature:			Date:	

Sorting issue

The obligation of separate collection and storage of waste whose valuable properties can be used are prescibed by the Waste Act (Official Gazette No 178/04, No 111/06, No 60/08). Also collected municipal waste should be without hazardous waste. Hazardous waste must be separated from municipal waste. Separate waste collection is organized and is being performed in all counties of Croatia.
Systems of separate collection of paper, cardboard, packaging waste (glass, PET and metal), green waste, spent batteries, medicinal products, oils, vehicle tyres, WEEE, metal bulk waste and construction waste launched in 90's. These systems have been gradually developing in Croatia.
According to Waste Act (Official Gazette No 60/08), every town and municipality has to ensure building up a yard for separate collection of municipal waste by the end of 2008.
Since 2005, systems for the management of individual waste categories have been establishing for packaging and packaging waste, waste tyres, end-of-life vehicles, waste oils, waste batteries and accumulators, WEEE. Systems have achieved excellent results, both in environmental protection and in economic development.

Economic instruments

The Environmental Protection and Energy Efficiency Fund (hereinafter „EPEEF") was established in 2004 as the extra budgetary fund, the legal entity with public authorities determined by law.

The main tasks of the EPEEF are as follows:

- **collection of charges,** e.g. for pollution to environment by different waste types, environment users, etc.);
- **project financing and definition of requirements for the allocation of funding,** e.g. encouragement of waste prevention and reduction, waste treatment and use of valuable properties of waste, encouragement of cleaner production.

The collection scheme applied in Croatia given above outlines that producers and importers of WEEE provide financial contributions to the EPEEF. The finances are used by collectors and treatment operators of WEEE.

MONTENEGRO

Collection issue

Waste Management Law, prescribed in article 50 following provisions with regard to collection of WEEE:

- the waste from electric and electronic goods shall not be mixed with other waste types;
- company or entrepreneur who carries out operations of collection of end-of-life electric and electronic goods shall keep records on waste type and quantity that is collected;
- competent government authority shall set down in details the method and procedure for end-of-life electric and electronic goods management.

In general, the *Regulation on hazardous waste* (still in use) regulates hazardous waste management e.g. separation, collection, transportation (also regulated by the Law on the Transport of Hazardous substances -THS) , etc. this Regulation does not deal with e-waste explicitly.

Also the *Law on public utility service* specifies among other municipal activities the collection of waste generated in the municipality (households, administration, commerce…).

Among priorities of the waste management system defined in the Plan of waste management (hereinafter „Plan“) in Montenegro belong establishing a system for collection and transportation of waste inter alia, which, among other things, requires separate collection and transport of waste components which can be recycled and appropriate legislative and institutional structures in this matter.
The Plan provides that, depending on the specifics of the local environment, municipal waste management system includes several elements as are:

- Expanding the existing areas to collect waste;
- System of selective waste collection and transport, with the possibility of recycling, which includes the establishment the network of collecting centers;
- Building transfer stations (relay points).

The system for collecting waste provides the primary waste separation and collection of certain categories of waste such as packaging material waste, waste tires, waste oil, etc. The Plan also provides the establishment of a network of recycling courtyards, where citizens will be able to storage things for which organized collection is not defined.

Establishment of successful and quality system for the primary separation of waste presumes a high level of public awareness.

An absence of informal collection systems, or their existence at a very poor level belongs among weaknesses of the present waste management system in Montenegro. This situation causes that there is no possibility to use current recycling strategy (for example recycling of plastics) and transfer it to e-waste collection.
There is no specific policy or legislation for e-waste management, only waste management in general.
Also a special infrastructure available for the formal collection of e-waste is missing though it is defined by the Plan, to be built in next 5 years.
There is a general lack of awareness among consumers and collectors of the potential hazards of e-waste to human health and the environment.

Sorting issue

Methods for sorting of WEEE aimed at another utilization of WEEE have been developed but not yet fully implemented. It is needed more time and effort to build up the necessary infrastructure for take-back systems and to implement adequate measures for further waste handling in Montenegro. This effort could be more effective by using internationally recognized technical standards for separate collection of WEEE.

Ecomonic instruments

No information about economic instruments applied in waste management are available.

TURKEY

Collection issue

At present the efforts undertaken by the Ministry of the Environment and Forestry (hereinafter „Ministry“) in relation to the regulations regarding the Waste Electrical and Electronic Equipment are in progress. Although there are no regulations regarding waste electrical and electronic equipment at the moment, the Ministry issues a certificate of conformity so that the processes such as the collection, etc. of such wastes shall be performed by the relevant facilities. Within this scope, there are five certified companies. The particulars of such companies are available on the website of the Ministry at www.atikyonetimicevreorman.gov.tr.

Moreover there are certain chambers and associations engaging in activities related to EEE's in Turkey. The most important of these associations are mentioned below:

- TOBB (Türkiye Odalar ve Borsalar Birliği)
- İSKİD (İklimlendime Soğutma Klima İmalatçıları Derneği)
- TÜRKBESD(Türkiye Beyaz Eşya Sanayicileri Derneği)
- KESİD(Küçük Ev Aletleri Sanayicileri Derneği)
- ECİD(Elektronik Cihazlar İmalatçıları Derneği)
- TESİD(Türk Elektronik Sanayicileri Derneği)
- AMAD(Alışveriş Merkezleri ve Perakendeciler Derneği).

The municipalities scrap dealers and private organizations are engaged in activities about the collection of WEEE’s in Turkey.
There is no collection system based on the manufacture liability described and registered for electrical and electronic household appliances.
In accordance with a study carried out by TURKBESD, there should be approximately 850 collection points operated by municipalities. WEEE will be deposited in these municipal collection points and then be transferred to additional handling. In this process, due to the large number of these local collection points; central collection facilities should also be established. According to the studies of some of the national collection enterprises; there is a need of 15 large collection centers to cover all the geographic area of Turkey.

Sorting issue

Municipalities scrap dealers and private enterprises sort collected WEEE's in Turkey. There is no sorting system that is determined and subjected to registration based on the responsibility of the manufacturer for electrical and electronic household wastes. The first sorting takes place during collection and storage of the collected wastes in practice. Sorting of the wastes is accumulated at the warehouses. To manage of sorting operation in a systematic and registered manner, public collection facilities should be built up operated, so that the consumers can easily return their waste; as it is in many European countries.

Economic instruments

According to the WEEE Forum collection and transportation costs of WEEE represent 40% of the total cost. Accordingly, the annual collection and transportation costs to occur in Turkey:

Total WEEE transportation cost including dispatch	**40.0%**	**€ 35,768,205**

The calculation above does not include the costs such as foundation and operation of the collection centers.

With the unit costs determined by WEEE Forum, the costs including the administrative costs except for the operational collection costs shall be as follows.

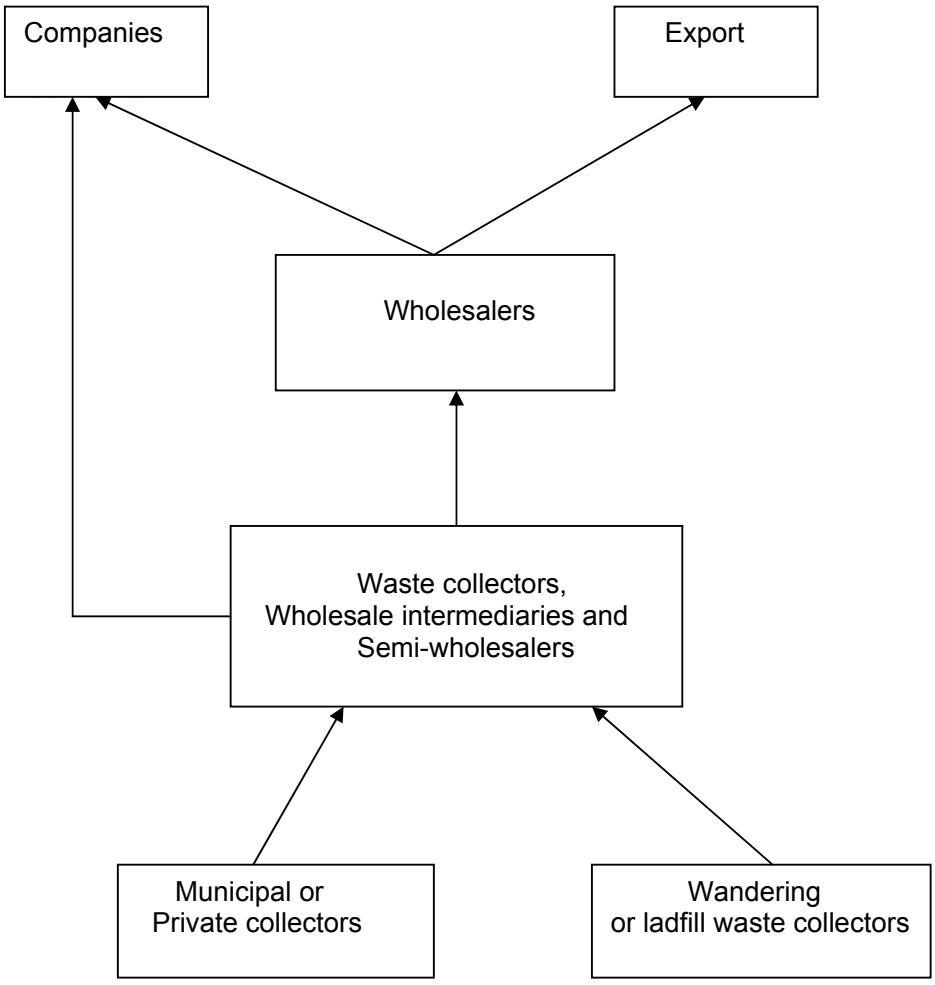
Additional costs	**16.0%**	**€ 14,307,282**

The costs of sorting operation depends on to the time-motion measurement. At present, there's no general data available which can be obtained from the companies that work in this sector.
A number of collection point operated by municipalities proposed by TURKBESD study will assume investment cost of 250.000.000 Euro and an annual operational cost of 50.000.000 Euro. There are also detailed cost studies on these aspects based on studies of some national collection and recycling enterprises. A need of 15 large collection centers declared by these studies will require an investment cost of 35.000.000 Euro and an annual operational cost of 25.000.000 Euro.

ARAB COUNTRIES

The situation regarding applied collection and collection scheme operations, organization of national collection schemes, cost of the schemes, applied economic instruments to facilitate the collection and administrative requirements is very, very poor in Arab countries.
Official collection systems and economic instruments to facilitate the collection of WEEE are not established at present.
Some information about three WEEE items are available. There are numbers of mobile phone handsets via subscribers, PC users through subscribers of internet and TV sets owning by households. All available information about WEEE has only informative character and it should be considered as a rough estimation. Few collection programs for end of life mobile phone batteries are initiated by local mobile operators but not publically propagated in Egypt. **In Morocco**, in terms of quantities of waste and numbers of people involved, **mostly the informal sector practises the collection and recycling of WEEE**. At this time, the formal sector is not ready to replace activities performed by informal sector. Some initiatives have been started to assisst Arab countries with e-waste management. The next figure outlines a simplified diagram of the WEEE collection chain applied in Morocco.

Figure 24 – WEEE collection chain in Morocco



Generally, an income hierarchy exists within this sector, where those at the bottom of the collection chain are the most numerous and earn the least.

Informal sorting of e-waste exists in Morocco as well as in other Arab countries. Here is described the situation in Morocco. Some waste collectors working for municipalities or private firms separate recyclable waste in the refuse truck and then sell it on to wholesale intermediaries. The proportion of WEEE is low and mainly consists of remote controls, radios and other small, broken household appliances. This activity supplements their income. Landfill waste collectors are collectors who sort through dumped waste, in order to recover as much recyclable material as possible. Wandering waste collectors also called ragpickers, they scour the city with a cart and collect recyclable waste from public rubbish bins, factories and dumps. There are no wandering waste collectors that specialise in WEEE as, according to them, the product is difficult to sell on. Some go from house to house, offering to buy EEE (old models sold at very low prices, or sometimes given away). These operators sell what they have collected to wholesale intermediaries (informal managers).
Wholesale intermediaries are usually located in working-class districts and on the edge of cities. They store, sort and/or wash recyclable waste purchased from waste collectors and small intermediaries. They also take part in auctions held by companies in the region and some public authorities. The purchasing strategy consists of making a visual diagnosis of the WEEE (which is often mixed with other items, particularly office furniture), and offering a price on the tonnage, taking into account the fact that the equipment is not in working order, which enables them to make a profit.
In Morocco metallurgy experts estimate that 90% of metal waste collection activities are informal. The majority of this metal is sold abroad, while local metallurgists import raw materials that are more expensive.

The formal sector is represented by following actors active in the collection of WEEE (PCs, TVs and mobile phones) in Morocco:

- Associations and/or NGOs that collect computer equipment (which may or may not be in working order) from companies to repair and distribute it to other associations, rural schools and other organisations. Non-repairable equipment is reused in other areas, with the WEEE resulting from these activities being stored until recycling facilities are created.
- Companies specialising in industrial pollution control. Their services are sometimes engaged by organisations to destroy WEEE and provide a certificate. Some of these companies do not have a waste recovery unit and are therefore unable to ensure the traceability of the waste, preventing them from providing this service. Others have denaturation units (industrial grinders). These companies can play an important role, providing an interface between the generators of waste and recyclers.
- Companies that sell computer equipment. Many offer their customers the possibility of trading in their computer equipment after a period of use (between 2 and 5 years), giving them a discount (of 10% to 30%) on the new equipment. The old traded-in equipment is upgraded and resold to other users, who are less demanding in terms of configuration and aesthetics (cyber cafés, private individuals, etc.).
- Companies specialising in collection, dismantling and recovery. This is a new phenomenon in Morocco, and a number of initiatives are already operational in the market. They operate independently, collecting waste from companies and separating the various components that they sell on the national or international market.

There are presented some experience of the ECODECHET - e-waste collector company that represents an formal sector in Morocco. The company set up in Casablanca two years ago, works with different types of waste (wood, plastic, glass and WEEE) and employs 16 people. Waste is collected from companies, public institutions (mostly hospitals) and waste collectors (at the markets of Derb Ghallef in Casablanca, Souk el Had in Rabat, etc.). The

criteria for purchasing WEEE are based on the functionality, content (with or without hard disk), model and weight. The position of the casing (vertical more expensive than horizontal) and its colour (black is more expensive than white) also influence the purchase price. Thus, the purchase price of a desktop computer varies between 50 and 100 dirhams, a laptop between 100 and 150 dirhams and a television set between 100 and 200 dirhams. Most of the WEEE purchased was manufactured between 1980 and 1990. After collection, the equipment is repaired; non-repairable units are dismantled and the components recovered. Recovered copper (extracted from electrical cables by burning or stripping, without any protection of either workers or the environment) and aluminium are sold to foundries for 40 to 55 dh/kg and 10 to 12 dh/kg respectively. Waste that cannot be reused is stored until a solution is found. Waste is transported by 4 trucks owned by the firm.

The private sector is involved in e-waste management mainly in collection, sorting out, refurbish activities **in Tunisia**. It is difficult to estimate storage conditions because of the fact that the producers of the ultimate waste are various (manufacturers, importers, distributors, repairers and households). **Inadequate storage of e-wastes** in private buildings, indoor or outdoor of the establishment **need to be solved.**

An elaboration of technical and economic study to implement recovery system for e-waste is one of the activities focused on e-waste issue that is realized in Arab region. The main idea of the study is to establish a "*deposit system*" to recover the WEEE management cost in Tunisia. Consumer can recover 80% of this amount when he brings back the old EEE. The study proposes three deposit amount according to the category of WEEE. Producers, manufacturers, importers or distributors of brand equity, have a legal responsibility to ensure the removal of WEEE. The objectives of the study represent:

- environmental objective: encourage people to bring WEEE
- *economic objective*: collect money to finance recovery system:
  - one by one
  - new one for old one
- *social objective*: implementation of small and medium enterprises (SME) for collection and transportation.

6. Reuse possibilities: current levels of reuse of different EEEW, opportunities for greater reuse products or parts of products, barriers to greater reuse, and an example of the best and the worst practices in re-use schemes

6.1 Ways of WEEE Reuse possible in the Mediterranean Region

Electrical and electronic devices are present in most of the professional, domestic and leisure activities equipment more and more each day. Although these devices have their quality of life as their main objective, the waste that they generate once their useful life is over can become an important environmental load for society, if their management is not adequate. On the other hand, they can generate new raw material and generate wealth if they are recycled.
Presently each Mediterranean citizen produces about 20-25 kg of WEEE per year and, in 2004.
The amount recovered in the European Mediterranean countries was 1-2 kg of material per person, and in 2007, the amount recovered materials exceeded 4 kg per person.
In order to mitigate this situation and with the most wide Mediterranean Region objective of collecting 4 kg of material per person by the end of 2006, a new legislation has been approved that requires manufacturers to establish and manage waste collection and recycling, and consumers to deliver no more unwanted EEE to established collection points and centres.

6.2 Objectives of separate collection, recovery, current levels of reuse and recycling of different WEEE

The European Mediterranean countries had to set deadlines for the attainment of the main objective - to achieve a rate of separate collection of at least 4 kilograms on average per inhabitant per year of WEEE from private households - by countries:

Basis	Countries	Deadlines for separate collection 4 kg/inhabitant	Deadlines for levels of recovery, reuse, recycling
Directive 2002/96/EC on WEEE	France, Italy, Spain	31. 12. 2006	31. 12. 2006
Directive 2002/96/EC on WEEE	Greece	31. 12. 2006, with a possibility of prolongation until 31. 12. 2008	31. 12. 2006, with a possibility of prolongation until 31. 12. 2008
Council Decision of 30. 3. 2004 granting the Czech Republic, Estonia, Hungara, Latvia, Lithuania, Slovakia and Slovenia certain temporary derogations from Directive 2002/96/EC on WEEE	Slovenia	31.12.2007	31.12.2007
Council Decision of 26. 4. 2004 granting Cyprus, Malta and Poland certain temporary derogations from Directive 2002/96/EC on WEEE	Cyprus, Malta	31. 12. 2008	31. 12. 2008

In the table 31 there are obligatory levels of recovery, reuse and material reuse of WEEE streams.
Nowadays, for consumer electronics, the minimum percentage recovery by average weight of appliance is at least 75% and the minimum percentage reuse and recycling of components, materials and substances by average weight of appliance is 65%.

Table 31 - Obligatory levels of recovery, reuse and material reuse of WEEE streams

Category	Main WEEE Streams	Recovery [%]	Reuse& Material Reuse [%]
1 10	Large household appliances Automatic dispensers	**80**	**75**
3 4	IT and telecommunications equipment Consumer equipment	**75**	**65**
2 5 6 7 9	Small household appliances Lighting equipment Electrical and electronic tools (the exception of large-scale stationary industrial tools) Toys, leisure and sports equipment Monitoring and control instruments	**70**	**50**
Part of 5	Discharge & fluorescent tubes	**80**	**-**

6.3 Recovery and reuse ”R” operations

R 1	Use principally as a fuel or other means to generate energy

R 2	Solvent reclamation/regeneration
R 3	Recycling/reclamation of organic substances which are not used as solvents including composting and other biological transformation processes)
R 4	Recycling/reclamation of metals and metal compounds
R 5	Recycling/reclamation of other inorganic materials
R 6	Regeneration of acids or bases
R 7	Recovery of components used for pollution abatement
R 8	Recovery of components from catalysts
R 9	Oil re-refining or other reuses of oil
R 10	Land treatment resulting in benefit to agriculture or ecological improvement
R 11	Use of waste obtained from any of the operations numbered R 1 to R 10
R 12	Exchange of waste for submission to any of the operations numbered R 1 to R 11
R 13	Storage of waste pending any of the operations numbered R 1 to R 12 (excluding temporary storage, pending collection, on the site where the waste is produced)

Important notes:
R 1 - This includes incineration facilities dedicated to the processing of municipal solid waste only for the specific energy efficiency.
R 3 - This includes gasification and pyrolisis using the components as chemicals.
R 5 - This includes soil cleaning resulting in recovery of the soil and recycling of inorganic construction materials.
R 12 - If there is no other R code appropriate, this can include preliminary operations prior to recovery including pre-processing such as, inter alia, dismantling, sorting, crushing, compacting, pelletizing, drying, shredding, conditioning, repackaging, separating, blending or mixing prior to submission to any of the operations numbered R1 to R11.
R 13 - Temporary storage means preliminary storage.

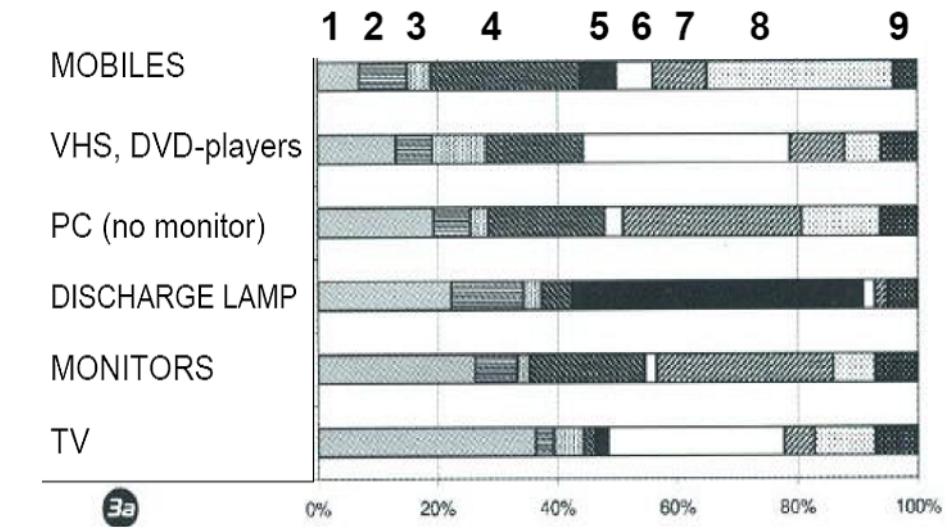
6.4 Opportunities for reuse products or parts of EEE products, barriers to greater reuse

Practical approach to reduce and to prevent WEEE generation and production:

- guarantee extension from 24 month to 36 and more month
- charity and donation actions
- exchange of the EEEs among citizens
- collection by the municipality and further distribution in case of need
- “green” municipal office approach (2-side printing, refilling, etc.)

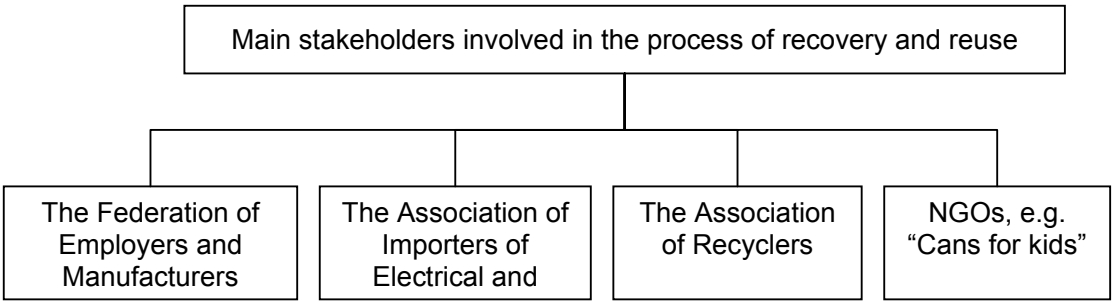
Usual ways of further handling of EEE (2007) are described in the picture below:

- bring on the collection yard (1)
- bring back to the shop (2)
- give to waste company (3)
- still in the house with no use (4)
- throw away in to dustbin (5)
- still in use (6)
- give to anybody else for free (7)
- sell to anybody else (8)
- partly dismantled by owner and reuse for differenet purposes (9)
- other ways not specified



6.5 Examples of the different practices in re-use schemes in the Mediterranean Region

CYPRUS



Data and results from Cyprus are not available.

SLOVENIA

Required recovery levels pursuant to the WEEE Directive and the Rules on WEEE [%]:

	Category	Recovery level	Recycling level	Completion -recycling	Completion - recovery for fuel	Completion - disposal at facilities
1	LHHA	**80**	**75**	**75**	**5**	**20**
2	SHHA	**70**	**50**	**50**	**20**	**30**
3	IT&T	**75**	**65**	**65**	**10**	**25**

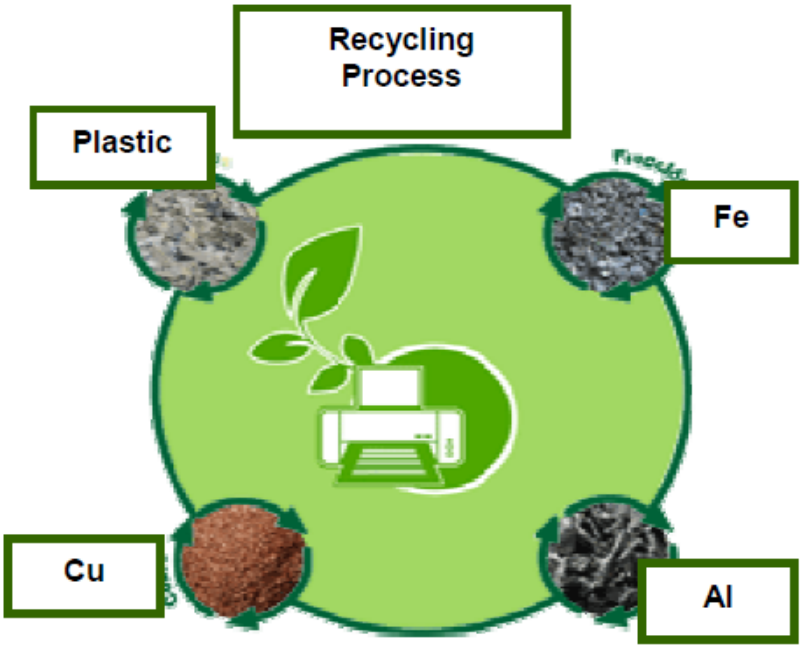
4	Consumer Equipment	**75**	**65**	**65**	**10**	**25**
5	Lighting	**70**	**50**	**50**	**20**	**30**
6	Tools	**70**	**50**	**50**	**20**	**30**
7	Toys/Leisure/ Sports	**70**	**50**	**50**	**20**	**30**
8	Medical	-	-	-	-	-
9	Monitoring & Control	**70**	**50**	**50**	**20**	**30**
10	Automatic	**80**	**75**	**75**	**5**	**20**

SPAIN

WEEE collected and brought into the treatment plants is than, under a strict process, subdivided in three stages:

1. Reception and transfer of the residues in the plants of authorized treatment	**2.** Decontamination of waste components potentially polluted	**3.** Processing in line

The waste residues are processed by successive millings, separations and complex concentration systems that allow to reclaim and to return to the economic circle secondary raw materials among others mostly plastic and metal component.



6.6 Biggest problems and challenges in the reuse of WEEE

Experience is generating the main recent problem - to obtain WEEE, lamps and tubes back from the citizens and companies.

Different methods to collect WEEE households:

collection based on surcharge positive / negative price	voluntary collection, no surcharge (collection in the streets, at schools)	advertising collection, commercial / schools competition

ALBANIA

Possibilities for reuse of waste are accepted by Albanian Law No 9010/2003 on the environmental management of solid waste. An article 11/1 of this Law considers the reuse of waste in the hierarchy of waste management (separation at source; recycling and reuse; composting; landfilling; incineration). Article 11/2 entitles the Minister of Environment and the Minister of Health to approve regulation on each on the above**. So far, no regulation has been adopted on waste reuse.** Neither is reuse monitored.

Following the logic of the obligations under the Stabilization and Association Agreement (hereinafter „SAA“) for trasposition of the waste directives in Albania, expectations for waste to be **reused could be about 10%** of the total volume of the municipal waste generated by 2015. This estimate was made on the believe that transposition of certain directives, will be associated with implementation and enforcement of their requirements, so to complete the full range of legal approximation.

As a matter of fact, **an informal market of WEEE exists in practice.** Considerable numbers of second hand electric and electronic equipment are imported annually and sold in Albania. To a much lesser extent this kind of market develops within the country itself: from Albanian WEEE holders to the special WEEE dealers. Another modest example of reuse, which is neither monitored, nor recorded or estimated, is that of families giving out their old equipment to family members or friends to use. Nevertheless, although in lack of monitoring, records or official data in this respect, considering the economic standard of the population, one may expect a considerable level of WEEE reuse. Obviously, that is due to economic reasoning, rather than a greater environmental awareness among the Albanian population.

BOSNA AND HERZEGOVINA

The objective of both Laws on waste management (Official Gazette FB&H No 33/03; and Official Gazette RS No 53/02) issued by each of two Bosnia and Herzegovina entities - the Federation of Bosnia and Herzegovina (FB&H) and the Republika Srpska (RS) is inter alia to encourage and provide the basic conditions for processing of waste for reuse.

The issue of **reuse is not yet regulated in Bosnia and Herzegovina**, nor there is a market for the secondary raw materials. Reuse of waste is not a practice. Also no information about reuse possibilities such as second hand market of used electric and electronic equipments were available. Economic policies in this field of work or incentives for development of waste reuse do not exist in Bosnia and Herzegovina at present.

However, the strategic document - Strategy for Environment Protection FB&H cites an economic instrument to facilitate reuse of waste it is not currently applied. The purpose of this instrument for the future as indicated in the strategic document will be an efficient use of resources.

As an additional measure, the Strategy for Environment Protection FB&H proposes an introduction of schemes for return (refund) of old and used electric and electronic equipment to the original producer, in accordance with EU Directive on electric and electronic waste (2002/96/EC).

The table 32 shows operational objectives for the perspective refunding of e-waste in FB&H.

Table 32 - Objectives for e-waste refund

Objective	2011	2014	2018
Increase of the percentage of waste reuse and recycling	20%	30%	70%

CROATIA

The national Ordinance on the management of waste electrical and electronic appliances and equipment (Ordinance on WEEE - OG 74/07) states that:

- a producer is obliged to ensure possibility for dismantling and disposal of the equipment, and specially reuse and recycling of its components. Also producer must not prevent reuse of WEEE through his manufacturing processes, unless such specific processes present overriding advantages with regard to the protection of the environment and/or safety requirements - Article 6;
- a producer has to provide reuse and treatment information for each type of new EEE put on the market within one year after the equipment is put on the market. This information shall identify the different EEE components and materials, as well as the location of dangerous substances and preparations in EEE. It shall be made available to collectors and treatment facilities in the form of manuals or by means of electronic media (e.g. CD ROM or online services) - Article 9.
- collection and transport of WEEE from holder to the treatment facility have to be done in the way that would enable reuse, dismantling and recycling. WEEE mustn't be dismantled by the holder in private households, but it has to be collected as a whole – Article 12.

Reuse of whole used appliances isn't especially encouraged in Croatia. Holders can sell or donate used electric and electronic equipments. Reuse of components is possible and common in repair shops where usable components are used as spare parts. Unutilizable parts are collected and delivered to additional handling.

The public awareness of the problems **related to WEEE management is still at low level** in Croatia. Reuse is not an exemption. It is necessary to organize more campaigns focused on raising public knowledge as well as to increase quality and quantity of information that people can get through media.

MONTENEGRO

Generally, reuse of WEEE offers the opportunity to avoid waste generation and therefore must be considered as important part of WEEE management. Seeing that **no specific policy or legislation for e-waste management exists** in Montenegro **reuse and refurbishment of WEEE is currently not actually organized** there. Moreover there are **no**

data on number of electrical household appliances in Montenegro, and duration of their usage at present.
What is worse the few informal activities associated with e-waste might lead to the exposure of individuals to hazardous substances and local pollution of the environment. There is a general lack of public awareness of the potential hazards of e-waste to human health and the environment.

Methods aimed at re-using end-of-life goods, obtaining valuable material contained in WEEE have been developed but not yet fully implemented. It needs more time and effort to build up the necessary infrastructure for take-back systems and to implement adequate reuse measures.

TURKEY

Although there are no regulations regarding waste electrical and electronic equipment at the moment in Turkey, the Ministry of the Environment and Forestry solves this problem by issuing certificates of conformity so that the processes such as the reuse, etc. of such wastes shall be performed by the relevant facilities.
Certificates of comformity repairing and testing reusable second-hand products from the collected WEEE's are granted to two companies.

The parts suitable for reuse are sorted from the wastes.The waste product or part is sold as second-hand for reuse for the revenues of the companies engaging in such activities.

If there is no possible to prioritize the reuse of and to reuse the WEEE compounds and parts, the WEEE recycling plants are solutions.

Turkey identifies some negative aspects in relation to the products to be reused faced by the people engaging in recycling and producers of products with reuse face.
People engaging in recycling signalized following problems relate with the products to be reused:

- The constantly renewed technology poses some difficulties about the reuse of the electronic equipment becoming old or out-fashioned because of it.
- The fast technological development in this realm make labor specialized in these respects necessary at the stage of offer of such products to the market for use as second hand.
- The employment of qualified staff with technical knowledge and equipment to enable reuse in recycling plants in sufficient numbers is an important problem. Indeed, the need for staff causes an increase in operational costs of the products offered to the market for reuse purposes.
- **No suitable market is found for the second-hand products offered to the market for reuse after repair.**

From this point of view the reuse is not considered very positively due to economic reasons by recycling companies.

The producers of products with reuse face following problems:

- *product safety and the protection of the consumer*
  The principles necessary for the products to be prevented from posing a risk against safety of people and goods have been defined in the regulations for products safety in Turkey as is the case with Europe. The similar rules are applied for sale in order to protect the consumer and to prevent them from being misled are also defined by the relevant legislation. The reused/recycled products should also meet these requirements as well as the liabilities in terms of safety, product functionality, reliability, efficiency, performance declaration and CE. As this market is not regulated as needed, these rules are not applied for the products sold for reuse purposes. The

component added to the new product may not be suitable for such product and flaws occur with product functionality, safety and performance as the necessary tests are not run.

- *energy labeling and limits*
  Energy saving up to 65% has been realized in especially the white goods with new technologies and techniques over the last 10 years. Thus the consumer should know how much energy the products that are renewed and sold to the consumers spend. And for this, the products should have energy labeling like new products. Otherwise, the consumer will not know that the product bought spends more energy than the new products by half and will be misled.
- *chemicals*
  The use of some chemicals such as some substances decreasing the ozone layer and cooler gasses and some chemicals as in the example of RoHS has been prohibited during the recent years. This should be taken into consideration most seriously in reuse by recycling. These substances hazardous to the human health and environment should also not be found in the products offered for sale. Otherwise, health of the consumers especially with lower level income shall be compromised and the processes created for the protection of the environment shall be undermined.
- *product liability*
  The renewed products bear the trademark of the trademark of the original manufacturer. However, the owner of the trademark on the product should be held responsible for products modified by another company (offering the product for sale after renewing), added components not used by the original manufacturer and processed with the original manufacturer being aware.

Due to all these reasons explained above, especially the large companies owning a trademark deliver such products to the recycling plants on the condition of not being recycled.

ARAB COUNTRIES

Based on responses from Arab countries to the questionnaire prepared by BCRC Egypt for the purpose of monitoring the e-waste situation in light of reuse in the region the following conclusion can be done:

- **Algeria, Egypt and Morocco** have confirmed that **reuse of e-waste is applied** in these countries.
- **Current levels of reuse of different EEEW differ**. The range of reuse of e-waste is 15 – 20% in Algeria, 25 – 30% in Egypt and 20 – 30% in Morocco. Presented percents are estimations.There were no information available from the rest of the countries in the region – Lebanon, Libya, Palestine, Syria and Tunisia – regarding this issue.
- **None of countries** in the region **provided information about opportunities for greater reuse products or parts of products, barriers to greater reuse, example of best and worst practices in re-use schemes. No information are available.**

Some information about used practices regarding reuse of e-waste in Morocco are available.
EEE repairers represent an important link in the overall organisational chain of the waste management sector in Morocco. The waste generated comes from recycling, changing faulty parts, etc. However, the management of WEEE differs between the formal and informal sectors. Some retailers provide the after-sales service themselves and either store WEEE, discard it together with ordinary waste, or export it to be recycled. Some entrust their WEE to industrial pollution control companies for denaturation (especially when the brand name is visible). Other retailers sub-contract the after-sales service to special firms, which store the

WEEE or sell it by weight to waste collectors. Few retailers give their WEEE to processing companies, as the offer is very limited and the cost is high.
With regard to the informal sector, most repairers learn the trade on the job, and the majority work with households. Part of the WEEE comes from equipment that the repairer abandons due to a lack of spare parts or the prohibitive cost of repairing it. Another part is bought from customers who find the cost of repair too high. WEEE with no further use is usually discarded in public rubbish bins, while operators in second-hand markets sell their unwanted equipment to waste collectors for 1 dirham per kilo. To give an example, the Derb Ghallef informal market in Casablanca has 218 stalls for the sale and repair of mobile phones, 186 stalls for the sale and repair of computers and 135 stalls for the sale and repair of household appliances. The informal market in Meknes has approximately 30 sale and repair stalls.

It is presumed that descibed situation of e-waste reuse in Morocco is similar to the situation in Egypt and Algeria that confirmed e-waste reuse in the country.

7. Technology to treat, process or dispose of EEEW: capacities and inputs/outputs for existing technologies for sorting, treatment including recovery, recycling and disposal

7.1 Selective treatment for materials and components of WEEE in the Mediterranean Region

Main process within the WEEE treatment is manual dismantling and removing of waste stated under first three points: hazardous substances, preparations and components. Waste from the mechanical treatment of waste, arising mainly as removed non fixed parts or components of WEEE within cleaning, sorting or visual control of WEEE.

Metal waste is in WEEE treatment process dismantled and removed from WEEE just where this is easy and readily to ensure. Also waste plastics arising within the sorting and visual control of WEEE, and removing of non fixed parts and components.

Special attention is given to control, that within waste plastics from mechanical treatment (sorting) there is no plastic casings of WEEE, containing brominated flame retardants. In the procedures of sorting and visual control also waste glass, textile and wood arise. Separate sorting of this waste is done within the process of sorting of WEEE.

WEEE is treated separately by similar groups of appliances, what ensure that for components, materials and substances from WEEE, reuse, recycling or recovery is ensured in accordance with targets, set in the directive. In the treatment facility management of WEEE must be separated from management of other kind of waste. In the case that operator treating WEEE for different collective WEEE managements plans, all the mass flow and other evidences must be separately managed for each management plan.

As a minimum the following substances, preparations and components have to be removed from any separately collected WEEE. These substances, preparations and components shall be disposed of or recovered in compliance with national hazardous wastes legal documents and regulation.

Components
polychlorinated biphenyls (PCB) containing capacitors
mercury (Hg) containing components, such as switches or backlighting lamps
batteries
printed circuit boards of mobile phones generally, and of other devices if the surface of the printed circuit board is greater than 10 cm^2
toner cartridges, liquid and pasty, as well as colour toner
plastic containing brominated flame retardants
asbestos waste and components which contain asbestos
cathode ray tubes
CFC, HCFC or HFC, HC
gas discharge lamps
liquid crystal displays (together with their casing where appropriate) of a surface greater than 100 cm^2 and all those back-lighted with gas discharge lamps
external electric cables
components containing refractory ceramic fibres
components containing radioactive substances
electrolyte capacitors containing substances of concern (height > 25 mm, diameter > 25 mm or proportionately similar volume)
cathode ray tubes; the fluorescent coating has to be removed
equipment containing gases that are ozone depleting or have a global warming potential GWP > 15, such as those contained in foams and refrigeration circuits: the gases must be properly extracted and properly treated; ozone-depleting gases must be treated in accordance the national regulation
gas discharge lamps; Hg has to be removed

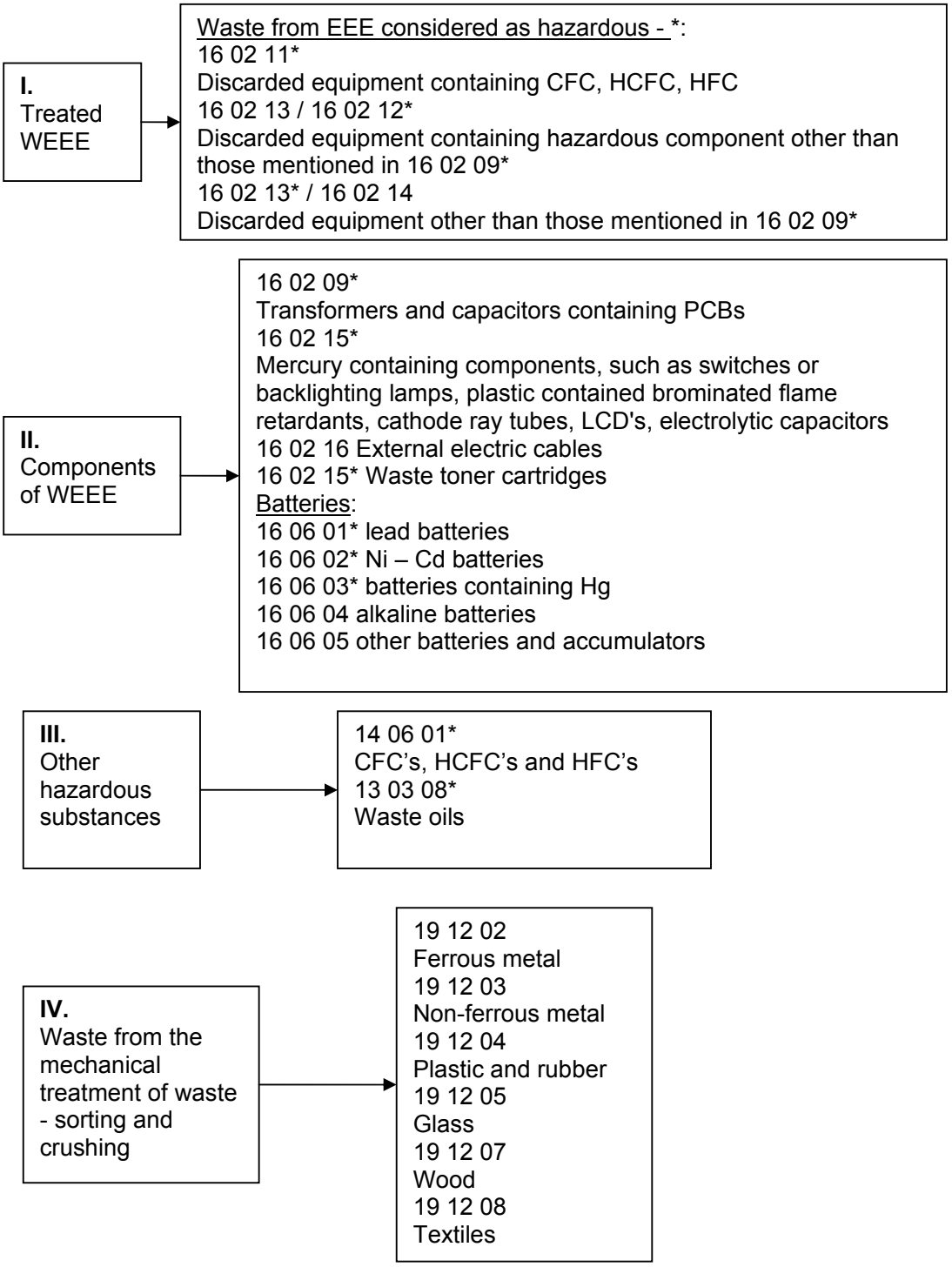
The environmental considerations and the desirability of reuse and recycling, shall be applied in such a way that environmentally-sound reuse and recycling of components or whole appliances is not hindered.

7.1.1 Need to Recycle and Reuse

The best environmental option for WEEE is, whenever possible, to repair or reuse the devices, thus avoiding their becoming waste. This requires logistics which allow the conservation of the EEE features with adequate collection, transportation, classification and storage to avoid deterioration that would prevent its reutilization. Secondly, there is the option of dismantling or crushing them for recycling.

WEEE recycling requires previous adequate treatment and, if possible, the substitution of dangerous material and substances for others which are less polluting. If adequate dismantling is not carried out, the dangerous substance that WEEE contains can contaminate the recovered material. All devices must be identified with the symbol of a crossed out container to inform consumers that they cannot be thrown in the garbage.

In treatment facilities the WEEE is stored, sorted and manually dismantled. Due to the fact that only first step of treatment is done, there are 4 main groups of waste representing mass flow out of the facility:



7.2 Existing technologies for sorting, treatment including recovery, recycling and disposal

WEEE can be processed using long established processes, such as the use of shredders / fragmentisers to process the majority of items in category 1 apart from fridges and freezers.

For a number of products e.g. fridges and freezers, small WEEE items, CRTs and fluorescent lighting, specialist processing facilities are required. Some of these specialised processes may be located at an integrated WEEE treatment facility that has been designed to treat smaller WEEE items in accordance with the treatment requirements of the WEEE Directive. In addition, dismantlers process some IT and telecoms equipment.

7.2.1 Shredders/Fragmentisers

Shredders/fragmentisers are long-established processes for treating general ferrous metal. They normally process a mixture of end-of-life vehicles (ELVs), mixed light iron items, and LHHA - white goods. The fragmentiser shreds the material to less than 150 mm in size, and the shredded material is fed to an air separator which separates the material into two fractions; a heavy, metal-rich, stream and a light, mainly non-metallic stream.

Ferrous metal is extracted from the heavy stream using an over-band magnet to produce the ferrous metal product. The remaining material from the heavy product, which is a mixture of non-ferrous metals, rubber and other non-metallic items, is then processed in a heavy media plant to recover the non-ferrous metals. The light stream, which is the residual waste stream, contains materials such as plastics.

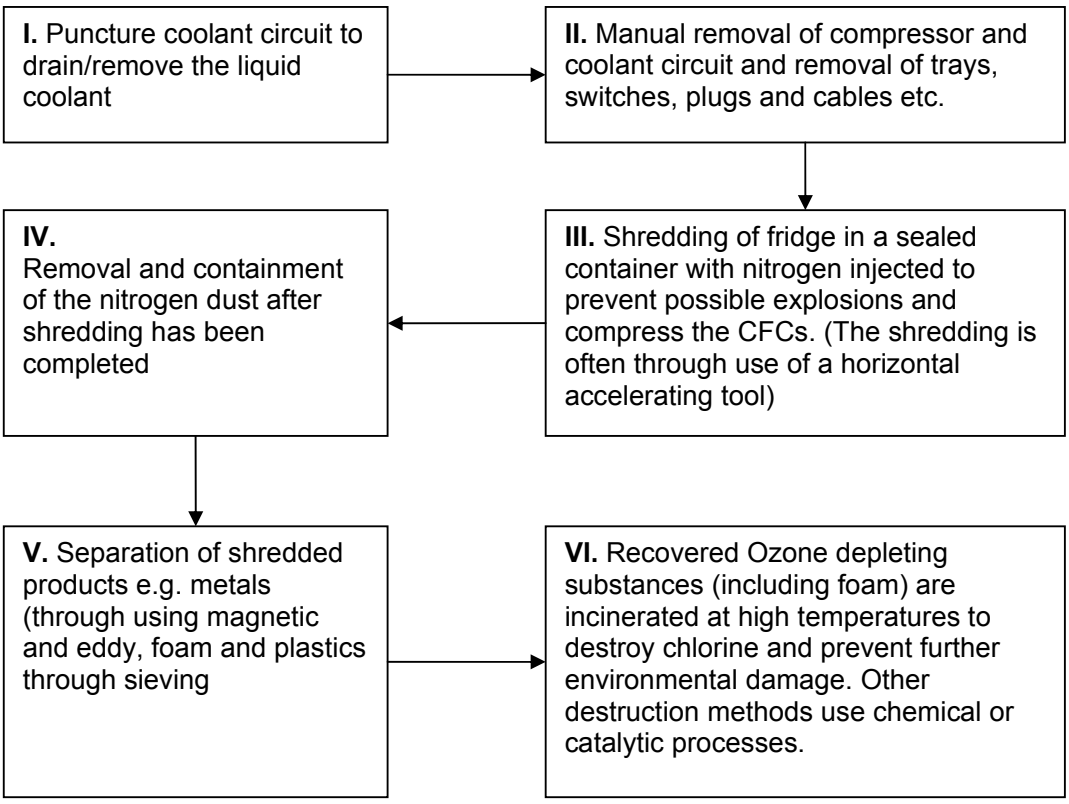
The residual waste stream was historically consigned to landfill. However, the introduction of the WEEE measurements now means that processing of this stream is now necessary in order to meet the recycling targets for defined categories of EEE. The additional processing is mainly concentrating on recovering plastics.

7.2.2 Dismantlers

Dismantling of ICT equipment has been operating for many years. This is because whilst it is a labour intensive process, the value of the materials and components is greater than the cost for dismantling. Some mechanical processing of the dismantled units may be conducted to enable additional materials to be separated for recycling. Some dismantlers are likely to expand their operations by processing small mixed WEEE items. This is because manufacturers will need to meet the costs for this activity.

7.2.2.1 Fridges and Freezers

The Ozone Depleting Substances multilateral environmental measures require all ozone depleting substances to be recovered from refrigeration equipment. In fridges and freezers both the coolant and insulating foam can contain Ozone depleting substances. There are several techniques for recycling fridges including various stages:



7.2.2.2 Small WEEE Items

Processes for treating these items are based on shredding, followed by mechanical separation. In 2007, Sims Mirec process used a two stage shredding process to reduce the material to less than 20 mm in size. Metal is then extracted from the shredded material using an over-band magnet to remove ferrous metal followed by an eddy current separator which removes nonferrous metal. The remaining non-metallic material is then processed in a water separator that produces two product streams; one is mainly circuit boards and wire, whilst the other contains mixed plastics and glass. The mixed plastics and glass stream is then sent to another process for further separation to recover the plastics.

7.2.2.3 Fluorescent Lighting

Fluorescent lights are classified as hazardous waste because of their Hg content. It is required that the Hg is removed from these lights. Currently there are two methods for removing mercury from fluorescent lamps. One method is to cut the end off the tube and remove the mercury and phosphor powder, and the second is to shred the complete light and then mechanically separate out the powder.

An established technique for re-processing fluorescent tubes involves breaking the tube into waste fractions and then extracting the mercury. The process is done in 2 stages:

I. The fluorescent tubes are crushed, sieved and separated producing a fluorescent powder, glass and metal. The powder is heated under vacuum while simultaneously supplying oxygen to the afterburner. Through varying the vacuum pressure mercury can be extracted from the powder and collected in condensers. Approximately 99 % of the Hg can be recovered.

II. Alternatively size reduction equipment techniques can be used. These operate by crushing the tubes, while a filter traps the mercury vapour that can then be either disposed of or sent for recycling. The mercury can be sold back into industry for use in products such as barometers, thermometers etc.

7.2.2.4 Cathode Ray Tubes (CRTs)

The WEEE legislation requires that the CRT is removed from the TV/monitor and that the fluorescent coating in the CRT is removed. The 2 methods that can be used to achieve this are:

I. Manually remove the CRT from the TV/monitor, split it to separate the funnel glass from the front panel glass, and manually remove the coating from the front panel

6 methods that can be used to split the front glass from the panel glass:
1. NiCr hot wire cutting
2. thermal shock
3. laser cutting
4. diamond wire
5. diamond saw
6. water jet

II. Manually remove the CRT from the TV/monitor, shred it, and then mechanically recover the products (including the coating).

7.2.2.4.1 Example of CRTs separation using a water jet

The Water jet method is being developed in the USA and the diamond wire method is very slow and generates dust. Most of the technical problems with the NiCr hot wire method have been overcome, and the laser cutting method is also being used by Proventia in 2007 commercially. After the front glass and funnel glass have been separated, the fluorescent coating is removed. Cutting processes use water as a lubricant and this turns the phosphor coating into a sludge which is then vacuumed off.

7.2.2.4.2 Example of CRTs separation using a shredding process

The alternative processes involve shredding of the CRT, and then separating the front and panel glass and recovering the coating. When the whole unit is shredded, the glass is

mechanically separated from the other material streams, such as metals, plastics, circuit board and cable. The two types of glass can be separated using a number of different techniques including density separation, sizing, UV light, visible light or X-ray fluorescence. One example of this type of process is that developed by the Sims Mirec group in 2007.

7.2.2.4.3 Examples of CRT's Best Available Treatment, Recycling and Recovery Techniques

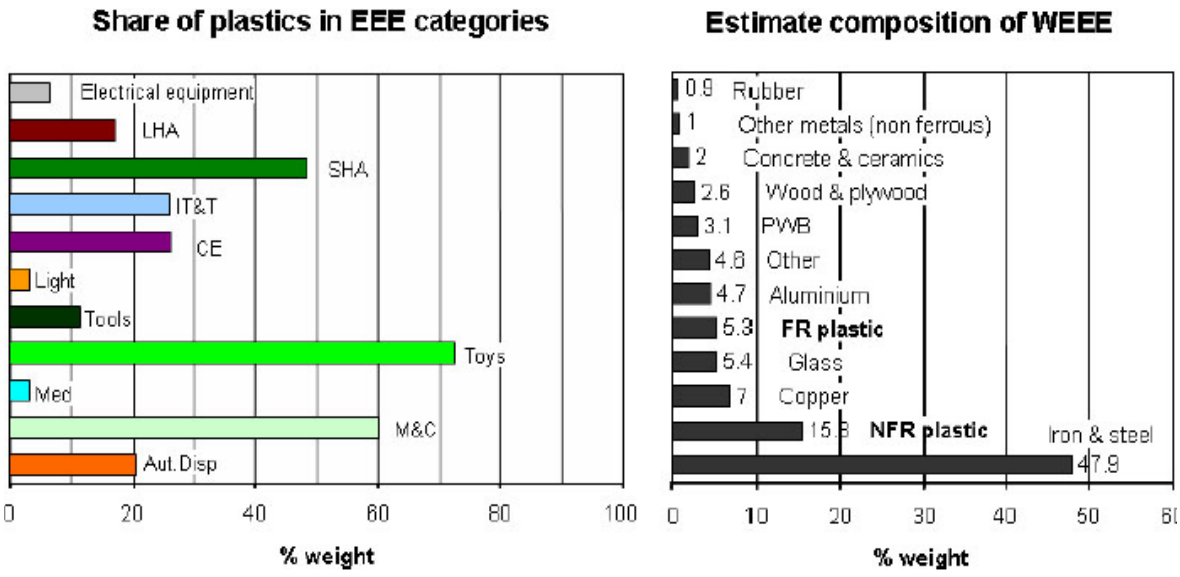
The option demonstrating compliance with the BATRRT requirement is that the fluorescent coatings have been removed as a separately identifiable fraction. Furthermore, it is unlikely to be regarded as BATRRT if the mixing and contamination of the various fractions preclude recycling of the glass.

A further potential treatment route for CRTs is in lead recycling. This smelting process could take un-shredded CRTs but may not "technically" meet the requirements of BATRRT regarding removal of the fluorescent coating.

7.2.2.5 Plastics

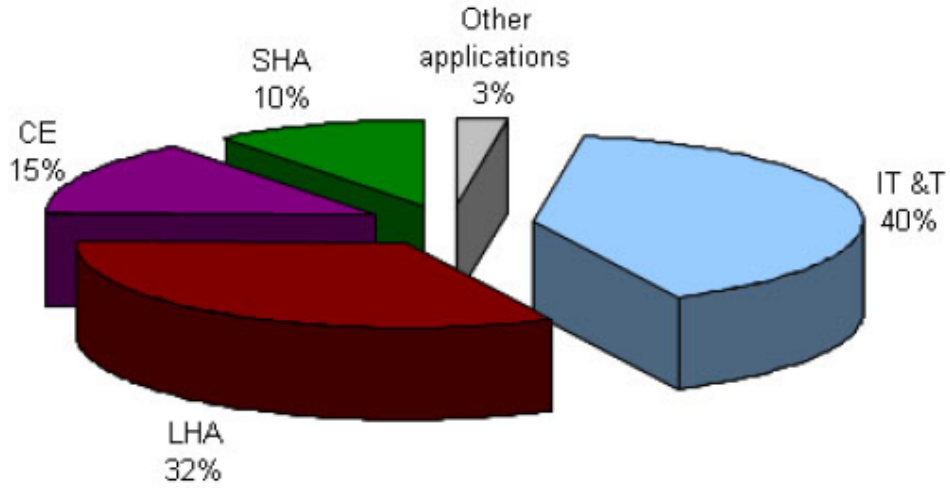
Information about the amount and composition of collected WEEE plastics in Europe is described in the figure below and shows that on average, plastics make up about 20 % by weight of end-of-life electronic products, although the share of plastics and the polymer composition vary enormously between categories.

Figure 25 - Average plastic in each of the E&E categories (left) and its overall content in WEEE (right), 2001



Next figure (26) shows that just three (IT&T equipment, LHHA and CE) out of 10 WEEE categories account for around 85 % of plastic consumption in the sector.

Figure 26 - Plastic consumption by main categories in E&E sector in Europe, 2001



Those same three categories represent above 85 % of collected WEEE nowadays and, hence, are the major sources of recoverable plastic in the waste stream.

7.2.2.5.1 Common types of polymers in collected WEEE

The WEEE collection results and the typical consumption figures by polymer supplied by the industry and the most common polymers in current collected WEEE are:

Polystyrene (PS) and Acrylonitrile Butadiene Styrene (ABS) from inner shelving and liner of cold appliances
ABS, Polycarbonate and ABS blends (PC/ABS) and High Impact Polystyrene (HIPS) from CE and IT&T equipment, such as TVs and PCs (especially monitors) and mobile phones
Polyurethane (PUR) from large household cooling appliances insulation
Polypropylene (PP) due to parts in LHHA (e.g. washing machines and dishwashers)

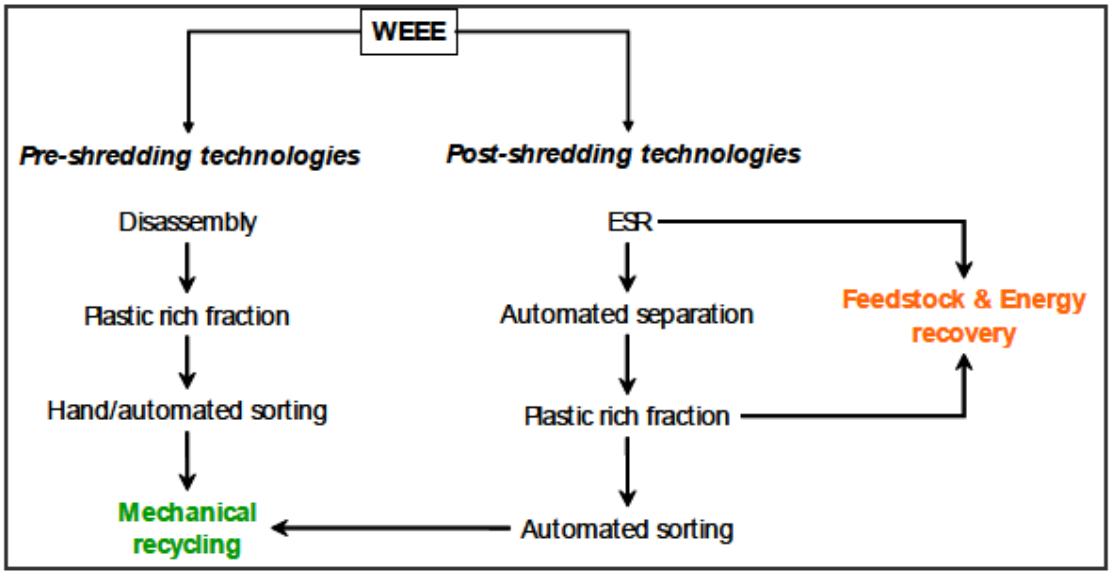
Epoxy resins used as substrate in Printed Wiring Boards (PWBs) are another polymer that is consistently found in most collected WEEE, but that, due to removal requirements set out in the WEEE regulations and current industry practices, are directed to metal-rich recovery routes. In addition, a broad range of polymers are present in small quantities in miscellaneous WEEE, as they are used for specific roles.

Two main routes can be foreseen as alternative treatments for plastic from WEEE:

1. Pre-shredding mechanical recycling treatments (based on hand/automated sorting & disassembly of large plastic parts), and

2. Post-shredding technologies, either aimed at mechanical recycling of sorted polymers fractions or at recovery of mixed plastics, or unsorted shredder residue.

7.2.2.5.2 Treatment routes for WEEE plastics



In the case of large plastic parts from manual dismantling, the recycling alternative usually consists of several steps of cleaning and inserts removal the (automated) identification of polymers/additives and the sorting into regrind compatible fractions for reprocessing. This recycling option is usually the treatment choice for styrenics from housings of TVs & monitors and inner shelving & lining of cooling appliances, as well as the potential alternative for the rigid PUR foam insulation of refrigerators and freezers. The recycling options for miscellaneous small equipment, (e.g. mobile phones, SHHA, IT peripherals) are mechanical treatment based on coarse shredding and mechanical separation of plastics into different polymer fractions.

Processes that can accept the whole waste stream or post shredder plastic rich mixtures from electronic scrap (ESR) can be viable alternatives to help increase the recovery ratio of complex WEEE mixtures, where the presence of fillers and additives in the heterogeneous polymer fraction, as well as contamination with other materials, hinders recycling by requiring expensive sorting and cleaning stages and affecting the final quality of the plastic recyclates.

Incineration with energy recovery and use of plastic rich ESR as secondary fuel and raw material in industrial processes - cement kilns, blast and smelter furnaces - are recovery solutions to otherwise untreated waste fractions annually in excess in the Mediterranean Region such as plastic content in shredder residue. Feedstock recovery processes oxidative and thermal processes - pyrolysis, gasification and combined technologies – are reasonable alternatives to combustion for opening new markets to materials and energy recovered from plastic waste (pyrolytic oils, syngas, methanol, olefins, marketable non-plastic by products such as vitrified mineral slag and electricity or district heating).

However, the European Plastics Recyclers Association confirmed the lack of information about the amounts of plastics generated from WEEE treatment and their final destinations. Recycling appears as the most frequently declared end for plastic fractions - both mixed and sorted. In the case of mixed plastic fractions several recyclers also declared that those streams are totally or partially disposed of without any recovery (landfill/incineration) or sent to other recovery options i.e. energy recovery.

Concluded estimations of the Association is that the overall plastics mechanical recycling rates for all applications in Europe is only 4.1 % of plastics raw material placed on the European market, i.e. 2.2 million tonnes total processed waste in the Region in 2006.

According to the PlasticsEurope estimates in 2002, total recovery of WEEE, as a proportion of end-use plastics waste stood at around 4.1 % - equivalent to 35,000 tonnes.

7.3 Examples of the different treatment practices schemes in the Mediterranean Region

7.3.1 CYPRUS

Recyclers in Cyprus constitute small quantities of waste and they contribute in the development/implementation of the appropriate waste management schemes.

Main waste stream in Cyprus for WEEE are TV sets, IT&T and LHHA. Based on the estimated 12 kg waste production per capita, it is supposed that the year WEEE production may be 4,000 tonnes.

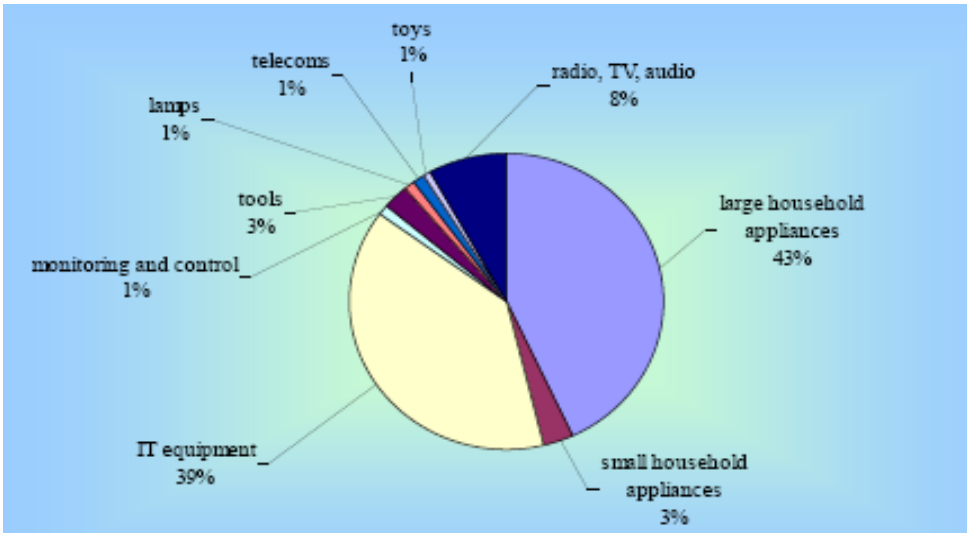
Table 33 – Targets of WEEE recovery, reuse/recycling

EEE	Recovery %	Reuse / Recycling %
LHHA	80	75
Automatic dispensers		
IT&T	75	65
Consuming products		
SHHA	70	50
Lamps		
Tools		
Entertainment equipment		
M&C		
Medical equipment	-	-

A product tax will be charged based on the difference between target recovery rate and actual rate achieved.

Main recycling Services in Cyprus:
9 - licensed municipal waste collectors
11 - licensed scrap metal collectors
8 - licensed recyclers and many others awaiting licensing

Figure 26 - WEEE composition in Cyprus



Problems with recycling in Cyprus:

- High initial investment costs,
- Small volumes of recycled material,
- High shipping rates and port taxes,
- Low international rates on recycled material,
- Fluctuation of market prices,
- Lack of qualified personnel,
- High cost of personnel,
- Lack of public awareness to support recycling.

7.3.2 FRANCE

The European Recycling Platform France - the compliance scheme - is, for its members, responsible for both removal and treatment of the WEEE. To do so, ERP intends to:

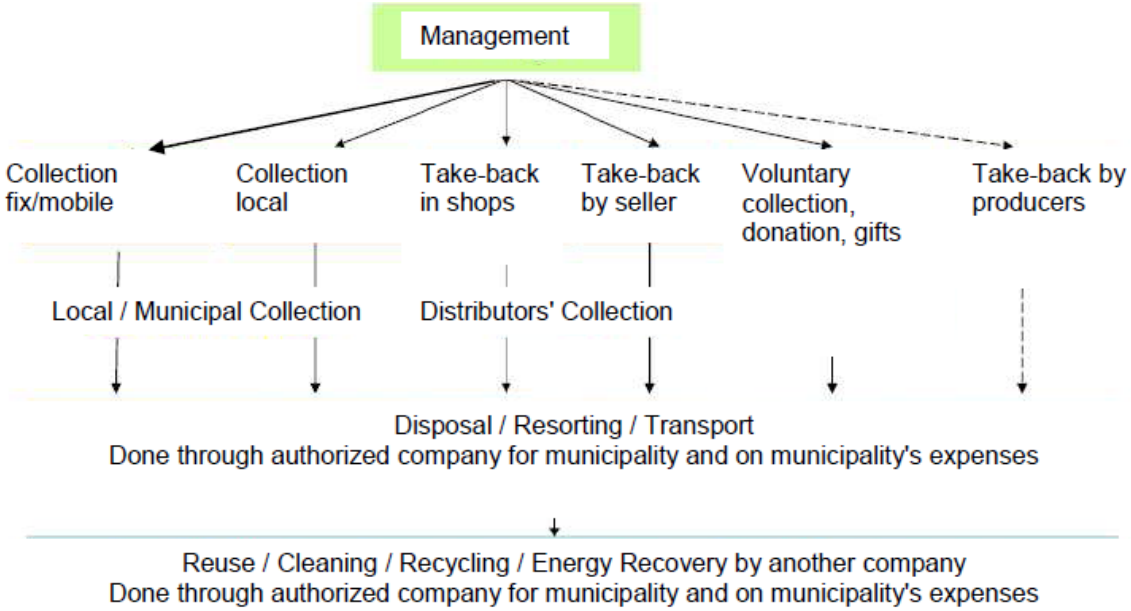
- fulfil the obligations specific to producers of EEE (producers, importers, distributors of products with their brand),
- promote innovative recycling technologies at the lowest cost,
- open new opportunities for pan-European recycling services,
- establish a dynamic in the world of WEEE, which is beneficial to producers and ultimately to consumers,
- allow different actors - producers, distributors, communities - to have a choice of interlocutors on WEEE.

In France 4 éco-organizations were approved for the treatment of the domestic WEEE:

EcoLogic	**Ecologic** Eco-organization approved for all safe WEEE of category 5 (Lamps). http://www.ecologic-france.com
Eco-systèmes	**Eco-Systémes** The association of LHHA, white and brown goods, incl. TVs and lightings. http://www.eco-systemes.com

ERP France Valorisation des Déchets d'Equipements Electriques et Electroniques - DEEE	**ERP France** Eco-organization approved for all 10 categories of WEEE and batteries collection. http://www.erp-recycling.org/france.html
récylum régénérons la lumière	**Récylum** Organizes the collection and the recycling of the used lamps held by the private individuals and the professional companies. http://www.recylum.com/

More detailed information about the collection systems is in chapter 5.



19,533 T of WEEE treated and contracted through ERP System in France in 2007:

Flux	Reuse (pcs)	Reuse (T)	Recovery (T)	Recycling (T)	Energy Recovery(T)	Destruction (T)
LHHA + cold EEE	3 603	173	0	2 200	785	281
LHHA – cold EEE	970	43	0	5 142	287	998
SCREENs	405	14	0	4 088	451	319
mixed SHHA	1 675	8	0	3 386	580	777
TOTAL = 19 533 tonnes	6 653	238	0	14 817	2 103	2 375

7.3.3 ITALY

ECODOM
Consorzio Italiano
Recupero e Riciclaggio
Elettrodomestici

7.3.3.1 Separate waste collection by Ecodom

The first step is to start the efficient WEEE recycling process for consumers and to separate recyclable products. Consumers should, on the other hand, bring their old household appliances to the local collection site or return them into the shops when they purchase new once. The free take-back by the distributers is being implemented and coming into force by the specific decree.

WEEE is technological rubbish, in most cases, made up of components which are dangerous for the environment, and which cannot be disposed of in normal landfills but in special plants.

There is waste separated by various hi-tech depending on the type into 5 groups, chosen specifically on the basis of the necessary technology for the appropriate treatment:

Group	EEE
R1	cold and air conditioners, fridges, air conditioners and water heaters
R2	LHHA, washing machines, dishwashers, ovens, hobs
R3	TV and monitors
R4	SHHA, consumer electronic and electric, lighting
R5	fluorescent heat source

After sorting into the groups, WEEE are picked up from the collective system and carried off for recycling. The Ecodom system (WEEE group R1, R2, R4) starts its operation which includes transportation, the treatment and the supervision of the recycling and, of course, disposal of EEE waste. The overall picture of the scheme is in the picture below.

ecoR'it

7.3.3.2 Separate waste collection by EcoR'it

EcoR'it guarantees an efficient and effective service of differentiated collection of WEEE over all of Italy, in compliance with the measures of the law. EcoR'it uses the top suppliers in terms of the best techniques available for treatment, recovery and recycling.

The selected suppliers cover all the phases of WEEE management with an integrated service and are divided into:

Logistics firms, for the following operations:

- collection;
- transport with permits;
- temporary storage at the intermediate platform (if applicable);
- delivery to the end plants.

↓

Treatment firms, for the following operations:

- putting in reserve (pre-treatment);
- recycling and reconditioning;
- treatment;
- separation, recovery (material or energy recovery);
- disposal (only of the fractions that are not recoverable);
- reporting.

Remedia
PASSIONE PER L'AMBIENTE

7.3.3.3 Separate waste collection by ReMedia

The WEEE collected from civic collecting sites may contain hazardous substances, such as phosphorus inside TV sets or ozone-depleting substances inside refrigerators. For instance, if the equipment is damaged during transportation or at the beginning of treatment, these hazardous substances can be released into air, becoming potentially dangerous for humans and the environment as well.

In order to ensure the safety of WEEE collected from civic collecting sites, Consorzio Re.Media partners have infrastructures that comply with requirements and are fully equipped to receive and stock WEEE, using appropriate handling systems, which ensures to avoid damaging the equipment during the treatment process.

Before the beginning of the treatment process, all WEEE have to be parted in order to take off the most dangerous components such as PCB-capacitors, and Hg-components, batteries, cables and so on. After the removal they are sent to different authorised plant for their treatment.

7.3.3.3.1 Treatment by ReMedia system

Treatment activities of recycling, recovering and upgrading are part of a real "production line" which, instead of assembling and transforming raw materials and components into finished products, carries out the reverse procedure.

ReMedia partners are committed to investing in leading-edge WEEE treatment technologies, thereby ensuring that the best treatment methods are applied in practice. The sites selected by ReMedia are all authorised and provide detailed and prompt documentation on the recycling and / or disposal of the materials that have been treated.

7.3.3.3.2 Recovery by ReMedia system

Italian legislative Decree No. 151 requires that collective producer compliance systems such as ReMedia achieve specific recovery objectives for treated WEEE. For example, for consumer electronics, the minimum percentage recovery by average weight of appliance is at least 75 % and the minimum percentage reuse and recycling of components, materials and substances by average weight of appliance is 65 %.

7.3.4 MALTA

WASTESERV MALTA LIMITED

WasteServ, a state-owned company established in November 2002, operates integrated waste management systems, including one for WEEE. The company is responsible for organizing, managing and operating integrated systems for waste management including integrated systems for minimisation, collection, transport, sorting, reuse, utilisation, recycling, treatment and disposal of WEEE, solid and hazardous waste.

Civic Amenity Sites (in the picture below) are supervised facilities where members of the public can bring and discard a variety of household bulky waste, incl. WEEE. Unlike Bring-In Sites, where only paper, plastic, metal and glass can be delivered, these sites cater for separate disposal of domestic bulky waste such as tyres, refrigerators, electronic products, waste from different activities and garden waste.

The purpose of these centres is to establish service facilities to optimise the collection of certain types of waste and increase the recovery of secondary materials. These facilities are manned by a trained workforce and will have particular opening hours where people can enter with their car to dispose of waste separately in specific containers.

There are 5 operational Civic Amenity Sites and are situated at Maghtab, Mriehel, Hal Far, Luqa and Xewkija (Gozo). These facilities are open every day (from Monday to Sunday) between 7.30 AM and 5.30 PM including weekends and Public Holidays.

<u>Bulky waste which can be taken to a Civic Amenity site includes:</u>

- paper, cardboard, glass, metal, plastic;
- furniture, mattresses, carpets and tiles;

- white goods such as fridges, cookers and microwaves;
- batteries, neon tubes;
- garden waste;
- edible oil and lubricant oils;
- solvents, spent medicines, used syringes, chemicals, paint and hazardous domestic waste;
- PCs, monitors, mobile phones, printers, toys, transmitters, electronic tools;
- small quantities of household construction waste;
- tyres.

7.3.5 SLOVENIA

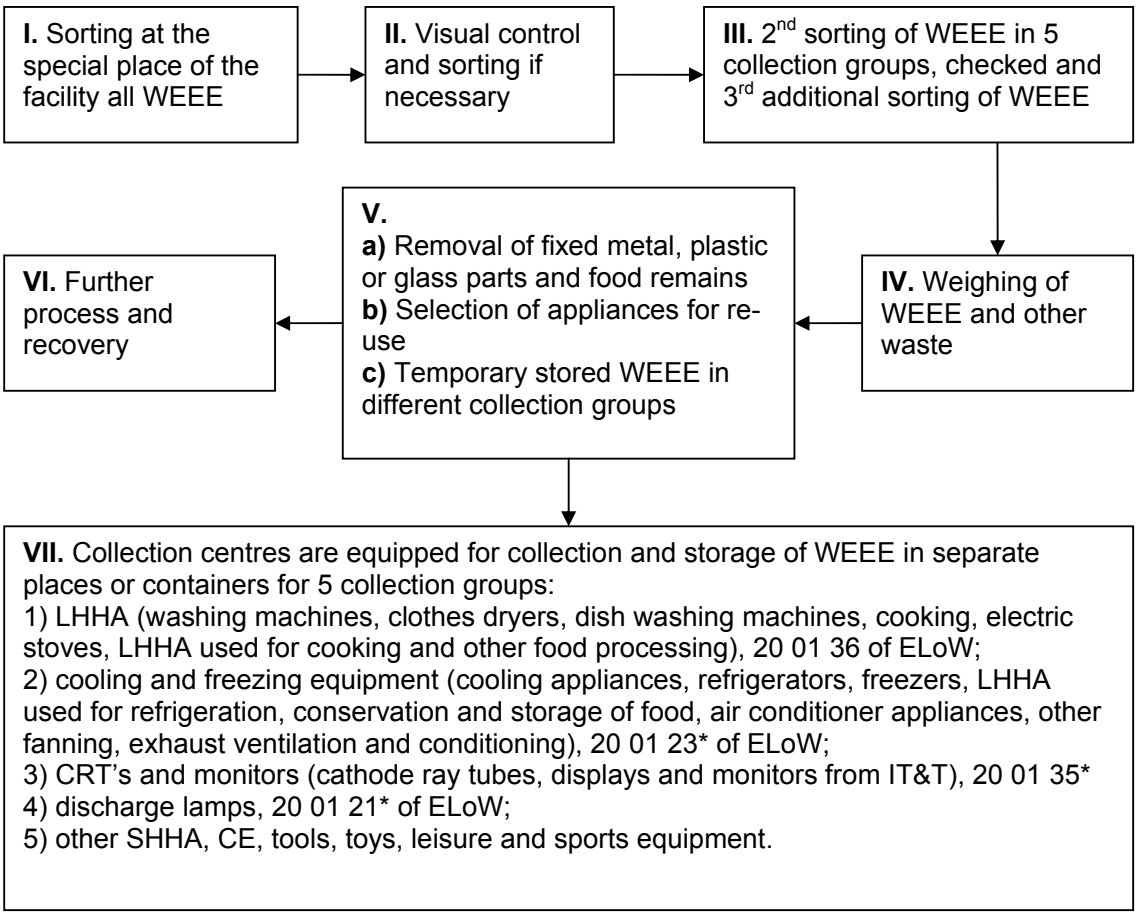
ZEOS is charging treatment partners from national market and from abroad. One part, especially the treatment of cooling and freezing appliances, gas discharge lamps and the treatment of dismantled cathode ray tubes is processed abroad. For the treatment of the rest of WEEE, ZEOS is using already existing infrastructure of Slovenia, also removing hazardous components from large and small appliances. Each specific logistic region is related to one treatment plant for each flow served by one logistic operator.

7.3.5.1 Slovene WEEE management plan and integrated actions

- collection and take-back to public service providers, distributors and collecting facilities
- treatment
- reuse, recovery and recycling within the prescribed levels
- the removal of remains generated by the WEEE recovery process

7.3.5.2 WEEE treatment process in Slovenia

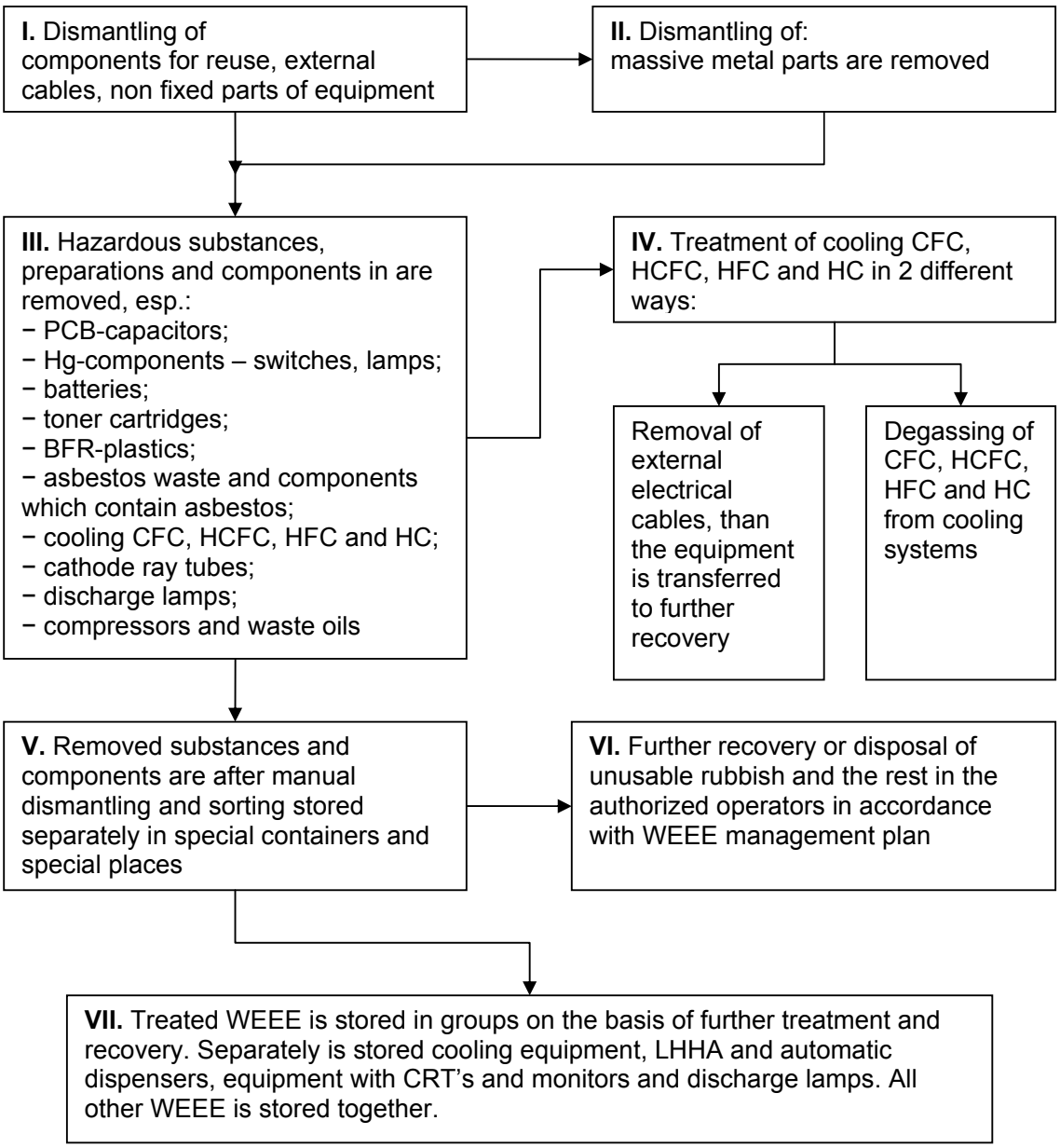
7.3.5.2.1 Sorting and storing of WEEE



At producer's collection points WEEE is collected in the same way, only the WEEE collected from professional end users is sorted directly at treatment centres.

7.3.5.2.2 Treatment of WEEE

The whole procedure consists of WEEE dismantling and removal and sorting of components, preparations and substances. It is done in 2 steps.



2007 DATA shows	
Total waste stream	**3,262 T**
Hazardous parts	**13 %**

Table 34 - Quantities of removed substances, preparations and components, ZEOS, 2007

Substances, preparations and components	kg
Capacitors with PCB	1,722
Batteries	1,628
Printed circuit boards >10 cm^2	29,223
Toner cartridges	181
Plastic containing brominated flame retardants	23,129
Cathode ray tubes	330,933
CFC, HCFC, HFC, HC	360
Discharge lamps	51,160
External electric cables	4,295
Total	**442,631**

7.3.6 ALBANIA

Although the national legislation - Law No 9010/2003 on environmental treatment of solid waste - prescribes treatment of waste in every stage of waste handling. This is not executed in practice. The reason of weakness of enforcement is due to the unclear legal requirements.

The World Bank Report provides some expectations regarding waste, e.g. that for waste to be recovered about 5% of the total volume of the municipal waste generated by 2015. The given percentage presumed transposition of certain regulations and their implementation.

A rough estimate of volume of WEEE in Albania was lately made by experts in a workshop organized in the frame of IFC PEPSE “Re-cycling linkages project”. That estimation was based on the number of population of Albania, the volume of electric and electronic waste put on market annually (15 kg/inhabitant/year compared to other countries), the minimum EU requested target of 4 kg/inhabitant (from the WEEE directive). The estimated volume of WEEE required to be treated in Albania is about 13,000 tons.

According to the estimates above, the following is expected:

Collection groups	Expected treatment volume (tonnes)
LDA (without cool)	3 700
Cool	2 200
CRT	2 700
Lamps	20
Other (categories 2, 6-10)*	4 000

Note: * refers to Annex IA of Directive 2002/96/EC on WEEE

The used techniques for waste handling include separation, pressing and cleaning of scrap. They are very simple and potentially harmful to environment, since they may destroy hazardous waste, discharging the hazardous parts into environment and collecting only the useful part. Mainly Roma community is involved into waste collection. Collectors use very simple methods for dismantling electric and electronic wastes.

Information about sorting and recycling systems are given in other parts of this report. The present situation from the point of view of the treatment in Albania can summarised as follows:

- no national treatment scheme exists yet;
- no cost of the scheme can be evaluated, since the national scheme does not exist;

- the status of economic instruments is insufficient. Only the metal parts of the WEEE is
  taken out and sold to the metal processers following the market prices for metal scrap;
- administrative requirements are yet to be defined. It is expected that they be defined in the new national regulation on WEEE management that will transpose the related directive;
- no technology exists and therefore no capacities or inputs/outputs can be given (neither for sorting, recovery, recycling or disposal).

7.3.7 BOSNIA AND HERZEGOVINA

The issue of e-waste is not solved legally at present. There are stipulate some measures for the future in waste management. The most important factors for waste reduction are considered sorting of wastes, pre-treatment of wastes and return waste materials through recycling processes. One of the operational goals of the Federal Strategy for Environment (2007) is to establish separate collection of municipal wastes in all municipalities. Sorting of municipal waste would also perspectively separate e-waste from other municipal waste and consequently it would no longer be disposed on the landfills.

The table below shows objectives for municipal waste sorting schemes.

Table 35 – Objectives for municipal waste sorting schemes

Objective	2011	2014	2018
Establishment of municipal waste sorting in municipalities	60 %	60 %	95 %

As one of the preconditions for sorting of waste, the Federal Strategy for Environment determines establishment of recycling yards that would be equipped with the necessary components for sorting, among other waste, of household appliances.

The Federal Strategy for Environment (2007) proposes introduction of schemes for recycling of old and used electric and electronic equipment, in accordance with EU Directive on electric and electronic waste (2002/96/EC). Until 2010 the Roof Feasibility Study should be elaborated for the purpose of determination of acceptable alternatives for handling of particular waste categories, especially mechanisms for reduction and disposal prevention of e-waste, introduction of refunding schemes of old and used technique to the original producer, all in accordance with the EU Directive on electric and electronic waste (2002/96/EC), including introduction and implementation of a pilot project of efficient sorting of e-waste.

The projection of regional concept of solid waste management is presented by the Solid Waste Management Strategy for B&H. The Strategy implies merging of municipalities into regions, and defining all aspects of waste management at the regional level. The Strategy is in phase of implementation. The waste management regional centres will represent a complex of facilities as:

- controlled disposal site,
- recycling yard for reception of separate fractions and waste brought in by the single waste producers (legal subjects, households),
- plant for pre-treatment, separation of secondary raw material and recycling,
- separate storages for reception of hazardous waste and communal waste,
- plant for mechanical-biological waste treatment.

The current status of e-waste management in Bosnia and Herzegovina does not allow to evaluate an application of technologies and treatment operations. Some aspects of waste

management situation in Bosnia and Herzegovina are mentioned in another parts of this report – recycling, disposal.

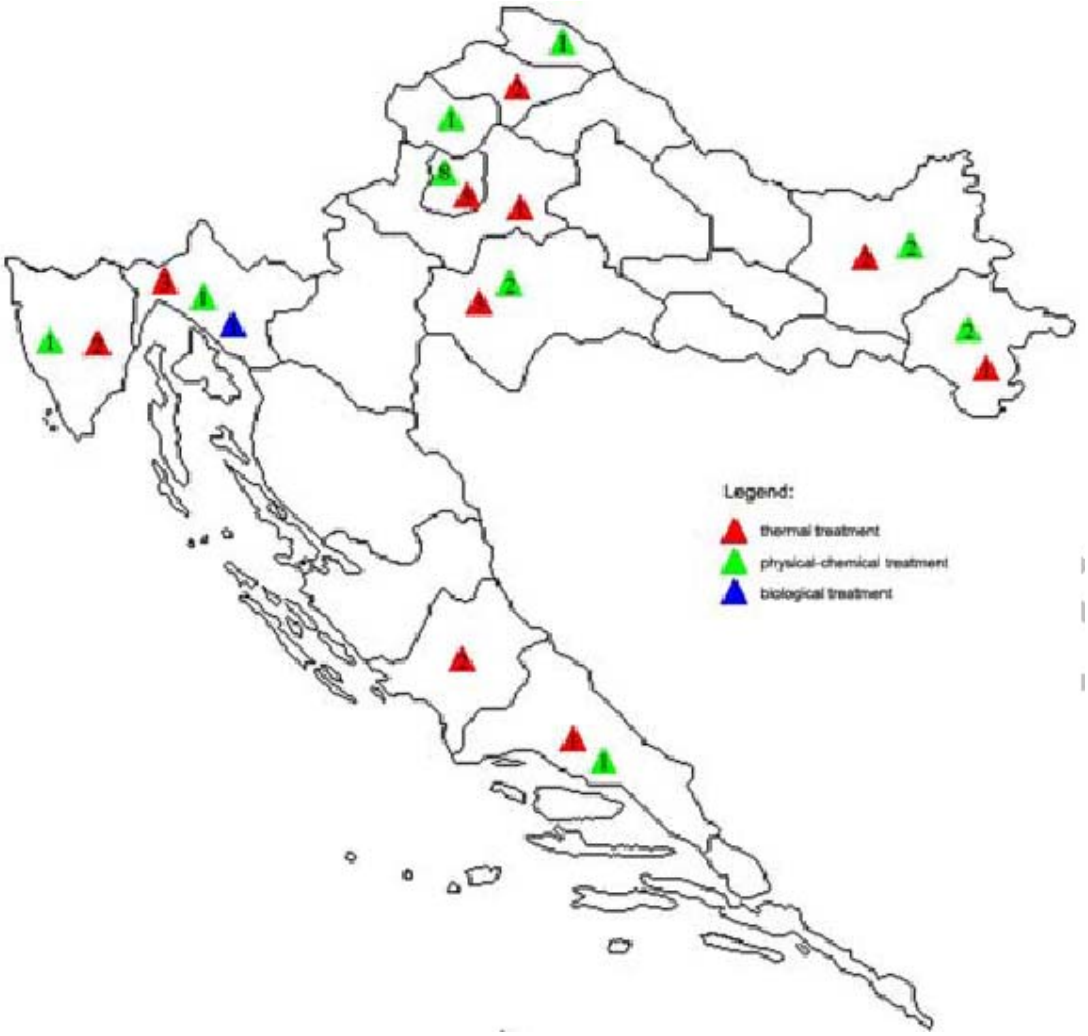
7.3.8 CROATIA

Waste Act OG 178/04, Article 3 para (7) states, that **waste treatment** means the changing of the properties of waste, by means of mechanical, physical, chemical or biological processes, including sorting, with the purpose of reducing its volume and/or hazardous properties, while facilitating its handling and enhancing its recoverability.

The waste treatment activity belongs among concession activities in waste management according to the Waste Act OG 178/04. A person authorised for treatment of EE waste – treatment operator - has to sign a contract with the Environmental Protection and Energy Efficiency Fund.
The national report of Croatia mentiones that technical and technological capacities for a treatment and other activities e.g. collection, storage of hazardous waste are being developed in accordance with supply and demand in the market. Recently several smaller specialised facilities in Croatia are built for the purpose of treatment of hazardous waste and further handling. There are available capacities within individual industrial installations which are used for handling of some types of hazardous waste including treatment.

The following figure shows territorial distribution of economic entities holding a permit for hazardous waste treatment.

Figure 27 – Territorial distribution of permit holders for hazardous waste treatment



The Ordinance on WEEE (OG 74/07), Article 9, para (1) prescribes the producer to ensure information on the possibility for reuse and **treatment** of EE equipment once when it becomes waste within one year from placing the EE equipment on the market.

The Ordinance on WEEE specifies requirements for selective treatment for materials and components of electrical and electronic waste. Treatment operator has at least to remove all fluids from WEEE and treat it in accordance with following:
1. The following substances, preparations and components have to be removed from any separately collected WEEE:

- capacitors containing polychlorinated biphenyls (PCB),
- components containing mercury, such as switches or backlighting lamps,
- batteries,
- circuit boards of mobile phones and of other devices if the surface of the printed circuit board is greater than 10 cm^2,
- toner cartridges, liquid and pasty, as well as colour toner,
- plastic containing brominated flame retardants,
- asbestos waste and components which contain asbestos,
- cathode ray tubes,
- chlorofluorocarbons (CFC), hydrochlorofluorocarbons (HCFC) or hydrofluorocarbons (HFC), hydrocarbons (HC),
- gas discharge lamps,

- liquid crystal displays (together with their casing where appropriate) of a surface greater than 100 square centimetres and all those back-lighted with gas discharge lamps,
- external electric cables,
- printed circuit boards,
- components containing refractory ceramic fibres,
- components containing radioactive substances with the exception of components that are below the exemption thresholds laid down in a special regulation,
- electrolyte capacitors containing dangerous substances (height > 25 mm, diameter > 25 mm or proportionately similar volume).

2. Separately collected WEEE has to be treated as indicated:
- fluorescent coating has to be removed from cathode ray tubes;
- gases that are ozone depleting or have a global warming potential (GWP) above 15 must be extracted and treated;
- extracted gases must be treated in accordance with special regulations;
- mercury must be removed from gas discharge lamps.

3. Paragraphs 1 and 2 shall be applied in such a way that reuse and environmentally sound recycling of components or whole appliances is facilitated.
All components that can be recovered in the Republic of Croatia are delivered to the proper facility.

The Ordinance on WEEE proposes basic technical requirements for storage and self treatment of WEEE that every treatment facility has to fulfil. Here are these requirements:

1. Sites for storage of WEEE prior to their treatment must have:
   - storage areas with impermeable surfaces and spillage collection facilities, decanters for spilt liquids and cleanser-degreasers,
   - covering that protects appropriate areas against adverse weather and atmospheric impacts.
2. Sites for treatment of WEEE must have:
   - balances to measure the weight of the treated waste,
   - appropriate areas with impermeable surfaces and covering against adverse weather and atmospheric impacts, spillage collection facilities and decanters for spilt liquids and cleanser-degreasers,
   - appropriate storage area for disassembled parts of WEEE, appropriate containers for storage of batteries, capacitors containing PCBs/PCTs and other hazardous waste;
   - equipment for the treatment of water in compliance with special regulations.

The obligations for treatment facilities are as follows:
- acquire a permit according to Article 41 of Waste Act and sign a concession contract →**licensed treatment facility**;
- take over collected waste from collector without any charges;
- meet technical requirements for operating according to Annex III of the Ordinance on WEEE;
- treat WEEE at least according to Annex II of The Ordinance and export components that cannot be environmentally sound recovered or disposed in Republic of Croatia;
- run register waste origin and waste flow;
- send data using prescribed IIKOEEO and IOOEO forms (see figures below) to EPEEF and CEA according to the determined schedule.

Each month the treatment operator submits to the EPEEF the data on the quantities of waste taken over from the collection operator, treated and exported using the IOOEEO and IIKOEEO forms, and to the CEA total data on annual basis.

Croatia licensed two companies for treatment of WEEE – the one licensed for large household appliances treated 50.4% of the total WEEE, and the another licensed for another nine types of WEEE treated 49.6% of the total quantity of WEEE treated in 2008.

IIKOEEO

REPORT ON EXPORTED QUANTITIES OF WEEE, COMPONENTS OF WEEE OR TREATMENT RESIDUES **for month: year:**	
TO BE FILLED OUT BY THE TREATMENT OPERATOR	
Treatment operator's name (company):	
Address:	
Contact person:	
Telephone:	Facsimile:
e-mail address:	
Registration number:	

Waste key number:			
EXPORTED:		to EU countries	outside EU
Category according to Annex IA (*)	Components of WEEE or treatment residues – brief description (**)	kilograms	kilograms
TOTAL:			

Location:	Signature:
Date:	
To be delivered to: Environmental Protection and Energy Efficiency Fund 10 000 Zagreb Ksaver 208	LS

(*) provide WEEE category number set out in Annex IA
(**) brief description of the waste (e.g., plastic keyboard parts, motherboard, screen cathode ray tube, etc.)

IOOEEO

REPORT OF THE WEEE TREATMENT OPERATOR for month:_____ year: _____	
TREATMENT OPERATOR INFORMATION	
Treatment operator's name (company):	
Address:	
Contact person:	
Telephone:	Facsimile:
e-mail address:	
Registration number:	

REPORT ON COLLECTED AND TREATED QUANTITIES OF WEEE				
	WEEE according to EE equipment category	**Taken over from the collection operator:**	**Treated:**	**Recovered:**
		kilograms	kilograms	kilograms
1.	Large household appliances			
2.	Small household appliances			
3.	IT and telecommunication equipment			
4.	Consumer equipment			
5.	Lightning equipment (except gas discharge lamps)			
5.a	Gas discharge lamps			
6.	Electrical and electronic tools (except large-scale stationary industrial tools)			
7.	Toys, leisure and sports equipment			
8.	Medical devices			
9.	Monitor and control instruments			
10.	Automatic dispensers			
Location:		Signature:		
Date:				
To be delivered to: Environmental Protection and Energy Efficiency Fund 10 000 Zagreb Ksaver 208		LS		

According to the Ordinance on WEEE (OG 74/07) the EE waste treatment operator is entitled to a compensation covering the expenses of treatment and recovery of EE waste. The amendments to this Ordinance (OG 31/09) states that compensation to the treatment operator shall amount to HRK 1.60 per kg of EE waste taken over for treatment and recovery except for category 1 of EE equipment listed in Annex IA to this Ordinance (equal to the relevant annex of EU Directive on WEEE). Compensation to the treatment operator (VAT included) for category 1 of EE equipment listed in Annex IA to this Ordinance shall amount to HRK 1.40 per kg of EE waste taken over for treatment and recovery.

7.3.9 MONTENEGRO

The Republic Waste Strategic Master Plan as a basic conceptual document states that the system of management of hazardous waste is based on the establishment of one hazardous waste treatment centre with the associated landfill and an incineration facility, serving the entire country considered as one catchments area. Treatment of waste involves method of solidification/stabilization of inorganic and solid organic waste, incineration of waste and in the short term perspective, export of liquid organic waste. Export of special waste, such as PCB and batteries is also part of the proposed management system.

In accordance with the Waste Management Law 80/05, an Article 50 (applicable from November 1st 2008) competent government authority shall set down in details the method and procedure for end-of-life electric and electronic goods management including treatment.

The Government of Montenegro adopted the Plan for waste management in Montenegro, for the period from 2008 to 2012 that is made in accordance with the requirements of the Law on Waste Management. The Plan envisages the establishment of inter-municipality, or regional system of waste management. This concept is based on the interests of municipalities that have recognized the advantages of association and formation of a joint center for waste management, and the basic objectives of this concept are the rational use of space (as

limited resources), and reducing the cost of waste treatment. Forming regions in order to construct regional landfills and network of recycling centers depends on several factors, primarily on the size and structure of municipalities and transport linkages within the region, since the system makes the collection, transport and waste disposal.
The Plan keeps the recommendations from the Strategic Master Plan on the need for the formation eight or seven regions for waste management. It is assumed that each region will use one inter-municipality landfill that has to be built in accordance with the applicable regulations and standards, and EU directives. Depending on the needs of local governments in the regions, it is planned that landfills have the infrastructure necessary for the treatment of certain recyclable waste components: recycling centers, facilities for green waste composting, treatment of municipal sludge etc. In fact, the Plan gives an overview of activities in the area of waste management to be implemented in the next five years, and it subjects responsible for their implementation.
Some weak points of the present e-waste management in Montenegro are mentioned in another parts of this report - waste recycling and waste disposal.
Detailed information about e-waste treatment – technologies, capacities, etc. used in Montenegro were not available.

7.3.10 TURKEY

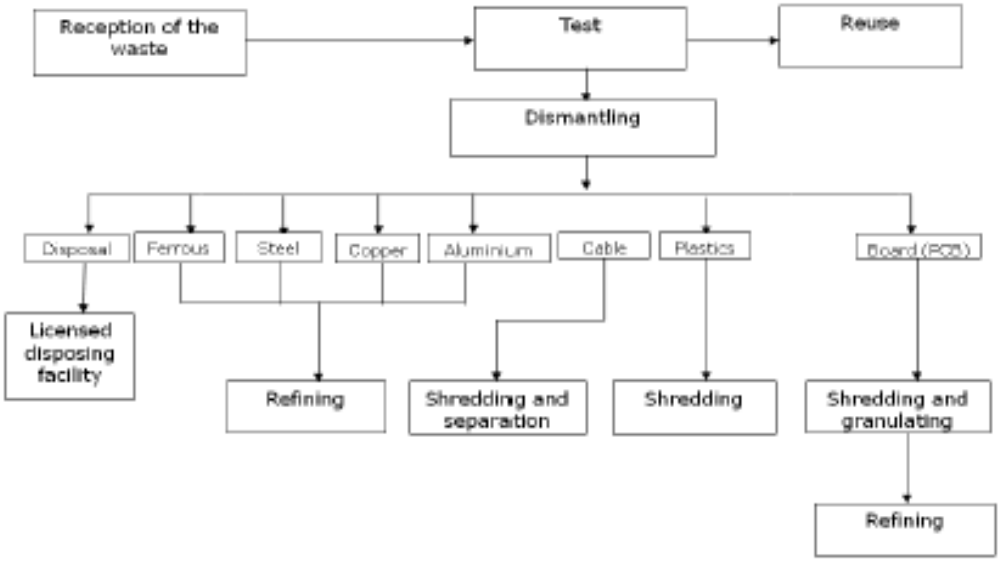
As it was mentioned in previous parts of this report there are no regulations regarding waste electrical and electronic equipment in Turkey at the moment. The handling of such wastes is performed by the relevant facilities that own certificate of conformity. The companies owning certificate of conformity break down the collected WEEE's into their components manually/mechanically. The treatment process is pursued to the extent that it is economical. The following table (36) shows the brief list of obtained materials from waste products and the place of their handling. The electronic circuits, electronic components, electrical materials and plastics are exported to countries such as Belgium, Germany and France for recovery/disposal.

Table 36 – A list of materials and a place of handling

Obtained material	Domestic/abroad
Iron	Domestic
Copper	Domestic
Aluminium	Domestic
Chromium	Domestic
Brass	Domestic
Plastic	Domestic and abroad
Cardboard	Domestic
Wood	Domestic
Electric circuit	Abroad
Electronic component	Abroad
Electrical materials	Abroad

Within this scope, 750 tons were exported to Germany with waste code 16 02 15 (hazardous components removed from discarded equipment), and 272 tons have been exported to Belgium with code 16 02 16 (components removed from discarded equipment other than those mentioned in 16 02 15) as of 2007. By the first half of 2008, approximately 1211 tons with code 16 02 16 (components removed from discarded equipment other than those mentioned in 16 02 15) were exported to Belgium and Germany.

A general treatment process diagram of electrical and electronic waste can be shown as below.



Status of existing technologies for sorting, recovery, recycling and disposal in Turkey is described in relevant parts of this report.

7.3.11 ARAB COUNTRIES

The treatment of waste - dismantling, recycling, disposing - in an unprofessional manner in poor and developing countries poses serious threats to health and the environment. Unprofessional approaches are very often in Arab region. An informal sector usually perforrms WEEE (PCs, TVs and mobile phones) collection and recycling activity that basically consists of the dismantling and recovery of metals/scrap. The public awareness of the informal sector on waste treatment especially e-waste is at the very low level. Many supportive activities are realized to enhance the present situation in waste management in Arab countries financing by different donors.
One of the latest source of information concentrated on e-waste issue is the technical report „Assessment of e-waste management in Morocco“ that was conducted within the framework of the "e-Waste Management in Africa" project launched by HP in 2007 in collaboration with the DSF and EMPA.
There are some facts given in the assessment. In Morocco some operators sell WEEE on directly, without processing it in any way, while others dismantle it first. Desktop computers and printers are broken apart with clubs, then the metal parts are sold as scrap and the electric cables are burned in the open air to recover the copper. Cathode-ray tube monitors and television sets are broken apart to recover the metal components (copper is sold at 45 dh/kg), or simply to avoid implosion when loaded onto the collection truck. The recovered materials are sold to wholesalers (usually in Casablanca) for a price of between 1.25 and 5 dirhams per kilo, depending on the content.

Manual dismantling to recover metals from the WEEE

Some waste collectors burn WEEE to recover metals (especially copper)

There are also certain practices for extracting precious metals, particularly gold, silver and palladium, and electronic circuits, using wet-chemical processes. These uncontrolled processes, which are widely practiced in the informal sectors in India and China, involve the use of acids, mercury and/or cyanide salts, and produce large quantities of chemical effluents. An application of such processes have not yet been observed in Morocco. Morocco has no industry for the recovery of the precious and special metals contained in WEEE, with the exception of the Guemassa hydrometallurgy complex, which specialises in a few metals, including copper, lead, zinc and cobalt. The scrap that interests wholesale waste collectors is metal from car carcasses, steel construction and, to a lesser extent, WEEE. WEEE is rarely exported, given its limited volume compared with ferrous and non-ferrous metals. Soaring commodity prices have favoured the export of Moroccan scrap. In 2006, some 274,000 tonnes of scrap (all types of metal) was sold abroad, compared to 130,000 in 2002. These sales represent a financial loss for Morocco of 2 billion dirhams, i.e. the added value of the 274,000 tonnes of metal exported each year if it were processed in the country, estimates the FIMME, which is calling for restrictions on the export of scrap over a period of 3 to 5 years. In 2008, Note 0604/1313 from the Facilitation Office introduced new provisions for the export of ferrous and non-ferrous metals, particularly metal debris, scrap metal and others. Since then, exporters of these materials must produce documents proving the origin of their cargoes in order to obtain customs release.

In 2008, the Department of the Environment was drafting a decree regarding the adoption of a National Hazardous Waste Master Plan in Morocco. A detailed feasibility study of the CNEDS hazardous waste treatment plant was being conducted by this Department. This initiative was undertaking within the framework of the cooperation between the Kingdom of Morocco and Germany. This plant would be a suitable solution for the disposal of WEEE components that cannot be reused, particularly lead-rich glass, plastics containing flame retardants, and other toxic wastes.

Some Moroccan actors in e-waste treatment area:

ECOTECHNO: Within the framework of a project hatched at the Innovative Enterprise Incubation and Support Centre (CIAEI) of the National School of the Mineral Industry (ENIM), a Moroccan team has developed a process for the recycling and reuse of waste electronic and electrical equipment. This initiative, for which a patent has been filed with the OMPIC, consists of recovering metals, metallic salts (steel, copper, gold, lead, etc.) and plastic materials from this waste. The process begins with characterisation and collection, followed by storage and dismantling. The next stage consists of sorting and physical treatment, and

finally chemical treatment to recover metals and salts. Metal powders are then sent to foundries and components containing gold will be treated by wet processes to separate the free gold. The company is based in Casablanca, on a 2,830-m^2 site, and employs 20 people. Ecotechno has been in operation since 2009. The company is seeking additional investors to expand its plans in the future.

VALDEM specialises in the recycling and export of scrap metal to Europe and Asia. This firm also treats WEEE for some Moroccan companies that pay for the service (e.g. ST Microelectronics and Philips). It processes an average of 500 computers a year. The recovered metal is sold locally and material that cannot be reused (particularly the lead-rich glass from monitors) is exported to France for treatment. This company, a subsidiary of SOVAMEP, the French leader in the recovery of precious metals, plans to invest more than 4 million dirhams to build a tailor-made structure and purchase various production facilities. The aim of this new structure will be to obtain ISO 14001 certification, in order to offer Moroccan manufacturers, companies and local authorities the same environmental guarantees as in Europe.

IVSEP, a company specialising in the treatment and recycling of WEEE, benefits from the support of the CMPP within the framework of the Ecologically Sustainable Industrial Development programme, in the following areas:

- technical support: choosing the process and pollution control devices (especially filters), and putting together the technical file to support its application for funding from the FODEP;
- seeking national (client companies) and international (R&D centres, purchasers of recycled products, etc.) partners, to optimise the investment;
- organisational support: assistance with the setting up of a regional WEEE collection network, in partnership with actors in the region (ragpickers, semi-wholesalers).

In 2009 this company was in operation with a staff around fifty people and with a treatment capacity of 2,000 tonnes of WEEE per year.

The present situation in e-waste treatment in Tunisia and Egypt is not differed than in the rest of countries concerned. At present WEEE is still usually abandoned in different places. Final waste reaches the landfill without preliminary treatment that is a real problem. This reality increases pollution risks and threats for life quality. During last 2 years, the private sector is mainly involved in e-waste management. Four private recycling facilities collect and treat e-waste in Tunisia. Tunisian regulations do not allow an import of used EEE or WEEE. The only exception is for draw back system in case of import to refurbishment and export of wastes that can not be treated in the country. The export of hazardous wastes is realized in compliance with international conventions.

At present the treatment centre for industrial and special wastes with capacity 90 000 t/y is operating that is a positive signal for waste management in Tunisia.

A new project „E-Waste Recycling“ belongs among the most recently launched activity in Egypt. This initiative is focused on people from informal sector to train them in computer assembly and repair using donated e-waste parts. To increase a public awareness is also one of the target of this activity.

8. Recycling and recycling scheme operation: organization of national recycling schemes, cost of the schemes, economic instruments to facilitate the recycling, administrative requirements

8.1 WEEE Recycling Framework

Electrical and electronic devices are present in most of our professional, domestic and leisure activities more and more each day. Although these devices have our quality of life as their main objective, the waste that EEE generate (WEEE) once their useful life is over can become an important environmental load for society, if their management is not adequate. On the other hand, they can generate new raw material and generate wealth if they are recycled.

Presently each citizen in the region produces about 20 - 25 kg of WEEE per year and in 2004, the amount recovered was 1 – 2 kg of material per person.

In order to mitigate this situation in the Region and the overall WEEE objective of collecting 4 kg of material per person by the end of 2006, a new legislation has been approved that requires manufacturers to establish and manage waste collection and recycling, and consumers to deliver unwanted EEE to established collection points.

Voluntary collective WEEE management systems

Even before the implementation of the WEEE Directives and other legal documents connected with WEEE, collective WEEE management systems were already operating in some region countries, and some of them started operating or are being established at an accelerated pace after the implementation of the WEEE legislation (detail information is in chapter 5 Collection and collection systems).

8.2 Associations active in recycling operations and recycling chain

8.2.1 WEEE Forum

The WEEE Forum is a not-profit association of voluntary more than 40 collection and recovery systems in Europe. It was founded in April 2002 with the purpose of mutual information of collective systems and information exchange and preceding the entry into force of Directive 2002/96/EC on WEEE in February 2003. The aim of the WEEE Forum is to provide a platform for these producer responsibility organisations, or take-back systems, to foster ideas and share best practices while optimising environmental performance through a proper management of WEEE.

Today, the WEEE Forum counts also more than 40 producer responsibility systems from almost all European Countries. All systems are open, non-profit oriented systems run on behalf of the producers' community.

Executive summary of the WEEE Forum's "Key Figures" in 2008

34 reporting organisations collected about 1.4 MT[1] of WEEE, which is about 50 per cent of all officially reported WEEE collection. Member organisations collected, in weighted average[2] terms, 4.03 kg/inhabitant of WEEE. One organisation reached a collection target of 16.5 kg/inhabitant.
In 2008, producers affiliated to 33 reporting collection and recovery organisations of the WEEE Forum put more than 5 MT of EEE onto the market. The arithmetic mean average and the weighted average[2] market input were 9.8 kg and 14.8 per inhabitant per year respectively.
29 reporting organisations spent a total of about €382,000,000 on the collection, transport, treatment of WEEE, and the administration of the organisation. Those 29 WEEE Forum members collected 1.3 MT WEEE, which translates to a weighted average[2] of the specific costs of 0.30 €/kg.
Some reporting organisations continued to fail to get hold of valuable WEEE, while others saw a stabilisation in the trend.
WEEE systems collected more than 2/3 of their WEEE from municipal collection facilities. This demonstrates that municipal collection facilities continue to be crucial in collection infrastructure.
[1] All 40 member organisations taken together collected approximately 1.5 MT in 2008 (source: compilation of individual members' figures in January 2009). **[2]** A weighted average is an average that takes into account the proportional relevance of each component, rather than treating each component equally.

The WEEE Forum is essentially a roundtable where producer responsibility organisations share ideas and common practices, and, in so doing, turn the Forum into a vibrant community. It is committed to making a substantial contribution to the achievement of environmental goals.

Contact
WEEE Forum
Diamant conference and business centre
Boulevard Auguste Reyerslaan 80
B-1030 Brussels
Belgium
www.weee-forum.org
pascal.leroy@weee-forum.org

8.2.2 CECED

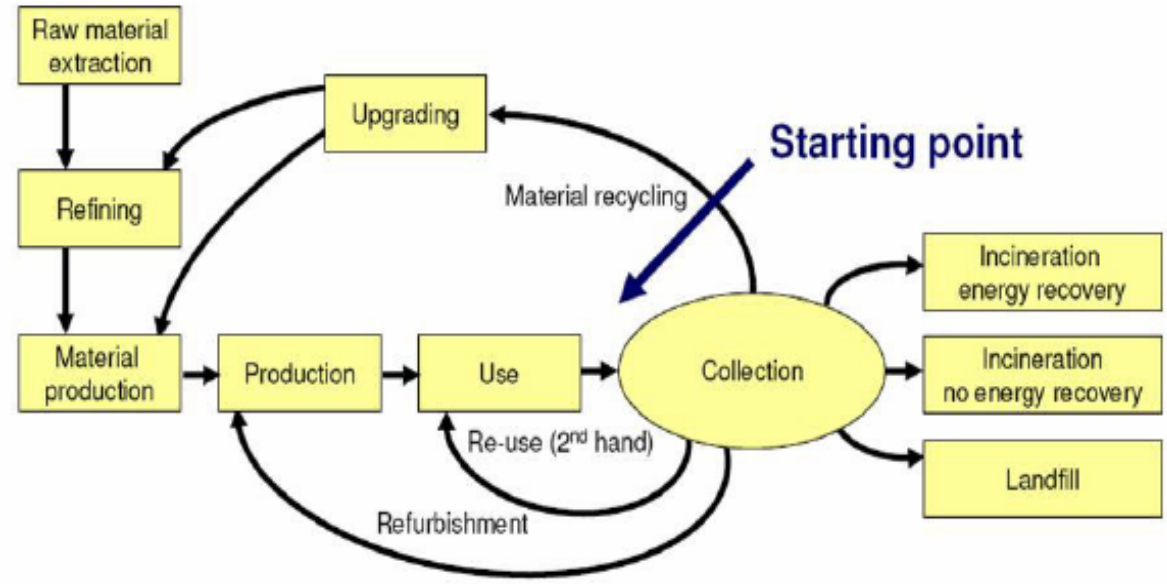
CECED - European Committee of Domestic Equipment Manufacturers

CECED is the association of manufacturers of LHHA and SHHA and national trade associations in Europe. The main objective of the CECED is to represent and defend European Industry interests in a dialogue with official institutions.

In 1958, CECED was founded as an initiative of the Western European National Associations. In 1997, CECED established a permanent office in Brussels to better represent the industry vis-à-vis the European institutions. It also began offering Direct Membership to individual companies that same year. In 1999, CECED streamlined its organisation and set up the structure that remains today. Today, CECED counts 14 Direct Members and 26 National Associations representing 23 countries. CECED promotes the industry's mission to increase appliance performance while reducing its impact on the environment.

Contact
CECED
80, Boulevard Auguste Reyers
1030 Brussels
Belgium
www.ceced.eu
secretariat@ceced.eu

8.2.3 Recycling chain



8.3 Cost of the schemes

Under the assumptions of actual recycling costs excluding start-up effects across the Europe, based on the average costs of 5 long running systems, since 2003, there, estimation of the economic impact for take-back and treatment of WEEE arising, ranges roughly from EUR 0.76 billion in 2005 for the current amount collected (table below) towards EUR 3.0 billion in 2020.

The latter is for the maximum possible collection percentages, which are estimated at 75 % for LHHA, and 60 % for SHHA. The technical costs shown below are for collection and recycling including revenues for secondary materials. The total costs include mainly guarantees, provisions and to a lesser extent overhead and administrative burden.

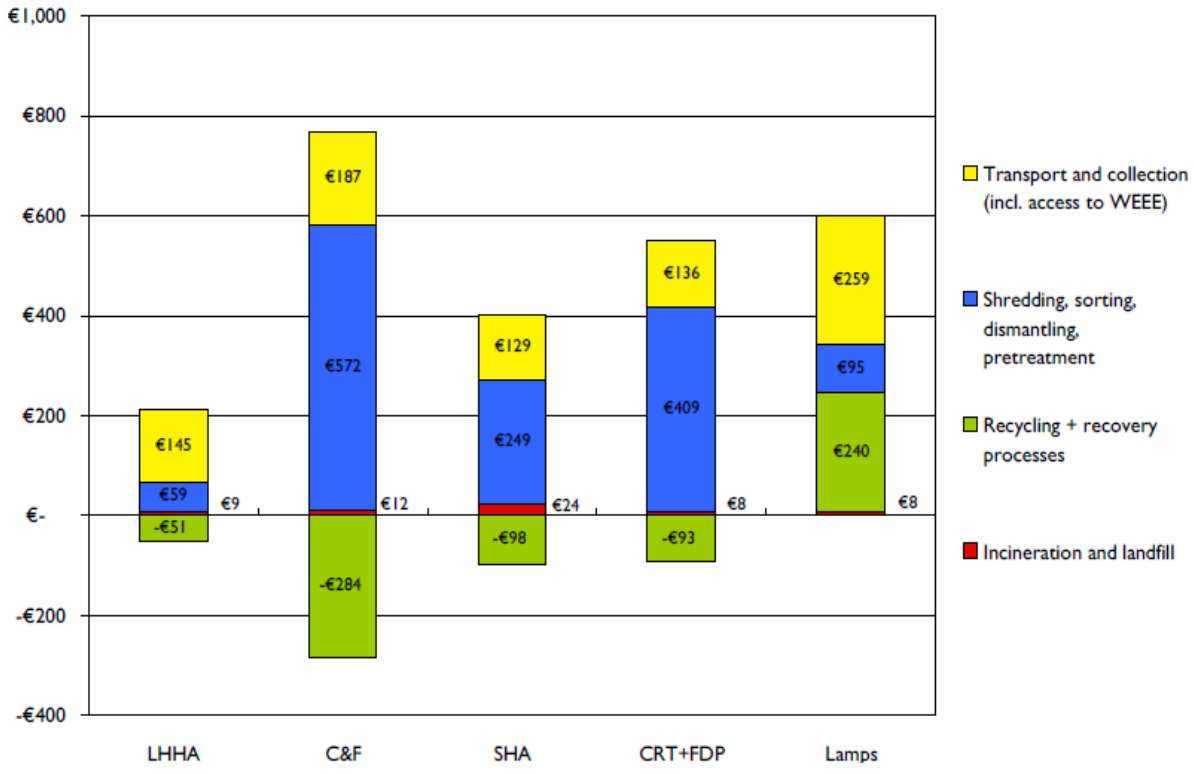
8.3.1 Overall Economic Impact across EU27 assuming FULL implementation

	Technical Costs [Million EUR]		Total Costs [Million EUR]	
Year	Current Collection%	Maximum collection%	Current Collection%	Maximum collection%
2005	**764**	1,692	**935**	2,045
2006	783	1,735	959	2,097
2011	889	**1,970**	1,089	**2,381**
2020	1,125	2,492	1,377	3,012

The main factors influencing these numbers are:
- the impact of additional costs on total take-back costs represents a considerable percentage across different categories,
- the impact of long running optimisation of systems, play an important role on the cost side. For the long running systems across Europe, the gap between minimum and maximum cost levels is much lower, and,
- the percentage of WEEE collected and treated versus potential WEEE arising in EU27 plays a crucial role in respect of overall economic impact on stakeholders responsible for financing,
- the impacts of costs along the chain depend on WEEE category compositions and recycling technologies used. They are further influenced by future developments of new technologies.

The figure (28) below presents the breakdown of technical costs for 2005 (long running systems collecting 5 main WEEE categories).

Figure 28 - Breakdown of technical costs for the 5 main collection categories (2005 long running systems)



The figure 28 demonstrates that the technical cost breakdown in percentages is built-up very differently per WEEE category:

- for category 1A, 10 LHHA, the main part is the transport costs. After these transport steps, the revenues are almost equal to the further processing costs;
- for category 1B, LHHA - Cooling and Freezing appliances, the treatment costs (CFC removal) are obviously a major portion of the total;
- this is also the case for the CRT containing appliances,
- relatively high costs are in absolute numbers for Lamps category 5B.

After transport and pre-treatment, for the SHHA there is no net revenue from the remaining fractions at 2005 price levels.

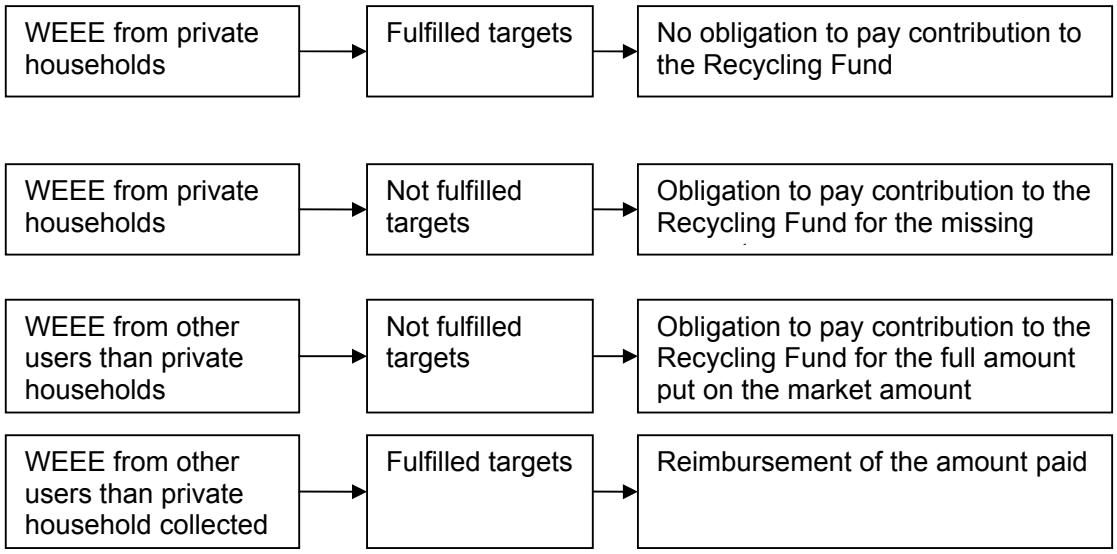
8.3.2 Influence of economic impacts of WEEE take-back and treatment

Prices for secondary materials. The sensitivity analysis showed that current 2007 market prices increase the revenues of the above categories by 50 – 100 EUR/tonne compared to 2005. This means net revenue after collection and transport for some categories.
Developments and availability of markets for downstream fractions and high-level reapplication/ valorisation of secondary raw materials.
Future developments of treatment technologies, as well as different treatment/dismantling requirements for particular product streams, which means that costs for CFC containing appliances are likely to decrease and flat panels are expected to cause an significant increase in total costs due to costly mercury removal steps.

8.3.3 Recycling Fund Mechanism

In some Region Countries mechanisms to ensure fulfilment of recycling targets have been developed as either a 'Recycling Fund' or a 'Product Fee' systems. Money is paid when placing equipment on market and could be reimbursed when producers demonstrate that in a give year they fulfilled the take-back obligations.

For instance in some countries the Recycling Fund works as follows:



The main advantage is that it provides an economic incentive to recycle. The main disadvantage is that it can be a barrier to trade. It is also known that WEEE based Recycling Funds are used for other purposes and/or lacking incentives to promote cost efficient operations.

8.4 Examples of the different recycling practices and recycling schemes including administrative requirements in the Mediterranean Region

8.4.1. CYPRUS

8.4.1.1 Overall numbers reported by Cyprus in 2006

Data officially reported by Cyprus to the European Commission based on the obligations of the country towards the WEEE Directive, reported year 2006.

Table 37 - WEEE collected and treated inside the country or exported in tonnes [T], 2006

		1	2	3	4	5	6	7
	Product category	Put on the market	Collected from private households	Collected other than private households	Total collected (2)+(3)	Treated in the Member State	Treated in another Member State	Treated outside the EU
1	Large household appliances	11 345	M	M	3 450	0	3 450	0
2	Small household appliances	1 007	M	M	100	0	100	0
3	IT & Telecommunication	470	M	M	857	0	857	0
4	Consumer equipment	114	M	M	100	0	100	0
5	Lighting equipment	241	M	M	M	0	M	0
5a	Gas discharge lamps	156	M	M	3	0	3	0
6	Electrical & electronic tools	434	M	M	M	0	M	0
7	Toys, leisure & sports equipment	106	M	M	M	0	M	0
8	Medical devices	884	M	M	M	0	M	0
9	Monitor & control instruments	173	M	M	M	0	M	0
10	Automatic dispensers	M	M	M	M	0	M	0

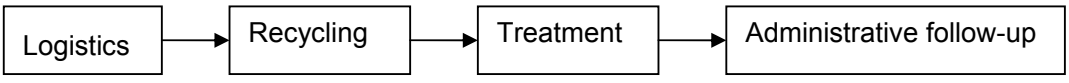
M – data not available

In the same time data on WEEE recovery, recycling and reuse, targets was not available.

8.4.2 FRANCE

ERP France
Valorisation des Déchets d'Equipements Electriques et Electroniques - DEEE

To fulfil its mission, ERP France puts in place the following operational activities:

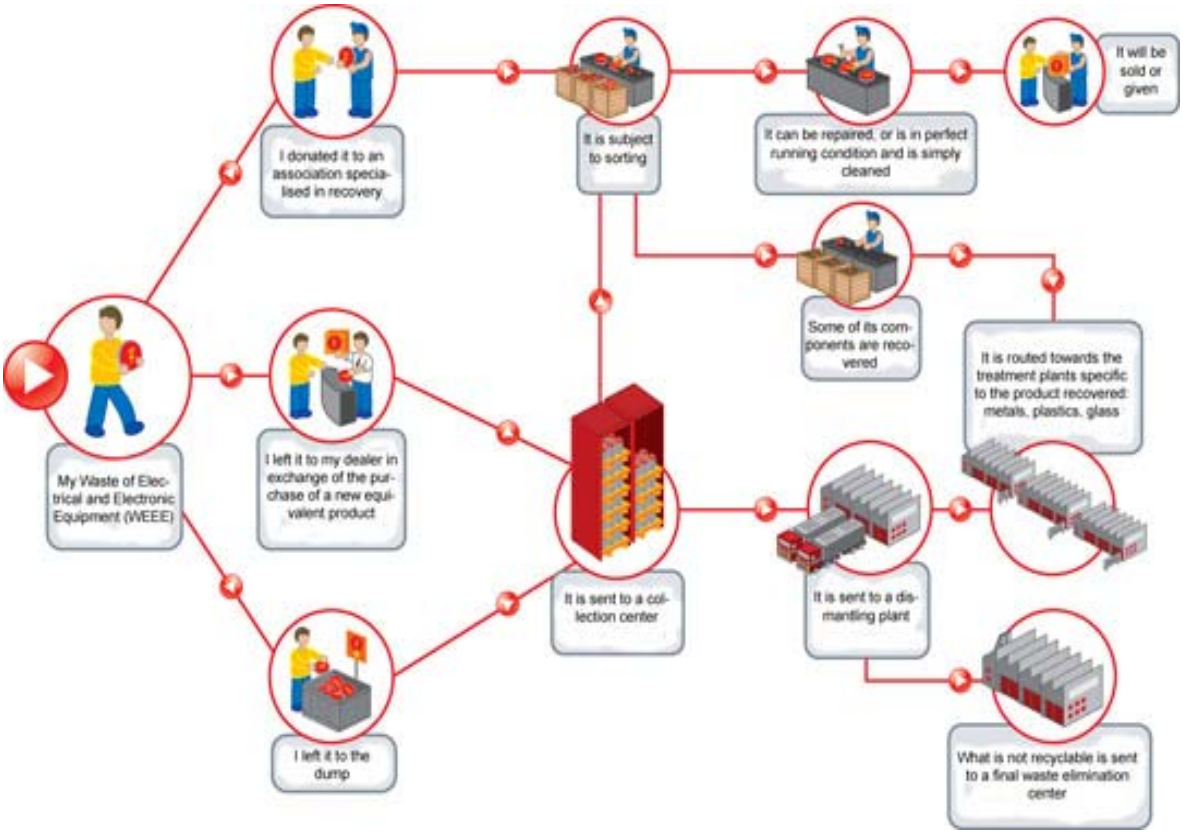


The WEEE main actors are described in the diagram which shows how ERP intends to satisfy the collection and recycling requirements of its members and to emphasize the essential role of consumers.

Consumers wishing to give away their old equipment have 3 possibilities:

- donating equipment to an association,
- the exchange called "1 for 1" through retailers,
- disposing of the equipment at an exact waste management facility.

The WEEE chain proposed by ERP France to its members



8.4.2.1 WEEE collected by the European Recycling Platform France

Year	WEEE collected by ERP Platform and 289 French distributors and collection partners
2007	26,481 T
2008	47,720 T
2009	65,602 T
2010 (I – VII)	36,999 T

Hazardous pollutants collected and separated from WEEE by ERP France in 2009

CFC liquids from LHHA	195.13 T
Glasses of cathode tubes from lighting	5,127.22 T

Main fractions separated and generated from WEEE by ERP France in 2009

Iron	17,285.51 T
Non-ferrous metals	3,852.48 T
Plastics	4,687.70 T

Equivalents of recycled products from WEEE by ERP France in 2009

Irons recycled out of Eiffel Tower	2.37

Electric cables (1,5 mm) recycled out of Tower of Terre	0.80
Plastics recycled out of not consumed barrels of petrol	75,003.19

8.4.2.2 Collected data in the recycling project by ERP France

Results, from 2009, collected during the special campaign are characterized by 4 main WEEE streams described in the following 4 subchapters.
1) LHHA without cold EEE
2) LHHA with cold EEE (all LHHA)
3) screens, TV screens
4) mixed SHHA

8.4.2.2.1 WEEE stream of the LHHA without cold EEE

The part of the project's results allows show ration and proportion of recycling and further utilisation of fractions obtained from LHHA without cold EEE.

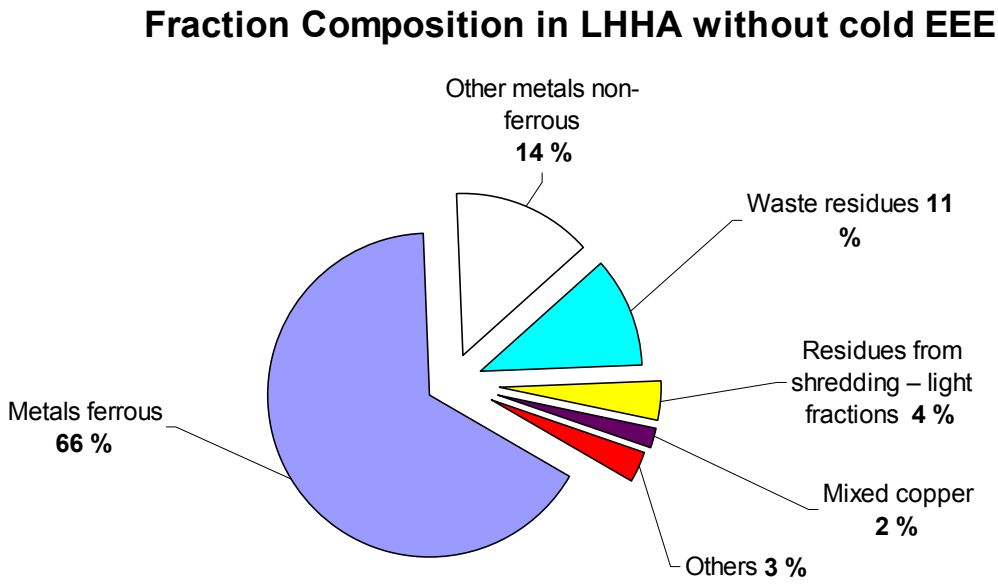
Table 38 - Project's results - a ration and proportion of recycling, reuse (material recycling) of fractions obtained from LHHA without cold EEE

	Recovery [%]		**Reuse& Material (Recycling) Reuse [%]**
	Material	Energy	Material
Legislative Targets	80		75
Achieved results by ERP France in 2009	79.48	4.43	**80.14**
	83.91		

Table 39 - Analyses of the fractions content in LHHA without cold EEE (2007)

Fraction Composition in LHHA without cold EEE	**Weight [T]**
Metals ferrous	4,259
Other metals non-ferrous (mix)	892
Waste residues	692
Residues from shredding and cutting – light fractions (sand, plastics, foams)	253
Mixed copper	117
Residues from shredding and cutting – dust/fine fractions (mixed metals, flakes of plastics)	63
Other plastics unusable	53
Other plastics usable	39
Mixed aluminium	37
Electric cables	14
Capacitors containing PCB	6
Printed circuit boards	2
TOTAL	**6,427**

Figure 29 – Composition of fractions - LHHA without cold EEE



8.4.2.2.2 WEEE stream of all LHHA

The part of the project's results allows show ration and proportion of recycling and further utilisation of fractions obtained from all types LHHA.

Table 40 - Project's results - a ration and proportion of recycling, reuse (material recycling) of fractions obtained from all types of LHHA

	Recovery [%]		**Reuse& Material (Recycling) Reuse [%]**
	Material	Energy	Material
Legislative Targets	70 - 80		50 - 75
Achieved results by ERP France in 2009	63.97	22.83	**69**
	86.80		

8.4.2.2.3 WEEE stream of screens, TV screens

The part of the project's results allows show ration and proportion of recycling and further utilisation of fractions obtained from all collected screens.

Table 41 - Project's results - a ration and proportion of recycling, reuse (material recycling) of fractions obtained from all collected screens.

	Recovery [%]		**Reuse& Material (Recycling) Reuse [%]**
	Material	Energy	Material
Legislative Targets	75		65
Achieved results by ERP France in 2009	83.90	9.25	**84.19**
	93.15		

8.4.2.2.4 WEEE stream of the mixed SHHA

The part of the project's results allows show ration and proportion of recycling and further utilisation of fractions obtained from all collected mixed SHHA.

Table 42 - Project's results - a ration and proportion of recycling, reuse (material recycling) of fractions obtained from all collected mixed SHHA

	Recovery [%]		**Reuse& Material (Recycling) Reuse [%]**
	Material	Energy	Material
Legislative Targets	70		50
Achieved results by ERP France in 2009	71.26	12.22	**71.44**
	83.48		

8.4.2.3 Overall numbers reported by France in 2006

Data officially reported by France to the European Commission based on the obligations of the country towards the WEEE Directive, reported year 2006.

Table 43 - WEEE collected and treated inside the country or exported in tonnes [T], 2006

		1	2	3	4	5	6	7
	Product category	Put on the market	Collected from private households	Collected other than private households	Total collected (2)+(3)	Treated in the Member State	Treated in another Member State	Treated outside the EU
1	Large household appliances	780 645	3 890	7	3 897	7	0	0
2	Small household appliances	131 634	146	2	148	2	0	0
3	IT & Telecommunication	203 327	411	8 129	8 540	1 550	1 595	0
4	Consumer equipment	174 539	908	115	1 023	0	0	114
5	Lighting equipment	26 905	0	135	135	0	0	0
5a	Gas discharge lamps	9 857	6	0	6	0	0	0
6	Electrical & electronic tools	87 903	21	77	98	1 343	0	0
7	Toys, leisure & sports equipment	37 757	5	92	97	0	0	0
8	Medical devices	7 980	0	860	860	364	6	0
9	Monitor & control instruments	9 732	5	19	24	1	0	0
10	Automatic dispensers	11 284	0	332	332	291	10	0

Table 44 - WEEE recovery, recycling and reuse, targets in tonnes [T], 2006

		1	2	3	4	5
	Product category	Recovery (tonnes)	Recovery rate (%)	Reuse and recycling (tonnes)	Reuse and recycling rate (%)	Reused as whole applicance (tonnes)
1	Large household appliances	0	0,0	0	0,0	443
2	Small household appliances	0	0,0	0	0,0	0
3	IT & Telecommunication	2 788	88,7	2 557	81,3	2 476
4	Consumer equipment	114	100,0	114	100,0	0
5	Lighting equipment	0	0,0	0	0,0	0
5a	Gas discharge lamps	n/a	n/a	0	0,0	0
6	Electrical & electronic tools	1 308	97,4	1 048	78,1	42
7	Toys, leisure & sports equipment	0	0,0	0	0,0	8
8	Medical devices	347	94	340	92	13
9	Monitor & control instruments	1	74,0	1	72,5	1
10	Automatic dispensers	21	7,0	21	7,0	556

8.4.3 GREECE

8.4.3.1 Overall numbers reported by Greece in 2006

Data officially reported by Greece to the European Commission based on the obligations of the country towards the WEEE Directive, reported year 2006.

Table 45 - WEEE collected and treated inside the country or exported in tonnes [T], 2006

		1	2	3	4	5	6	7
	Product category / Tonnes	Put on the market	Collected from private households	Collected other than private households	Total collected (2)+(3)	Treated in the Member State	Treated in another Member State	Treated outside the EU
1	Large household appliances	117 584	7 820	891	8 711	7 664	0	0
2	Small household appliances	11 593	246	81	327	278	0	0
3	IT & Telecommunication	15 427	451	550	1 001	889	0	0
4	Consumer equipment	21 093	1 009	15	1 024	845	0	0
5	Lighting equipment	1 262	2	2	4	0	0	0
5a	Gas discharge lamps	1 838	0	12	12	0	9	0
6	Electrical & electronic tools	2 993	10	41	51	18	0	0
7	Toys, leisure & sports equipment	940	54	6	60	61	0	0
8	Medical devices	722	1	24	26	39	0	0
9	Monitor & control instruments	1 478	5	10	15	0	0	0
10	Automatic dispensers	1 005	1	109	111	12	0	0

Table 46 - WEEE recovery, recycling and reuse, targets in tonnes [T], 2006

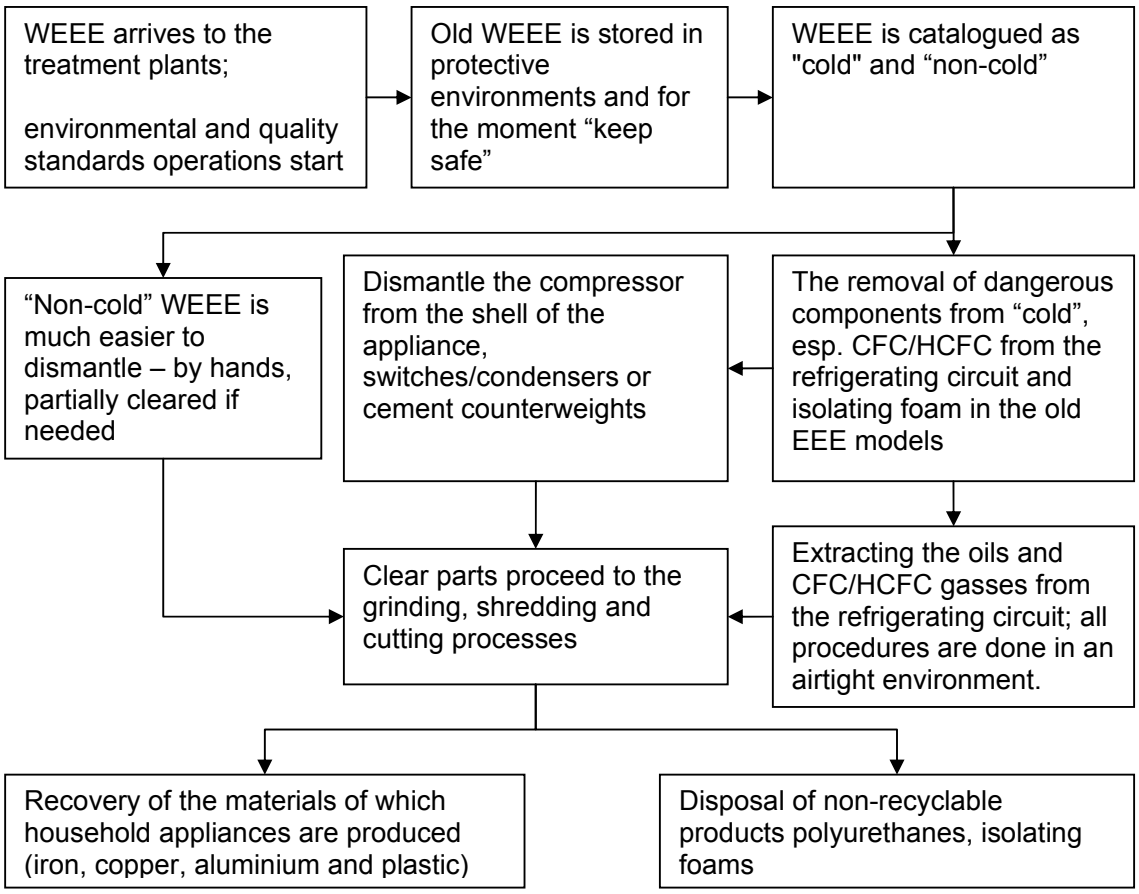
		1	2	3	4	5
	Product category	Recovery (tonnes)	Recovery rate (%)	Reuse and recycling (tonnes)	Reuse and recycling rate (%)	Reused as whole applicance (tonnes)
1	Large household appliances	7 437	97,0	7 437	97,0	0
2	Small household appliances	257	92,4	257	92,4	0
3	IT & Telecommunication	788	88,6	788	88,6	0
4	Consumer equipment	754	89,2	754	89,2	0
5	Lighting equipment	0	0,0	0	0,0	0
5a	Gas discharge lamps	n/a	n/a	9	93,4	0
6	Electrical & electronic tools	18	97,8	18	97,8	0
7	Toys, leisure & sports equipment	57	94,2	57	94,2	0
8	Medical devices	34	87	34	87	0
9	Monitor & control instruments	0	0,0	0	0,0	0
10	Automatic dispensers	11	99,0	11	99,0	0

n/a – data not available

8.4.4 ITALY

ECODOM
Consorzio Italiano
Recupero e Riciclaggio
Elettrodomestici

8.4.4.1 The WEEE recycling process by Ecodom Italy



8.4.4.1.2 Recycled material by Ecodom

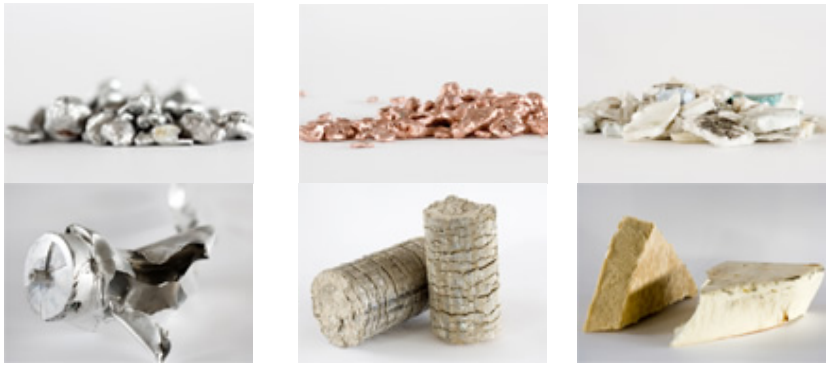
The final result is the regeneration of raw material from different appliances. The method used by the plants chosen by Ecodom consent the retrieval of more than 80 % of the material used for new appliances, the extent of purity permits the recycling of the products.

Mainly iron, copper, aluminium and different plastics are separated by physical and mechanical process after being shattered and hit for recycling.

In this way every household appliance becomes a mine of raw material:

Content of raw materials in 1 fridge

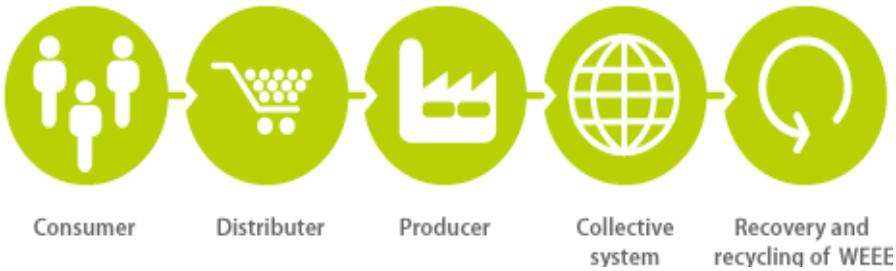
Iron	28 kg
Copper	3 kg
Aluminium	3 kg
Plastic	6 kg



8.4.4.1.3 The economic flow of Ecodom system

The economic flow that finances these appliances starts the moment a new piece of equipment is purchased by a chain of distributers or individual out-lets. These in turn pay producers the WEEE eco-contribute on the basis of the equipment purchased. The moment a purchase is made, the out let then recuperates the WEEE eco-contribute paid. The producers then deposit the entire sum received to the collective system to which they belong.

The Collective Systems use the WEEE Eco-contribution exclusively for financing the management of collecting, transporting, treating, recycling and their WEEE, as shown on the following chart.



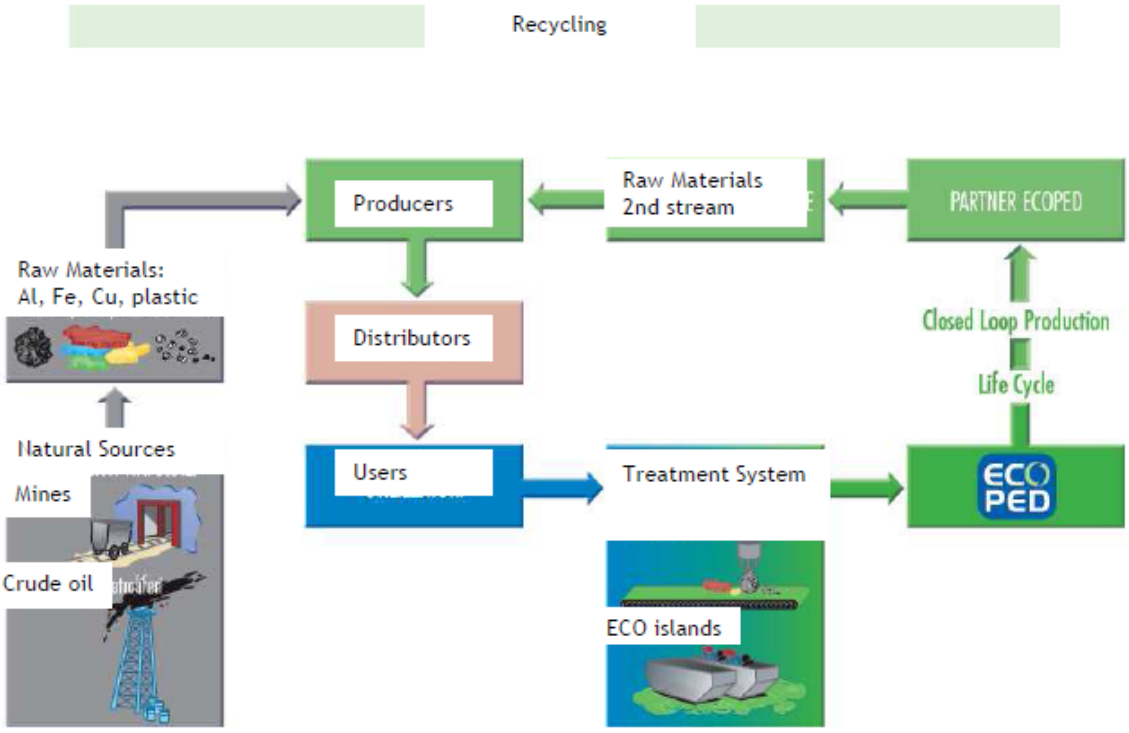
Remedia
PASSIONE PER L'AMBIENTE

8.4.4.2 The WEEE recycling process by Consorzio RE.MEDIA Italy

There are not only metallic, plastic and glass parts removed but also components and substances harmful to the environment or to health.

Today, less than 2 kg of WEEE per capita in Italy undergoes pre-sorted collection, comparing with the European average of 5 kg and an output of electronic waste of approximately 14 kg per capita. Accordingly, it is vital for consumers to collect this type of waste properly, by presorting it, and so contribute to safeguarding the environment.

8.4.4.3 Raw material recycling chain by Consorzio Ecoped – Ridomus



8.4.4.4 Overall numbers reported by Italy in 2006

Data officially reported by Italy to the European Commission based on the obligations of the country towards the WEEE Directive, reported year 2006.

Table 47 - WEEE collected and treated inside the country or exported in tonnes [T], 2006

		1	2	3	4	5	6	7
	Product category	Put on the market	Collected from private households	Collected other than private households	Total collected (2)+(3)	Treated in the Member State	Treated in another Member State	Treated outside the EU
1	Large household appliances	M	37 000	20 563	57 553	M	0	0
2	Small household appliances	M	M	M	M	M	M	M
3	IT & Telecommunication	M	M	M	M	M	M	M
4	Consumer equipment	M	M	M	M	M	M	M
5	Lighting equipment	M	M	M	M	M	M	M
5a	Gas discharge lamps	M	9 044	M	9 044	M	0	0
6	Electrical & electronic tools	M	M	M	M	M	M	M
7	Toys, leisure & sports equipment	M	M	M	M	M	M	M
8	Medical devices	M	M	M	M	M	M	M
9	Monitor & control instruments	M	M	M	M	M	M	M
10	Automatic dispensers	M	M	M	M	M	M	M
	total	M	129 132	547 420	676 552	1 547 026	5 308	63 560

M - data not available
Category 2 - only domestic WEEE collected separately

Category 5 - included the quota of domestic WEEE landfilled, estimated 937600 T

Table 48 - WEEE recovery, recycling and reuse, targets in tonnes [T], 2006

		1	2	3	4	5
	Product category	Recovery (tonnes)	Recovery rate (%)	Reuse and recycling (tonnes)	Reuse and recycling rate (%)	Reused as whole applicance (tonnes)
1	Large household appliances	M	M	M	M	
2	Small household appliances	M	M	M	M	
3	IT & Telecommunication	M	M	M	M	
4	Consumer equipment	M	M	M	M	
5	Lighting equipment	M	M	M	M	
5a	Gas discharge lamps	n/a	n/a	M	M	
6	Electrical & electronic tools	M	M	M	M	
7	Toys, leisure & sports equipment	M	M	M	M	
8	Medical devices					
9	Monitor & control instruments	M	M	M	M	
10	Automatic dispensers	M	M	M	M	
	total	294 494	18,2%	294 493	18,2%	

M - data not available
Product Category 1 - excepted the storage of WEEE pending operations R13 and D15
Product Category 2 - data relating only to recycling
Product Category 3, 4 - excepted the storage of WEEE pending operations R13 and D15, data relating only to recycling

8.4.5 MALTA

WasteServ, a state-owned company, operates integrated waste management systems, including one for WEEE. WasteServ Malta Ltd. was established in November 2002.

The amount of WEEE going for recycling or recovery is not known in detail. The only figures available up to now are the amounts of WEEE delivered to the Sant Antnin plant - 80 tons of WEEE in 2004, which corresponds to 0.2 kg per capita and year.

In Sant Antnin Plant, WEEE collected separately from retailers, from local councils and from commercial enterprises is stored intermediately, sorted, and is packed for export to foreign recycling plants. A certain amount of large household appliances is also recycled at local metal shredder facilities. The remaining amounts of WEEE obviously end up at the landfill.

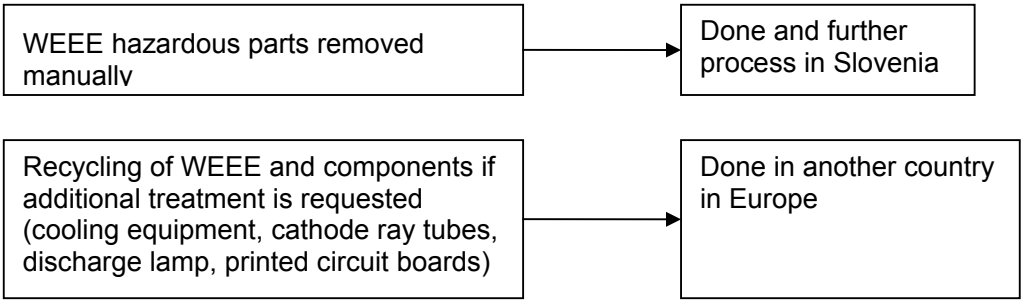
Overall numbers reported by Malta is not available.

8.4.6. SLOVENIA

8.4.6.1 Logistic system by ZEOS System

For the logistic system ZEOS have contract with existing logistic companies in Slovenia. They run the logistic system based on the rules and requirements prepared by ZEOS. Logistics is organized on base of logistic areas - one partner will be responsible for one area.

Recycling of treated WEEE:



In accordance with WEEE management plans as recovery operations intended for recycling of WEEE main recovery operations are:

- R4 - recycling / reclamation of metals and metal compounds, and
- R5 - recycling / reclamation of other inorganic materials.

In the next table recovery and recycling rates reported by compliance scheme ZEOS for 2007 are presented. Reported data and methodology of rate determination is still under assessment by Slovene Environmental Agency.

Table 49 - Achieved recovery and recycling rates of ZEOS compliance scheme for 2007

Category of EE equipment	Recovery rate (%)		Re- use and recycling rate (%)	
	target	achieved	target	achieved
1 - Large household appliances	80%	87.04%	75%	86.50%
1a – Cooling equipment	80%	89.51%	75%	86.50%
2 – Small household appliances	70%	64.53%	50%	67.87%
3 – IT and telecommunications equipment	75%	70.88%	65%	74.38%
4 – Consumer equipment	75%	70.88%	65%	74.38%
5 – Lighting equipment	70%	64.53%	50%	67.87%
5a – Discharge lamps	80%	95.99%	80%	95.99%
6 – Electrical and electronic tools	70%	64.53%	50%	67.87%
7 - Toys, leisure and sports equipment	70%	64.53%	50%	67.87%
8 – Medical devices		64.53%		67.87%
9 – Monitoring and control instruments	70%	70.88%	50%	74.38%
10 – Automatic dispensers	80%	87.04%	70%	86.50%

8.4.6.2 Overall numbers reported by Slovenia in 2006

Data officially reported by Slovenia to the European Commission based on the obligations of the country towards the WEEE Directive, reported year 2006.

Table 50 - WEEE collected and treated inside the country or exported in tonnes [T], 2006

		1	2	3	4	5	6	7
	Product category	Put on the market	Collected from private households	Collected other than private households	Total collected (2)+(3)	Treated in the Member State	Treated in another Member State	Treated outside the EU
1	Large household appliances	15 180	M	M	M	M	M	M
2	Small household appliances	1 764	M	M	M	M	M	M
3	IT & Telecommunication	3 404	M	M	M	M	M	M
4	Consumer equipment	3 369	M	M	M	M	M	M
5	Lighting equipment	930	M	M	M	M	M	M
5a	Gas discharge lamps	203	M	M	M	M	M	M
6	Electrical & electronic tools	1 492	M	M	M	M	M	M
7	Toys, leisure & sports equipment	221	M	M	M	M	M	M
8	Medical devices	231	M	M	M	M	M	M
9	Monitor & control instruments	197	M	M	M	M	M	M
10	Automatic dispensers	254	M	M	M	M	M	M
	total		1 184	1 762	2 947	967	1 504	377

Product Category 2 – European Waste List catalogue numbers: 20 01 21/23*/35*/36

Table 51 - WEEE recovery, recycling and reuse, targets in tonnes [T], 2006

		1	2	3	4	5
	Product category	Recovery (tonnes)	Recovery rate (%)	Reuse and recycling (tonnes)	Reuse and recycling rate (%)	Reused as whole applicance (tonnes)
1	Large household appliances	M	M	M	M	
2	Small household appliances	M	M	M	M	
3	IT & Telecommunication	M	M	M	M	
4	Consumer equipment	M	M	M	M	
5	Lighting equipment	M	M	M	M	
5a	Gas discharge lamps	n/a	n/a	M	M	
6	Electrical & electronic tools	M	M	M	M	
7	Toys, leisure & sports equipment	M	M	M	M	
8	Medical devices					
9	Monitor & control instruments	M	M	M	M	
10	Automatic dispensers	M	M	M	M	

M - data not available

8.4.7 SPAIN

8.4.7.1 WEEE Collection by ECOTIC FUNDACIÓN - consumer electronics system in Spain

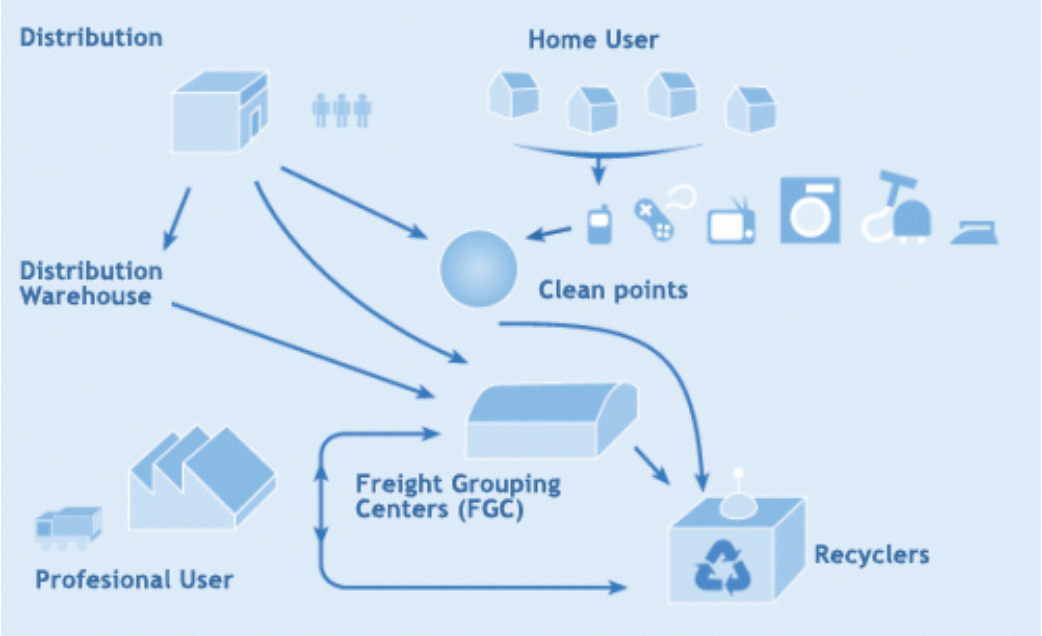
WEEE collection is based on 3 fundamental points of collection and storage, which are:

- "Clean Points" and other municipal points, where users can hand over their WEEE,
- the distribution companies' own storage,
- ECOTIC Freight Grouping Centres (FGC), which receive "Clean Point" and distributor WEEE before they are transported to recycling companies

8.4.7.2 Transportation and Recycling Cycle

From Clean Points, distribution storage and Freight Grouping Centres waste is transported by the logistics operator to the recycling companies.

End users of EEE should be able to dispose of this waste free of charge. The manufacturers of WEEE should manage and finance the recycling cycle of the devices from collection at recycling points, transportation and treatment to the adequate elimination of all waste.



8.4.7.3 Overall numbers reported by Spain in 2006

Data officially reported by Spain to the European Commission based on the obligations of the country towards the WEEE Directive, reported year 2006.

Table 52 - WEEE collected and treated inside the country or exported in tonnes [T], 2006

		1	2	3	4	5	6	7
	Product category	Put on the market	Collected from private households	Collected other than private households	Total collected (2)+(3)	Treated in the Member State	Treated in another Member State	Treated outside the EU
1	Large household appliances	327 083	151 391	26	151 418	M	M	M
2	Small household appliances	38 100	696	0	696	M	M	M
3	IT & Telecommunication	40 306	4 243	2 405	6 648	M	M	M
4	Consumer equipment	77 881	6 705	10	6 715	M	M	M
5	Lighting equipment	7 095	545	549	1 094	M	M	M
5a	Gas discharge lamps		M	M	M	M	M	M
6	Electrical & electronic tools	9 014	46	0	46	M	M	M
7	Toys, leisure & sports equipment	11 227	207	1 717	1 924	M	M	M
8	Medical devices	1 283	50	255	305	M	M	M
9	Monitor & control instruments	489	3	49	52	M	M	M
10	Automatic dispensers		0	70	10	M	M	M

M - data not available

Table 53 - WEEE recovery, recycling and reuse, targets in tonnes [T], 2006

		1	2	3	4	5
	Product category	Recovery (tonnes)	Recovery rate (%)	Reuse and recycling (tonnes)	Reuse and recycling rate (%)	Reused as whole applicance (tonnes)
1	Large household appliances	114 943	76,4	103 744	69,0	
2	Small household appliances	405	58,9	404	58,7	
3	IT & Telecommunication	2 042	78,9	2 000	77,3	
4	Consumer equipment	4 794	93,9	4 605	90,2	
5	Lighting equipment	47	91,7	47	91,7	
5a	Gas discharge lamps	n/a	n/a			
6	Electrical & electronic tools	33	72,7	33	72,7	
7	Toys, leisure & sports equipment	136	65,5	121	58,3	
8	Medical devices	35	80	35	80	
9	Monitor & control instruments	2	83,7	2	63,5	
10	Automatic dispensers					

8.4.8 ALBANIA

Under the Stabilization and Association Agreement (SAA) for transposition of the waste directives in Albania some expectations for waste were presented in the World Bank Report, e.g. for waste to be recycled about 10-20% of the total volume of the municipal waste generated by 2015. Expected percents based on the assumption that certain directives will be transposed and associated with implementation and enforcement of their requirements, so to complete the full range of legal approximation. At present a transposition of a number of waste directives is in progress.

The International Finance Corporation/Private Enterprises Partnership in South Eastern Europe (IFC/PEPSE) provides advisory services in several Mediterranean countries among which is also Albania. Within the Recycling Linkages Project realized under the IFC/PEPSE in Albania a recycling association has been established recently.
The association cover 58 bussines companies deal with ten waste groups mentioned in the table below:

Table 54 - Waste groups and number of companies included in the recycling association

Waste group	**Number of company**
paper (recycling)	3
plastic	10
textile	1
aluminium	4
steel	15
metal scrap	21
inert waste (demolition briks)	1
wood	1
waste oil	1
used tyres	1

None of the companies deal with WEEE as it is noted above.

In connection with an issue of waste recycling in Albania an important step was made within the suportive project “Solid Waste Management - Ministry of Environment and Korca” that has initiated a network of coordination between various Roma associations of Albania and other countries (Macedonia and Serbia). The project was supported by the Swedish International Development Cooperation Agency (SIDA). Relevant stakeholders of Korca formalized the sector of waste recycling named Eco-Service Korca, through a Memorandum of Understanding (MoU) and a management board of representatives of all Roma associations. An issued environmental permit enabled them to apply the permit at the regional level.

An informal market focused on waste that could be re-used/recycled/recovered has been started. Market price for metal scrap is highly variable, the minimum being 23.65 US$/ton the max being 283.80 US$/ton. This depends on the weight of metal sold, the threshold being 20 tons.
Some examples of the current prices of plastic, as well as the custom tarifs for importing and exporting of recyclable waste are given below.

Type of plastic	**Price imposed to recycling companies by individual collectors**
PET	10-25 AAL/kg
Plastic packaging	10-15 AAL/kg
Clean, high quality plastic packaging	60 AAL/kg

Custom tarifs for recyclable waste	**Custom tariffs**
Aluminium **(imports)**	0%
Glass **(imports)**	0%
Plastic **(imports)**	5%
All waste exports	0%

The next table shows amounts of different recycable waste exported from Albania in time period 2003 – 2005.

Table 55 – Exported amounts of recycable wastes in time period 2003 - 2005

Recycable waste exported from Albania	**2003 (kg)**	**2004 (kg)**	**2005 (kg)**
Cuprum-Zink Alley Scrap	1,029,730	3,668,750	3,265,048
Pure cuprum scrap	304,563	713,244	885,792
Plastics	304,563	713,244	885,792
Fe-Steel scrap	14,224,734	48,679,412	38,314,201
Aluminium scrap		4,062,282	4,982,649
Glass scrap			331,380
Paper	0	0	0

Source: IFC PEPSE

The company Kurum International Sh.p.k. is the significant and only Albanian iron and steel producer. It owns a Quality System Assessment and Conformity Certificate. The following table (56) illustrates demands of Kurum for metal scrap, amounts imported and amounts delivered by Albanian collectors.

Table 56 – Demands for treatment of metal scrap by Kurum company

Metal scrap used by KURUM (in Albania)	**in 2006** (ton]	**in 2008** (ton]	**in 2010** (ton]	**in 2012** (ton]
Overall demand	260,000	600,000	700,000	800,000
Furnished by Albanian scrap collectors (max)	120,000	140,000	150,000	150,000
İmported	140,000	460,000	550,000	650,000*

Source: KURUM
* About 75% of the scrap demand in 2012 will be secured through imports

Some following barriers are given for metal waste recycling in Albania:

- high energy price;
- high transport costs;
- general lack awareness at the public, administration and business level;
- a lack of appropriate practical arrangements and stimuli to promote re-use, recycling and recovering;
- a lack of training on waste segregation/ re-use/recycling/recovering at the different levels of value chain;
- a lack of expertise on the side of the recycling business itself;
- difficulties to access financial sources to develop such businesses.

The mentioned barriers have not to concern only metal waste recycling but also another recycable waste commodities.

The present situation in waste recycling could be summarised as follows:

- No national recycling scheme for WEEE exists;
- No cost of the scheme can be evaluated, since the national scheme does not exist.
- The status of economic instruments is poor. Only the metal parts of the WEEE are taken out and sold to the metal recyclers following the market prices for metal scrap;
- Administrative requirements are yet to be defined. It is expected that they be defined in the new (to be drafted) regulation on WEEE management that will transpose the related directive.

At the beginning of the WEEE implementation process the rate of WEEE return/recycling of 4 kg/inhabitant (according to the WEEE Directive) seems to be over-optimistic for Albania.

8.4.9 BOSNIA A HERZEGOVINA

An Article 24 of the Law No 33/2003 (Official Gazette FB&H) and an Article 31 of the Law No 53/2002 (Official Gazette RS) on Waste Management prescribes to waste producers and owners an obligation to collect waste produced by their activities or waste owned by them and ensure its additional handling e.g. recycling if it is appropriate. However, both Laws on waste management in accordance with EU legislation prescribes handling the hazardous waste the absence of specific by-laws and regulations makes it very difficult to implement. They are no regulations that prescribe obligations and liabilities regarding e-waste, and accordingly recycling of e-waste.

Although the recycling of waste is described in the Laws on waste management by foreseeing separation of recyclable waste in special containers, this procedure is not implemented in practice. There is no systematically organized recycling of the municipal waste. Recycling of some industrial waste is being carried out, but based on private initiatives.

According to the Strategy for Environment Protection of the Federation of Bosnia and Herzegovina, an economic instrument to facilitate recycling of waste is not implemented at present. The Strategy states that the purpose of this instrument will be for the future, e.g. in expanding the recycling network (investing in plants for recycling).

Missing by-laws to regulate recycling of solid waste, in general, is affected to the market for the secondary raw materials. This issue is neither covered by economic policy nor incentives. There are also no waste recycling capacities and facilities for the sorted waste.

As regards to the e-waste, there are no organized recycling scheme operations. The only recorded company for recycling of e-waste is the accumulator factory “Tesla” from city Brčko, which installed a new plant for recycling of old accumulators and furnace of steel, by the European standards. The price for one ton of the whole and undamaged accumulators is about 350 KM (1 € = 1,95583 KM).

8.4.10 CROATIA

According to the Croatian Act on amendments to the waste act (OG No 60/2008) the term of recycling means reuse of waste in the production process, but not including the use of waste for energy purposes.

The Ordinance on the management of waste electrical and electronic appliances and equipment (OG No 74/2007) states that a person authorised for treatment and recovery of EE waste is a legal or natural person who is authorised pursuant to the Waste Act to perform EE treatment and recovery operations, has a concession to perform EE waste treatment and

recovery operations, and has signed a contract with the Environmental Protection and Energy Efficiency Fund.

In accordance with WEEE management recovery operations intended for recycling of WEEE represent two operations namely recycling /reclamation of metals and metal compounds (R4) and recycling / reclamation of other inorganic materials (R5).

An Article 5 of the Ordinance of WEEE (OG No 74/2007) states recovery targets for EE waste by 31 December 2008 as follows:

a) for EE waste generated from EE equipment falling under categories 1 – large household appliances and 10 – automatic dispenser
   - the rate of recovery should be increased to a minimum of 80% by weight of collected EE waste;
   - the rate of reuse and recycling for components, materials and subtances should be increased to a minimum of 75% by weight of collected EE waste;

b) for EE waste generated from EE equipment falling under categories 3 – IT and telecommunications equipment and 4 – leisure consumer equipment
   - the rate of recovery should be increased to a minimum of 75% by weight of collected EE waste;
   - the rate of reuse and recycling for components, materials and subtances should be increased to a minimum of 65% by weight of collected EE waste;

c) for EE waste generated from EE equipment falling under categories 2 – small household appliances, 5 – lighting equipment, 6 – electrical and electronic tools (except large-scale stationary industrial tools), 7 – toys, leisure and sports equipment and 9 – monitoring and control instruments
   - the rate of recovery should be increased to a minimum of 70% by weight of collected EE waste;
   - the rate of reuse and recycling for components, materials and subtances should be increased to a minimum of 50% by weight of collected EE waste;

d) for gas discharge lamps, the rate of reuse and recycling for components, materilas and substances should be increased to a minimum of 80% by an average weight per lamp.

All collected WEEE (with exception of appliances selected for reuse of whole appliances) have to be treated before recovery/recycling and disposal with main goal – to remove substances, preparations and components given in the Annex 2 of the Ordinance of WEEE (OG No 74/2007) that is in compliance with Annex II of the WEEE Directive. A removal of hazardous substances is needful in order to avoid the dispersion of pollutants into the recycled material or the waste stream.
Croatia is a relatively small country with rather small quantities of separately collected WEEE. It does not posses numerous facilities for recovery, reuse and recycling of hazardous waste due to insufficient waste for worthwhile recycled production. There are two companies licensed for waste processing.

Since the new WEEE management system is established in Croatia collectors are obliged to deliver all quantities of collected WEEE to treatment operator. All components that can be recovered/recycled in Croatia are delivered to the proper facility.

If there are no technical and workforce capacities in Croatia for treatment and recovery/recycling of the components of WEEE or of treatment residues, the operator of facility shall export them at own expense and deliver proof to the EPEEF that the waste exported for recovery/recycling or disposal has been recovered/recycling or disposed as

intended. The export of untreated e-waste is not allow. The total amount 876.28 t of e-waste was exported to the EU countries in 2008. Furthermore, the import of hazardous waste has been prohibited by Croatia for a long time.

Establishing some new modern recovery facilities as is the one for WEEE recovery, enabled new collection systems to become more efficient. Furthermore, a lot of work has been done on raising public awareness and introducing new systems so Croatia expects better results in waste recovery in the near future.

The operator of the treatment/recovery facility has a duty to submit to EPEEF once a month the data on the quantities of waste taken over from the collection operator, treated/recovered and exported using the IOOEEO and IIKOEEO forms given in the Annex V of the Ordinance of WEEE (OG No 74/2007), and to CEA total data on annual basis. The examples of IOOEEO and IIKOEEO forms are given in the part of this report – treatment.

CEA prepares an annual Report on the implementation of the Ordinance of WEEE using forms IPOP I and IPOP II given in the mentioned Ordinance. Mainly the IPOP II monitores EE equipment categories from the point of view of the total weight of recovered/recycled waste in tonnes and recovery/recycling rate in %. The examples of both forms are given below.

IPOP I

	EE equipment category	Placed on the market	Collected from households	Collected other	Total collected	Treated in the Republic of Croatia	Exported to EU countries	Exported out of EU
		kilograms	kilograms	kilograms	kilograms	kilograms	kilograms	kilograms
1.	Large household appliances							
2.	Small household appliances							
3.	IT and telecommunication equipment							
4.	Consumer equipment							
5.	Lightning equipment (except gas discharge lamps)							
5.a	Gas discharge lamps							
6.	Electrical and electronic tools (except large-scale stationary industrial tools)							
7.	Toys, leisure and sports equipment							
8.	Medical devices							
9.	Monitor and control instruments							
10.	Automatic dispensers							

IPOP II

EE equipment category		Recovery	Recovery rate	Recycling	Recycling rate
		Total weight tonnes	%	Total weight tonnes	%
1.	Large household appliances				
2.	Small household appliances				
3.	IT and telecommunication equipment				
4.	Consumer equipment				
5.	Lightning equipment (except gas discharge lamps)				
5.a	Gas discharge lamps				
6.	Electrical and electronic tools (except large-scale stationary industrial tools)				
7.	Toys, leisure and sports equipment				
8.	Medical devices				
9.	Monitor and control instruments				
10.	Automatic dispensers				

Table 57 - IPOP I form for the year 2008

	EE equipment category	Placed on the market	Collected from households	Collected other	Total collected	Treated in the Republic of Croatia	Exported to EU countries*	Exported out of EU
		kilograms	kilograms	kilograms	kilograms	kilograms	kilograms	kilograms
1.	Large household appliances	41 985.85	1 222 073.00	1 497 910.00	2 719 983.00	2 730 265.00	0	0
2.	Small household appliances	5 030.58	20 911.00	62 684.00	83 595.00	67 598.00		0
3.	IT and telecommunication equipment	7 630.84	284 091.00	1 452 795.00	1 736 886.00	1 570 206.00		0
4.	Consumer equipment	5 687.05	435 423.00	308 177.00	743 600.00	702 032.00		0
5.	Lighting equipment (except gas discharge lamps)	3 757.71	2 160.00	8 401.00	10 561.00	16 142.00		0
5a.	Gas discharge lamps	334.17	272.00	93 221.00	93 493.00	33 354.00		0
6.	Electrical and electronic tools (except large-scale stationary industrial tools)	4 405.57	6 237.00	18 700.00	24 937.00	38 549.00		0
7.	Toys, leisure and sports equipment	477.25	1 807.00	3 945.00	5 752.00	7 148.00		0
8.	Medical devices	422.54	429.00	20 798.00	21 227.00	20 775.00		0
9.	Monitor and control instruments	1 189.45	339.00	50 372.00	50 711.00	70 466.00		0
10.	Automatic dispensers	526.02	60.00	227 755.00	227 815.00	164 126.00		0

* Amount exported to EU countries with an approve

Source: FZOEU, 2009

8.4.11 MONTENEGRO

The Government of Montenegro has adopted Republic-Level Waste Strategic Master Plan in 2005. The Master Plan sets except the overall objective also interim targets, which reflect the short-term needs to focus on municipal, hazardous, healthcare and other waste streams. An introduction of recycling activities belongs among short-term needs.

The national Waste Management Law, prescribed in Article 50 among others following provisions:

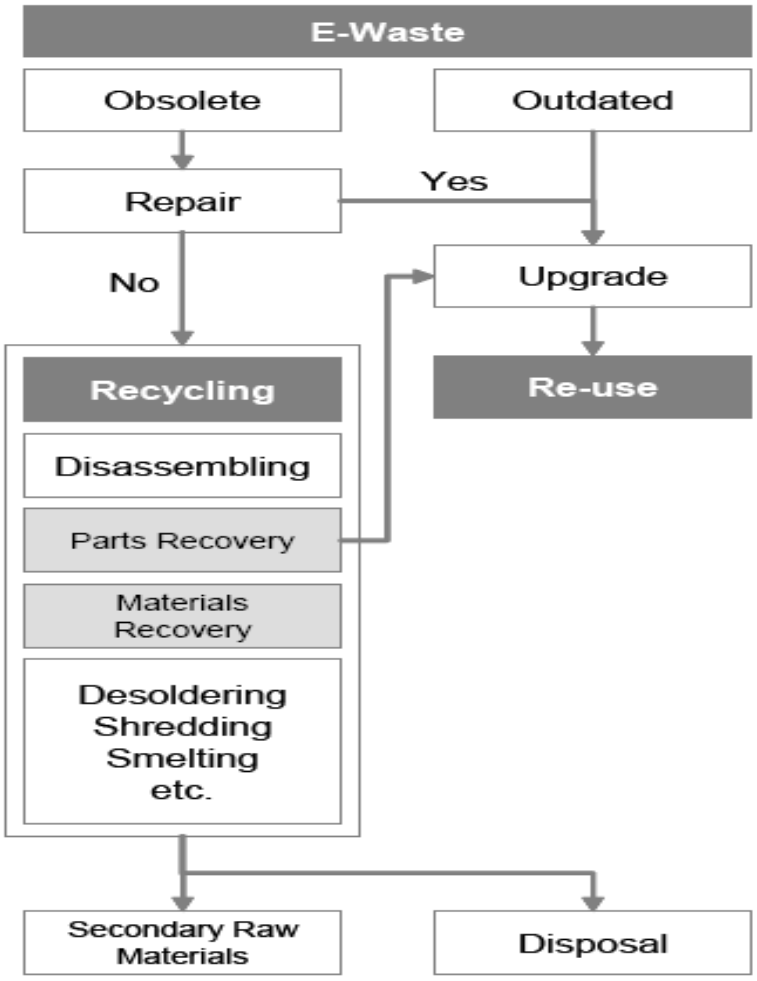
- manufacturer or importer of electric or electronic goods shall identify recyclable components of those goods and,
- the owner of electrical or electronic goods shall implement recovery operations of that waste for recycling of the components.

Adopted Plan of waste management in Montenegro the period from 2008 to 2012 provides that, depending on the specifics of the local environment, municipal waste management system includes except other things a construction of recycling centers in accordance with EU standards. Recycling centres should provide starting point for further development of e-waste (and other specific types of waste) management systems.

Different to many other products computers and mobile phones are thrown away since they are outdated and not because they are not functioning any more. Therefore these devices should be considered within a recycling concept anyway. Methods for recycling components of WEEE, and recovering valuable material contained in WEEE have been developed but not yet fully implemented. An implementation of adequate recycling measures will required more time and effort.

The following figure outlines recycling strategy for e-waste in general.

Figure 30 - Recycling strategy for e-waste



Current system regarding e-waste recycling in Montenegro shows several weak points as follows:

- Current recycling strategy in waste management is not possible to apply because its implementation relates with waste collection systems; no informal waste collection systems are exercises in practice;
- There is no recycling industry, which could absorb the plastic and ferrous metals and aluminum fractions;
- There is no special infrastructure available for the formal recycling of e-waste, but it is defined by the Plan, to be built in next 5 years.

8.4.12 TURKEY

Efforts of the Ministry of the Environment and Forestry in Turkey regarding the WEEE Directive concerning electrical and electronic wastes are in progress jointly with the representatives of the relevant sector. It was intended to issue the new draft regulations in 2009. With respect to this fact, there is not enough data in Turkey regarding a recycling system in conformity with such Directive and the actual recycling costs pertaining to such system. Waste recycling belongs among prioritised waste management principles in Turkey.

It is expected that the actual data will be available with a comprehensive pilot project that is intended for implementation by the White Goods Manufacturers of Turkey in 2009.

At the moment regarding waste electrical and electronic goods, there are approved companies by a letter of the Ministry that are enabled to perform some processes regarding waste electrical and electronic goods. However, due to the costs arising out of the requirements in the EU Directive in relation with the electrical and electronic wastes these companies are not competitive enough against those that are called “scrap dealers” that are engaged in collecting mixed wastes and recycling them. The enforcement of new national regulations focused on WEEE will regulate a competition in this field as the technical requirements applicable in the EU will become applicable in Turkey as well by means of a licensing system.

Based on the results of the actual costs of the activities realized in EU it is possible to obtain some results for Turkey. A calculation resulting from unit recycling costs found in the WEEE Forum reveals that the costs of processing (recycling) all the electrical and electronic wastes in Turkey (319.359 tons for year 2007) are as follows. This result involves only a general approach due to the considerable periodical changes in scrap prices and the changes in the input costs between Europe and Turkey. In cases where there is no data relating to the costs arising out of actual activities, as is the case in Turkey, the international estimations will constitute the most reliable estimations. As it is also possible to export the wastes, it is expected that the recycling costs in the European countries will become close to each other. Especially when the countries recently accessing the EU are taken into consideration, it can be said that the costs in Turkey will be close to the EU averages. The calculations of WEEE Forum, a platform of the recycling activities and actors in entire Europe, based on the actual data received from the countries find Euro 0,28/kg as the average cost for the entire Europe for waste handling including waste recycling. Such costs include collecting and logistics costs, container costs for storage, recycling and processing costs, research and development costs, cost of public awareness activities and administrative and other costs.
The costs at the recycling, in other words, waste processing stage, make up for 33% in the entire period including all of the above-mentioned elements according to the average costs found by WEEE Forum based on the actual data in entire Europe. In this case, the annual recycle cost of the electrical and electronic wastes shall be as follows within the framework of the waste formation and collection volumes estimated for Turkey:

Total WEEE quantity in Turkey in 2007(ton)	319.359
Average total WEEE cost	0,28
Total WEEE TR cost	**€ 89.420.512**

WEEE Processing (Recycling) Cost	**% 33**	**€ 29.508.769**

In Turkey, there is no state support or loan made available by the Ministry of the Environment and Forestry for such recycling plants. However, if such plants are considered as environmental investments by the Ministry of the Environment and Forestry, the Undersecretariat of Treasury can make available state support or loans with low interest rates exclusive for such plants.

8.4.13 ARAB COUNTRIES

Limited information regarding recycling opportunities in Arab countries are available. Recycling activities need to be developed with development of viable markets for recycling

products in Egypt as well as in all other Arab countries. The bulk of WEEE recycling is performed by informal sector. The formal sector represented by associations, NGO´s, companies specialising in industrial pollution control, companies that sell IT equipments, etc. is in a phase of implementation of several waste management initiatives that have been initiated recently. Establishment of recycling and recovery programmes seems to be as a necessity in these countries.

The table 58 shows some information about recycling possibilities in Morocco that are published in technical report on the assessment of e-waste management in this country.

Table 58 – Recycling possibilities in Morocco

Type of material	Recycling possible in Morocco	Potential structures
Plastic	Yes, partially	Recycling by construction and public works sector; patent filed by ENIM/ECOTECHNO "impermeable polymer", in June 2008
Ferrous metals	Yes	SONASID and others
Aluminium	Yes, partially	Craft industries (manufacture of pans and other items)
Copper	Yes, partially	Macz and other firms / craft industries
Printed circuit boards (precious metals)	Partially, in its infancy	Industrial recyclers currently setting up /export to Europe
Cathode-ray tubes (containing lead, beryllium, phosphorus, etc.)	No	Hazardous waste treatment plant (CNEDS) or landfill centres
Hazardous materials (PCB in capacitors, mercury in lamps, batteries, getter pills, etc.)	No	Hazardous waste treatment plant (CNEDS) or landfill centres

The Moroccan Centre for Clean Production (CMPP) is helping the company IVSEP (recycling of WEEE) with its technological choices, as well as with putting together the technical file to support its application for funding from the FODEP and finding financial and commercial partners nationally and internationally.

There are recycled few parts of WEEE in Tunisia. WEEE is mainly originated from the computing sector, offices, electric household appliances and audio-visual equipments.

The private sector has its place in recycling of plastic or metal components from WEEE. The rest of WEEE is exported. There are 4 private recycling facilities that have an agreement to handle e-waste with capacity of recycling 2 000 t/year in Tunisia.

A realization of a pilot project for collecting and recycling of e-waste financed by Korean cooperation (3 500 M$) is under way in Tunisia. The objectives of the project are:

- development of the preparatory studies necessary to set up the project controls recycling and of valorization of the WEEE (identification of the holders, optimization of the collection…);
- installation and operation of recycling unit and valorization of the WEEE and acquisition of three trucks for the collection of the EEEW from holders (households or public or private establishments) and several containers for suitable collection in the pilot project area;

- technical assistance for development of information, communication and training of the pilot project beneficer.

9. Disposal and disposal scheme operation: organization of national disposal schemes, cost of the schemes, economic instruments to facilitate the environmentally safe disposal, administrative requirements.

9.1 WEEE Environmental Problem connected with WEEE disposal

The current lifestyle is increasing the demand and production of EEE of daily consumption domestic, in offices, professional, etc. At the current rate, it is forecast that these devices' waste will double in the near future to 12 million tonnes by the end of 2010.

The production of EEE as well as the elimination of their waste entails an environmental and health problem. Large quantities of energy and raw materials are needed for their manufacture. Some are very harmful for the environment as well as for humans. Some of the components with the greatest impact are fire-resistant brominated (brominated flame retardants) materials and heavy metals such as cadmium, chrome, lead, nickel and mercury.

On the other hand, over 90 % of WEEE are eliminated through incineration or landfilling, treatments that do not involve decontamination nor recovery processes, and which assume significant environmental risks and the resources wasting. In incineration, contaminating gases are released that come from the combustion of the mainly PVC. Leaching and filtration of dangerous substances, the vaporization of gases and uncontrollable fires are the main environmental impacts of dumping.

However, the new worldwide and European approach through different environmentally sound guideline on WEEE refers to the manufacturers' liability, reorganizes the functions of agents involved in managing this waste and establishes mandatory collection and recycling.

Collection, separation, recycling and raw material recovery gained from WEEE seems to have an increasing trend (see chapters 5 and 8).

9.2 The Producer Responsibility Principle

The Producer Responsibility Principle as a policy principle can be summarised as "concept that manufacturers and importers of products bear a degree of responsibility for the environmental impacts of their products throughout the products' life-cycles, including upstream impacts inherent in the selection of materials for the products, impacts from manufacturers' production process itself, and downstream impacts form the use and disposal of the products.

Producers accept their responsibility when they design their products to minimize the life-cycle environmental impacts and when they accept legal, physical or economic responsibility for the environmental impacts that cannot be eliminated by design". The WEEE legislation put the principle in concrete terms and allocates concrete responsibility on stakeholders involved in the lifecycle of electric and electronic products.

Producers are responsible for the financing of the costs of collection, treatment, recovery and environmentally sound disposal of WEEE from users other than private households for products placed on the market after 13 August 2005. Except for France, all MS determined that for historical WEEE, producers are responsible to accept WEEE from end users when purchasing new products. If end users of historical WEEE are not purchasing new equipment

the responsibility rests with the end user. However, in France the end user is responsible for financing all B2B historical WEEE.

Municipalities have been given the primary responsibility to provide information to consumers of their obligation not to dispose of WEEE with unsorted domestic waste as well as location of the options available to households to return WEEE. Municipalities are also responsible to inform consumers of EEE of their role in the reuse, recycling and other forms of recovery, including the impacts on the environment and human health from the disposal of WEEE. Producers are responsible for the above information provision “accordingly”.

9.3 Disposal and elimination ”D” operations

D 1	Deposit into or on to land (e.g. landfill, etc.)
D 2	Land treatment (e.g. biodegradation of liquid or sludgy discards in soils, etc.)
D 3	Deep injection (e.g. injection of pumpable discards into wells, salt domes or naturally occurring repositories, etc.)
D 4	Surface impoundment (e.g. placement of liquid or sludgy discards into pits, ponds or lagoons, etc.)
D 5	Specially engineered landfill (e.g. placement into lined discrete cells which are capped and isolated from one another and the environment, etc.)
D 6	Release into a water body except seas/oceans
D 7	Release to seas/oceans including sea-bed insertion
D 8	Biological treatment not specified elsewhere in this Annex which results in final compounds or mixtures which are discarded by means of any of the operations numbered D 1 to D 12
D 9	Physico-chemical treatment not specified elsewhere in this Annex which results in final compounds or mixtures which are discarded by means of any of the operations numbered D 1 to D 12 (e.g. evaporation, drying, calcination, etc.)
D 10	Incineration on land
D 11	Incineration at sea (*)
D 12	Permanent storage (e.g. emplacement of containers in a mine, etc.)
D 13	Blending or mixing prior to submission to any of the operations numbered D 1 to D 12 (**)
D 14	Repackaging prior to submission to any of the operations numbered D 1 to D 13
D 15	Storage pending any of the operations numbered D 1 to D 14 (excluding temporary storage, pending collection, on the site where the waste is produced) (***)

Important notes:

(*) This operation is prohibited by EU legislation and international conventions.
(**) If there is no other D-code appropriate, this can include preliminary operations prior to disposal including pre-processing such as, inter alia, sorting, crushing, compacting, pelletizing, drying, shredding, conditioning or separating prior to submission to any of the operations numbered D1 to D12.
(***) Temporary storage means preliminary storage according to EU legislation.

9.4 Hazardousness of WEEE

WEEE, which is considered hazardous, is an important case. Detailed classification of waste as hazardous waste, regulated under strict specifications in order to prevent the potential negative effects on the environment and on human health, is described in chapter 3 and hazardous waste properties in chapter 3.5.

WEEE is often dismantled with little or no personal protection equipment, low environmental protection levels, weak pollution control measures and low labour costs. There are some illegal practices when components are burnt in the open space to retrieve metals and fly ash particulates laden with heavy metals, flame retardants and other toxic materials are usually emitted, resulting in increased human exposure, as well as contamination of food, soil and surface water.

9.5 Transport and shipment of WEEE by the Basel Convention

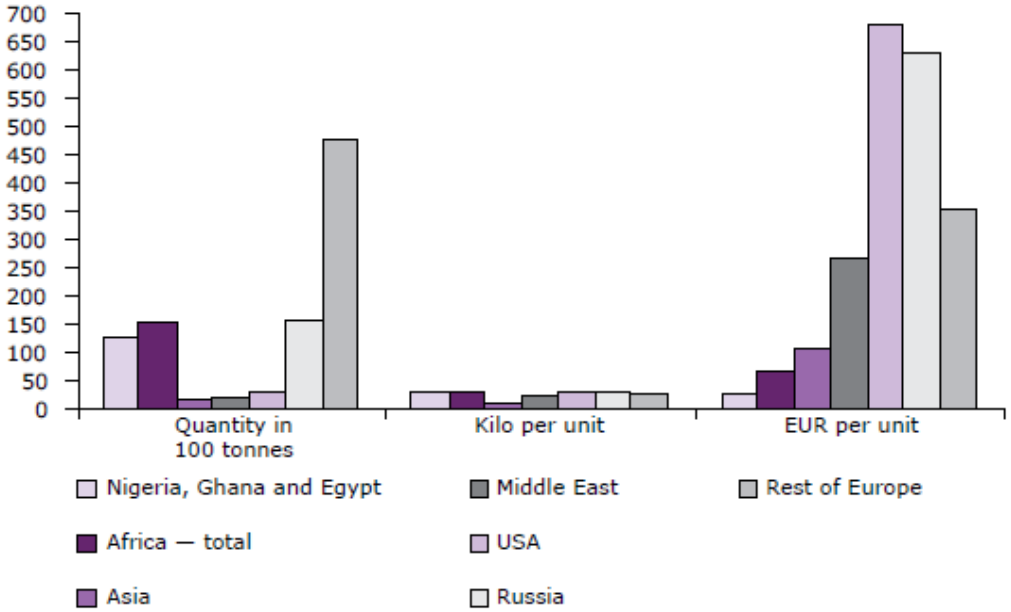
There is not a clear picture when it comes to WEEE shipped within and out of the EU partly because ambiguous codes are used for the reporting of shipments of electronic waste. It is difficult to tell if a TV is being exported as a second hand device, which is acceptable or as waste for disposal, which is not. In general, export of WEEE from the EU to non-OECD countries is prohibited. However, the export of a TV that still works is perfectly acceptable.

There have been well documented cases, in the frame of the Basel Convention on the Control of Transboundary Movements of Hazardous Wastes and their Disposal, that break this ban. Indeed, it appears that a significant portion of the exported used TV sets, PCs, monitors and telephones to non-OECD countries are waste purchased with the intentions of retrieving the components and elements mentioned in chapter 9.1.

9.5.1 Tracking down data on WEEE by the Basel Convention

Despite the difficulties associated with finding, checking and analysing data on waste, the EEA in partnership with the “European Topic Centre on Resource and Waste management” has carried out an analysis of shipments of waste from the EU to other regions. Using European trade statistics it is possible to identify the amounts, size and value of exports of used electronic and electrical products shipped from the EU to other regions.

Figure 31 - Export of colour television sets from the EU25 to Africa, Asia, the Middle East, USA and other European countries, EEA, 2005



In 2005, more than 15,000 tonnes of colour TV sets were exported from the EU to African countries. In Nigeria, Ghana and Egypt alone about 1,000 TV sets arrived every day. The average value of exported colour TV sets to Africa is very low: for Africa as a whole the price

per unit was EUR 64 and EUR 28 on average for the three countries mentioned above. In comparison, TV sets traded within Europe have an average value of EUR 350.

The low value per unit for TV sets sent to Africa suggests that many of these exports are in fact used products, much of which is likely to be waste. As these figures are for TV sets only, the total export of used computers, mobile phones, CD players etc. to these regions is expected to be significantly higher. This suggests that the EU ban on the trade of hazardous waste with non-OECD countries is being broken.

9.6 Maximum environmental impact and maximum cost schemes of WEEE

These two values are defined as the theoretical scenario of 'every material ending up in the worst possible (realistic) end-of-life route', including the environmental burden plus (environmental) costs of pre-treatment: collection, transport, disassembly and shredding and separation into fractions.

The 'realistic' end-of-life scenarios under consideration are controlled and uncontrolled landfill, incineration with or without energy recovery and all subsequent treatment steps for material fractions, like copper, ferrous and aluminium smelting, glass ovens and plastic recyclers. In addition this theoretical value cannot easily be exceeded except under extreme disposal conditions, which are normally forbidden by law.

9.7 Instruments to facilitate the environmental sound disposal and general requirements

The WEEE directive is focussing on a much broader objective: the prevention of waste electrical and electronic equipment, and in addition, the reuse, recycling and other forms of recovery of such wastes so as to reduce the disposal of waste.

The methods of storage used shall ensure that the further recycling/disposal is not adversely affected and that environmental damage, in particular soil contamination, is prevented.

It also seeks to improve the environmental performance of all operators involved in the life cycle of electrical and electronic equipment, e.g. producers, distributors and consumers and in particular those operators directly involved in the treatment of waste electrical and electronic equipment.

All permits, licences, letters of authorization, valid proof of disposal and any official requirements shall be documented and kept up to date and accessible at all times. Documentation of all output flows (type and quantity) and the documentary evidence required to meet the provisions of the Waste Avoidance, Recycling and Disposal Act.

<u>The instruments used to obtain these objectives are:</u>

- Support of eco design in order to obtain easily recyclable or reusable waste;
- Separate collection and take back obligations, with a collection target of 4 kg/inhabitant/year;
- Treatment using best available techniques, minimum quality standards and recovery targets;
- Financing and information/reporting obligations;
- Penalties, inspection and monitoring.

9.8 Examples of the different disposal scheme including administrative requirements in the Mediterranean Region

9.8.1 CYPRUS

Data officially reported by Cyprus to the European in 2006 shows in chapter 8.4.1 that total production of WEEE collected and disposed of in another country of the EU is more than 4,510 T.

Green Dot Cyprus is already in co-operation with 6 municipalities and 3 communities in Limassol and Nicosia. Soon it will cover more than 50 % of Cyprus' population, with an organised programme for collecting and recycling materials. Green Dot will also soon be in a position to manage WEEE on behalf of WEEE Electrocyclosis Cyprus Ltd, as well as household batteries on behalf of the organisation AFIS Cyprus Ltd.

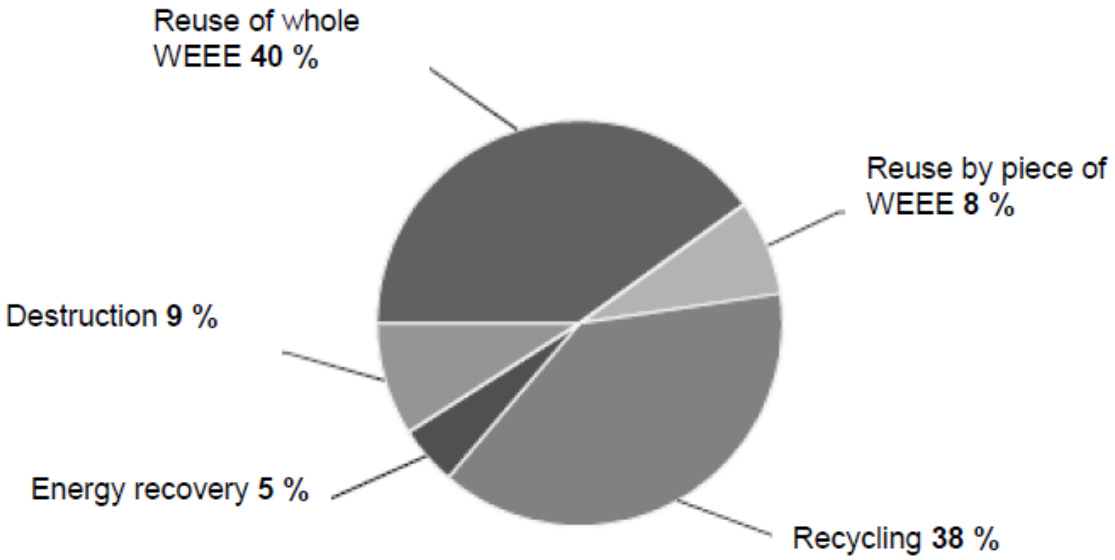
Green Dot Cyprus has activated a number of campaigns, aimed at the public and schoolchildren. A package of fun leaflets with games and treasure hunts – treasures being recyclable materials, their further reuse and final disposal – have already been sent out to all the island's schools.
The new programme to collect and process WEEE began in February 2007 and so far covers Strovolos, Ayios Athanasios, Yermasoyia, Kato Polemidia, Mesa Yitonia, Mouttayiaka, Agios Tychonas and Ypsonas. The Limassol project began in February 2007 and means that Green Dot Cyprus' recycling programme now covers 250,000 of the population.

By the middle of 2008, Green Dot's programme aims to expand to the remaining municipalities of greater Nicosia, covering an additional 150,000 people. The Minister of Agriculture also recently approached Green Dot to discuss the expansion of the WEEE programme to the Larnaca, Paphos and Famagusta districts.

9.8.2 FRANCE

The following figure gives a distribution of the treatment of the professional WEEE by processing waste.

Figure 32 - Treatment of professional WEEE in 2006, distribution per type of treatment [T]



Among the 7,700 tons of treated WEEE:
- 48 % are reused, including 40 % by whole WEEE devices and 8 % by elements/parts,
- 43 % are recovered, including 38 % recycled and 5 % incinerated with energy recovery,
- 9 % are eliminated without any further reuse (put in landfill or incineration plant without valorisation).

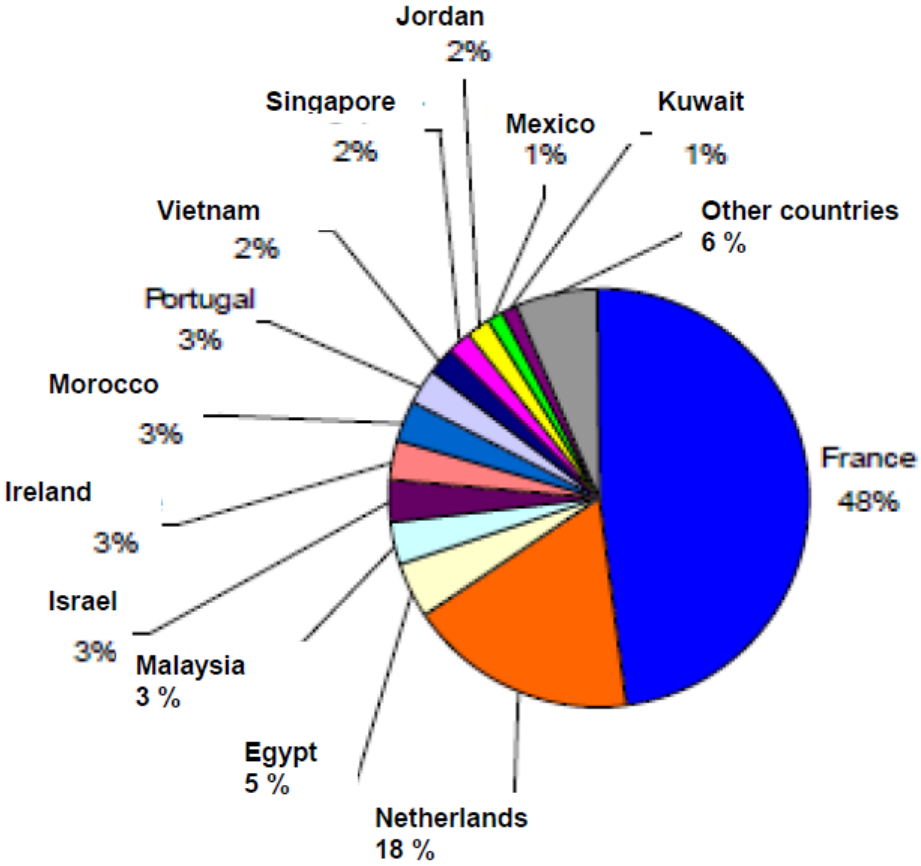
Treated total 7,700 tonnes means:

Country of Treatment	%
France	48
Other MSs of the EU	24
Other countries outside the EU	28

Reuse of whole WEEE is carried out by 2/3 in the EU, whereas the re-use by parts takes place mainly in France. Recycling is divided between France and the European Union MSs. Lastly, energy recovery and destruction take place with more than 90 % in France.

The figure 33 shows a distribution of the treatment of the professional WEEE by country where is carried out the waste processing, the important fact is that it relates to low volumes, only.

Figure 33 - A distribution of the treatment of professional WEEE by country

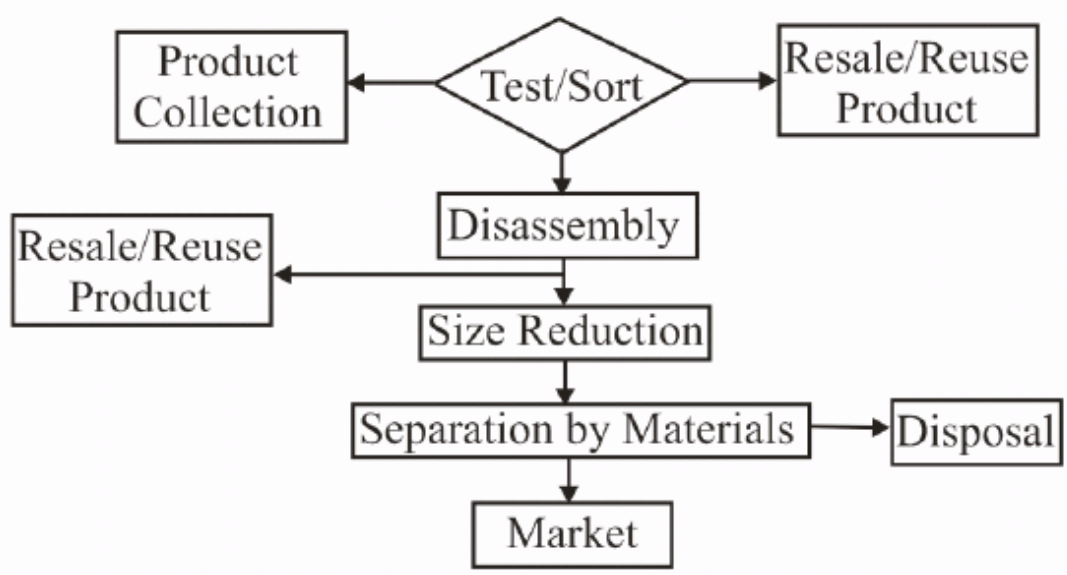


9.8.3 GREECE

WEEE represents a growing management problem due to their increasing quantity and also their hazardous content. WEEE quantities in Greece reach 175,000 T in 2001. The main objective of this paper is to give an estimation of the quantities of recyclable and hazardous materials, which could be recovered and diverted from final disposal to landfill through separate collection and disassembly. Results show that annually, from white goods only there is a potential for recovery of ca. 6,522 T plastics, 10,681 T ferrous metals and 1,504 T non-ferrous metals.

The environmental burden due to the production of EEE exceeds by far the environmental burden and thus the production of materials constituting the other sub-streams of the municipal solid waste stream. Moreover, the hazardous material content is also of concern, as WEEE is a major contributing stream of hazardous substances to MSW, and some components are hazardous waste.

9.8.3.1 Simplified flow diagram for WEEE management in Greece



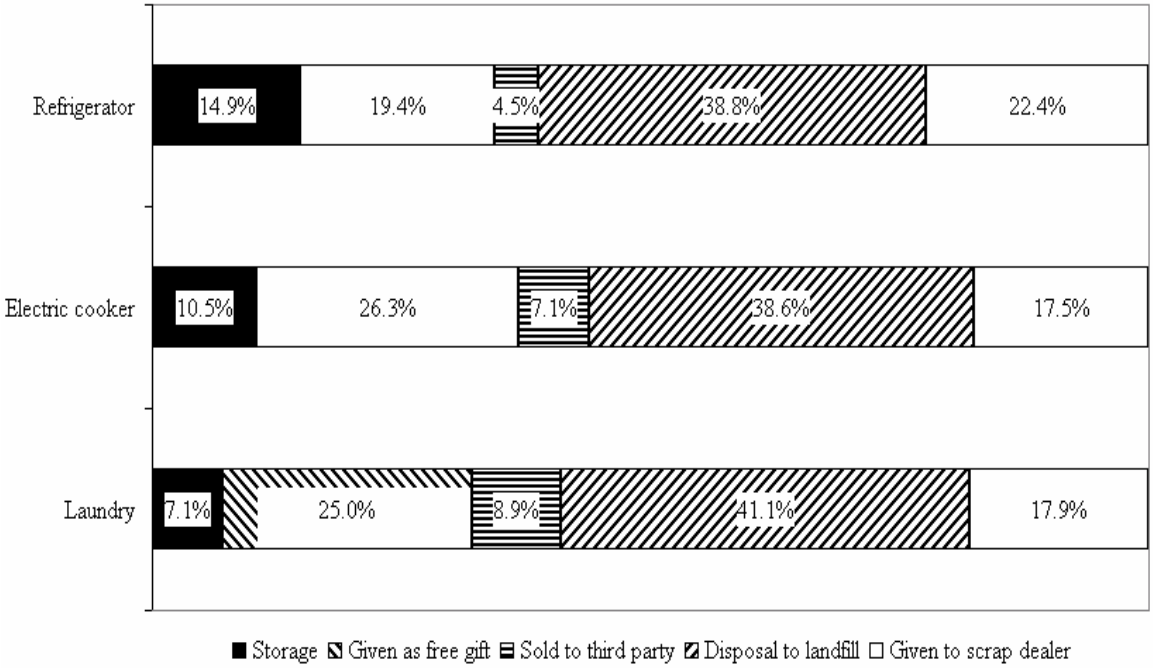
The conventional, primary disposal mode for LHHA in Greece is in controlled, semi-controlled or uncontrolled landfills. A field survey on WEEE took place in the city of Thessaloniki, Greece, within the year 2002, in the frame of the HELCARE network. The survey was conducted with suitable questionnaires in the following two groups of stakeholders:

EEE department stores	The main aim here was to determine aspects of their role in the WEEE chain and waste-related characteristics of their products (e.g. lifespan).
Households of various municipalities	The main aim was to determine their profile as WEEE producers and provide first-hand, raw data. 126 households were interviewed.

Data analysis that resulted from the field survey showed that WEEE – LHHA are:

directly disposed to landfills	40 %
given away or sold to third parties	30 %
stored by their last owners	20 %
given to scrap dealers, who use only parts and dispose the rest at landfills	10 %

9.8.3.2 Percentages of main LHHA disposal methods in Greece



New waste management options are needed to divert WEEE - LHHA from landfills. However, there are several factors to consider in the development of a successful diversion strategy. This strategy must be based on its economic and environmental sustainability, technical feasibility, and a realistic level of social support for the program. One aspect of the strategy should include enhanced recycling and reuse of WEEE - LHHA.

9.8.3.3 Quantities of hazardous substances and recyclable materials in Greece

According to research mentioned in chapter 9.8.2.1, estimated quantities of heavy metals ending up in Greek landfills as a result of WEEE disposal are given in the table below. These represent years 2002 and 2006, as well as year 2006 if the target set out by legislation (i.e. 4 kg/cap/year separate collection) is attained.

Heavy metals in Greek landfills from WEEE

Substance	Amount (t)		
	2002	*2006*	*2006 with separate collection 4 kg/cap·year*
Pb	166.803	187.155	74.111
Hg	0.134	0.151	0.011
Cd	0.770	0.863	0.360
Sb	25.059	28.112	11.715
Be	0.177	0.199	0.083

Looking at LHHA specifically, hazardous substances of concern are ODS, mainly CFCs and HCFC, with an estimated 0.65 kg/refrigerator in the cooling system and foam insulation. It is estimated that every year, from refrigerators only, 67.3 T of ODS end up in landfills in Greece, whereas some 38.8 T end up in scrap dealers, where they are generally mishandled (i.e. shredded for metals recovery without any pre-treatment).

In calculating the perspectives of material recovery, it is considered in this case that only the 'disposal to landfill' and 'given to scrap dealer' WEEE - LHHA amount is referred to as 'recovery'. The annual remarketing potential of recycled materials from white goods in Greece could be in 5,270 pcs of WEEE LHHA:

10,681.7 T	ferrous materials	62 % of refrigerators
1,504.3 T	non-ferrous materials	59 % of laundry machines
6,522 T	plastic materials	56 % of electric cookers

9.8.4 ITALY

Environmental disadvantages of unused and not processed WEEE

Around 14 kg of WEEE per inhabitant is produced every year in Italy. In continual growth, unfortunately most of it still ends up in the city dumps or worse still along the road side causing incredible damage to the environment.

An incorrect method of treatment, not only means that the raw material cannot be recycled – 80 % of the weight of old household appliance, but also the spreading of dangerous substances in the environment.

This is the case mainly of CFC and HCFC ozone gasses present in the cooling circuit and isolating foam which aren't only found in very old fridges and freezers, but condensers, mercury switchers and chrome components contained in the majority of modern day appliances. CFC and HCFC gasses are held responsible for the release of chlorine in the atmosphere. Even though only a minimal part is present in the appliances, it has a strong negative impact on the environment.

Furthermore, the recycling of EEE permits the recovering of glass, plastic and metals such as iron, steel, cast iron and aluminium, reducing sensibly the amount of rubbish in the city dump.

9.8.5 SLOVENIA

The purpose of WEEE Management system - prevention, reuse, recycling and other forms of recovery of WEEE - is to reduce the disposal of WEEE. Before the establishment of WEEE management system significant part of WEEE was most probably also disposed off without appropriate pre-treatment and further recovery.

As already mentioned in chapter 5 on administrative Slovene requirements, the WEEE Management Plan is essential part in the EEE producer registration process. Besides data on WEEE collection, planned methods and operators for reuse, pre-treatment, recovery, the WEEE Management plan shall also include data on disposal of WEEE and final treatment of residues from WEEE.

In approved Slovene plans of disposal operations, in accordance waste legislation of WEEE treatment, residues and waste from WEEE are stated as described below.

Disposal operation	Operation used in	Method classification and type of WEEE
D 1 Landfilling	Slovenia	Waste from WEEE pre-treatment

		classified as mixed municipal waste and other waste from mechanical treatment of waste (concrete, mineral wool, foam, etc.)
D 5 Specially engineered landfilling	Outside Slovenia but in the European Member States	Placement into lined separated landfill cells which are capped and isolated from one another and from the environment: for batteries, hazardous components containing asbestos
D 10 Incineration on land	Outside Slovenia but in the European Member States	For ozone depleting substances CFC, HCFC, HFC, batteries

All operators carrying out disposal operations must have a permit from competent authority in Slovenia or in the Member States where the waste is processed.

According to the reports of compliance schemes ZEOS, INTERSEROH and SLOPAK, in 2007 all together 666,684 kg of WEEE has been disposed off, which represent 12.54 % of collected WEEE in 2007. Reported the only disposal operations in 2007 are D1 and D10. Detailed information on each WEE category is in the table 59.

Table 59 - Quantities of disposed WEEE according EEE categories in Slovenia, 2007

EEE category	Disposal operation	kg	% of collected WEEE
1 - Large household appliances	D1, D10	98.858	5.78
1a – Cooling equipment	D1, D10	123.651	8.02
2 – Small household appliances	D1, D10	59.933	25.14
3 – IT and telecommunications equipment	D1, D10	266.572	21.55
4 – Consumer equipment	D1, D10	77.893	22.50
5 – Lighting equipment	D1, D10	3.001	30.46
5a – Discharge lamps	D1, D10	2.154	3.57
6 – Electrical and electronic tools	D1, D10	10.589	22.94
7 - Toys, leisure and sports equipment	D1, D10	6.785	29.32
8 – Medical devices	D1, D10	1.744	32.14
9 – Monitoring and control instruments	D1, D10	5.006	25.62
10 – Automatic dispensers	D1, D10	10.498	12.96
TOGETHER		**666.684**	**12.54**

9.8.6 SPAIN

9.8.6.1 Administrative requirements in Spain

The registering authority for the WEEE waste management is the National Register of Industrial Establishments under the Ministry of Industry, which is up and running as of December 31, 2005. In Spain, a parallel obligation to register at the regional level exists. Regarding WEEE, producers must contact the officials in each Spanish region in which they operate. The entire registration process is free of charge.

All companies using integrated management systems need an electronic signature, and also all those that have more than 100 employees.

Examples taken from data of National Register of Spain for 2006 demonstrate total weight of EEE put on market and breakdown B2B/B2C.

Table 60 - Total weight of EEE put on market and breakdown B2B/B2C, Spain, 2006

Category	Weight% Put on Market	% household	% non-household
1	58,3	97	3
2	6,3	98	2
3	11,6	59	41
4	10,7	99	1
5	6,8	16	84
6	2,0	77	23
7	2,1	55	45
8	1,2	9	91
9	0,2	30	70
10	0,8	1	99
Total Spain	**100**	**86**	**14**

WEEE must be transported by a government certified logistical service or the end users will be subject to extra costs. Electrorecycling SA is an approved WEEE logistical service.

Contact

Electrorecycling SA
Ctra. BV1224, del Pont de Vilomara a Rocafort
08254 El Pont de Vilomara i Rocafort Barcelona
http://www.electrorecycling.net
electrorecycling@electrorecycling.net

For larger quantities of the recycling companies should be contacted directly in order to arrange and pay for an alternative collection method. E.g. the Data Domain recyclers in Spain are:

Location	Recycler	Telephone Number	Website
North-East Spain	Electrorecycling	+34 938 316 701	www.electrorecycling.net
South Spain	Indumetal Recycling	+34 944 710 165	www.indumetal.com
Rest of Spain	Recilec	+34 954 930 042	n/a

As existing plants are located in North and East Spain, a significant concentration of top ranking municipalities can be observed in South and Central Spain. The current state does not present an optimal structure of the future recycling system. Currently, the total capacity of Spanish WEEE recycling plants is almost 97 500 tons per year, which is clearly insufficient.

Data officially reported by Spain to the European in 2006 showed in chapter 8.4.7.3 that total WEEE collected was 168,908 T. Disposal of waste in Spain from this amount is unknown. Number of EEE put on the market in 2006 was 512,478 T.

9.8.7 ALBANIA

The Law No 9537/2006 on hazardous wastes administration establishes a comprehensive legal framework that regulates hazardous waste handling including disposal. This Law transposes and is in partial compliance with many important EU directives acting in waste management, e.g. Council Directive 1999/31/EC on the landfill of waste, Directive 2000/76/EC on the incineration of waste, etc. Hazardous waste generator shall be responsible for the costs of the transport, recovery or disposal - under this law (an Article 4/3).

An article 11/1 pursuant to the Law No 9010/2003 on the environmental management of solid waste considers inter alia the final disposal methods – waste landfilling and incineration. Article 11/2 entitles the Minister of Environment and the Minister of Health to approve relevant regulation.

So far, regulations have been drafted on composting, landfilling and incineration. The new draft landfill and inicineration regulations will transpose the landfill directive and the incineration directive (before end of 2010).

At present EEE wastes go into the same municipal landfill, as any other kind of waste in Albania. Waste sorting is at very low level.

Current status of waste disposal is similar to the waste recycling. It could be characterised as follows:

- no national disposal scheme exists yet;
- no cost of the scheme can be evaluated, since the national scheme does not exist;
- the status of economic instruments is at the low level. Only business with metal parts of the WEEE is realized;
- administrative requirements are yet to be defined. The new regulation on WEEE transposing the related directive will defined them.

9.8.8 BOSNIA AND HERZEGOVINA

Within the framework of certain articles of Laws on waste management (Federation of Bosnia and Herzegovina and the Republic of Serbia) obligations of waste generators and owners are specified in general. **Presently B&H does not have specific legislation defining obligations and liabilities for e-waste disposal**. Due to this reason, e-waste is handled in practice as if it has been a municipal waste. It means, that e-waste is collected and disposed on landfills together with other types of wastes. The preparation of relevant legal regulations has started.

The Solid Waste Management Strategy for Bosnia and Herzegovina (elaborated within EU PHARE project in 2000) gave proposals for region concept of solid waste management, which implies merging of municipalities into regions, and defining all aspects of waste management at the regional level. Construction of 16 regional landfills is suggested of which 10 in Federation of Bosnia and Herzegovina and 6 in Republic of Serbia. This Strategy is currently in the phase of its implementation.

According to the Laws on Waste Management, existing landfills, in order to obtain the environmental permit, are obliged to elaborate a Conditioning plans containing any corrective measures which the landfill operator considers will be needed in order to comply with the requirements of the permit. One of the requirements is that only municipal waste can be

disposed on the landfills, whereas hazardous waste, including e-waste, can not be disposed. The landfill operators were obliged to implement their Conditioning plans until the beginning of 2008. This implies that, in the near future, the landfill operators have to solve the problem of sorting of the municipal waste from other types of waste, including e-waste. However, enforcement of these regulations in practice is very slow and limited due to the lack of financial resources.

Existing municipal landfills, with very few exceptions, are uncontrolled landfills, and although according to the Laws on waste management they should be closed and improved, that has not been done yet.

Generally, electric and electronic waste should not be disposed on landfills according to the information obtained from the representatives of relevant authorities of Bosnia and Herzegovina. Institutions and companies – users of electric and electronic equipment and prospective generators of e-waste are responsible for e-waste collection and disposal. Owning to the missing e-waste monitoring system it is impossible to identify what happens to it, in most cases. It is assumed that some of it is eventually disposed on landfill, together with municipal waste.

Data on proper disposal of e-waste are not available according to the Strategy for Environment Protection FB&H. There is only an assuption of individual initiatives - about 5% of produced e-waste.

9.8.9 CROATIA

An improvement of existing landfill sites and increasing the proportion of controlled collection and waste disposal have been set among objectives of the Environmental Protection Strategy of the Republic of Croatia.

With respect to the EU legislation the disposal operations (in accordance with Annex II A of Directive 2006/12/EC of the European Parliament and of the Concil on waste) are as follows:
- D1 - deposit into or on to land (e.g. landfill, etc.)
- D5 - specially engineered landfill (e.g. placement into lined discrete cells which are capped and isolated from one another and the environment, etc.)
- D10 - incineration on land.

The mentioned operations are recommended to apply also to WEEE / treatment residues from WEEE.

Directive 1999/31/EC on the landfill of waste has been transposed into the Waste Act, Ordinance on waste management (OG No 23/07) and Ordinance on the methods and conditions for the landfill of waste, categories and operational requirements for waste landfills (OG No 117/07). Croatia asked for transitional period for full implementation of Waste landfill directive into national legislation. The full implementation should be finished until 31 December 2020.

Directive 2000/76/EC on the incineration of waste has been fully transposed into the Waste Act, Ordinance on waste management (OG No 23/07) and Ordinance on the methods and conditions for the thermal treatment of waste (OG No 45/07) and the Regulation on limit values of pollutants from stationary sources (OG No 21/07).

An Article 3, para 19 of the Waste Act (OG 178/04) specifies the term of waste disposal as any treatment or landfilling procedure.

The Act on amendments to the Waste Act (OG 111/06), Article 1 states that facilities for waste disposal are: regional and county waste management centres, landfills for hazardous, non-hazardous and inert waste and facilities intended for waste incineration – waste incineration plants. Waste management centre is a system of buildings and facilities for processing, recycling and/or disposal of waste.

An Article 104 by the Waste Act (OG 178/04, OG 111/06) cites that the Minister responsible for environmental protection shall be authorised for passing ordinances, which shall regulate, inter alia:

- waste management: the procedures for recovery and/or disposal of waste, categories and technical and technological requirements for facilities used for waste storage, professional requirements to be met by persons who perform storage, recovery and/or disposal of waste, as well as the method of maintaining and submitting data on waste management;
- the criteria, procedure and method for determining the amount of compensation to the real property owners and local self-government units,
- types and amounts of fees paid by the fee payers for special categories of waste, the method and time-limits of calculating and payment of fees, and the method of managing special categories of waste, e.g. waste electrical and electronic devices and equipment;
- the method and conditions for waste landfilling, the categories and requirements forlandfill operation;
- the method and conditions for the thermal treatment of waste, subject to the approvalof the Minister responsible for the economy.

In order to undertake activities related to the disposal/recovery of hazardous waste it isnecessary to obtain a licence issued by the MEPPPC, pursuant to Article 41 of the WasteAct (OG 178/04, OG 111/06, OG 60/08). According to the para (2) of the Article mentioned above the licence depending on the type of activity shall determine:

- the type of waste that is being operated,
- the amounts of waste in terms of types of waste that are being operated with and in terms of the available capacity of the location for operating waste,
- meeting the prescribed requirements (technical requirements for operating, method and system for monitoring),
- precaution measures that need to be undertaken for safety reasons,
- the recovery procedure and/ or disposal or other waste management method,
- the location of recovery and/or disposal.

The Ministry shall decide on the application for issuing the licence for hazardous waste management and incineration and/or co-incineration of waste. The validity of the issued licence is maximum for five years and may be extended several times.
The method of disposal/treatment of hazardous waste in Croatia is determined on the basis of the permits issued and is carried out in one of the following ways:

a) incineration/co-incineration,
b) conditioning by incorporation into brick products,
c) solvent regeneration, neutralisation of acids and bases,
d) solidification and stabilisation,
e) sterilisation/disinfection,
f) electrolysis and dilution.

The conceptual document Waste management plan for time period 2007-2015, part 4.5.3. Existing infrastructure for hazardous waste management states that 43 companies is holding permits for the activities of waste disposal/treatment in conformity with Article 41 of the

Waste Act mentioned above. One permit was issued for the incineration plant and 22 permits for co-incineration plants.

CEA maintances the Waste Management Licence Register. Register contains data on licence types, licence holders, issue date, period of validity, etc. as well as codes used for waste type identification and adequate procedures for waste handling.

The present situation on existing locations of landfills is monitored by CEA, that maintances Waste management information system (WMIS). A supervision over the operating of WMIS is under the competence of the MEPPPC. The WMIS is maintained pursuant to the Waste Act (OG 178/04, 111/06, 60/08) and Regulation on the Environmental Information System (OG 68/08).The WMIS disposes on-line GIS database on existing locations of landfills which will need to be brought in line with the requirements of the new Ordinance on landfilling - Landfill Cadastre. In 2008 the database contained data on 278 landfills in Croatia. Each site is described by its surface area (polygon) and other data, including waste type, environmental protection measures, and remediation funding.

The landfill operator has a duty to notify the competent authority of any adverse environmental effects revealed by the control and monitoring procedures and of the corrective measures taken at the operator's expense. Once a year the landfill operator submits a report on all control and monitoring results.

System of charges (fees) and financing costs for landfilling has been established by relevant legal regulations. Waste deposition costs include the landfill designing, construction and operating costs and estimated costs of the landfill closure, maintenance and monitoring for a period of 30 years after the closure. Waste deposition costs shall be defined in accordance with the waste quantities and properties and applying the 'polluter pays' principle.

Possibilities for the energy recovery of hazardous waste or incineration are limited. Most of Croatia’s hazardous waste intended for disposal is exported to other countries. (www.un.org/esa/dsd/).
Recent amendments to the Waste Act were adopted in June 2009, which enabled the import of useful hazardous waste that could be recovered in Croatia.

9.8.10 MONTENEGRO

Montenegrin official services are currently working on waste management, in general. First of all, it assumes construction of landfills for municipal waste and recycling centers, that should be a good basis for development of e-waste (and other specific types of waste) management system in the future.

Hazardous waste handling including final disposal - landfilling, notification, and monitoring of waste amounts and types generated is regulated by the Regulation on hazardous waste (OGM No. 56/00) still in use. E-waste is not specially concerned.

Regarding the issue of financing system the following articles of the Environment law of the Republic of Montenegro (OG No 12/1996), part VI , are concerned:

Article 35
The sources of financing environmental protection activities are the following:

- budgetary funds;
- eco-charges;
- funds from the collection of fines prescribed by this Law;
- funds from particular sources as prescribed by local authorities, subject to the approval of Governmemnt;

- funds from other sources.

Article 36
Eco-charges are the following:
- charges on investments and
- charges on pollution of the environment (principle "polluter pays").

Article 38
Charges are payable by legal and physical entities. Pollution charges are payable for:
- release of polluting substances into air;
- consumption of fossil fuels;
- use of substances that impair the ozon layer;
- use of lubricant oils;
- **production and disposal of hazardous waste;**
- use of motor vehicles, aircrafts and vessels.

Article 39
The Government prescribes the amount of payable charge, the calculation and payment model.

Article 40
The funds collected from eco-charges mentioned above shall be paid to the Republican Budget, to its separate sub-account (ecological account) and shall be used for the purposes as stipulated by this Law.

The funds as of Article 35 of this law shall be used for:
- realisation of the Ecological Program;
- cofinancing of the programs of protection and development of protected nature
- resources;
- financing the elaboration and performing the rehabilitation program in case of
- unknown polluter;
- cofinancing measures of intervention in cases of emergency related to pollution of the environment;
- cofinancing other investment programs which contribute to significant reduction of environmental pollution;
- providing funds for case-studies, applicable scientific projects, studies, elaborates and construction projects;
- cofinancing professional trainig of staff in professional, scientific, industiral and public institutions related to the field of environment of the Republican interest;
- cofinancing of organized pollution prevention activities and rehabilitation of the environment that are carried out by ecological non-goverment organisations;
- cofinancing publications, magazines, professional and scientific gatherings and information/promotional activities in field of protection and improvement of the environment. (Article 41)

The current Master Plan of Montenegro establishes except overall objectives also interim targets, which reflect the short-term needs e.g. a reduction of landfilling of generated waste, increasing the amount of collected waste, etc. The short-term needs are focused on municipal, hazardous, healthcare and other waste streams including e-waste.
The national Law on Waste Management represented a framework in harmony with the EU regulations. But during the period from enactment of this Law to the day of its application several factors e.g. adoption of the new EU directives, implementation of activities envisaged by Strategic Master Plan for waste management at Republic level, etc. indicated the need to come into the process of ongoing changes and amendments. A preparation of the Law on

Amendments to the Law on Waste Management has appeared as necessary step in this situation. The Law on Waste Management should have started by November 1st 2008. This Law also implies the issue of waste disposal - landfilling. Before the date of its application some obligations should have been built e.g. an existance of necessary infrastructure (particulary controlled landfills), national and local waste management plans, etc. Because of the lack of funds some of the obligations have not been fulfilled. Building of controlled landfills fall into costly projects, which create the preconditions for the implementation of the EU directives, which are known as the "heavy directive" (because they require large investments). Moreover, there are certain obligations on the development of project documentation, as well as the obligation to create the necessary space-planning assumptions, i.e. provision of conditions that, through spatial and general plans of municipalities, on whose territories it was planned to build the landfill, then the detailed urban plans or studies location, should obtain the appropriate approval and permits, which also requires time. Starting from the fact that the building landfills and the beginning of their work is a requirement for full implementation of the Law on Waste Management, modifications and amendments extended the date of the application of certain provisions to the January 1st 2010.

Postponing the deadline of application, local governments would be given the opportunity to create the preconditions for its full implementation.
The Law on Amendments to the Law on Waste Management will require to develop a number of new by-laws regulating certain issues.

Main weaknesses of the current e-waste management system regarding waste disposal are as follows:

- there is no specific policy or legislation for e-waste management;
- there is no infrastructure available for the disposal of the hazardous fraction from e-waste;
- a lack of controlled landfills for final disposal of waste; uncontrolled landfill sites and burying might lead to an increase of pollutants in spring water in their vicinity;
- there is a general lack of awareness among community and collectors of the potential hazards of e-waste to human health and the environment.

9.8.11 TURKEY

The operation „disposal“ is considered as any operation which is not recovery even where the operation has as a secondary consequence the reclamation of substances or energy.
As the efforts to create regulations concerning the waste electrical and electronic wastes are in progress, there is not enough data in Turkey regarding a disposal system in conformity with such WEEE Directive and the actual disposal costs pertaining to such system.

Besides that, there is one plant located in İzmit-Turkey for the incineration and landfill of clinical and hazardous wastes, namely İzmit Waste and Residue Treatment, Incineration and Recycling Co.Inc. (İZAYDAŞ)

The plant with annual capacities is shown as below:
İZAYDAŞ (landfill) : 790.000 m^3
İZAYDAŞ (incineration) : 35.000 tons

The waste materials which are generated from treatment of electrical and electronic waste and can not be recycled or recovered in Turkey are subject to disposal operations. The basic materials which are disposed are: toner cartridge, batteries, fluorescents, dismantling and mechanical sorting wastes, CRT glasses, capacitors.

Following disposal prices have been taken from İZAYDAŞ official website (http://www.izaydas.com.tr):

- Toner cartridge: can be disposed by incinerating with energy recovery or can be combusted to be used as a secondary fuel resource in cement factories. The cost of disposal as a secondary fuel resource is 950 TL/tones and the cost disposal as a energy recovery is 1210 TL/tones. Some brands of toner cartridges are also collected by take back systems and exported to EU countries so as to be recycled.
- Used batteries: used batteries which can not be recycled are collected and landfilled. Disposal costs are financed by battery producers and importers with the collection scheme named TAP (Portable Battery Producers' and Importers' Association). But chargeable batteries have a positive value and exported to be recycled in Europe.
- Fluorescents: although it is technically possible to recycle, due to current high costs of this operation, fluorescent wastes are being land filled at a cost of approximately 500TL/tonnes. But fluorescent recycling plants will be available in a short period in Turkey
- Dismantling and mechanical sorting wastes: these are the non hazardous waste materials which are generated during dismantling operations, but which can not be recovered. (Non recyclable plastics, blank printed circuit boards etc.) These wastes are being landfilled at a cost of approximately 200TL/tones in 2009.
- CRT glass: The CRT is separated as panel and back glass with a special machine. This glasses material can not be recycled in Turkey and the exportation of the glasses that is recycled requires additional cost. The glasses are being land filled at a cost of approximately 240 TL/tones in 2009.
- Capacitors: the capacitors generated from the treatment of waste electrical and electronic equipment are being incinerated at a cost of approximately 2070 TL /tones in 2009. (1 EURO=2,126 TL (Turkish Liras)

9.8.12 ARAB COUNTRIES

The basic available information for the Arab countries reflects the scale of probable impact of unacceptable disposal of e-waste and enhances the need for concerted efforts towards their sound management.

There are not established conditions for disposal of e-waste environmentally sound manner, an organisation of national disposal schemes, a cost of the schemes as well as economic instruments to facilitate the environmentally safe disposal and administrative requirements **in Arab countries concerned**.

Several facts regarding e-waste disposal were obtained based on the assessment of e-waste management in Morocco. There are some examples of waste handling used in the practice, e.g. after dismantling of WEEE, materials that cannot be sold on, such as plastic stands, are simply abandoned if they cannot be used for something else (e.g. cow milking stools). Glass, which has a high lead content, is simply dumped as it cannot be sold on. The presence of WEEE in waste represents a real threat to the environment and health, particularly in uncontrolled dumps.

The Moroccan Law 28-00 on the management and disposal of waste prohibits the mixing of hazardous waste with other types of waste. Moreover, it establishes rules for the organisation of existing dumps and calls for their replacement by controlled landfills, defining three different landfill categories. This categorisation depends on the type of waste they are authorised to receive. Of 150 landfill sites studied by the Direction Générale de l'Hydraulique (Water Resources Department), only 20% are located on non-vulnerable land. In 2008 two draft decrees were solving disposal issue in Morocco, i.e. draft decree on sanitary landfills

and draft decree relating to the incineration and co-incineration of waste. A slow progress in waste management area is under way in Morocco.

Also the direct or indirect landfilling of e-wastes especially for the after sale services as well as the households and the repairers is an usual practice in Tunisia.

Unsafe disposal practices include the open-air burning of cables, printed circuit boards and other electric wires, with the aim of getting rid of the PVC sheath or epoxy support to recover the copper or aluminium in Arab countries . The lowtemperature incineration of PVC under such conditions carries a high risk of producing dioxins and furans, organic pollutants with high carcinogenic potential. Uncontrolled cable incineration sites revealed high concentrations of dioxins in the soil. The open-air incineration has been observed in Morocco. Some waste collectors burn electrical cables, tyres and batteries.

At present the ECOCIM platform (former ECOVAL) offers a specialist service for the incineration of waste in cement plant furnaces in Morocco. The company guarantees safe and strictly controlled disposal. It gives the client a tracking sheet to ensure the traceability of hazardous waste and its disposal in accordance with best practices. However, WEEE is not accepted by these companies as it contains heavy metals above the acceptable limits and because of the flame retardants contained in the plastics.

The introduction of new best available techonologies in waste management could be considered as a benefit to Arab region.

10. Recommendations – actions to be taken

Based on data and information collected during the project in the Mediterranean Region for the collection, take-back system, reuse, treatment, recovery, recycling and disposal of waste from electrical and electronic equipment, following actions are proposed for the functional, satisfactory and sustainable future waste management of WEEE in the Mediterranean Region:

10.1 Administrative and financial actions proposed

- Obey the WEEE law and inspect its regulatory compliance
- Implement national WEEE waste management plans and try to achieve their collection, reuse and recovery targets of different WEEE categories
- Create appropriate conditions for the market of recyclate and secondary raw materials
- Generate detailed national WEEE statistics and regularly report comprehensive WEEE data through the one designated body on both regional and international level
- Improve product design with a view to both preventing WEEE generation and increasing its recoverability, reusability or recyclability
- Ensure the establishment of financing systems for the complex WEEE treatment
- Share information on the experience of running the WEEE systems incl. the financial matters

10.2 Technical actions proposed

- Improve collection infrastructure especially of WEEE from municipal and household waste stream
- Provide and widen WEEE take-back system for consumers of end-of-life EEE
- Establish separation facilities and centres covering the main residential and industrial areas of interest
- Radically reduce WEEE disposal to landfill
- Increase number of collection public yards and points

- Organize public awareness campaigns, undertake WEEE pilot projects, positively motivate consumers to change their habitudes towards WEEE handling

10.3 Detailed recommendations and actions to be taken

The following tables provide an overview of recommendations for relevant country and the summary of actions to be taken in the region with regards to the topic of the report.

Legislation

Country	Recommendations
Albania	• full transposition of the new EU Waste Framework Directive (2008) into a new draft of the Waste Management Law • development of national implementary regulations on e-waste handling; • inclusion requirements of the WEEE regulations into the conceptual documents at national, regional and municipal level;
Bosnia and Herzegovina	• finalisation of the work on the national draft Regulation on WEEE; • development of national implementary regulations on WEEE handling; • inclusion the WEEE issue into national conceptual documents
Croatia	• no special recommendations are needed
Montenegro	• development of strategic document on WEEE management; • development of specific legislation regulating e-waste handling dealing with minimum requirements for handling, specifications for the extraction of hazardous components from WEEE etc.;
Turkey	• finalisation of the work on the national draft Regulation on electric and electronic waste transposing EU Regulation on WEEE
Arab region (Algeria, Egypt, Lebanon, Libya, Morocco, Syria and Tunisia, in addition to the territories under the sovereign of the Palestinian authority)	• development of the regulatory legal framework in waste management acts to ensure a sustainable WEEE management and its implementation; • development of special legislative framework describing the responsibilities of main participants in WEEE management process e.g. importers, manufacturers, owners and its enforcement; • updating existing waste management legislation, wherever possible, to deal with WEEE management; • development of the national strategic plans focused on WEEE management ; • development of the conceptual documents at regional and municipal level reflecting general waste management demands in the country; • development of appropriate guidelines on WEEE for the Arab region based on guidelines carried out within the Basel Convention initiatives, EU regulation on WEEE and other relevant international documents.

Summary of actions to be taken in the region – legislation part:

- *to develop national legislation on WEEE handling or transpose EU Directive on WEEE and to ensure its implementation*

- *to develop strategic documents on wastes including WEEE issue at regional, national, municipal level*
- *to develop appropriate guidelines to ensure sustainable WEEE management*

Identification and /or estimation of current and future waste streams: materials composition of current and future flows streams

Country	Recommendations
Albania	• using subsidiary initiatives to support waste monitoring (to seek possibilities of financial resources); • development of the information system on waste, especially on WEEE; • monitoring the situation in WEEE management; • regular reporting on waste including WEEE - entities concerned;???
Bosnia and Herzegovina	• improvement of the WEEE statistics ; • development of the IS on waste, especially WEEE with national/international financial support; • establishment of regular reporting system on waste/WEEE - entities concerned; • supervision on fulfilment of obligations resulting from legislation of entities concerned;
Croatia	• continuously updating the used monitoring system to ensure up-to-date and reliable data on waste/WEEE;
Montenegro	• development the statistics on waste/WEEEespecially electrical household appliances; • development the IS on waste, especially WEEE with national/international financial support; • establishment of regular reporting on waste/WEEE – entities concerned;
Turkey	• development of data collection system on WEEE; • development of the information system on WEEE; • establishment of regular reporting on waste/WEEE entities concerned;
Arab region (Algeria, Egypt, Lebanon, Libya, Morocco, Syria and Tunisia, in addition to the territories under the sovereign of the Palestinian authority)	• elaboration of assessment studies on WEEE management status in each country concerned (Morocco´s study could be a model for elaboration); • performance of inventories focused on WEEE; • development of waste/WEEE statistics based on legislation; • collection of data on WEEE with guaranteed data accuracy and reliability; • development the IS on waste/WEEE; • supervision on fulfilment of obligations resulting from legislation of entities concerned; • establishment of regular reporting on waste/WEEE – entities concerned

Summary of actions to be taken in the region – identification part:

- *to develop an information system on waste/WEEE*
- *to establish or improve regular reporting on waste/WEEE*
- *to develop or improve national waste/WEEE statistics with guarantee of data accuracy and reliability*

- *to elaborate assessment study on WEEE management status mainly in Arab region*

Collection and collection systems, sorting and sorting systems: organization of national collection and sorting schemes, cost of the schemes, economic instruments to facilitate the collection and sorting, administrative requirements

Country	Recommendations
Albania	• institutional arrangement of collection and sorting systems (regional level, municipalities); • establishment and realization of WEEE collection, sorting and recycling systems • development of an adequate sorting system taking into account local circumstances and national economic standards, simplicity and its modest in light of costs; • training of different target groups involved in collection and sorting systems; • improvement of the awareness at the public, administration and business level concerning WEEE collection and sorting • initiation of a programme to increase awareness of WEEE collectors; • placing of collection bins for different waste types including WEEE; • financial motivation regarding WEEE collection, sorting and recycling (potential source of metals and other materials) to develop WEEE business; • establishment of the economic instruments for collection or sorting of WEEE e.g. producer responsibility etc.
Bosnia and Herzegovina	• initiation of activities for establishment of waste sorting systems in general; • establishment and realization of WEEE collection, sorting and recycling systems • improvement of municipal waste sorting to separate WEEE from households; • monitoring of WEEE handling ; • introduction of obligations and responsibilities regarding WEEE, and accordingly sorting of WEEE at different entities concerned; • increasing the attractiveness of WEEE business and to develop a market for secondary raw materials; • determination of economic policy that will regulate market for secondary raw materials; • introduction of subsidies or incentives for WEEE collectors ; • elaboration of a manual on WEEE handling designed for different target groups; • improvement awareness of producers, dealers and citizens in the light of collection and sorting of WEEE; • introduction of refund system for WEEE;
Croatia	• organizing campaigns to improve public awareness on the WEEE issue;
Montenegro	• development of WEEE management policy; • determination of obligations and responsibilities of entities interested in WEEE collection and sorting; • improvement of existing waste collection systems;

	• establishment of an infrastructure for organized WEEE collection; • improvement of municipal waste sorting to separate WEEE from households; • improvement awareness of consumers, collectors and others of the WEEE potential hazards in general; • implementation of the sorting methods for WEEE; • development of the business for secondary raw materials; • implementation of education at all levels of society e.g. individuals, non-governmental organizations, educational institutions, public and state institutions, units of local government in respect to primary separation of waste; • introduction of economic instruments in term of waste/WEEE collection and sorting; • establishment of the necessary infrastructure for take-back systems
Turkey	• introduction of WEEE collection system based on the manufacture liability; • establishment of public collection facilities for WEEE; • implementation of waste/WEEE sorting system in a systematic and registered manner; • establishment of economic tools for collection and sorting of WEEE;
Arab region (Algeria, Egypt, Lebanon, Libya, Morocco, Syria and Tunisia, in addition to the territories under the sovereign of the Palestinian authority)	• institutional arrangement of collection and sorting systems (regional level, municipalities); • introduction of official collection systems; • improvement of temporary storage facilities for WEEE; • participation of private sector in WEEE collection and sorting systems of ; • development of economic instruments to facilitate WEEE collection; • development of a manual on WEEE handling designed for different target groups; • training of different target groups involved in collection and sorting systems, mainly people that represent an informal sector; • introduction of awareness programme (public events, mass media, workshops, etc.); • establishment of waste/WEEE collection and sorting centres; • introduction of WEEE take back programmes ; • definition of duties and responsibilities of each stakeholder with regard to the collection and sorting; • application a principle of extended producer responsibility ;

Summary of actions to be taken in the region – collection part:

- *to ensure institutional arrangement of collection and sorting systems at regional level, municipalities*
- *to organise training courses for trainers focused on WEEE management as well as for different target groups involved in collection and sorting systems*
- *to develop or improve WEEE business (financial motivation of collection and sorting activities)*
- *to introduce or improve a market of recycable materials and secondary raw materials originated from WEEE*

- *to introduce awareness programmes (campaigns, public events, mass media, leaflets, etc.) regarding WEEE issue*
- *to establish waste/WEEE collection and sorting centres*
- *to introduce or improve a principle of take back system for WEEE*
- *to determine or apply obligations and responsibilities of entities involved in WEEE collection and sorting*
- *to develop or implement economic tools regarding WEEE collection and sorting*

Reuse possibilities: current levels of reuse of different WEEE, opportunities for greater reuse products or parts of products, barriers to greater reuse, and an example of the best and the worst practices in re-use schemes

Country	Recommendations
Albania	• determination of legal conditions for waste/WEEE reuse; • changing informal market of WEEE to formal one; • monitoring of WEEE flow in light of its reuse; • introduction of registration of entities dealing with WEEE reuse; • implementation of supportive activities to develop a market of second hand electric and electronic equipments; • determination of economic policy that will regulate market for secondary raw materials; • development of the WEEE business for secondary raw materials;
Bosnia and Herzegovina	• development of economic policy in the field of waste/WEEE reuse; • initiation of incentives for development of WEEE reuse; • development of formal market for second raw materials; • introduction of registration of entities performing WEEE reuse; • improvement an awareness at the public, administration, and business level in the light of WEEE reuse;
Croatia	• encouragement of WEEE reuse; • improvement of public awareness relating to WEEE reuse;
Montenegro	• development of legal conditions for waste/WEEE reuse; • development of economic policy in the field of waste/WEEE reuse; • introduction of WEEE reuse; • implementation of awareness programmes to develop WEEE business for secondary raw materials; •
Turkey	• establishment of a suitable market for the second-hand products after repair that could compete in market of new products (an important fact is to consider economy of reuse process); • determination of second-hand product characteristics (e.g. safety, energy labelling and limits, product liability, identification of the used chemicals, protection of the consumer); • increasing public awareness in the area of WEEE reuse
Arab region (Algeria, Egypt, Lebanon, Libya, Morocco, Syria and Tunisia, in addition to the territories under the sovereign of the Palestinian authority)	• determination of reuse conditions regarding WEEE on legal basis; • introduction or improvement of WEEE reuse; • building local capacities – centres for refurbishment / graduate persons on WEEE management; • establishment of refurbishing programme for equipment or parts that have a resale value; • development of the WEEE business for secondary raw materials; • initiation of an awareness programme focused on formal and informal sector (leaflets, booklets, TV spots, educational movies,

	etc.)

Summary of actions to be taken in the region – reuse part:

- *to determine legal conditions for waste/WEEE reuse*
- *to change informal WEEE market to formal one*
- *to monitor WEEE flow in light of its reuse*
- *to build up local capacities - centres for refurbishing of electric and electronic equipments with trained staff*
- *to develop or improve business of second hand electric and electronic equipments*
- *to determine basic characteristics of second hand products*
- *to introduce or improve formal market for secondary raw materials removed from the WEEE*
- *to establish refurbishing programme for equipment or parts with resale value*
- *to introduce or improve awareness at the public, administration and business level regarding WEEE reuse*

Technology to treat, process or dispose ofWEEE: capacities and inputs/outputs for existing technologies for sorting, treatment including recovery, recycling and disposal

Country	Recommendations
Albania	• introduction of administrative requirements in light of WEEE treatment; • necessity to establish national waste treatment scheme in general; • introduction of WEEE treatment schemes taking into account national conditions; • improvement of the current status of WEEE treatment ; • initiation of activities to support introduction of new treatment technologies; • introduction of economic instruments regarding waste treatment on legal basis; • determination of input/output monitoring conditions for treatment technologies (recovery and final disposal);
Bosnia and Herzegovina	• inclusion of WEEE treatment issue into relevant legal instrument and implementation of this regulation in practise; • establishment of recycling yards for sorting WEEE; • improvement of present situation in application of technologies and treatment operations; • finalization of the Feasibility Study which deals with acceptable alternatives for waste handling including WEEE etc. • introduction and implementation of a pilot project of efficient WEEE sorting ; • implementation of a WEEE treatment regional concept presented in strategic documents (development of waste management regional centres); • introduction of subsidies or incentives for establishment of new waste treatment facilities;
Croatia	• continuous updating the used IS in compliance with EU requirements; • verification of quality and reliability of collected data on

Country	Recommendations
	waste/WEEE;
Montenegro	• projection of idea regarding waste treatment presented in strategic documents into practise; • starting recycling strategy e.g. recycling of plastics from WEEE; • utilization of different financial initiatives/sources to build up waste treatment facilities; • determination of special infrastructure for WEEE handling e.g. treatment, recycling, etc.; • improvement of awareness among public and treatment entities about potential hazards originating from WEEE;
Turkey	• improvement of the current status of WEEE treatment – to extend WEEE treatment taking into account economic efficiency aspects; • involvement of private sector into WEE treatment; • limitation of transboundary movements of WEEE; • introduction of new treatment technologies ; • development of economic instruments regarding waste treatment on legal basis;
Arab region (Algeria, Egypt, Lebanon, Libya, Morocco, Syria and Tunisia, in addition to the territories under the sovereign of the Palestinian authority)	• training of informal sector involved in WEEEsorting and dismantling systems ; • introduction of environmentally sound WEEE handling in practice; • providing technical support to the informal sector with the aim of reducing the impacts on health and the environment; • training programmes for trainers regarding new WEEE treatment technologies; • establishment of new treatment centres for recovery of the precious and special metals contained in WEEE; • development a handbook on WEEE treatment designed for operators of treatment facilities ; • introduction of awareness programmes (public events, mass media, leaflets, workshops, etc.); • utilization of different international initiatives/grants focused on improvement of WEEE handling ; • participation in pilot projects such as ESM treatment financed by donors; • involvement of private sector into WEEE treatment process;

Summary of actions to be taken in the region – treatment part:

- *to establish waste/WEEE treatment schemes taking into account national conditions*
- *to introduce or improve status of WEEE treatment*
- *to motivate and involve private sector into WEEE treatment process*
- *to introduce new treatment technologies*
- *to participate in pilot project on ESM treatment financed by donors*
- *to implement WEEE treatment regional concept regarding establishment of waste management regional centres*
- *to build up new treatment facilities or innovate treatment facilities in operation using subsidies and different financial sources*
- *to develop or update existing IS on waste/WEEE with regard to quality and reliability of collected data for treatment issue*
- *to provide technical support for informal sector acting in treatment area*
- *to train informal sector acting in treatment area*

- *to introduce training programmes regarding new/existing WEEE treatment technologies*
- *to establish new treatment centres for recovery of the precious and special metals contained in WEEE (to limit transboundary movements of WEEE)*
- *to develop or apply a general guideline on WEEE treatment designed for operators of treatment facilities*
- *to introduce or improve awareness programme (public events, mass media, workshops, etc.)*

Recycling and recycling scheme operation: organization of national recycling schemes, cost of the schemes, economic instruments to facilitate the recycling, administrative requirements

Country	Recommendations
Albania	• establishment of national waste recycling scheme in general; • introduction of WEEE recycling schemes taking into account national conditions; • introduction of economic instruments regarding WEEE recycling on legal basis; • introduction of administrative requirements in light of WEEE recycling; • improvement of the current status of WEEE recycling – to recycle also other parts of WEEE, not only metal parts; • elimination of existing barriers regarding waste recycling (high energy price, transport costs, financial sources to develop such businesses, etc.); • improvement of awareness in the light of recycling at the public, administration and business level; • creation of appropriate practical arrangements to promote recycling; • introduction of training on waste segregation/re-use/recycling/recovering at the different levels of value chain; • application of expertise on the side of the recycling business itself; • participation in pilot project focused on technical support – to introduce new e-waste recycling technologies; • utilization of financial resources to build up WEEE recycling facility;
Bosnia and Herzegovina	• introduction of waste recycling issue into economic policy or incentives; • development of an economic instrument and its implementation to facilitate waste recycling; • development of national waste recycling scheme operations in general; • introduction of WEEE recycling scheme operations taking into account national conditions; • determination of obligations and liabilities regarding WEEE recycling on legal basis; • implementation of recyclable waste separation - special containers, in general; • systematically organized recycling of waste/WEEE; • encouragement of existing private initiatives to WEEE recycling; • need of waste recycling capacities and facilities for the sorted waste;

Country	Recommendations
	• introduction of subsidies or incentives for establishment of new WEEE recycling facilities;
Croatia	• increasing a number of recycling yards for WEEE; • creating suitable conditions for recyclers in term of loans for the equipment; • public awareness raising regarding WEEE recycling;
Montenegro	• application of waste recycling strategy in general; • implementation of WEEE recycling goals given in national strategic documents; • development of specific legislation governing WEEE recycling dealing with e.g. minimum requirements for recycling, specifications for the extraction of hazardous components from WEEE etc.) • determination of special infrastructure available for the formal recycling of WEEE in accordance with projection of national strategic document; • necessity of construction of recycling centres for waste/WEEE in compliance with EU standards; • introduction of adequate methods for recycling WEEE components; • introduction of BAT for recovering valuable materials contained in WEEE; • development of industry for recycling of selected commodities e.g. plastics, ferrous metals and aluminium fractions originated from different waste streams including WEEE); • utilization of financial resources to construct WEEE recycling facility; • creation of new job opportunities in waste recycling industry; • participation in projects focused on improvement of WEEE handling organized by international bodies; • improvement of public awareness relating to WEEE recycling;
Turkey	• legal support of waste recyclers that represent a formal sector; • improvement of data statistics on WEEE recycling (quality, reliability); • monitoring of recycling systems in term of recycling costs; • introduction of licensing system in waste recycling area on legal basis; • extension of waste recycling systems on different commodities not only metal scrap; • increasing interest in waste recycling plants with state support or loans with low interest rates in general; • improvement of public awareness relating to WEEE recycling;
Arab region (Algeria, Egypt, Lebanon, Libya, Morocco, Syria and Tunisia, in addition to the territories under the sovereign of the Palestinian authority)	• development of market for recycling products; • strengthening recycling activities in general; • encouragement of formal sector acting in waste recycling area; • establishment of recycling programmes; • identification of recycling technologies ; • extension of WEEE recycling on more commodities than metals and plastics ; • realization of a pilot project for recycling of WEEE financed by international support; • enhancement participation of the concerned stakeholders in

Country	Recommendations
	WEEE management e.g. recycling; • development of a proper recycling system – ESM; • incorporation of private enterprises in a recycling system; • development of technical and business models based on high social and environmental standards; • defining duties and responsibilities of each stakeholder with regard to waste/WEEE recycling or surveillance of the sector; • establishment or strengthening the necessary infrastructure at each stage of the WEEE recycling; • establishment of new waste/WEEE recycling centres with international financial support; • introduction of licensing system for WEEE recycling companies, or at least encourage them to certify their environmental management systems according to ISO 14001, EMAS, or other standards; • application of the principle of extended producer responsibility (EPR) based on the 'polluter pays' principle; • development a general guidelines on WEEE recycling operations designed for staff of recycling facilities; • raising of public awareness regarding WEEE management through education campaigns including information on occupational health and safety procedures; and companies and governments to set up appropriate standards in WEEE management; • training programmes for trainers regarding new WEEE recycling approaches; • participation in pilot projects such as ESM recycling operations financed by donors;

Summary of actions to be taken in the region – recycling part:

- *to develop or apply waste/WEEE recycling strategy*
- *to establish waste/WEEE recycling scheme taking into account national conditions*
- *to determine a special infrastructure and administrative requirements in light of the formal recycling of WEEE according to relevant legal regulations*
- *to eliminate existing barriers regarding waste/WEEE recycling*
- *to create suitable conditions for waste/WEEE recyclers in term of loans (new equipments, etc.)*
- *to develop or introduce economic instrument regarding WEEE recycling on legal basis and to ensure its implementation*
- *to introduce new or innovate existing WEEE recycling technologies for recycling of WEEE components based on ESM standards using international/national financial support*
- *to establish or increase a number of recycling yards for recyclable wastes*
- *to introduce systematically organized waste/WEEE recycling*
- *to build up recycling centres for waste/e-waste that meet up-to-date standards*
- *to introduce or improve statistical data on recycling of e-waste (quality, reliability)*
- *to introduce or monitor recycling systems in term of recycling costs*
- *to introduce licensing system in waste/WASTE recycling area on legal basis*
- *to develop or improve market of recycling products*
- *to extend WEEE recycling on more commodities – not only metals and plastics*
- *to create new job opportunities in waste recycling industry*

- *to participate in projects/pilot projects focused on establishment or improvement of WEEE management organized by international bodies*
- *to organize training courses focused on different target groups considering technical, environmental, health and safety aspects of recycling technologies*
- *to develop a general guidelines on WEEE recycling operations designed for staff of recycling facilities*
- *to introduce or improve awareness relating to WEEE recycling*

Disposal and disposal scheme operation: organization of national disposal schemes, cost of the schemes, economic instruments to facilitate the environmental sound disposal, administrative requirements

Country	Recommendations
Albania	• finalization, adoption and implementation of national landfill and incineration regulations; • development and establishment of national waste/WEEE disposal schemes taking into account national conditions; • introduction of cost schemes with regard to disposal schemes; • improvement of economic instruments regarding WEEE disposal; • introduction of administrative requirements in light of WEEE disposal; • utilization of financial resources to build up new landfills or remedy old ones in accordance with EU standards; • introduction of training programmes for operating personnel of disposal facilities; • improvement of awareness in the light of waste/WEEE disposal operations at the public, administration and business level;
Bosnia and Herzegovina	• development of national waste disposal scheme operations including WEEE issue suitable for the country; • introduction of economic instruments regarding WEEE disposal; • determination of obligations and reliabilities of entities that deal with WEEE disposal on legal basis; • implementation of goals given in national strategic documents with regards to construction of regional waste landfills; • utilization of different financial initiatives/sources to build up new disposal facilities e.g. regional waste landfills that meet EU requirements; • removal or remediation of existing environmental burdens, e.g. uncontrolled waste landfills with national and international financial support; • monitoring of WEEE streams through the whole life cycle, e.g. from production to disposal; • introduction of registration for waste/WEEE disposed (landfilled, incinerated, etc.); • development IS on waste/WEEE including waste/WEEE disposal facilities; • introduction of training programmes for personnel of disposal facilities – to improve knowledge and skill regarding waste/WEEE disposal; • awareness raising regarding waste/WEEE disposal operations;
Croatia	• creation of suitable conditions for full implementation of EU Directive on waste landfill into national legislation during the transition period;

Country	Recommendations
	• utilization of financial support from national EPEEF to build up new facilities for the energy recovery or incineration of hazardous waste to limit transboundary movements of hazardous wastes;
Montenegro	• implementation of goals regarding WEEE disposal given in national strategic documents; • determination of infrastructure available for the disposal of the hazardous fraction from WEEE in accordance with projection of national strategic document; • construction of new controlled landfills for final disposal of waste in compliance with EU standards • utilizing different financial initiatives/sources for improvement of WEEE handling e.g. WEEE disposal; • removal or remediation of existing uncontrolled waste landfills through grants/financial projects; • improvement of awareness among community regarding waste/WEEE disposal operations;
Turkey	• updating IS on waste/WEEE including waste/WEEE disposal facilities – to take into account requirements of EU Directive on WEEE; • improvement of statistics regarding data on WEEE disposal (quality, reliability); • monitoring of disposal systems in term of disposal costs; • improvement of awareness relating to WEEE disposal;
Arab region (Algeria, Egypt, Lebanon, Libya, Morocco, Syria and Tunisia, in addition to the territories under the sovereign of the Palestinian authority)	• determination of obligations and reliabilities for WEEE disposal on legal basis; • development of a proper disposal system – EMS; • development and introduction of cost scheme with regard to disposal system; • development of economic instruments in the area of WEEE disposal; • removal or remediation of existing environmental burdens, e.g. uncontrolled waste landfills with national and international financial support; • construction of new waste disposal facilities - controlled landfills, incineration plants for final disposal - in compliance with international standards utilizing different financial sources; • establishment of disposal facilities network; • improvement of supervision performance regarding WEEE disposal; • determination of sanctions for uncontrolled landfilling of wastes and waste incineration at uncontrolled incineration sites; • development of a manual focused on WEEE disposal designed for staff of disposal facilities; • organization of training programmes for different target groups focused on occupational health and safety procedures in connection with waste/e-waste disposal operations; • participation in pilot projects regarding WEEE issue e.g. implementation of ESM disposal operations financed by international and national donors; • raising of awareness regarding WEEE disposal operations;

Summary of actions to be taken in the region – disposal part:

- *to develop or implement regulations concerning waste disposal methods*
- *to develop or establish waste/WEEE disposal scheme taking into account national specificity*
- *to develop or introduce cost scheme with regard to disposal scheme*
- *to introduce WEEE disposal operations with regard to ESM or improve present status in the given area*
- *to legalize obligations and reliabilities of entities that deal with WEEE disposal*
- *to develop or improve economic instruments in the light of waste/WEEE disposal*
- *to remove or remedy existing environmental burdens with national and international financial assistance*
- *to innovate or build up new disposal facilities for WEEE in compliance with international standards*
- *to establish or improve monitoring of waste/WEEE stream from production to disposal –introduction of official records*
- *to develop or update IS on WEEE including WEEE disposal facilities to meet international requirements – better statistics - data quality, data reliability, reporting*
- *to establish or improve supervision performance regarding WEEE disposal*
- *to utilize different financial sources for development or improvement of WEEE management e.g. implementation of ESM WEEE disposal operations*
- *to develop a guide on WEEE disposal designed for staff of disposal facilities*
- *to introduce training programmes for staff of disposal facilities*
- *to participate in pilot projects centred on WEEE management supported by donors*
- *to introduce awareness programmes for different target groups focused on protection of health and environment in respect to waste/WEEE disposal operations*

11. Conclusion

The current lifestyle is increasing the demand for EEE production at home and in offices. At the current rate of 50 million large appliances and 200 million small appliances sold in Europe each year, it is foreseen that WEEE will double in the near future to 12 million tonnes. Especially in information technology which have resulted in the more frequent replacement of electrical and electronic equipment by various stakeholders.

The objective of improving the management of WEEE cannot be achieved effectively by countries acting individually. In particular, different national applications of the producer responsibility principle may lead to substantial disparities in the financial burden on economic operators. Having different national policies on the management of WEEE hampers the effectiveness of recycling policies. For that reason the essential criteria should be laid down at regional level.

From an environmental point of view, it is beneficial to collect more WEEE and to treat it more effectively. The data in this report proves that this applies to all treatment categories investigated. The environmental priorities such as toxicity control, resource and energy conservation and other environmentally relevant emissions - global warming and ozone layer depletion - vary substantially per category, making WEEE a very heterogeneous stream from an environmental perspective. This results in the fact that it might be better to differentiate in environmental targets per treatment category.

It is expected that there will be significant growth and consolidation of collection and recycling services to enable more efficiencies and economies of scale. Household WEEE will be recycled in larger sites as volumes will increase significantly. This will allow better technology and the cost is expected to decrease. Regarding organisation, it is believed that some key contractors will appear both at international and regional level, with excellent logistics and high-volume recycling plants and absorb the smaller stakeholders.

For the next couple of years, recycling costs are expected to decrease in general. However, waste handling, transport and sorting are major parts of the overall WEEE cost and these will probably remain steady as these are difficult to optimise, in particular for products at their end of life. Certain factors like availability of collection points, geographical location, culture, waste collection ways and the resent financing mechanisms, influence treatment performance. These various effecting actors are probably all relevant to a certain level and further influenced by the active role of different stakeholders involved, including public authorities and each country in the Mediterranean Region.

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13. List of acronyms and abbreviations

AAL Albanian lek
AMAD Alışveriş Merkezleri ve Perakendeciler Derneği

BAN Basel Action Network
BATRRT best available treatment, recycling, and recovery techniques
BCRC-Egypt Basel Convention Regional Centre - Egypt
BFR brominated flame retardant
B2B business-to-business
B2C business-to-customer

CARDS Community Assistance for Reconstruction, Development and Stability in the Balkans
CCCI Cyprus Chamber of Commerce and Industry
C&F cold and air conditioners (Italian WEEE classification)
CE consumer equipment
CEA Croatian Environment Agency
CIAEI Innovative Enterprise Incubation and Support Centre
CFC (CFC's) chlorofluorocarbon(s)
CMPP Moroccan Centre for Clean Production
CO_2 carbon dioxide
CP Cyprus Pounds
CRT (CRTs) Cathode ray tubes – screens
CPU Computer unit

DSF Global Digital Solidarity Fund
DVDs Digital Video Discs

EC European Commission
ECİD Elektronik Cihazlar İmalatçıları Derneği
EEA European Environmental Agency
EEE electrical and electronic equipment
ELoW European List of Waste
ELVs end-of-life vehicles
EMPA multidisciplinary research institute for material science and technology of the Swiss Federal Institute of Technology
ENIM National School of the Mineral Industry
EP European Parliament
EPEEF Environmental Protection and Energy Effieciency Fund
ESM environmentally sound management
ESR electronic scrap
EU European Union
EU15 "old" EU Member States (Austria, Belgium, Denmark, Finland, France, Germany, Greece, Ireland, Italy, Luxembourg, the Netherlands, Portugal, Spain, Sweden and the United Kingdom)
EU25 EU Member States (Austria, Belgium, Cyprus, Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Ireland, Italy, Latvia, Lithuania, Luxemburg, Malta, the Netherlands, Poland, Portugal, Slovakia, Slovenia, Spain, Sweden and the United Kingdom)
EU27 "new" EU Member States (Austria, Belgium, Bulgaria, Cyprus, Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Ireland, Italy, Latvia, Lithuania, Luxemburg, Malta, the Netherlands, Poland, Portugal, Romania, Slovakia, Slovenia, Spain, Sweden and the United Kingdom)
EUR/€ euro currency

FB&H Federation of Bosnia and Herzegovina
FIMME Federation des Industries Metallurgiques et Mecaniques
FODEP Le Fonds de Dépollution industrielle
FR flame retardants
FPD Flat Panel Display

GDP Gross Domestic Product
GeSI Global e-Sustainability Initiative
GIS Geographic Information System
GWP Global Warming Potential

HC hydrocarbons
HCFC hydrochlorofluorocarbons
HFC hydrofluorocarbons
HP Hewlett-Packard
HRK Hrvatska Kuna

ICT Information and Communication Technologies
IFC/PEPSE International Finance Corporation/Private Enterprises Partnership in South Eastern Europe
IIKOEEO form Report on exported quantities of WEEE, components of WEEE or treatment residues
IMS Integrated Management Systems
IOOEEO form Report of the WEEE treatment operator
IS Information system
İSKİD İklimlendime Soğutma Klima İmalatçıları Derneği
ISO International Organization for Standardization
ISOEEO form Report of the WEEE collection operator
IT Information Technologies
IT&T IT and telecommunications equipment
ITU International Telecommunication Union

KESİD Küçük Ev Aletleri Sanayicileri Derneği
KM Convertible Mark (Bosnia and Herzegovina)

LCD (LCDs) liquid crystal displays
LDA large domestic appliance
LHHA large household appliance

M&C monitoring and control instruments/equipment
MEPPPC Ministry of Environmental Protection, Physical Planning and Construction
MoU Memorandum of Understanding
MP3 patented digital audio encoding format
MPPI Partnership on used and end of life Mobile Phones
MPWTT Ministry of Public Work Transport and Telecommunications
MT megatonnes
MSs Member States
MSW municipal solid waste

nBFR non-brominated flame retardants
NGO non-governmental organization
NiCd nickel-cadmium
NiCr nickel-chromium

ODS ozone depleting substance
OECD Organization for Economic Co-operation and Development
OG Official Gazette
OGM Official Gazette of the Republic of Montenegro
OMPIC Moroccan Industrial and Commercial Property Office

PACE Partnership for Action on Computing Equipment
PBBs polybrominated biphenyls
PBDEs polybrominated diphenyl ethers
PCB (PCBs) polychlorinated biphenyls
PC/PCs personal computers
pcs pieces
PDAs personal digital assistant (palmtop computer)
PED personal electronic devices
PET Polyethylene terephthalate
PHARE Poland and Hungary: Assistance for Restructuring their Economies
PHI Public Health Institute
PPEEO form WEEE delivery receipt
PVC polyvinyl chloride
PWBs Printed Wiring Boards

R&D Research and Development
RDF Refuse Derived Fuel
RoHS Restriction of the use of Hazardous substance
RS Republic of Serbia

SAA Stabilization and Association Agreement
SHHA = SDA small household (domestic) appliances
SIDA Swedish International Development Cooperation Agency
SME Small and Medium Enterprises
StEP Solving the E-waste Problem

T metric tonne (tonne)
TAIEX Technical Assistance and Information Exchange instrument
TAP collection scheme of Portable Battery Producers' and Importers' Association
TESİD Türk Elektronik Sanayicileri Derneği
THS Transport of Hazardous Substances
TL Turkish Lira
TOBB Türkiye Odalar ve Borsalar Birliği
TV set television set
TÜİK Statistical Institution of Turkey
TÜRKBESD Türkiye Beyaz Eşya Sanayicileri Derneği

UNESCO United Nations Educational, Scientific and Cultural Organization
US United States
USD the United States dollar

VCRs Video Cassette Recorders

WEEE waste from electrical and electronic equipment
WMIS Waste Management Information System