Balkan e-Waste Management Advocacy Network

E-Waste Assessment: Macedonia

www.bewman.eu

Metamorphosis Foundation

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Executive Summary

Researches were conducted in Macedonia, Serbia, Croatia and Bulgaria in order to provide a preliminary assessment of the legal and institutional framework, identify existing practices for e-waste management, but most importantly to obtain valid and quantifiable statistical data about the situation with e-waste in the respective countries. The framework of the researches is based on the assessment methodology developed by the Partnership for Action on Computing Equipment (PACE) of the Basel Convention and EMPA, the Swiss Federal Laboratories for Material Testing and Research, who have extensive field experience in many countries developing e-waste management systems.[1]

The research was consisted of two complementary parts. The first part is to assess the legal and institutional framework as well as identify existing practices for e-waste management. The tools used for this part of the research were: interviews of decision makers, mail surveys and focus groups gathering decision makers, media and CSO representatives. The second part was survey using a semi-structured questionnaire for gathering the data. It targeted a representative sample of citizens in the four countries and will be conducted by a specialized company.

The results of this research provide road map for the remainder of the "Balkan E-Waste Management Advocacy Network" Project and will provide a solid and credible base for developing context-sensitive advocacy materials for CSOs from the Balkan region.

Balkan E-Waste Management Advocacy Network (BEWMAN) is a two year project, initiated by Metamorphosis Foundation (www.metamorphosis.org.mk) and co-financed by the European Union's IPA 2008 Programme of the Civil Society Facility, with overall objective to improve the legal and institutional framework that will contribute to proper e-waste management in Macedonia, Serbia, Croatia and Bulgaria, in accordance with relevant with the EU legislation and standards. Project partners are Computer Aid International (United Kingdom), ZaMirNet (Croatia), the association Center for civil society development PROTECTA (Serbia), and Bluelink Foundation (Bulgaria).

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[1] For more information about this methodology, and to view case studies, see ewasteguide.info.

Introduction

Background

The accelerating pace of technological change in the ICT markets contributes to fast product obsolescence, which rapidly increases the quantity of discarded electronics equipment all over the world. Electronic waste (e-waste) comes from discarded electronic devices - computer monitors, television screens, and cellular phones. These devices are comprised of toxic substances which can cause damage to blood systems, increased risks of cancer, and other serious health problems. Moreover, e-waste that is not properly recycled or disposed of can end up in rivers and other water supplies, poisoning nearby communities. While some recyclers in the developed nations process the material with an eye toward minimizing pollution and health risks, many more sell it to brokers who ship it to the developing world, where environmental enforcement is weak.

Macedonia has not yet implemented an e-waste management system, and any kind of practical solution. Until now, only several private companies have initiated collection systems, trying to gain from the potential profit from recycling discarded electronic and electric equipment. They offer collection only for companies, and for larger amounts of e-waste.

Problem identification

The Balkans is often targeted for e-waste disposal by the countries of the first world, and the practices for dealing with locally produced e-waste remain unsatisfactory. The current situation with waste management in the region can be assessed as substandard in regard to human and financial resources, accompanied by insufficient and ineffective monitoring and implementation of existing regulations. No official statistics related to e-waste are available for the Balkan region in regards to quantities, sources and manners of disposal.

Objective of the assessment

The objectives of the assessments are:

- Develop a baseline assessment of current e-waste quantities and challenges in Macedonia

- Identify relevant stakeholders in the existing e-waste management system

- Evaluation of the social, economic and environmental impacts of the current management system

- Develop a roadmap for proper e-waste management, as well as recommendations for advocacy efforts

Acknowledgements

Methods

Methodological framework

This assessment is based on the assessment methodology developed by the Partnership for Action on Computing Equipment (PACE) of the Basel Convention and EMPA, the Swiss Federal Laboratories for Material Testing and Research. Necessary modifications have been made to reflect the objectives of this assessment, and the resources and time available for the study.

Data acquisition

The data was collected through document reviews of policies and laws, interviews with stakeholders, focus groups and questionnaires.

Literature review and statistical data

Sources of information and important key figures for assessment of e-waste streams include the following:

- Internet sites (e.g. governmental and commercial)

- E-Waste reports

- Databases

- National Statistics

Meetings, interviews and focus groups

Meetings were conducted with key stakeholders, including consumers of electronics (household and business), waste collection and treatment operators, and key decision-makers in government and industry. For the purpose of the research 40 interviews/meetings were conducted with relevant stakeholder.

Surveys, questionnaire sampling

There were questionnaires carried out with a help of a specialized company (IPSOS Strategic Puls - Skopje[2]). It was a survey using a semi-structured questionnaire for gathering data from representative sample of citizens and businesses/organizations:

- Data collection method: telephone interview conducted in the household of the respondent – Computer Aided Telephone Interviewing (CATI**)**

- Data source based on random representative sample of the population in Macedonia, aged 18+ years of age, based on sample frame from telephone directory (electronic)

- Type of sample: two-staged stratified combined representative sample, with the following selection stages :

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[2] IPSOS Strategic Plus – Skopje http://www.ipsos.com/

- o Household simple random sample (CPCWoP)

- o Household member aged 18+ years of age

- Sample stratification is performed according to:

  - o Type of settlement – urban/rural

  - o Four geo – economic regions (Stratums)

- Interview control: automatic (100% procedure control), interactive (100% logic control and consistency control).

- Target population: Citizens of Republic of Macedonia aged 18+ years of age

- Survey was conducted from 14 to 18 January, 2011

Limitations

Limitations that apply to the research are:

- Not all stakeholders were available for interviews or forthcoming with data, and representative data or information needed to be constructed from other sources

- The difficulty of accessing data held by manufacturers, suppliers and users

System definition

Geographical Scope

The research was done on a national level. Target population: Citizens of Republic of Macedonia aged 18+ years of age.

Product scope

The following electrical and electronic equipment categories (defined by the EU WEEE Directive) that are the scope of the study:

Sector	Tracer products
Large household appliances	Washing machine, Electric heater (Heater, el. stove, fan heater, radiator, heating panel etc.), Fridge (regular or freezer), Stove (regardless if the hobs and oven are separated or not)
Small household appliances	Coffee machine, Machine for filter coffee etc., Fan, Hair dryer, Iron, Cleaning machine (vacuum cleaner etc.)
IT and telecommunication equipment	Landline phone, Mobile phone, Laptop, Personal computer – PC, LCD monitor (for computer), CRT monitor (for computer), Modem, Printer, Scanner
Consumer equipment	Camera, DVD Player, Game Console (Play station etc.), MP3 Player, Radio, Stereo system, Hi-Fi, TV – CRT, TV – Flat screen
Batteries	Accumulator for other purposes, One-Way Batteries, Rechargeable Batteries

Specifically the research limited the product scope to: Fridge (regular or freezer), Washing machine, Stove, Personal computer – PC, CRT monitor, LCD monitor, Laptop, Mobile phone, TV – CRT, TV - Flat screen, Radio, Printer, DVD Player, MP3 Player

Development indicators

The development status which may influence e-waste generation and management are:

People	
Total population	2 052 722 (Census 2002)
Number of households	564 297 (Census 2002)
Household size	3,6 (Census 2002)
Average annual population growth rate	2,3
Share of economically active children	56,3 (2009)
Unemployment	31,7 (2010)
Youth unemployment	56,4
Population below international poverty line (Population bellow 1$ per day, population below 2$ per day)	$1.25: < 2 2$: 5,3
GINI index	42,8 (2006)

Environment	
Electricity consumption in the industry (GWh) 2008	2 606 GWh (2008)
Capacities for electricity production (MW)	installed capacity 1 585 MW
Energy statistics	Gross-primary production 1000 toe 1,607 Net energy imports in 1000 toe 1,254 Net oil imports in 1000 toe 1,015 Net natural gas imports 1000 toe 64 Total energy needed 1000 toe 2,791 Final energy consumption in 1000 toe 1,652 Industry 1000 toe 422 Traffic 1000 toe 432 Other consumption 1000 toe 798 Gross-production of electricity GWh 6,828 Final electricity consumption GWh 6,392 Socioeconomic statistics Gross Domestic Product (at current exchange rate) 6 677 million euros Mid-Year population 2.050.671 Energy intensity Total required energy / GDP kgoe/ 1000 EUR 418.0 Final energy consumption / GDP kgoe/ 1000 EUR 247.4 Energy consumption per capita Total required energy / capita kgoe / kgoe / capita 1361 Final energy consumption / capita kgoe/ kgoe/capita 806 Household consumption / capita kgoe/ kgoe/capita 264 Final electricity consumption / capita kWh/capita 3 117 kWh/capita 3 117

	Energy dependence
	Net energy imports / total energy required in % 44.9
	Energy efficiency
	Final energy consumption / total required energy in % 59.2
	Efficiency of thermal power plants and energy plants in % 36.6
Emissions of organic water pollutants	The total quantity of created waste per capita in 2009 is estimated at 354 kg, i.e. 0,9 kg per day, out of which 76,3% were disposed to landfill
Land area	Agricultural land 1 014 410 ha Arable land - 513 234 ha Plough land and gardens 420 163 ha Orchards 14 266 Vineyards 20 606 Meadows 58 199 Pastures 500 468
Rural population	866 248
Urban population	1 186 473
Population in largest city	506 926 (Skopje, capital)

Economy	
Gross domestic product (GDP)	6,720 Million Euros (2008)
Purchasing power parity (PPP) conversion factor	24,055 LCU per international dollar (2008)
GDP per capita	3,283 Euros (2008)
GDP (PPP) per capita	8,430 (2008)
GDP composition by sector (agriculture, industry, services)	agriculture: 41,341 Million Denars (2008) industry: 106,403 Million Denars (2008) services: 181,173 Million Denars (2008)
Labour force by sector (agriculture, industry, services)	agriculture: 116,668 (2009) industry: 83,838 (2009) services: 229,395 (2009)
Consumer price index	99,2 (2009)

States and Markets	
Telephones access	68,4 (June, 2010)
Households with television	97%
Personal computers per 1000 people	PC users: 52% Laptop users: 29%
Internet users per 1000 people	41,8% (2009)
Mobile Phone subscribers per 1000 people	84,3% (June 2010)
Micro, small, and medium-size enterprises	Total in RM: 70 710 micro: 38 107 small: 31 873 medium: 533 large: 197
Tax revenue collected by central government	62.108.504.004 Denars (2009)

Policy and Legislation

E-Waste related policies & legislation

Law on Environment[3]

The Law on Environment regulates the rights and the responsibilities of the Republic of Macedonia, municipalities, the City of Skopje and the municipalities of the City of Skopje as well as the rights and the responsibilities of legal entities and natural persons, in the provision of conditions required to ensure protection and improvement of the environment, for the purpose of exercising the right of citizens to a healthy environment.

The objectives of this Law are:

1. Preservation, protection, restoration and improvement of the quality of the environment;

2. Protection of human life and health;

3. Protection of biological diversity;

4. Rational and sustainable utilization of natural resources;

5. Implementation and improvement of measures aimed at addressing regional and global environmental problems.

Law on waste[4]

The Law on waste regulates the waste management; plans and programs for waste management; rights and obligations of the legal entities and individuals related to waste management; the manner of and conditions for waste collection, transportation, treatment, processing, storage and disposal; waste import, export and transit; monitoring; information system and financing.

The objectives of this Law shall be to provide:

1. Avoidance and reduction to the maximum possible extent of the amount of waste generation;

2. Re-use of usable components of the waste;

3. Sustainable development through protection and saving of natural resources;

4. Prevention of negative impacts of waste on the environment, human life and health;

5. Environmentally acceptable waste disposal; and

6. High level of protection of the environment, human life and health;

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[3] Law on environment: http://www.moepp.gov.mk/WBStorage/Files/Law%20on%20Environment.pdf
[4] Law on waste: http://www.moepp.gov.mk/WBStorage/Files/Law%20on%20Waste%20Management-final,%20enacted%201.pdf

As so far there are no specific e-waste legislatives the Law on waste is most relevant to this issue, and covers the legal regulations for e-waste management. In this law the e-waste is defined as:

"Waste electric and electronic device" shall mean any electric and electronic device which the generator and/or holder is discarding, intends to discard or is required to discard, including all parts and components which are integral parts of the device at the time of discarding;

Article 71 of the Law is specifically devoted to the management of e-waste. It states that the *handling of used electric and electronic devices* shall be done in the following way:

1. For the design and production of electrical and electronic equipment, one needs to take into consideration and also facilitate the disassembly, processing and use, and in particular the reuse and recycling of the used electrical or electronic equipment, components and embedded materials.

2. The manufacturer of electrical and electronic equipment shall identify equipment components that are recyclable.

3. The manufacturer is obliged to provide collection and processing, reuse or recycling of the used electrical or electronic equipment, components and embedded materials from paragraph (1) of this article produced or imported by the manufacturer, and to collect them free of charge from the customers in accordance with this Law and other regulations.

4. Buyer is obliged to collect, store and return the used equipment to the manufacturer, and may also return it to the vendor or the natural or legal person collecting or processing used electrical or electronic equipment.

5. The seller or manufacturer is obliged to inform buyers about the operation of the return system and schemes for collection of electrical and electronic equipment.

6. It is prohibited to dispose of used electrical and electronic equipment as communal waste.

7. Legal or natural persons that are taking back the electrical and electronic equipment shall keep records on the type and quantity of the used electrical and electronic equipment that they received, and they will issue confirmations of receipt and confirmations for equipment delivery for treatment, processing or disposal in accordance with this Law or other regulations.

8. The vendor or manufacturer is obliged to select the collected electrical and electronic equipment and give it to the legal and natural persons authorized for treatment and processing of electrical and electronic equipment.

9. Legal and natural persons performing treatment and processing of the used electrical and electronic equipment must have a permit, in accordance with this law or other regulation.

10. Waste from the used electrical and electronic equipment must not be mixed with other types of waste, nor disposed of without prior treatment or processing.

11. Legal and natural persons referred to in paragraph (9) of this Article shall maintain and keep records on the types and quantities of the used electrical and electronic equipment they had collected, treated, or processed in accordance with this Law or other regulations.

12. Data from the records from paragraphs (7) and (11) of this Article shall be submitted on specified forms by March 31 of the current year for the previous calendar year to the competent authority for performing expert environmental activities.

13. At the proposal of the minister managing the public administration organ responsible for environmental matters, in agreement with the minister managing the public administration organ responsible for economic matters, the Government will determine the classes of electrical and electronic equipment, the list of products to be specified in classes of electrical and electronic equipment which will be selectively collected, the method, conditions for collection, return, treatment and processing, as well as the goals and deadlines for their realization, the method of keeping records and the form and content of reporting forms, the method of labeling and the types of electrical and electronic equipment excluded from these procedures.

Article 71-a defines the restrictions and prohibitions on use and the contents of certain hazardous substances in the electrical and electronic equipment:

It prohibits the sale of electrical and electronic equipment containing lead, mercury cadmium, six-valent chromium, polybromides, polybrominated biphenyls or polybrominated difenileters except in amounts compliant with the regulation in Article 71-b paragraph (8) of this Law.

Article 71 - b defines the obligations of the manufacturer:

1. The manufacturer is obliged to guarantee that the electrical and electronic equipment distributed on the market does not contain lead, mercury cadmium, six-valent chromium, polybromides, polybrominated biphenyls or polybrominated difenileters, in accordance with this Law and other regulations.

2. The manufacturer is obliged to guarantee that the batteries of electrically charged vehicles do not contain cadmium.

3. For the electrical and electronic equipment that the manufacturer launches on the market for the first time, the manufacturer is obliged to provide a statement of compliance, guaranteeing that it is in compliance with the provisions of paragraph (1) and (2) of this Article.

4. If the electrical equipment is imported, the statement of compliance from paragraph (3) of this Article shall be issued by the importer or authorized distributor.

5. The statement of compliance from paragraph (3) of this Article shall be kept for 5 years starting from the date when the last piece of electrical and electronic equipment was manufactured or imported.

6. The statement of compliance must be available in every outlet.

7. A copy of the statement shall also be submitted to a competent authority for expert environmental activities.

8. The minister managing the public administration organ responsible for environmental matters, in agreement with the minister managing the public administration organ responsible for economic matters, specify the maximum concentration values for the presence of certain hazardous substances in electrical and electronic equipment, its components and materials, including electric lamps for lighting in the households, as well as the method of handling, goals and deadlines for achieving them, the form and content and deadline for issuing a statement of compliance.

According to Article 53 *obligations of the consumers* in general, not just specifically for e-waste, are:

1. The consumer shall use the product and the packaging according to the directions for use given by the producer or importer, as the case may be, in a manner that would not endanger the environment or human life and health.

2. The consumer shall select the waste generated from the used product and the packaging, and hand them to:

   - The seller who sold the product to him/her or to the producer or importer, as the case may be, provided that the product is appropriately labeled with regard to the treatment of used product and packaging;

   - Legal entities and individuals collecting and transporting waste, or;

   - Legal entity or individual that has a license for waste processing.

A penalty of 3000 euros will be imposed to a legal person dealing with waste, in case the person sells electrical and electronic equipment containing lead, mercury cadmium, six-valent chromium, polybromides, polybrominated biphenyls or polybrominated difenileters (Article 71-a)

Waste Management Strategy of the Republic of Macedonia (2008-2020)[5]

The Waste Management Strategy reflects the national policy in waste management and represents the basis for preparation and implementation of an integrated and cost-effective waste management system. With this document, the Republic of Macedonia defines the fundamental directions in waste management for the coming twelve year period (2008-2020), on the basis of recognition of serious impacts to the living and natural environment caused by improper waste management at present and in the past, and it determines the fundamental directions of the gradual waste management system set-up

based on the hierarchy of the main principles of waste management and on the main principles of sustainable use of natural resources.

According to the research done to create the Waste Management Strategy (2008-2010):

- A significant portion of the general waste stream is composed of spent goods and a variety of end-of-life products such as construction and demolition waste (app. 500.000 t/year), used tires, accumulators, end-of-life vehicles, **electrical/electronic waste**, in total to an amount of 40 000 t/year (approximate).

- The management of other types of waste such as batteries, accumulators, end-of-life vehicle, PCB's, electrical/electronic waste, etc., is not in compliance with EU directives.

In this document there are several parts devoted to e-waste:

- *Current legal framework and transposition activities*
  Transposition of the main EU directives on waste management into the Macedonian legislation framework is carried out by drafting and adopting obligations and rules with regard to hazardous waste, to waste oils, to packaging and packaging waste, to disposal of PCB/PCT and batteries and accumulators, to WEEE and ELV-s, for the purpose of providing the necessary legal basis for preparation, adoption and implementation of the secondary legislation.

- *Separate collection of municipal waste streams*
  Some technical measures for the collection of recyclable constituents in municipal waste shall be implemented with some retard, in particular in settlements with more than 50.000 habitants: Technical collection measures for different end-of-life products may be implemented according to the producer's responsibility. Separate collection of end-of-life products like used tires, end-of-life cars, waste electric and electronic equipment, used mineral oils, batteries and accumulators may be carried out in the network of the specialized collection- and recycling yards organized as public services or in the separate collection network organized by producers.

- *Utilization of municipal waste and special waste streams as substitute for natural resources*
  Pre-treatment, recycling and other kinds of utilization of end-of-life products may be carried out on different technological levels regarding specific characteristics of products, available facilities for recycling or for other kinds of utilization and the economy of scale. Products from the pre-treatment processes may enter different technological processes of recycling and final disposal available in Macedonia or other countries: Partial dismantling and separation of usable, unusable and hazardous constituents may be the only fast feasible tasks in management of the waste electrical and electronic equipment.

- *Priority measures and actions:*
  Preparation of the waste management plans on the various levels should include the activities, which are based on the specific status of the certain waste types and streams and on the needed actions to overcome existing practice and to initiate better management by means of

taking account of the requirements in the corresponding EU waste management directives: policy documents for implementation of the measures (systems) for special, waste streams: waste oils, waste tires, waste accumulators, end-of-life vehicles, PCB's, packaging waste, waste electrical and electronic equipment together with the promotion, public campaigns and support actions for implementation of all mentioned systems.

Generally, the special waste streams such as packaging and packaging waste, used tires, car batteries, ELV, WEEE, and other special end-of-life products are of less importance and the implementation may start in the second development phase of the waste management system, although some of them may be managed via private sector participation and via voluntary scheme according to the "producer's responsibility" principle.

National Waste Management Plan (2009-2015) of the Republic of Macedonia

The National Waste Management Plan (NWMP 2009 - 2015) as a constitutive part of the National Environmental Action Plan is based on the adopted Waste Management Strategy of the Republic of Macedonia (WMS), which reflects the national policy in waste management and represents the basis for preparation and implementation of an integrated and cost-effective waste management system.

The National Waste Management Plan (2009 - 2015) is a novelty of the proposed document prepared in 2005. The purpose of the novelty of the National Waste Management Plan is to provide an adequate environmental policy, decision-making framework, economic basis, public participation and gradual setting-up of the technical infrastructure for carrying out the waste management operation in order to implement the waste management system in compliance with EU legislation and with the EU Sixth Environmental Action Program (2002-2012), taking into account its priority in waste management, i.e. thematic strategy on sustainable use of resources and thematic strategy on waste prevention and recycling.

In this document the e-waste streams are not specified and only mentioned that they require special consideration and that "discarded electrical and electronic equipment (WEEE) mainly appears as a constituent of the municipal waste and it is disposed of in municipal landfills."

According to the Waste Management action plan, activities planned, relevant to e-waste are:

Measures	Stakeholders	Activities	Scope of main tasks	Year of implementation (2008-2014)					
				1	2	3	4	5	6
Transposition of the EU legislation and directives on waste management into the national legislation framework	MoEPP, MF; producers, importers, retailers;	Amending environmental and other affected legislation with regard to end-of life products:	• Establishment and implementation of Producer's/Importers responsibility optionally linked with Environmental Fund as an earmarked part of the State budget. • Involvement in voluntary agreement scheme and/or earmarked tax collection for management/disposal of the EL products (tyres, packaging, batteries/accumulators, used oils, WEEE, ELV,C &D waste). • Obligations for the recovery (take-back) mechanisms EL products. • Financial/economic instruments; material and financial monitoring and reporting.		x x x	x x	x x x	x x x	x x x
Secondary legislation and permitting/enforcement instruments	MoEPP, municipalities, producers	Regulation on the local level for management of special waste streams	Regulation of the organisational and technical setting-up of WM services and facilities for the special waste streams, i.e. tires, packaging, batteries/accumulators, used oils, WEEE, ELV, construction/demolition waste in relations to compliant scheme according to "producer's responsibility".		x				
Institutional, organisational arrangements: Special waste streams	MoEPP, MoE, MoF, economic sector concerned, municipalities	Linked institutional set-up for management of the special waste streams and end-of-life products	• Creation of waste management schemes, plans, targets, feasibility studies on management of special waste streams (P &PW, oils, PCB waste, accumulators and batteries, WEEE, tyres, construction/demolition waste, waste from water treatment plants). • Establishing of organisational, financial and operative structure for the collection, treatment, recovery/recycling and disposal of selected special waste streams and end-of-life products. System operates mainly on the basis of public services by involvement of private sector.			x	x x	x	x

Specific e-waste management legislation

In the period while the research was conducted, the Ministry of Environment has published the draft version of the Law for electronic and electric equipment, which is transposition of the Waste Electrical and Electronic Equipment Directive (WEEE Directive) 2002/96/EC, and The Restriction of Hazardous Substances (RoHS) Directive 2002/95/EC. It is expected to be adopted by the Parliament in September, and enforced from January 1st, 2013.

Batteries and accumulators

The Law On The Management Of Batteries And Accumulators And Waste Batteries And Accumulators regulates the requirements for protection of the environment that batteries and accumulators must meet prior to their production and placement on the market in the Republic of Macedonia and actions involving waste batteries and accumulators, which include the obligations and responsibilities of economic operators and other subjects participating in the process of production and placing on the market of batteries and accumulators, limiting the use of batteries and accumulators containing hazardous substances, rules on collecting, treatment, recycling and disposal of waste batteries and accumulators, as well as other conditions for operations with waste batteries and accumulators; reporting economic instruments for achieving the national goals for collecting and treatment of waste batteries and accumulators.

This Law mentions waste electronic and electric equipment several times, and only those articles are taken into consideration for the research. From the application of the Law (Article 4): „*In activities involving batteries and accumulators and waste batteries and accumulators, in addition to the provisions of this Law, there shall be appropriate application of the provisions of the acts regulating the management of used vehicles and waste electrical and electronic equipment*.“

As obligation of the importer/manufacturer, in article 18 it is written: "The expenses for collection, treatment and recycling paid by the producer from paragraph (1) of this Article may not be duplicated against the same expenses incurred in handling used vehicles and waste electrical and electronic equipment".

The Collective handling of waste batteries and accumulators is defined in Article 21, as: "*The collective handler may perform the obligations from paragraph (2) of this Article as a single activity or jointly with the activity for handling of waste electrical and electronic equipment or with the activity for handling used vehicles, if he has a permit for this in accordance with law.*".

Treatment and recycling (Article 26) will be done according to: "If the batteries and accumulators are collected together with waste from electrical and electronic equipment, the waste batteries and accumulators are separated from the collected waste from electrical and electronic equipment".

Institutional framework

Political structure

Macedonia is a Republic having multi-party parliamentary democracy and a political system with strict division into legislative, executive and judicial branches. From 1945 Macedonia had been a sovereign Republic within Federal Yugoslavia and on September 8, 1991, following the referendum of its citizens, Macedonia was proclaimed a sovereign and independent state. The Constitution of the Republic of Macedonia was adopted on November 17, 1991, by the first multiparty parliament. The basic intention was to constitute Macedonia as a sovereign and independent, civil and democratic state and also to create an institutional framework for the development of parliamentary democracy, guaranteeing human rights, civil liberties and national equality.

The Assembly is the central and most important institution of state authority (www.sobranie.mk). According to the Constitution it is a representative body of the citizens and the legislative power of the Republic is vested in it. The Assembly is composed of 120 seats.

The President of the Republic of Macedonia represents the Republic, and is Commander-in-Chief of the Armed Forces of Macedonia. He is elected in general and direct elections, for a term of five years, and two terms at most. (www.president.gov.mk)

Executive power of the Republic of Macedonia is bicephalous and is divided between the Government and the President of the Republic. The Government is elected by the Assembly of the Republic of Macedonia by a majority vote of the total number of Representatives, and is accountable for its work to the Assembly. The organization and work of the Government is defined by a law on the Government.

The Municipalities of the Republic of Macedonia are first-order administrative divisions. In August 2004, the Republic of Macedonia was reorganized into 84 municipalities; 10 of the municipalities constitute the City of Skopje, a distinct unit of local self-government and the country's capital. The territorial division of the Republic and the area administered by each municipality are defined by law.

Municipalities are responsible for performing the following environmental tasks: urban (urban and rural) planning, issuing permits for construction of buildings of local importance established by law, spatial arrangement and arrangement of construction sites, protection of the environment and nature in terms of taking measures for protection and prevention of pollution of water, air, soil, protection from noise and non-ionizing radiation; Communal activities, such as supply of drinking water, supply of technical water, drainage and filtering of waste waters, drainage and storm water treatment, public lighting, public cleaning, collection, transportation and handling of municipal solid and industrial waste, arranging and organizing the local public transport, maintenance of graves, cemeteries and provision of funeral services, construction, maintenance, restoration and protection of local roads and streets and other infrastructural facilities, traffic regulation, construction and maintenance of street traffic signs, construction and maintenance of public parking spaces, removal of illegally parked vehicles, removal of wrecked vehicles from public surfaces, construction and maintenance of markets, chimney cleaning, maintenance and use of parks, greenery, park forests and recreational areas, regulation, maintenance and use of river basins in urbanized areas, determining the names of streets, squares and other

infrastructural facilities, preparation and implementation of measures for protection and rescuing of citizens and material goods from war destruction, natural disasters and other accidents and the consequences thereof, and other matters specified by law.

Important governmental bodies related to e-waste

Ministry Of Environment and Physical Planning

The Ministry of Environment and Physical Planning[6] (Law on Organization and Work of the Public Administration, "Official Gazette of RM" No. 58/2000) is organized in four Departments, as follows: Department of Legislation and Standardization, Department of Sustainable Development, Department of European Integration and Environmental Information Centre, two Divisions for projects implementation - Division for Implementation of the Lake Ohrid Conservation Project based in Ohrid and Division for Implementation of the Dojran Lake Salvage Project based in Star Dojran, as well as three bodies as constituent parts, i.e. State Inspectorate of Environment, Office of Environment and Fund of Environment and Nature Protection and Improvement.

State inspectorate of environment

The State Environmental and Nature Protection Inspectorate carries out inspection supervision over the implementation of technical and technological measures for air and water pollution, conservation of the special natural heritage, protection of soil against degradation and contamination, harmful noise and protection against waste matters and non-ionizing radiation.

The State Environmental and Nature Protection Inspectorate (SENPI) is a body within the Ministry of Envirement and Physical Planning.

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[6] http://www.moepp.gov.mk

Stakeholder assessment

The process of e-waste management in Macedonian is not strictly defined, but with the new WEEE law (expected in September) this should be done. There are no recycling factories, but there are several firms licensed to store and collect e-waste.

Following is the flow of e-waste in Macedonia, based on the input from stakeholders, desk research and telephone survey:
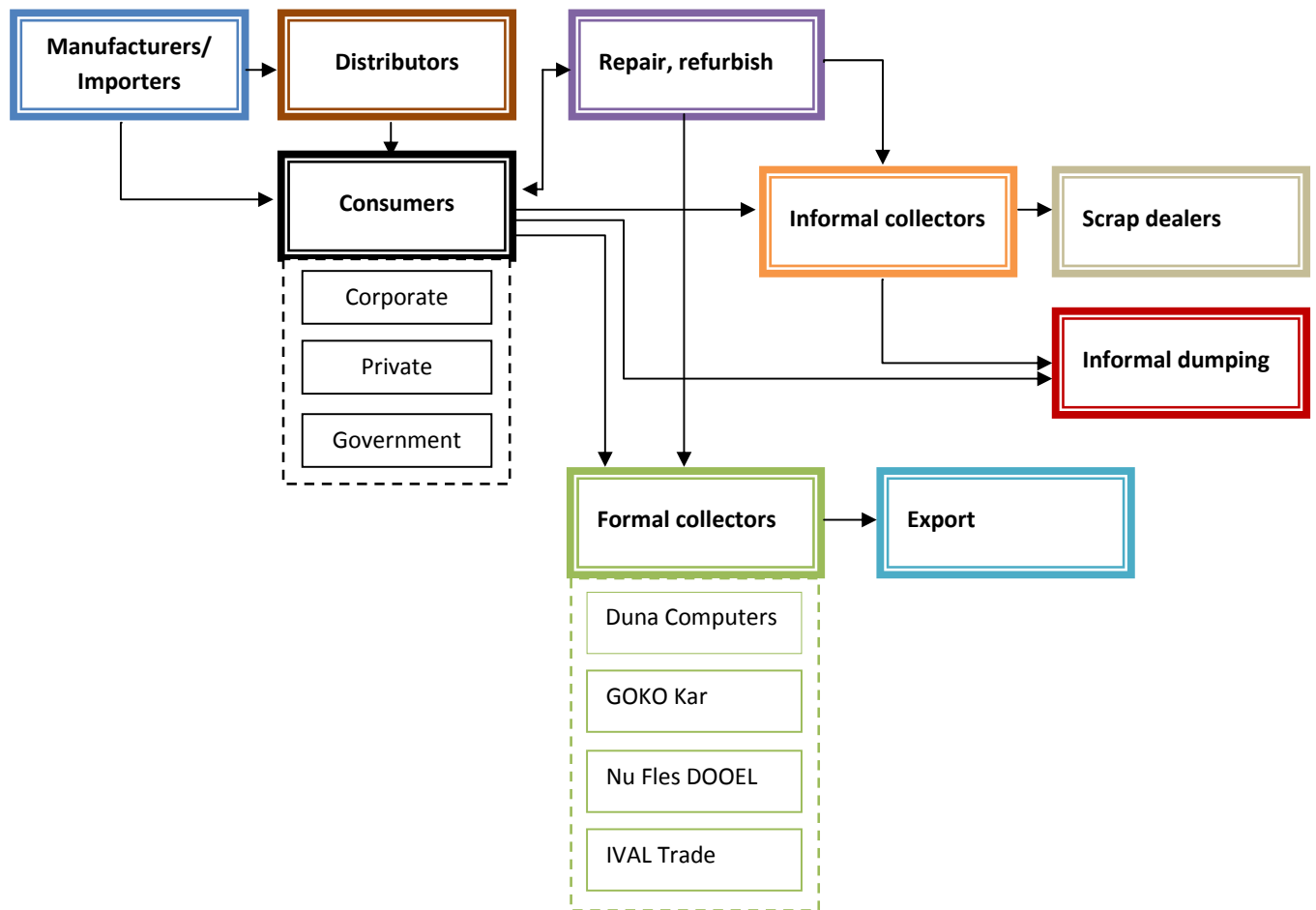
Civil society

The civil society in Macedonia before this project hasn't deal with e-waste issues. Within the framework of the Balkan E-waste Management Advocacy Network, 13 organizations[7] have created a national network that will work on raising awareness on e-waste. Beside these organizations, there are some others that started reflecting the e-waste issue this year.

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[7] Macedonian national network: http://mk.bewman.eu/nacionalna-mreza.html

Household and Corporate survey

Household survey

The modern living in the era of technical and technological society implies everyday development of the ways of handling e-waste. This is a subject for a broad discussion in every modern society, including the Republic of Macedonia, as a country that follows the world technique and technology trends.

Household appliances used on an everyday basis

Concerning the larger household appliances which are used on an everyday basis, the highest percentage, or 99% of the total population have refrigerator, 94% have washing machine, 92% have oven, 53% have some electric heating element, while only 20% have electric coffee machine.
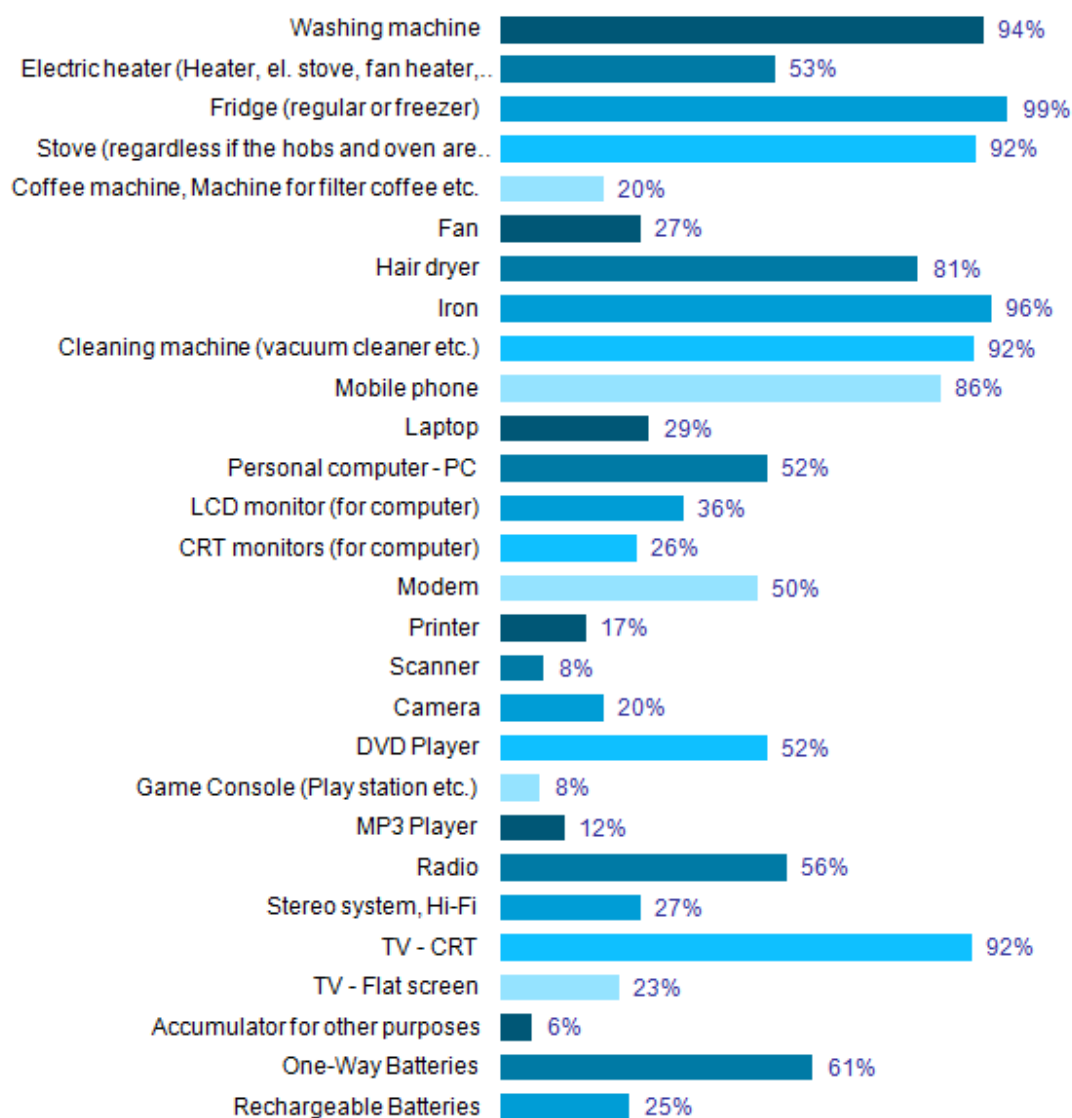

Appliance	Percentage
Washing machine	94%
Electric heater (Heater, el. stove, fan heater,..	53%
Fridge (regular or freezer)	99%
Stove (regardless if the hobs and oven are..	92%
Coffee machine, Machine for filter coffee etc.	20%
Fan	27%
Hair dryer	81%
Iron	96%
Cleaning machine (vacuum cleaner etc.)	92%
Mobile phone	86%
Laptop	29%
Personal computer - PC	52%
LCD monitor (for computer)	36%
CRT monitors (for computer)	26%
Modem	50%
Printer	17%
Scanner	8%
Camera	20%
DVD Player	52%
Game Console (Play station etc.)	8%
MP3 Player	12%
Radio	56%
Stereo system, Hi-Fi	27%
TV - CRT	92%
TV - Flat screen	23%
Accumulator for other purposes	6%
One-Way Batteries	61%
Rechargeable Batteries	25%

Figure 1: Appliances that are in use in the household - Total

Regarding the smaller household appliances, 96% of the total population have electric iron, 92% clean with electric cleaning machine, 81% have hair-dryer, and only 18% have fan at home.

IT and telecommunication equipment: 86% out of the total population in the Republic of Macedonia have at least one cell phone, 52% have personal computer, 29% have notebook, while modems are owned by 50% of the households. The LCD monitors (36%) gradually replace the CRT monitors (26%).
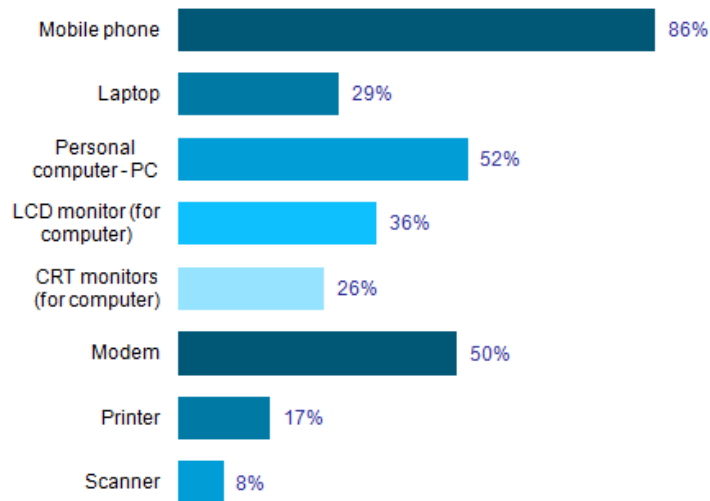

Figure 2: IT and Telecommunication Equipment

In relation to the other equipment in the household, the highest percentage – 92% have CRT (usual) televisions, while flat screen televisions have only 23% of the households. The radio-56% and the DVD player – 52% are owned by more than a half of the population in the Republic of Macedonia, while 27% have HI-FI, and 20% have camera.
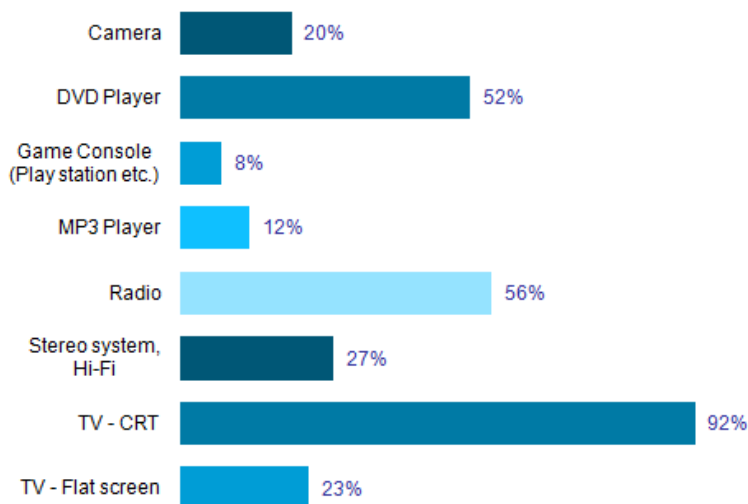

Figure 3: Other Equipment

Batteries: The accumulators which are used for various purposes, other than cars, are used by a small percentage of households – only 8%. Unfortunately, the awareness of the population of the Republic of Macedonia about the dangerous effect of the batteries is still not very high, so that the single-use batteries are used by 61% of the population, while the rechargeable batteries are used by only 25%.

Out of use household appliances, but still kept at home

This category covers the household appliances which are potential e-waste, but for some reason, we still keep them at home. 29% of households in the Republic of Macedonia have at least one cell phone that they didn't throw out; 22% have refrigerator, 19% - CRT television that isn't used anymore, and 17% have an oven and radio which aren't used, 13% have washing machine, PC- 6%...
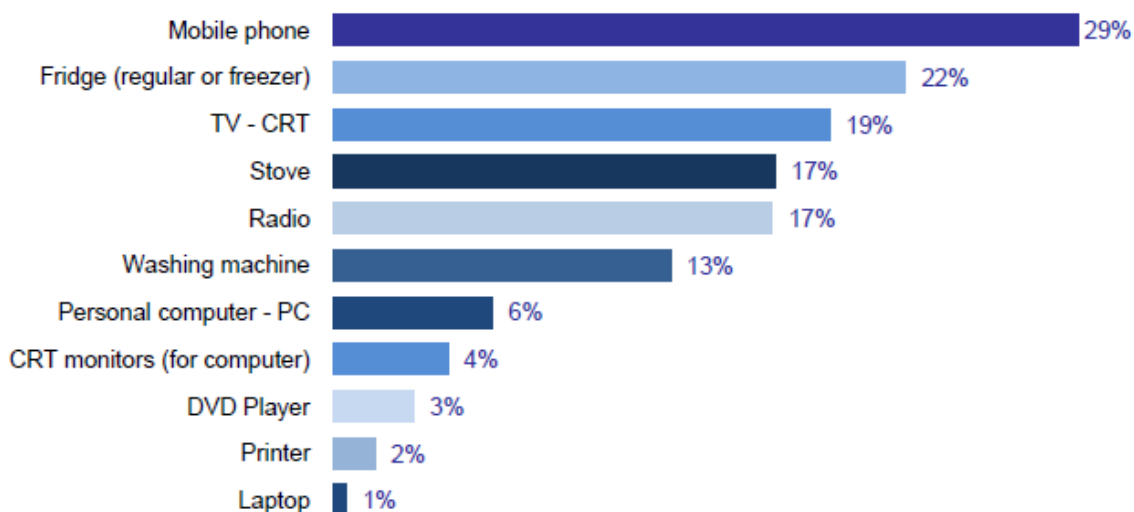

Figure 4: Household products that are not in use anymore but still keep them at home

In relation to those 29% who didn't throw out the cell phones that they don't use, more than 42% had been using the cell phones from 2-4 years, while 24% had been using them from 1-2 years. 19% of the households had been using them from 4-6 years. This indicates to the rapid development of this technology that causes the old equipment to be quickly replaced, so that 43% of households have cell phones that are not used but which are in good condition.
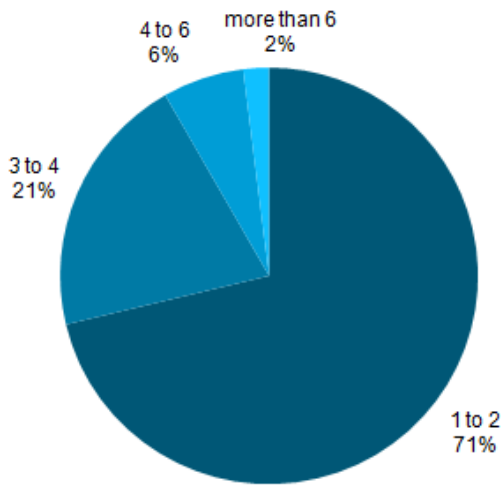
Figure 5: Number of mobile phones that you still have at home but are not used anymore
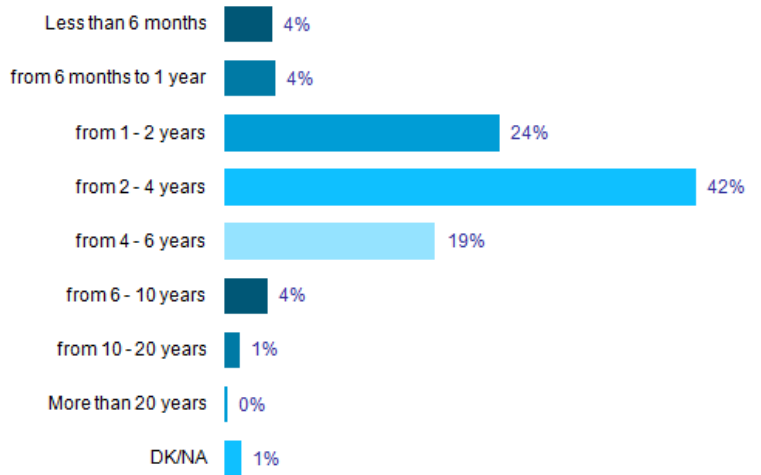

Figure 6: How many years had you been using the mobile phone in the past?

The quick development of the computer technology can be seen through the quick replacement of the PCs which aren't used. From the 6% of households that have PC they don't use, 33% had been using it from 4-6 years, and what's more, 68% of those computers are in good, usable condition.
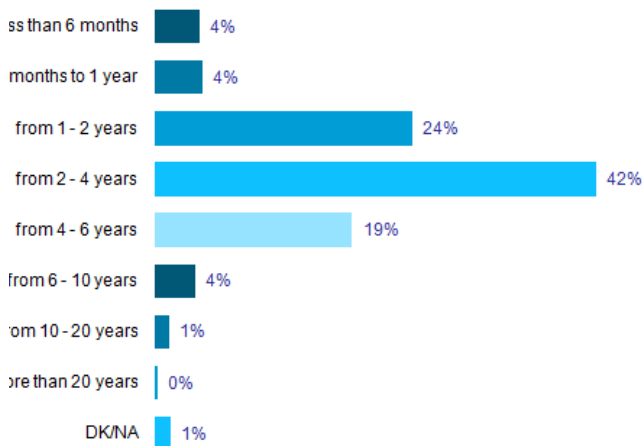
Figure 7: How many years had you been using the PC in the past?
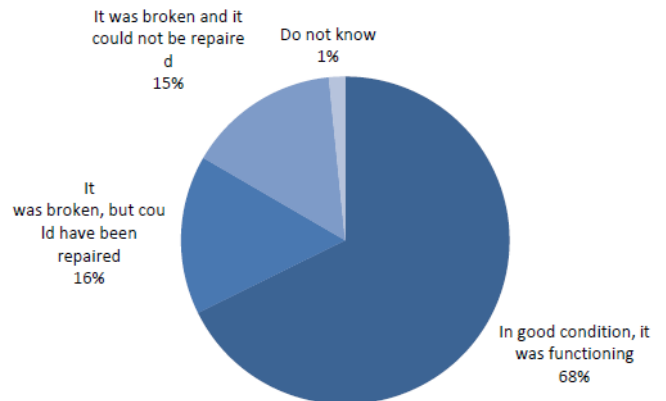

Figure 8: In what condition was the PC when you stopped using it?

Concerning the larger household appliances, such as refrigerator, oven, washing machine, CRT TV etc, the period of usage is much longer (32% of the households had been using the refrigerator from 10-20 years, while 28% - for more than 20 years), (washing machine – 36% had been using it from 10-20 years,

while slightly smaller is the percentage, or 34%, of those who had been using it for more than 20% years) (CRT-39% had been using it from 10-20 years, while 30% - for more than 20 years). Most of these appliances have been replaced with new ones, although the old were still usable.

Household appliances removed from the household

This category refers to the e-waste which is removed from the household. The highest percentage of appliances that are removed from the household are refrigerators – 34%, laundry washing machines – 27%, ovens – 24%, CRT – 23%, cell phones – 16% etc. Due to not having an organized way of handling the e-waste, almost all household appliances that have been removed from home, were removed by means of giving the appliance as donation/gift, giving/selling to the street dealer (known as rag-and-bone man), as well as leaving the appliance on a street, close to container.
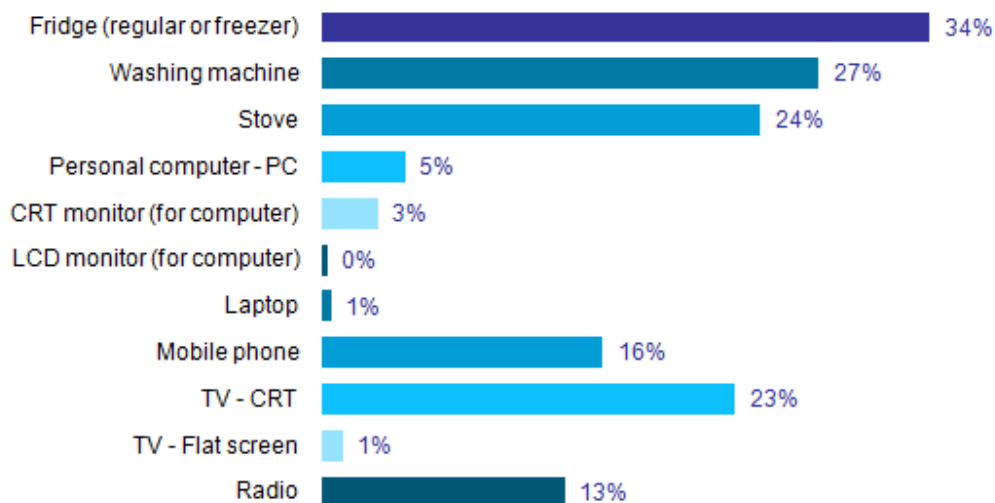
Appliance	Percentage
Fridge (regular or freezer)	34%
Washing machine	27%
Stove	24%
Personal computer - PC	5%
CRT monitor (for computer)	3%
LCD monitor (for computer)	0%
Laptop	1%
Mobile phone	16%
TV - CRT	23%
TV - Flat screen	1%
Radio	13%

Figure 9: Household appliances that have been disposed off from the household

40% of the total population that removed a refrigerator from home (which is 34%) gave the refrigerator as a donation/gift, while 30% gave it or sold it to a street dealers (known as rag-and-bone man)

The situation is similar with those 27% of the households that removed the washing machine from their home. 33% of them gave the mashing machine as a donation/gift, while 35% gave it/ sold it to a street dealer.

The CRT televisions in the households were mostly given as a donation/gift – 43%, while 23% were left on a street, near a container, while 19% were left somewhere else.

Concerning the offered 4 options for handling the e-waste, 45% of the citizens of the Republic of Macedonia think that the most suitable way for its removal from the household is to be donated and taken away from home. For 28% of the population, most suitable way for removing the e-waste is its giving/selling to a reseller having a permission for his work, while 15% would prefer to leave the e-waste

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on a street, near container. Slightly lower (13%) is the percentage of those who think that the most suitable way is to leave the e-waste in the specially designated areas in the municipality.
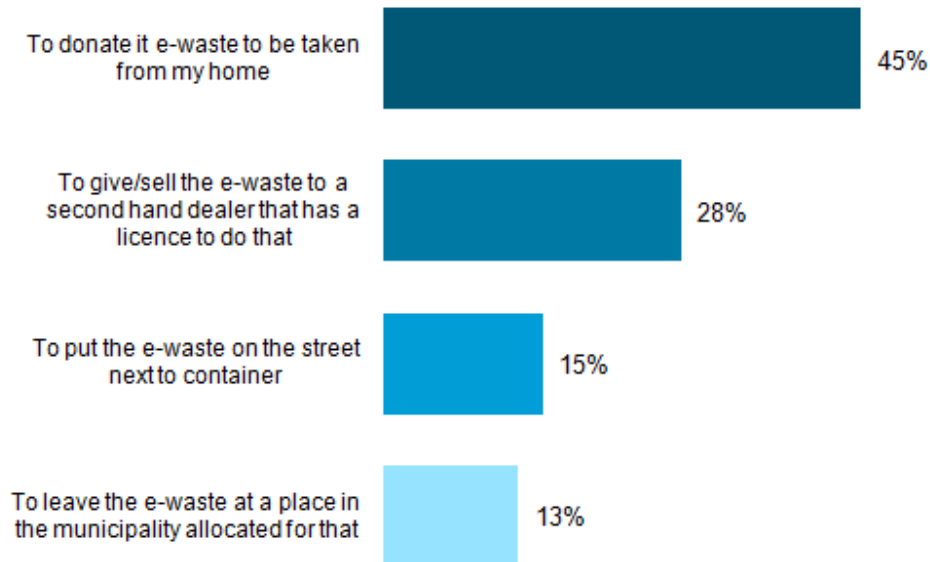
Figure 10: The most adequate way for disposal of electronic waste, e-waste from your household

The second most suitable way of removing the e-waste from the household, according to 32% of the population, is e-waste to be given/sold to a reseller having a permission for his work, 29% think that the e-waste should be donated – should be taken away from home, 23% think that most suitable way is to leave the waste in specially designated areas in the municipality, where the smallest part of the population, as a second choice, would leave the e-waste on a street, near container.

Full results from the household survey are published on the BEWMAN website (www.bewman.eu).

Corporate survey

Electronic equipment in use and possible e-waste volumes

The following electrical and electronic equipment categories (defined by the EU WEEE Directive) were the scope of this qualitative study: IT and telecommunication equipment, some consumer equipment, and batteries.

Generally all the interviewed entities claim to prefer buying new equipment only, with slight exceptions in a couple of cases, but these are far from regular practice. Equipment is either bought from a local dealer – general distributor in the case of bigger companies or retail seller in the case of smaller SME, or imported directly from international brand producers. In the couple of cases when second hand equipment was mentioned it referred to desktops and LCD monitors, primarily, but these occur very rarely are not to be further dealt with. There is an overall impression that Macedonian company representatives do not 'trust' in old equipment when electronics are concerned, mostly because of the fast improvements and innovations in this field and the limited warranty for this type of products. And, even more, because of the high repair fees as opposed to low selling prices for new devices.

> *I don't see any point in trying to fix an old computer, when you can buy a new one for almost the same amount....*

> *We always buy new devices – IT equipment develops very fast...*

> *We need brand new machines for our business and we have good deals with our suppliers, so new equipment is our option.*

In the case of non-governmental organisations, there are instances where equipment is provided through donations from partner and funding organisations.

Approximately one third of the interviewed companies have implemented special procedures related to replacement of electronics and e-waste, primarily IT equipment, which is either introduced by their IT department or by the technical departments in the respective companies. These are usually big and well established companies that operate under strict procedures and follow quality standards. In several cases it was said that their electronic waste procedures are not based on any requirements posed through regulations at a national level but on the already implemented business standards within their companies. In this respect, ISO 9001, 14001, 20000, and similar standards were mentioned by the respondents, as inevitable for sound business operations and as a solid basis for e-waste management at a company level.

Other companies manage e-waste at an ad hoc level, i.e. when necessary or when there are funds for renewal of equipment. A small number of companies reports doing this simply for the sake of buying the latest equipment, but they are only a few examples.

> *Our strict e-waste procedures come from our commitment to quality of delivered services and products through the design and implementation of the Quality Management System ISO*

9001:2008, Environmental Management System ISO 14001:2004, and IT Service Management System ISO 20000:2005.

We don't need such policies, we only have a few computers, and we do replacements whenever necessary.

I am not familiar with any such procedure but we do replace the computers when they break down...

According to the respondents statements, there is no general practice for lease of IT and telecommunication equipment among the Macedonian companies and institutions, but few representatives mentioned lease of specific equipment – LCD projectors, modems, printers, and similar, on ad-hoc basis or when bigger projects are implemented and additional electronics are needed for the short period of project execution.

Moreover, there are no common or prevalent findings related to the replacement period for IT and telecommunication equipment. Majority of SME seem to have an ad hoc practice for replacement of equipment– based on their different needs and capacities – and they seem to make new supplies when 'computers break down' or when 'new, cooler and faster devices appear on the market'. Only bigger and well established companies reported procedure regulated replacements based on implemented quality standards and higher technical demands posed by the production processes (predominantly software companies that are always in need of 'faster and smarter high-performance machines' and international corporations' branch offices). The replacement period for IT equipment ranges between 2 and 5 years (7 or 8 years for printers and scanners), and up to '*when they stop functioning or break down completely*', with few exceptions where shorter duration was mentioned but it was either due to old equipment being used in the past or having plenty of devices at disposal - in the case of international brand representative offices where, for example, testing new equipment and frequent replacements are practiced.

We use the machines for about three months maximum and then we get new ones from our head offices...we sell the used ones as tested...

Mobile phones are usually replaced within a shorter period of time – from 1 to 3 years, due to their limited capacity and shorter life-span. Prestige was also mentioned as a sufficient reason for replacement, while discussing mobile phone and laptop devices with some of the respondents...

According to respondents' opinions, storing old equipment of all types seems to be a very common and not yet abolished tradition, not only on the side of the companies but at a household level as well. Informed respondents talked about general practices at a wider household level related to ineffectual storage of piles of goods (in basements or other storage places) even after their life has ended, 'just for the sake of storing it'; this was mentioned couple of times as an important concern that needs to be worked upon.

If you teach people how to behave properly within their households, they will replicate their practices in their working environment, as well. Therefore, wider public awareness on e-waste issues is of huge importance and can be seen as a very good starting point for solving the unresolved issues related to electronics that are out of use.

IT and telecommunication devices that are still operational but are somehow getting out of use are either stored in the company, sold as second-hand (although much rarely) or donated to institutions and people in need (homeless children homes or similar). There are companies that report donation or selling IT equipment to their own employees, at certain instances, for much lower prices.

IT and telecommunication devices that stop functioning appear to have varied 'destinies' among different companies. Some international branch offices and a few other company representatives report returning equipment back to their head offices or using previously established responsible channels for electronics. Companies working under high quality standards claim to have their own subcontractors for this purpose, some mentioning annual tender procedures for the selection of these entities, which is in accordance with implemented procedures and existing regulations.

It is done on annual basis – we publish a tender and select the most suitable offer from the companies that apply. It has been done for a couple of years now, and we have dealt with a few companies so far...what do they do with the equipment, is something I don't have any insight at...

Inopportunely, there are many reported examples where Drisla (the biggest, and only leagal, landfill in the country) is mentioned as the final destination for e-waste dumping, though there were companies who explicitly said that this practice is not according to legal rules and clearly emphasised that it was not an appropriate or healthy solution to the problem. Even bigger and well established businesses report this as being their modus operandi that has to be abandoned, some claiming that it is only a matter of past processes, and that constructive changes are already present in this respect and companies are starting to dump e-waste through other companies – subcontractors or ad hoc providers of e-waste collection and disposal services.

There was a control question included in the interview referring to eventual IT or telecommunication equipment replacements during the last twelve months and different answers were received spanning within a range that is rather difficult to be discussed as generalised, based on companies' individual experience and current needs, and only specific insights into separate examples can be made. Therefore, these data are provided as raw for each particular company or institution involved.

Among the reasons behind the last replacement of IT or electronic equipment, the following were mentioned:

We had to replace some devices that stopped functioning and could not be repaired - 1 desktop PC, old mobile phones, printers and broken LCD monitors.

We replaced our mobile phones because of prestige!

We had an agreement including promotional prices, and we followed it...

We had to replace our monitors due to burglary... and our mobile phones were changed because we made a new deal with a new provider who offered new devices for the employees.

We had to purchase new machines because of the increased number of employees and the need for better performance PCs for the existing software engineers.

Regarding inventories and keeping record of electronic devices used, majority of respondents report having inventories and information on currently used IT and telecommunication equipment, in particular, but there are also such that do not keep any records of the devices they use (mostly smaller companies). However, not all companies are likely to share this information openly and there were some instances where this issue was said to be confidential, with an emphasis on the server machines which are the most important devices and no related information can be shared in public due to strict procedures.

Waste management companies declare to keep very detailed records on the waste collected, selected, and further processed for recycling, dumping, or destroying, as strict regulations and licenses oblige them to do so.

Even though equipment is stored, business entities do not report any specific routines or very long storage periods. Most frequently mentioned storage period is between 6 months and one year (rare reports are found for longer periods, and there are also such companies claiming not to keep any equipment stored in their premises but immediately disposing broken devices in accordance with reported procedures, or simply '*in the nearby container*'. There were also claims that this information is private and it is not to be shared with third parties.

We don't have any designated period for storage – perhaps for weeks, months ...until someone calls or applies for an add, or until we get ready for donation activities.

It is usually between 6 months to a year....

We either sell them of throw them away in the container, it depends...

Our old devices are bought and transported by a Slovak company...

Same practices seem to apply for batteries – they are either stored and then delivered to recycling companies or thrown away as other waste materials. A number of companies seem to have well established relations with existing battery collectors and recyclers and they are already aware of the negative effects batteries can have on the environment.

E-waste volumes differ among various consumers and are closely related to their size and type of business and it is rather challenging to determine approximate amounts of e-waste disposed at a general level, which is even more constrained by the sample size used in the qualitative research. However, apart from the case of bigger companies and high tech software producers, which need

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constant replacements of IT devices and higher volumes of equipment for their operations, there still seems to be a lower amount of e-waste generated by the companies, at least according to their claims related to approximate numbers of equipment that is either stored, discarded or replaced during the last 12 months.

Even though equipment is stored, the business entities do not report any long storage periods nor any patterns in storing IT equipment (this does not apply for telephones, especially mobile ones which are said to be more frequently discarded due to shorter 'lifespan' and changes in technology, as well as good offers from suppliers). Nevertheless, it can be said that the most frequently reported storage period moves between 6 months and a year.

> *There is no specified time for storage – can be days, weeks, or even months, until someone applies to the published add or until the charity procedures are prepared.*

> *We store equipment for up to a year, and then we either sell it or throw it away...*

> *We keep it for up to 6 months and then give it to charity or to smaller companies we cooperate with....*

Here, it is interesting to mention that there are a number of companies that deliberately store batteries for further recycling or disposal to '*companies that can take proper care further on...*'

Awareness on e-waste and further proceedings for disposed equipment

The bigger IT and telecommunication companies show much higher awareness on e-waste and they seem to already have introduced e-waste policies thorough various methods and channels they could find on the market. Some smaller companies claimed to have no awareness for further processing of e-waste and did not give any insight or opinion related to e-waste management and likely recycling. However, there were others that were well informed on the matter and could discuss upon this issue and relevant experiences (either theirs or other best examples they were informed of or have seen).

What prevails among the opinions of the surveyed companies is that they all agree that the Macedonian businesses need higher awareness about e-waste and its proper disposal, as well as about the possible negative effects it can have on the environment.

Though it is rather obvious that improvements have been made in this respect, there is still a lot to be done in order to be "*consistent to the international world.*"

Awareness on different materials IT equipment is made of and their possible side effects is very low. Only several companies discussed e-waste selection and separation according to materials – plastic, aluminium, gold, other toxic components contained in the condensers or lap top batteries, which were considered to be the most toxic parts of this type of equipment, together with the old CRT monitors and TVs. This was particularly pointed out by the waste management companies whose representatives made an elaborate explanation about the processes involved in e-waste management, from collection

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and disposal to recycling and reuse. These were the only 2 companies providing e-waste services to consumers and they both mentioned that the most dangerous part of e-waste is only transported to China, the only country willing to deal with this type of hazardous waste.

Further proceedings for the disposed equipment are not of major concern for all the companies interviewed during the survey. With an exception of a few cases, interviewed respondents believe that further waste processing should be an issue for the waste management companies, and they are the ones to be concerned with the proper disposal, selection, and recycling. Some representatives were rather unenthusiastic in their opinions and showed slightly negative expectations regarding e-waste ('*In Macedonia!?! they throw it all in containers...*') but most of them seem to expect recent improvements in this field, simply conditioned by the country's EU approximation processes.

> *Eco-centar is collecting our equipment – what they are doing further on is not something that I know of.*

> *Yes, of course, they select different parts of the waste and transport and recycle it further more...*

> *Yes, we have a contract with Eco-cirkon*

> *Well, we used to dispose it all in Drisla, but as of last year, a company from Stip came and took all the waste away...forgot their name...*

Some of the respondents are familiar with the process and discuss different ways of e-waste management – like for example, big companies collecting their products back and sending them to their own disposal and recycle sites, in Europe or wider, or mere dismantling and re-usage of some parts and further disposal or destroying of others.

Here, Duna Computers were mentioned as a company that collects and buys waste from big companies and proceeds with it further on, but the company wasn't available to discuss their practices referring to waste management.

Possible solutions to e-waste channels and ways of disposal and recycling

Practically, majority of respondents show interest in possible e-waste collection from their premises and they respond affirmatively when waste collection is introduced as a possible service. There are a number of companies, about one fifth of the interviewed entities, who already have established waste collection channels – some having stronger regulations and procedures, other doing it on ad hoc basis. Among the companies mentioned to provide these services are: Duna, Eco Cirkon and Eco Center – which, unfortunately refused to participate to the survey and give their valuable inputs. In the case with Duna – a company with several relevant services for this research – it was later brought up during the interviewing process that they further subcontract this part of their operations to one of the two interviewed waste collectors, the only two licensed by the Ministry of Environment and Spatial Planning, according to their claims and specific documents provided.

Among the preferred conditions for e-waste collection, companies mention the following:

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Special boxes/collectors for the specific e-waste parts and timetables for picking the waste up, as well as a guaranteed proper disposal which is in line with the environmental wellbeing.

On the spot collection of waste, might be on annual basis, with planned disposal, dismantling, and recycling or reuse.

An option for ad hoc collection of waste, upon company's prior request

Favorable buying price, since they [waste companies] can benefit from this type of waste, or whenever possible – swapping old for new equipment

Creative offer for services, followed by interesting ads, informational and educational materials for the good of mankind

Reasonable treatment of different types of waste – symbolic payments for the valuable parts and free collection for others, as well as proper treatment which is in line with the existing legislation

As for the best actors that could manage this collection and recycling of IT and telecommunication equipment, majority of the companies agrees that it should be a private company that has satisfactory skills and knowledge about e-waste and could possibly find some benefit in this business.

Other proposals involve the following criteria:

Anybody that can make sense and knows exactly what he does

Somebody with a good background in cooperation to recycling companies, who would not abuse the given rights for personal benefits

Anybody that has funds, space, and proper equipment

Definitely not the local municipalities – it must be a professional company; municipalities can only serve as a good collecting point or information and assistance point in the whole process...

A company with high skilled labour (mechanical engineering, environment protection, technology and metallurgy...) that can cope with highly technological processes like, for example, separation of silica or cadmium from plumbum or nickel.

A regular license for waste management, issued by the Ministry of Environment and Spatial Planning is a must for such a company

Initial subsidiaries might be inevitable in the inception phase, since recycling is a business that costs a lot and it is in the interest of the country, in general.

Non-governmental organisations can have their own part in the process, through lobbying and advisory activities, information, and organisation of various actions and events related to e-waste management.

Situation in the country, accent on the NGO sector, and knowledge on foreign experiences

All of the NGOs are aware of e-waste issues and the immediateness of activities and measures that need to be taken in this field. However, only few of the interviewed organizations report any real action taken so far. What underlined all of their statements is the readiness to take the first /next steps and get deeply involved in e-waste management issues and contribute to the development of this segment in the country.

Hereby, we should mention the NGOs involved in this research, for informative purposes only, and they are: Macedonian Ecologic Society, 4x4 Balkan Bridges, Macedonian Green Centre, Ecosense, CEPROSARD, and Planetum (as well as Front 242 whose representative gave some interesting information on their counterparts and more suitable respondents but clearly pointed out having no previous experience in e-waste, except for the fact that one of their legal consultants is to be sent to e-waste legislation training in near future, but for the moment they are primarily dealing with legislation referring to ecology in general, climate change, education on the covered topics, and sustainable development issues). CEPROSARD also reported that not much has been done in their case but that they are now preparing, or more precisely '*are in negotiations for future activities*'. On the other hand, 4x4 Balkan Bridges, Macedonian Green Centre, Ekosvest, and Planetum (to a lesser extent), all seem to be involved in the e-waste project activities, according to their statements.

Metamorphosis is the first association mentioned when e-waste is posed as an issue and possible institutions actively dealing with e-waste management in the country. This was the case that continuously emerged even during the screening process ('*You should contact Metamorphosis, they will definitely have what to say on the topic you are interested in*...').

More to the point, it was pointed out by almost all of the non-governmental representatives that there was an earlier initiative for introducing a proper law on e-waste, started by several NGOs, which showed some good results but it is still an issue that needs to be further worked upon. This is where interviewed respondents see Metamorphosis interventions as necessary and regard this organisation as a good '*umbrella institution*' for organised and efficient actions in this particular field.

As for the companies part, it is generally believed that all companies should respect legal norms, not only waste companies, which, on the other hand should definitely have proper licences and rights in order to deal with any actions related to e-waste collection or dumping.

Providentially, there are green companies in Macedonia, though few in numbers, which do not only take care about their electronic waste but they are also concerned with paper an PET waste, as well as batteries and similar devices in use (like UPS devices, for example, which were mentioned as very hazardous when turning into waste).

There were foreign practices mentioned and particular countries where e-waste management is differently resolved. Germany is one of the countries mentioned as a very good example, where e-waste

is settled at a national level and long practiced. It was said that companies are the ones that pay a certain amount (*2 euros per a piece of waste...*) for their waste to be disposed since it is their duty and obligation to do so for the benefit of the community. Nevertheless, huge mind-set and development differences between this country and ours were pointed as an obstacle in adopting this model on short term basis in our country.

Croatia was another country mentioned, but it was not highly appreciated as an example because of apparent issues it has with the concessions for e-waste and similar unresolved matters.

Japan was mentioned as the most progressed country in this respect – having the best and most scrutinized processes of selection and disposal of different waste materials and their further processing.

Moreover, low amounts of e-waste generated in our country were pointed as a major challenge for the prospects of any business actor who decides to ender the e-waste recycling. Therefore, buying waste from other companies and disposal places or dumps usually ends with merely physical processing, or separation of different parts and materials that need further management and recycling.

In line with the above said, it is good to mention that one of the two companies dealing with e-waste, GOKO Kar from Vinica, eastern Macedonia, mentioned to have already established facilities for recycling of one particular segment of e-waste and that they have plans for further development of the business and buying additional machines for recycling of different e-waste parts, which is definitely conditioned by the market demands and willingness for cooperation. So far, only other countries were mentioned as the last recycling points for different waste types, including not only e-waste but other waste materials as well: "*...like PET for example...we collect it but we still don't have a recycling unit for this type of plastic – it is taken to Bulgaria, as far as I know...and we only recycle plastic bags and similar materials here in the country ... and for the batteries, we have SAP from Probishtip that makes further processing, i.e. melting of batteries for a longer period now.*

In the end, it is important to say that despite some reserved attitudes and reluctance in cooperation, there were many respondents who were really willing to cooperate and share some positive experiences and examples. There were some interesting points and ideas regarding future activities and policies and they are elaborated in the conclusions and recommendations section at the end of this report.

Conclusion

Generally, according to the findings from this research, Republic of Macedonia is seen as fairly lagging behind when e-waste is an issue, particularly if compared to the developed countries in Europe. A somewhat more positive image is present among the bigger companies who already practice certain policies on e-waste but they still find that this process needs a lot of improvements and perhaps nationally-wide solutions or frames that would tackle many unresolved parts in the general course of actions.

There seems to be a number of companies that provide services related to different types of waste but the exact situation with these entities needs to be inspected further on, since gathered information shows disparity in respondents' claims and only 2 companies seem to be operating in the particular e-waste segment, of which only one has introduced recycling activities.

Other waste types were also mentioned by the respondents – PET and batteries, more precisely, and here as well no common procedures could be traced apart from individual examples of good practices.

What is warmly greeted by all respondents is the already existing legislation and the process of amendments and introduction of new regulations standardizing this particular area, and predominantly waste separations and disposal procedures. However, nationalisation of this segment is a must and attention to environmental issues is something that needs to be worked out and communicated among the wider population, not only corporate entities and institutions.

It was also pointed out that Macedonian business people need to work on their business ethics and be able to listen and implement knowledge and experience.

By and large, negative comments were much more oriented towards the 'former' climate in the country, when it lacked any awareness or service of this type. However, there is still a lot of space for criticism oriented towards the present situation as well. Legal impediments and bureaucratic obstacles are to be analysed more deeply and possible solutions for further measures introduced in near future.

It was indicated that although administration is trying to do introduce laws and regulations and establish principles for better performances, they need to work on the implementation part to adapt the introduced regulations to the local context (being taken from EU). Majority agrees that this is an ongoing and long process that is time and resource consuming and immediate results cannot be expected instantaneously.

The message is that *it takes time to do such huge changes and they definitely don't happen overnigh*t.

It was pointed out that Macedonia should learn to follow agreements and be responsible. This applies to the country itself, but to the individual people as well, according to the given statements. National campaigns on e-waste and various educational activities are seen as a good way for improvements in the e-waste management and other hazardous waste materials, as well as the overall environmental issues in the country.

Key Findings

Majority of the respondents find general e-waste awareness and actions related to e-waste to be at a low level and all of them believe something needs to be done in very near future to improve this segment in our society.

Though general awareness about e-waste is believed to be at a low level, both for households and businesses, there are prudent examples among the interviewed companies that have already implemented procedures for dealing with e-waste.

Some of the waste companies have issues with e-waste, as the long screening process and the corresponding interviews in the later process revealed. It was either a matter of lack of experience or information on the company side, or simply reluctance in discussing these issues outside the company boundaries.

Local business environment and low frequency of related activities and businesses impose parallel business activities that make subsector divisions a bit difficult and thus imply only group conclusions for specific matters researched. It was rather challenging to distinguish between importers, distributers, assemblers, retail, and second-hand dealers, as many of the interviewed companies deal with several activities at once.

Even more, the same applies for the waste sector, where only few examples could speak about e-waste and had experiences to share; nevertheless, similar multi-activity practice is present and waste disposal, selection, and recycling activities usually go together. Market size is an important factor here, and it influences some activities and their frequency of practice, apart from other factors like economic development and implementation of regulations, which are also very important in this respect.

Out of all the contacted waste management companies, only two have an official license for dealing with e-waste, and out these two, only one has entered the recycling business, at least when electronics and e-waste are the interest. This was also confirmed by the statements of the national authority representatives involved in this research.

However, there are findings that reveal that there seem to be several other companies dealing with electronic waste as well, as of recently, but they were not willing to discuss these matters further on, or they simply denied these findings and claimed not to have any experience with the researched topic, thus avoiding further communication.

Both companies dealing with e-waste were quite familiar with the subject and were more than willing to share their experiences and opinions on e-waste matters, as well as further cooperate with active stakeholders in the field.

Other waste mentioned by the interviewed waste management companies involves: batteries (all types), plastic, PET, glass, paper, etc. Nonetheless, no representative reported any national solutions for the mentioned waste; all claims referred to individual examples and temporary solutions that need to be further developed and improved. It is interesting to say that individual Roma people gathering litter

and doing waste collection and selection were pointed out as "*the most organised and dedicated actors signifying the most important chain in the recycling business in the country in the country*".

Seminal factor for the e-waste management in the country seems to be the human factor, i.e. in almost all of the interviews, when various e-waste aspects were discussed, respondents mentioned local human practices and behaviour resembling a 'tradition' of gathering different types of objects, usually considered as waste, in people's basements and other storage spaces.

Other factors influencing the e-waste management practices are: the small size of the market offering no profitable prosperity for e-waste companies, as opposed to the expensive equipment needed for its recycling.

Moreover, what is frequently mentioned is that e-waste management needs to be regulated at a national level, not locally nor through individual approaches and solutions; making it a top level priority could speed up the ongoing processes and make the e-waste management easier and wider.

Following issues were also mentioned as challenging per different sectors: lack of specialised skilled labour, gathering sufficient volumes for recycling, high costs, transport issues, etc.

Not all interviewed companies found interest in cooperating and dealing with e-waste on regular basis; some found it irrelevant to their businesses, due to the small amounts of e-waste they generate or simply lack of awareness about e-waste issues, and there were others that expressed a certain amount of disbelief that this can be nationally regulated and that there are companies that are capable of dealing with the mentioned issues. Here, it has to be mentioned that such examples did not have any prior knowledge about the already existing actors on the local market and eventual actions taken in this respect.

Regular and timely information about any changes in regulations and the legal framework in general need to be communicated among the companies and institutions, and active involving in the field supported by strong advocacy in the governmental institutions for relevant issues arising, as well as professional advice and assistance that are in line with the EU trends and regulations related to e-waste are of high concern for the country and its business environment.

Education on e-waste, awareness about the existing regulations, adopted long time ago, and the necessity for eventual changes and adaptations for better functioning and application are seen as the most important processes, not only by the NGO representatives but by the well-informed company representatives as well.

The image that the Metamorphosis Foundation has is one of acting within the field as a sole player and as an important factor for further development of e-waste actions and activities. If this is combined with a transparent and direct cooperation, and a professional and systematic approach, informed respondents believe it can really assist in joining the domestic forces and making a national platform for further communication and operations in the field of e-waste in general.

The expectations about the areas in which Metamorphosis could most favourably help are: awareness and educational campaigns, lobbying, dissemination of timely information, and various other activities related to the above mentioned issues.

In the end, it is important to say that despite some reserved attitudes and reluctance in cooperation, there were many respondents who were really willing to cooperate and share some positive experiences and examples. There were some interesting points and ideas regarding future activities and policies and they are elaborated in the conclusions and recommendations section at the end of this report.

Overall recommendations

The specific problems that need to be addressed by future activities are: low awareness about the consequences resulting from improper e-waste management, scarce NGO capacity for dealing with these problems, absence of networking bodies operating at all societal levels and coping with e-waste problems, accumulated e-waste not only by companies but even more by households that is potential threat to the surroundings if disposed improperly.

Some of the most important aspects in reference to future shaping of programmes and actions and general issues to be considered in order to enhance the e-waste situation in Macedonia are given as indicated by the respondents, according to their own views and predominantly in their own wordings, and they are the following:

- We need to raise awareness about e-waste and emphasise the importance of immediate measures to be taken in this respect.

- We have to educate not only the key stakeholders but the general population and discuss in public about e-waste management and its impact on the community. Old habits for keeping e-waste stored in the basement or the attic, or throwing it to waste dumps, need to be alleviated and replaced by better practices that positively influence the environment.

- What's very important in this process, and wider, is the human factor – personal responsibility and obligations are where change in mindset can appear and citizens' role in the process can really be used as a good starting point for sooner changes and improvements.

- Most important in this respect are the NGOs, as their lobbing and intermediate role between the businesses and citizens, on one side, and the government institutions on the other, can be of utmost importance, as already shown by the actual introduction of the e-waste law. However, media, and citizens are not to be underestimated as a potential.

- Improvements and amendments in the legal and institutional framework that will contribute to proper e-waste management in Macedonia, and the region widely, are a must.

- Lots of workshops need to be organised, campaigns and promotions on e-waste and batteries and their proper management and possible environmental effects are recommended across the country, altogether with proper information materials and dedicated events.

- Organization of collecting campaigns and actions at a local level and definition of suitable waste collecting points with particular information on the type of waste to be collected at each of these points, increased community actions and waste separation for better management.

- Opening recycling facilities and learning from best practices (not only international but even local green company practices should be taken into account.

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Web Sites

Balkan E-Waste Management Advocacy Network: www.bewman.eu

Ministry of Environment and Physical Planning: http://www.moepp.gov.mk/default-en.asp

E-Waste Guide: www.ewasteguide.info

Solving the e-waste problem - StEP initiative: http://www.step-initiative.org/index.php

European Commission - WEEE portal: http://ec.europa.eu/environment/waste/weee/index_en.htm