

**Practical guidance for the development  
of inventories of waste electrical and  
electronic equipment**

## **Note**

This draft guidance has been developed by the Secretariat of the Basel, Rotterdam and Stockholm Conventions at the request of the Conference of the Parties (COP) to the Basel Convention. At its 13<sup>th</sup> meeting in April 2017, the COP took note of the guidance and invited Parties and others to make use of it and inform the Secretariat on their experience in doing so.

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# 1 Introduction

1. Parties to the Basel Convention are required under Article 13, paragraph 3, of the Convention to transmit each year to the Conference of the Parties a national report on information related to the measures taken towards its implementation. Undertaking inventories can be an effective way of gathering information on the generation, transboundary movements and management of hazardous and other wastes for the purpose of national reporting. Such information and others are to be submitted, through the Secretariat of the Convention, using the national reporting format.<sup>1</sup>
2. This guidance aims to provide practical instructions to assist Parties and others in developing an inventory of waste electrical and electronic equipment (e-waste). It is meant to be used in conjunction with the Methodological guide for the development of inventories of hazardous wastes under the Basel Convention [1] which provides complementary guidance on the methods of developing national inventories for the preparation of national reports. Accordingly, this guidance proposes an approach for developing an inventory that is consistent with the one contained in the Methodological guide.
3. The main objective of developing an inventory of e-waste is to obtain information on the amount of such waste generated in a country, its disposal and transboundary movement. Knowledge of the amount of waste generated provides a sound basis for their environmentally sound management (ESM) [2]. This information can be used to develop appropriate policies and strategies for the collection and disposal of waste e-waste and is an important input into the planning of recycling and disposal facilities that require substantial financial investment and regular throughputs of wastes. In addition, the development of the inventory can provide insight into the effectiveness of the control system in place in a country to regulate the transboundary movements of e-waste.

## 2 Description and classification of e-waste

4. For developing the inventory, establishing a classification of wastes that is used consistently will help ensure comparability of inventory information collected from various sources and over the years. Wastes should also be classified in a way that serves the objectives of developing the inventory, such as for the planning of disposal facilities. The format for national reporting under the Basel Convention requires that some of the information provided be categorized according to Annex I or Annex VIII codes. Therefore, using a classification of wastes that is harmonized with the annexes of the Basel Convention will make it easier to integrate the outputs of the inventory into the national report.
5. E-waste is included in Annex VIII to the Convention under the following entry for hazardous waste:

“A1180 Waste electrical and electronic assemblies or scrap<sup>2</sup> containing components such as accumulators and other batteries included on list A, mercury-switches, glass from cathode-ray tubes and other activated glass and PCB-capacitors, or contaminated with Annex I constituents (e.g., cadmium, mercury, lead, polychlorinated biphenyl) to an extent that they possess any of the characteristics contained in Annex III (note the related entry on list B B1110).”<sup>3</sup>
6. Further guidance on hazardous components or substances that may be contained in e-waste is provided in the Technical guidelines on transboundary movements of electrical and electronic waste and used electrical and electronic equipment, in particular regarding the distinction between waste and non-waste under the Basel Convention [3].
7. E-waste is often misunderstood as comprising only waste of computers and related IT equipment. However, a diverse range of electrical and electronic equipment (EEE) is put on the market in most countries and eventually become waste. The main categories of EEE listed in WEEE directive<sup>4</sup> of the European Union is provided in table 1 as an example of the range of products that can be considered as EEE.
8. The diversity of EEE that exists on the market complicates the classification of e-waste for the purpose of developing an inventory. In an attempt to harmonize the collection and compilation of statistics on e-waste, a system has recently been developed that encompasses the majority of EEE and classifies them in categories based on similar function, comparable material composition and related

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<sup>1</sup> UNEP/CHW.12/INF/16/Rev.1; available through the electronic reporting system at <http://www.basel.int/Countries/NationalReporting/ElectronicReportingSystem/tabid/3356/Default.aspx>

<sup>2</sup> This entry does not include scrap assemblies from electric power generation.

<sup>3</sup> PCBs are at a concentration level of 50 mg/kg or more.

<sup>4</sup> Directive 2012/19/EU, annex I; categories covered by the Directive until 14 August 2018.

end-of-life attributes [4]. In this system, each equipment is assigned a unique code known as the UNU key. An advantage of this classification system is that it is aligned with the codes of the Harmonized Commodity Description and Coding System<sup>5</sup> (HS) which is used globally for compiling statistics on trade. Using this system of classification will thus make it easier to use trade statistics for developing the national inventory (see section 4.1). Inventories developed using this system will also be comparable to one another and contribute to harmonizing statistics about e-waste on an international level.

**Table 1. Categories of EEE listed in the European Union WEEE Directive**

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

9. For the development of an e-waste inventory and the assessment of its results, it is helpful to identify the main actors involved and understand their role in the e-waste management system, how they are organized and their impact on the flows of e-waste. Figure 1 provides an example of the flows of EEE and e-waste in a national management system.

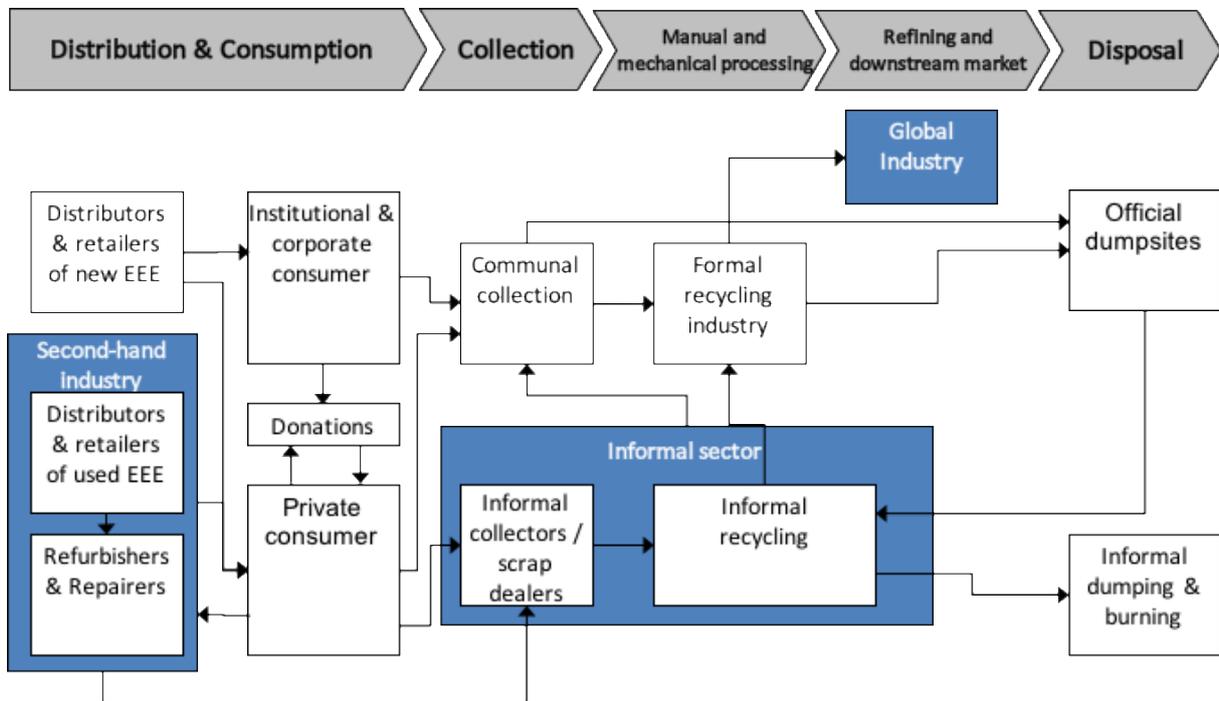


Figure 1: Example of a massflow chart, showing the key stakeholders in a (national) e-waste management system (adapted from [11])

### 3 Defining the scope of the inventory

10. Important considerations in defining the scope of the inventory include: its purpose (including for completing the national report under the Basel Convention), desired outcomes, category of

<sup>5</sup> <http://www.wcoomd.org/en/topics/nomenclature/instrument-and-tools/hs-nomenclature-2017-edition/hs-nomenclature-2017-edition.aspx>

equipment to be included (see tables 1 and 2), geographical area to be covered and specific exclusions and limitations due to e.g. access to information sources and budget.

11. This document gives practical guidance on how to develop an inventory for the following categories of EEE: large household appliances, small household appliances, IT and telecommunications equipment and consumer equipment (categories 1-4 of table 1). The inventory methodology provided can be easily applied to any other category in case the national inventory needs to include additional ones.

12. The geographical focus defines which cities and/or regions will be targeted for data collection, and whether rural areas are considered. In the case the amount e-waste generated is estimated based on amount of EEE put on the market (section 4.1), this consideration is not relevant, since calculations rely on statistics of imports. In the case where the inventory will be developed based on field studies with questionnaires and surveys (section 4.2), data collection could initially concentrate on the main urban areas and results extrapolated to the entire country.

## 4 Methodologies for developing the inventory

13. This practical guidance proposes two approaches for the inventory of e-waste, to provide flexibility to a wide range of Parties with varying priorities and capacities. The two approaches present a different level of methodological complexity. Moving from the first to the second method implies a Party is opting for an approach that is progressively more demanding in terms of complexity and data requirements, and therefore more resources may be needed.

14. The first approach relies on readily available statistics in combination with estimates for key parameters (provided in this guidance) and possibly a few stakeholder interviews. The second approach involves more resource-intensive data collection activities but should also yield more accurate results. The proposed methodologies are useful for conducting a first-generation inventory in situations when a national system for collecting data from waste generators is not yet fully developed.

### 4.1 Estimate based on EEE put on the market

15. The methodology proposed in this section is derived from the market supply method **Error! Bookmark not defined.** and the approach developed by the United Nations University (UNU) under the Partnership for Measuring ICT for Development [4]. The method is based on historical data for the total amount of EEE put on the market. The e-waste generation potential in a given year is estimated by extrapolating the assumed life-span backwards in time.

16. The inventory is developed in two steps:

1. Estimation of **EEE put on the market** for the most relevant equipment categories based on import/export statistics;
2. Calculation of **e-waste generated** based on an average lifespan of each equipment category.

17. The methodology is appropriate for developing an inventory of e-waste in unsaturated EEE markets, which are typically found in developing countries. For saturated markets (as found in OECD countries) where only product replacement occurs, the average lifespan of a product becomes irrelevant. If the market supply method is to be applied to such situations, the numbers of obsolete appliances would equal the numbers of sales minus the number of reused items in the same year.

#### 4.1.1 Data sources for the inventory

##### Data on EEE put on the market

18. Total EEE put on the market is defined as being equivalent to the domestic sales of equipment in a country. Sales data is usually collected by individual enterprises and often not publicly available. In that case, the amount of EEE put on the market has to be estimated through various statistics as follows:

$$\text{Amount of EEE put on the market} = \text{domestic production} + \text{Import} - \text{Export}$$

19. Data on domestic production may be available through national statistical information of economic activities, e.g. from the ministry of industry, commerce or finance and/or national statistical offices. However, for most countries the amount of domestic production is quite low when compared to imports and therefore not very important for the estimate. The relative importance of production data has to be decided on a case by case basis.

20. Import and export of EEE can be assessed by analyzing trade statistics from international databases and national statistics and trade records compiled by customs and port authorities. The most widespread available international database is the UN Comtrade Database<sup>6</sup>. The database uses different classification systems to organize commodities, of which the most commonly used is the HS. For the first generation inventory it is recommended to concentrate on the types of equipment provided in Table 1. This represents the most relevant equipment in terms of (i) the total market size in terms of weight, (ii) hazardous components, and (iii) content of valuable resources, which would be lost if they are not recovered. Table 2 also links the HS codes to the corresponding UNU keys. A full list of all equipment types classified according to UNU keys and the corresponding HS codes can be found in UNU 2015 [4].

**Table 2. Relevant product categories for the first generation inventory with reference to their UNU key and HS Code**

UNU key	Equipment (according to UNU Key)	Corresponding HS Codes
0104	Washing machines	845012
0108	Fridge or combined fridge/freezer	841810, 841821, 841822, 841829
0111	Household Air conditioner	841510, 841581, 841582
0308	CRT monitors	852821, 852822, 852841, 852849
0407	CRT TVs	852812, 852813, 852873,
0303	Laptop, notebook, tablet	847130
0306	Mobile phones	851712, 851761, 851950, 852520
0309	Flat panel display for computer	852851, 852859, 853120
0408	Flat panels televisions	852872

21. Trade statistics only provide an indication of EEE that are officially imported into the country. The import of second-hand equipment, is often not officially reported and is therefore not captured by trade statistics. This information is crucial, however, as second-hand imports can comprise up to 70% of total imports in certain developing countries. The share of this type of import can be assessed by conducting interviews or surveys of importers and port authorities. Such surveys should clarify if import and export statistics (such as the UN Comtrade database) include second-hand equipment and should address at least the following key indicators:

- (a) Type of imported products;
- (b) Amount of imported products (e.g. in units, in tonnes, in full containers, etc.);
- (c) The share of new imports relative to second-hand imports (e.g. in weight %).

22. If surveys cannot be conducted, data from countries with similar economic development and consumer behaviour (e.g. neighbouring countries) can be used. Table 3 presents examples of such data, obtained from various field studies on e-waste flows. It is important to note this information is obtained from old reports and hence should be verified if used for developing an inventory.

**Table 3. Import data of EEE (mainly for EEE in categories 1-4 of table 1), including rough estimations of the share of second-hand EEE for some African countries**

Country	year	population Millions	imports		Reference
			Units/year	Thereof second-hand	

<sup>6</sup> <http://comtrade.un.org/db>

Ghana	2008	23.8	750,000	70%	[5]
Nigeria	2009	154.7	2,200,000	35-70%	[6]
Morocco	2009	32	900,000	<11%	[7]
South africa	2007	47.6	1,900,000	8%	[8]
Tanzania	2009	42.5	120,000	13%	[9]
Uganda	2007	28.8	29,000	14%	[10]

23. Data on the weight of equipment may also be needed to compute the total amount of EEE imported if only the number of units of imported equipment is known. An indicative list of the weight of selected equipment can be found in annex G of [11].

24. Table 4 below shows an example of the calculation of import of new and second-hand equipment in a country, based on an analysis of trade statistics. In this example, the amounts of imported EEE, derived from UN Comtrade data, is adjusted by 30% to account for second-hand imports that are not included in trade statistics. Data on imports was obtained for only four equipment types (so-called tracer products). On the assumption that these tracer products represent 43.5% by weight of all imported EEE, the total amount of EEE imported could be calculated.

**Table 4. Estimate of import of EEE based on the analysis of trade statistics (adapted from [5])**

Product		No. of Units	Tons	Source
% for underdeclaration added	30%			
Refrigerator		983,654	34,428	UN comtrade 2008
Aircondition		919,908	17,018	UN comtrade 2008
Computer/laptop		984,317	17,718	UN comtrade 2008
Television		815,414	23,647	UN comtrade 2008
sum			92,811	
Products are % weight of all	43.5%			
Total imports			213,409	

#### Data on the lifespan of EEE

25. The average lifespan of an equipment is needed to calculate the amount of e-waste generated. Such data can be gathered from various sources and requires a small desk study. Table presents a sample lifespan data found in the literature based on studies from 1995 – 2017 in European and Latin American countries. It should be noted that such data can become outdated quickly, especially in growing markets, and should be verified for the specific geography in scope. Life-span data used for the inventory should preferably be obtained from recent reports and from national sources or from countries with similar economic development and consumer behaviour (e.g. neighbouring countries).

**Table 5. Sample data for average the lifespan of various types of EEE**

Equipment	Range (years)
camera	3.8 – 10.4
tv (cathode ray tube)	11.2 – 12.8
tv (flat panel)	7.3 – 11.3
desktop computer	4 – 10.7
laptop computer	2.9 - 7
mobile phone	1.5 - 9
printer	4 – 10.5
radio / hifi	9 – 13.8
video equipment	4.1 – 9.5
microwave	5.2 – 8.3
fridge / freezer	9.5 – 12.3
washing machine	7.6 – 10
oven	8.3 – 11.1

#### 4.1.2 Estimating the amount of e-waste generated

26. The amount of e-waste generated is estimated on the premise that an equipment will become waste at the end of its lifespan. It follows that:

For each type of equipment,  
Amount of e-waste generated in year  $t$  = amount of EEE put on the market in year  $(t - \text{average lifespan of equipment})$   
Where  $t$  is the year of the inventory

27. The amount of EEE put on the market in the year  $(t - \text{lifespan})$  is estimated as follows:

For each type of equipment,  
Amount put on the market (kg) = amount of domestic production + amount of new import + amount of second-hand import – amount of export

28. Example calculation

Assuming an average life-span of 7 years for desktop computers, the estimated amount of desktop computers generated as e-waste in 2016 = the amount of desktop computers put on the market in 2009 (= 2016 – 7).

#### 4.2 Estimates based on consumption and use

29. The second methodology proposed in this guidance is based on the consumption and use method. It is derived from the approach used in E-Waste Assessment Methodology - Training & Reference Manual [1]. The inventory relies on field surveys to assess the behaviour of EEE consumers in a specific country. The inventory is developed in two steps:

1. Assessment of the amount of **EEE in use or stored at consumer level** (stocks) based on consumer surveys
2. Calculation of the amount of **e-waste generated**, also based on the survey

##### 4.2.1 Data sources for the inventory

30. Data should be collected from main consumers of EEE (i.e. the main sources of e-waste generation) to assess the amount of EEE stockpiled (EEE in use or stored at consumer level) and the average lifespan (combined time of use and storage by the consumer) of the each equipment type. Additional information should be collected on parameters that will allow extrapolation of the collected data to a national level.

31. The main consumers of EEE are classified in two groups:

- (a) Private consumers (households);
- (b) Institutional and corporate consumers (public institutions, government, parastatals, health and educational sector, large businesses (industries), small and medium enterprises).

32. The data collection for this methodology is done through questionnaires that are targeted at these different types of consumers in order to assess the key indicators. Examples of questionnaires for the survey are provided in the annexes to this guidance and should be tailored to the scope and context of the inventory.

##### Surveys of private consumers (households)

33. Household surveys will produce data in the format of “per household”. National statistics on the number and average size of households (e.g. from census data) will be necessary to extrapolate data to the entire country, keeping in mind differences in rural and urban consumer behaviours and income classes. Therefore, household surveys could be carried out in both rural and urban areas, and among different income classes. The questionnaire should request information for the following key indicators:

- (a) The type and amount of installed EEE in the household;

- (b) Average lifespan of each individual equipment (distinguishing between how long an appliance is in use and how long it is stored before being given a way/entering the waste stream);
- (c) Size of the household (number of persons);
- (d) Demographic location of the household (rural or urban);
- (e) Income class of the household (classified according to the official national income classification, in order to be compatible with national statistics).

#### **Survey of institutional and corporate consumers**

34. The questionnaires need to take into account different economic sectors that might feature different consumer behaviours, e.g. the banking sector might consume more ICT appliances than the manufacturing industry. The chosen economic sectors should be in accordance with national statistics about employee distribution levels between the different economic activities (i.e. sectors). This will make it possible to extrapolate from the survey results to the national level. The questionnaire should address the following key indicators:

- (a) The type and amount of installed EEE in the organization;
- (b) Average lifespan of each individual appliance (distinguishing between how long an appliance is in use and how long it is stored before being given a way/entering the waste stream, respectively);
- (c) Size of the organization (number of employees);
- (d) Type of organization and main activity (institutional or corporate, economic sector).

#### **4.2.2 Estimating the amount of e-waste generated**

The amount of e-waste generated is calculated as follows:

For each type of equipment,

$$\text{Amount of e-waste generated (metric tons) annually} = \frac{\text{Amount of equipment stockpiled (metric tons)}}{\text{Average lifespan of the equipment}}$$

##### Example calculation:

If in 2009, 5000 metric tons of television were estimated to be stored by households, assuming an average lifespan of 7 years for televisions, the average amount of television to become waste per year is  $5000/7 = 714$  metric tons.

35. For a detailed understanding of the application of the methodologies presented in the guidance, including questionnaire use and compilation of the resulting data for inventory development, it is helpful to refer to reports of e-waste inventories developed using these methodologies (see references in table 3).

## **5 Preparation of national summaries**

36. Translating the results of the inventory to a national estimate of the amount of e-waste generated is a complex task. The coverage of data sources may be incomplete due to limitations in data availability and quality and resource constraints. In cases where the amount of e-waste generated has been calculated on the basis of amount of EEE put on the market, the results represent a national estimate. As explained above, if the consumption and use method is used, data should be collected that allow extrapolation of the results to the national level. The underlying assumptions and limitations of the national estimate should be indicated when reporting on this information.

37. Information on the total amount of hazardous wastes generated is requested in table 6 of the national reporting format. Parties have the option of providing detailed information concerning specific hazardous wastes categorized according to the codes of Annex I or VIII to the Basel Convention or national codes. Further instructions can be found in the Manual for completing the format for national reporting under the Basel Convention [12].

## **6 Obtaining data on options for waste disposal and recovery**

38. Information on options for the final disposal and recovery of hazardous wastes and other wastes available in a country is requested in table 2 and table 3 of the national reporting format, respectively. It is therefore important to collect information on existing facilities in the course of developing the inventory, through field studies and by holding interviews with key stakeholders of the waste sector. When such facilities do not yet exist, information obtained on e-waste collection and alternative disposal practices will help in devising an appropriate strategy for the ESM of this waste stream.

## **7 Obtaining data on transboundary movements**

39. Parties to the Basel Convention have the obligation to designate one or more authorities (competent authorities) for approving the transboundary movements of hazardous and other wastes. Competent authorities should therefore maintain a record of annual imports and exports of e-waste. Parties should provide this information in table 4 (export) and table 5 (import) of their national report.

## **8 Updating the inventory**

40. It is recommended that data collected in the course of the inventory and its results be managed in an appropriate database and be shared with governmental agencies responsible for statistics and resource and waste management. Establishing a procedure for requesting data from stakeholders on a regular basis will help ensure that the inventory is updated.

41. Over time, as a country progresses through iterations of the inventory, the data quality should become more reliable. It is assumed that countries establish and update inventories of e-waste for waste management and material recovery purposes and that this will result over time in more robust inventories.

## **9 Assessment of results and conclusions**

42. An assessment of the results of the inventory, the strategy and process used and information collected are needed to identify further actions needed to make the inventory more complete. The assessment may also identify potential gaps in the control system for the implementation of the Basel Convention. A gap analysis in the execution of the first generation inventory could result in the need to consider alternative statistics, contact some of the stakeholders again to get more information or identify other stakeholders to be contacted to help fill the gaps.

43. The amount of e-waste generated can be compared to the flows of e-waste in the country. Discrepancies between the amount of e-waste generated and the amount disposed/recycled domestically and/or exported could be due to a number of reasons that are worth investigating. They could indicate inaccuracies in the data collected, poor record keeping, differences in classification, missing data, etc. They could also point to deficiencies in the management system of e-waste and the control of their transboundary movement.

## 10 Reference

- [1] ICC (Committee for Administering the Mechanism for Promoting Implementation and Compliance of the Basel Convention). 2014. Methodological guide for the development of Inventories of hazardous wastes and other wastes under the Basel Convention. Available at: <http://www.basel.int/portals/4/download.aspx?d=UNEP-CHW.12-9-Add.1.English.pdf>
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**Annex 1****Example of a questionnaire for the survey of EEE used and stored by private consumers (adapted from [11])**

Date:	Location:	Interviewer:
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**Interview introduction**

I am ..... (name of interviewer) coming from ....

We are collecting data on e-waste generation and management in order to ....

Can we ask you some questions about e-waste? / Thank you for participating in our survey

**Interviewed person**

<b>Name</b>	
<b>Suburb</b>	
<b>City &amp; State</b>	<input type="checkbox"/> rural area <input type="checkbox"/> urban area
<b>Telephone</b>	
<b>E-mail</b>	

**0. Introductory question**

*(Introduction & introductory question, answers will not be evaluated. First question should ideally be answered with yes in order to set up a positive atmosphere for the interview to be held.)*

**Do you know what e-waste or waste of electrical and electronic equipment is?**

*(describe to interviewed person what e-waste is, if necessary....)*

**1. Questions about awareness and behaviour**

1.1	Are you aware that some hazardous fractions in e-waste need a special treatment in order to be safely disposed of?	<input type="checkbox"/> YES <input type="checkbox"/> NO
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1.2	<p>Do waste collectors come and pick up waste at your door?</p> <p>Do they pick up e-waste too?</p>	<input type="checkbox"/> YES, everything <input type="checkbox"/> YES, but no e-waste <input type="checkbox"/> NO	
1.3	<p><b>a)</b> Is the current e-waste collection convenient to you?</p> <p><b>b)</b> What could be improved?</p>	<p>a)</p> <input type="checkbox"/> YES <input type="checkbox"/> NO	<p>b)</p>

## 2. Number (#) of electrical and electronic equipment in the household

How many appliances of each electric and electronic product do you have in your household (in use & stored)?

Large household appliances (category 1)	
Product	#
<b>Fridges*</b>	
<b>Air conditioners*</b>	
<b>Washing machines*</b>	
Freezers	
Clothes dryers	
Electric heaters	
Dish washers	
Grillers	
Electric/Gas stoves	
(Steam-)Ovens	
Electric hot plate	

Carpet sweepers	
Toasters	
Popcorn makers	
Rice cooker	
Water dispenser	
Cables	
Extension boxes (?)	
Soldering iron	
Electric lawn-mowers	
(Alarm) Clocks	

Consumer equipment (category 4)	
Product	#
<b>TVs (CRT)*</b>	
<b>TVs (flat panel)*</b>	
<b>Radios*</b>	
<b>Stereos*</b>	
DVD players	
VCR players (video-cassette recorder)	
MP3-players	
Cameras	
Game consoles	

IT and telecommunications equipment (category 3)	
Product	#
<b>PCs* (central unit)</b>	
<b>CRT monitors*</b>	
<b>LCD monitors*</b>	
<b>Laptops*</b>	
<b>Mobile phones*</b>	
Phones	
Printers	
Copy machines	
Scanners	
Fax machines	
Modems	

Lighting equipment (category 5)	
Product	#
<b>Light bulbs*</b>	
<b>Fluorescent tubes*</b>	
Long life light bulbs (energy saving)	
Rechargeable lamps	

Small household appliances (category 2)	
Product	#
<b>Irons*</b>	
<b>Kettles*</b>	
<b>Blenders*</b>	
<b>Microwaves*</b>	
Hair dryers	
Mixers	
Fans	
Vacuum cleaners	

Batteries	
Product	#

Accumulators	
Car batteries	
One-way batteries	


<b>Other</b> _____ _____	
<i>Product</i>	<i>#</i>

\* Tracer products

<b>3. Tracer products</b>	
<b>3.1 Life span of the tracer product</b>	
<p><b>a) From the <u>moment you buy the product until the moment you dispose it or give it away</u>: How many years do you have the product in your household, approximately?</b></p> <p><b>b) For how many years do you use the product?</b></p> <p><b>c) After its usage, for how many years do you store the product in your household?</b></p> <p><i>note: adding up answer b) and c) should equal answer a) → b) + c) = a)</i></p>	

Cat.	Product	a)	b)	c)
		[in years]		
1	Fridge			
1	Air conditioner			
1	Washing machines			
2	Iron			
2	Kettle			
2	Blender			

2	Microwave			
3	PC (central unit)			
3	CRT monitor			
3	LCD monitor			
3	Laptop			
3	Mobile phone			
4	TV (CRT)			
4	TV (flat panel)			
4	Radio			
4	Stereo			
5	Light bulb			
5	Fluorescent tube			

### 3.2 Detailed information about tracer products

If there is more than one device per product in a household, please **list each device individually**.

Category	Product	Where was it bought? (e.g. supermarket, second hand market, friends, etc.)	did you buy it? N - new U – used+working	did you store the product before disposal?	at the end of life? W - working B - broken F - broken but
1	Fridge				
1	Air conditioner				
1	Washing machines				
2	Iron				
2	Kettle				
2	Blender				
2	Microwave				
3	PC (central unit)				
3	CRT monitor				
3	LCD monitor				
3	Laptop				
3	Mobile phone				
4	TV (CRT)				
4	TV (flat panel)				
4	Radio				
4	Stereo				
5	Light bulb				
5	Fluorescent tube				

### 3.3 Disposal of tracer product<sup>2</sup> (please tick)

#### How do/did you dispose your electric and electronic products?

(if there is more than one device per product in a household, please **list each device individually**)

Category	Product	Sell to a second hand dealer	Give or sell to a scrap dealer	Dispose with household waste	Hand over to e-waste collection	Put on the street	Store at home	Sell to individual	Donate	Other
1	Fridge									
1	Air conditioner									
1	Washing machines									
2	Iron									
2	Kettle									
2	Blender									
2	Microwave									
3	PC (central unit)									
3	CRT monitor									
3	LCD monitor									
3	Laptop									
3	Mobile phone									
4	TV (CRT)									
4	TV (flat panel)									
4	Radio									
4	Stereo									
5	Light bulb									

5	Fluorescent tube										
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#### 4. General information

<b>4.1</b>	<p><b>Would you give out your e-waste to the waste collectors for free if you could be sure that the waste will be well taken care of in a way that is useful and that does not pollute the environment?</b></p> <p style="text-align: center;"> <input type="checkbox"/> YES                      <input type="checkbox"/> NO         </p>
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<b>4.2</b>	<p><b>Do you have further comments or suggestions concerning e-waste management?</b></p>
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<b>4.3</b>	<p><b>How many persons live in your household? (please tick)</b></p>				
	1 <input type="checkbox"/>	2 <input type="checkbox"/>	3-4 <input type="checkbox"/>	5-8 <input type="checkbox"/>	more than 8 <input type="checkbox"/>

<b>4.4</b>	<p><b>What is the monthly income in the household? (please tick)</b> <span style="float: right;"><i>(in local currency \$)</i></span></p>				
	< 200 \$	200 – 500 \$	500 – 1'000 \$	1'000 – 2'000 \$	> 2'000 \$
	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

*Note: the income classes must be adapted to the official national income classification*

#### Interview closure

- **Thank you for participating in this survey**
- *The interviewer could also provide information about when & where the results of the survey will be available (if this is the case)*



**Annex 2**

**Example of a questionnaire for the survey of EEE used and stored by institutional and corporate consumers (adapted from [11])**

Date:	Location:	Interviewer:
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<b>Interview introduction</b>
<p><i>Before the beginning of the interview, the interviewer should localize the person which is responsible for the management of electrical and electronic equipment (EEE) or the waste/e-waste management in the organization.</i></p> <p><b>I am ..... (name of interviewer) coming from ....</b></p> <p><b>We are collecting data on e-waste generation and management in order to ....</b></p> <p><b>Can we ask you some questions about e-waste? / Thank you for participating in our survey</b></p>

<b>General information about organization</b>	
<b>Name of organization</b>	
<b>Type of organization</b>	<input type="checkbox"/> public authority <input type="checkbox"/> educational organization <input type="checkbox"/> private company <input type="checkbox"/> NGO <input type="checkbox"/> other: .....
<b>Address / City</b>	
<b>Number of employees</b>	
<b>Name and function of contact person</b>	
<b>Telephone</b>	
<b>E-mail</b>	
<b>Main activity</b>	
<b>For private companies:</b>	<input type="checkbox"/> Mining <input type="checkbox"/> Manufacture of industrial products <input type="checkbox"/> Bank/Insurance <input type="checkbox"/> Sales <input type="checkbox"/> Telecommunication <input type="checkbox"/> Tourism <input type="checkbox"/> Other services <input type="checkbox"/> other:
<b>Economic activity of the company</b>	
<b>Is your organization ISO 14001 certified?</b>	<input type="checkbox"/> YES <input type="checkbox"/> NO

*(ISO 14001 is an international environmental certification)*

## 0. Introductory question

*(Introduction & introductory question, answers will not be evaluated. First question should ideally be answered with yes in order to set up a positive atmosphere for the interview to be held.)*

**Do you know what e-waste or waste of electrical and electronic equipment is?**

*(describe to interviewed person what e-waste is, if necessary....)*

## 1. Questions about awareness and behaviour

	Question	Answer	Enhance the replies with comments, suggestions, details, etc.
1.1	<b>Are you aware about the environmental hazards caused by discarded electronic equipment?</b>	<input type="checkbox"/> YES <input type="checkbox"/> NO	
1.2	<b>Are you aware that some electronic parts may be profitably recycled?</b>	<input type="checkbox"/> YES <input type="checkbox"/> NO	
1.3	<b>Are you aware that some hazardous fractions in e-waste need a special treatment in order to be safely disposed of?</b>	<input type="checkbox"/> YES <input type="checkbox"/> NO	
1.4	<b>Does your organization have a policy or strategy for the management of e-waste?</b>	<input type="checkbox"/> YES <input type="checkbox"/> NO	
1.5	<b>Does your organization keep inventories of the electric and electronic equipment it discards / stores?</b>	<input type="checkbox"/> YES <input type="checkbox"/> NO	<i>(if yes, ask for a copy?)</i>

## 2. Number (#) of electrical and electronic equipment in the organization

- a) How many appliances of each product do you totally have in your organization (in use and stored)?
- b) How many of them are not in use (stored)?

### *IT and telecommunications equipment (category 3)*

<i>Product</i>	<i>a) total</i>	<i>b) not in use</i>
<b>PCs* (central unit)</b>		
<b>CRT monitors*</b>		
<b>LCD monitors*</b>		
<b>Laptops*</b>		
<b>Mobile phones*</b>		
<b>Landline phones*</b>		
<b>Printers*</b>		
<b>Copy machines*</b>		
Scanners		
Fax machines		
Modems		

### *Small household appliances (category 2)*

<i>Product</i>	<i>a) total</i>	<i>b) not in use</i>
Kettles		
Microwaves		
Fans		
Water dispenser		

### *Large household appliances (category 1)*

<i>Product</i>	<i>a) total</i>	<i>b) not in use</i>
<b>Fridges*</b>		
<b>Air conditioners*</b>		

### *Consumer equipment (category 4)*

<i>Product</i>	<i>a) total</i>	<i>b) not in use</i>
<b>TVs (CRT)*</b>		
<b>TVs (flat panel)*</b>		
<b>Radios*</b>		
Video projector		
DVD players		

Cameras		

_____		
Product	a) total	b) not in use

<b>Lighting equipment (category 5)</b>		
Product	a) total	b) not in use
Light bulbs		
Fluorescent tubes		
Long life light bulbs (energy saving)		
Rechargeable lamps		

\* Tracer products

Other \_\_\_\_\_

### 3. Tracer products

#### 3.1 Life span of the tracer product

**a) From the moment the product is bought until the moment it is disposed of or given away: How many years does your organisation have the product, approximately?**

**b) For how many years is the product in use?**

**c) After its usage, for how many years is the product usually stored in your organisation?**

*note: adding up answer b) and c) should equal answer a) → b) + c) = a)*

Cat.	Product	a)	b)	c)
		[in years]		
3	PC (central unit)			
3	CRT monitor			
3	LCD monitor			
3	Laptop			
3	Mobile phone			

3	Phone			
3	Printer			
3	Copy machine			
1	Fridge			
1	Air conditioner			
4	TV (CRT)			
4	TV (flat panel)			

4	Radio			
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### 3.2 Detailed information about tracer products

Category	Product	Where does your organization buy its products? <i>(e.g. supermarket, second hand market, friends, etc.)</i>	How many new appliances does your organization buy per year?	How many years does your organization store a product before its disposal?
	In general			
3	PC (central unit)			
3	CRT monitor			
3	LCD monitor			
3	Laptop			
3	Mobile phone			
3	Phone			
3	Printer			
3	Copy machine			
1	Fridge			
1	Air conditioner			
4	TV (CRT)			
4	TV (flat panel)			
4	Radio			

**3.3 Disposal of tracer product (please tick)**

**What does your company do with the electrical and electronic equipment which is not of use anymore?**

Category	Product	Sell to a second hand dealer	Give or sell to a scrap dealer	Dispose with general waste	Hand over to an e-waste collection	Sell via tender offer	Sell/hand over to employees	Sell to individuals	Donate	Other
	In general									
3	PC (central unit)									
3	CRT monitor									
3	LCD monitor									
3	Laptop									
3	Mobile phone									
3	Phone									
3	Printer									
3	Copy machine									
1	Fridge									
1	Air conditioner									
4	TV (CRT)									
4	TV (flat panel)									
4	Radio									

#### 4. General questions

	Question	Answer	Enhance the replies with comments, suggestions, details, etc.
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4.1	Are you aware of what happens to the equipment you have discarded?	<input type="checkbox"/> YES <input type="checkbox"/> NO	
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4.2	<b>From your point of view, what are the main obstacles for a proper e-waste treatment?</b> <i>(e.g costs, lack of infrastructure and/or policy within your company, lack of legislation, absence of recycling solutions, absence of collection system, etc.)</i>
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4.3	<b>What should be done to facilitate e-waste management (to your organization)?</b>
-----	---

4.4	<b>Would you be willing to pay for your equipment to be collected and treated?</b>	<input type="checkbox"/> YES <input type="checkbox"/> NO	<b>If yes: at what conditions?</b> <i>(e.g. pickup service, guarantee of proper disposal, etc.)</i>
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4.5	<b>Is your organisation working on a formal basis or is it an informal organisation?</b> <input type="checkbox"/> formal <input type="checkbox"/> informal
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4.6	<b>General remarks</b>
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#### Interview closure

- **Thank you for participating in this survey**
- *The interviewer could also provide information about when & where the results of the survey will be available (if this is the case)*

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