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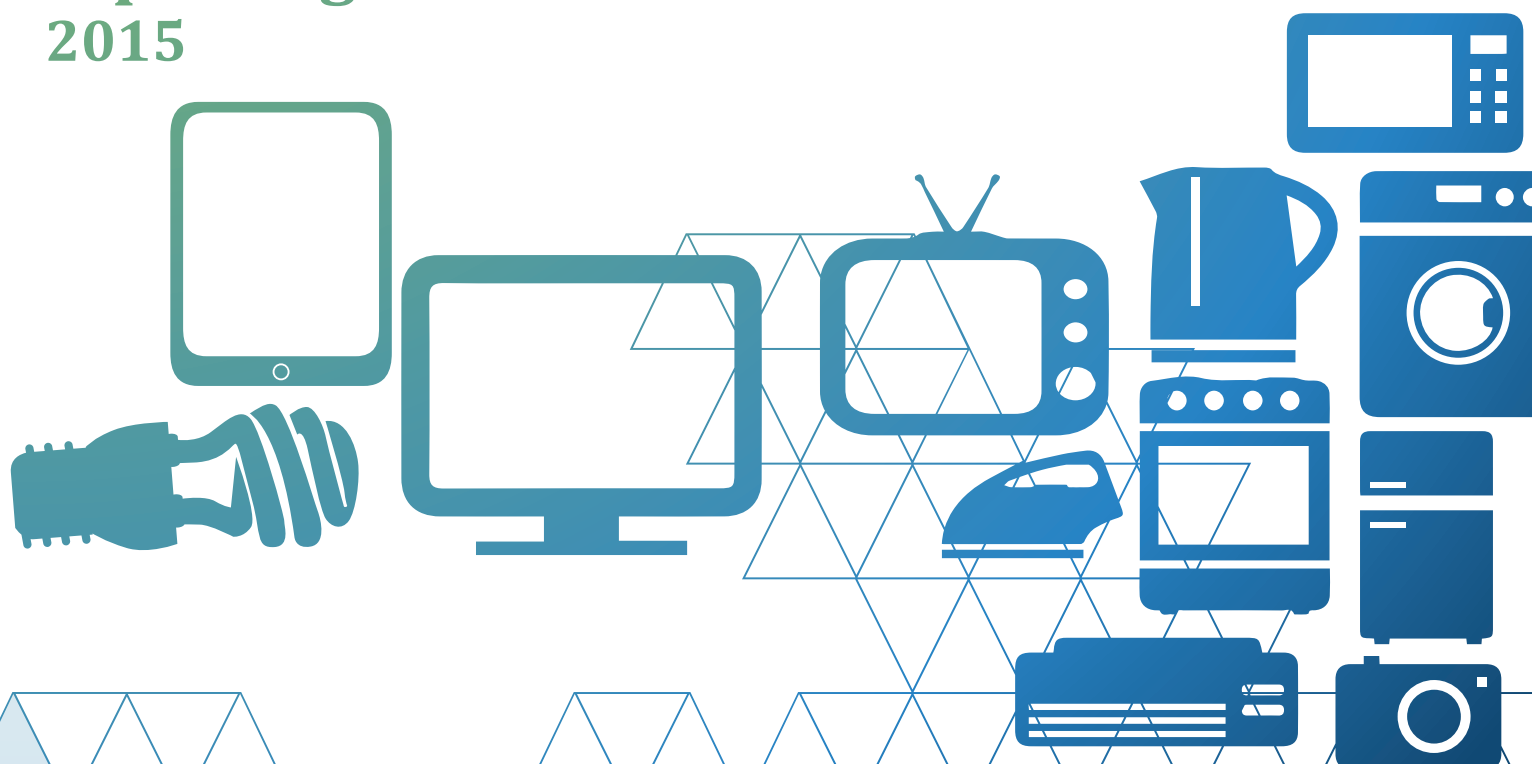
UNU-IAS

Institute for the Advanced Study
of Sustainability

E-waste statistics

Guidelines on classification, reporting and indicators

2015



TASK GROUP ON
MEASURING E-WASTE

 PARTNERSHIP ON
MEASURING ICT
FOR DEVELOPMENT



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Foreword

Since the 1990s, electrical and electronic equipment has revolutionized people's lives. These products are ubiquitous in our households, offices, hospitals, transportation systems and communication networks. They also support development around the globe, but with ever-increasing technological innovation and rapidly increasing sales, electronic waste—or e-waste—has become one of the fastest-growing waste streams. This is a challenge for waste management, as many electronic products contain both hazardous as well as valuable materials.

In response, the *Partnership for Measuring ICT for Development* undertook the development of guidelines on e-waste statistics in order to harmonise early approaches to this challenge. The United Nations University (UNU), as lead author, has developed the guidelines to support countries in their efforts to collect and disseminate information on e-waste statistics, based on internationally-approved definitions and standards. This first edition of the guidelines has been endorsed by all Partnership members following a public stakeholder consultation and Partnership discussion.

The guidelines on the classifications, measurement scheme and indicators facilitate the implementation of harmonised concepts to measure the size of a country's e-waste market, its transboundary e-waste movement and the e-waste recycling performance within that country. The data collected will support policymakers in drafting fact-based policies to create the infrastructure to manage e-waste within their countries. This will contribute to the creation of green jobs and the eradication of poverty, which are central themes from the Rio+20 sustainable development conference and the United Nations' post-2015 development agenda.

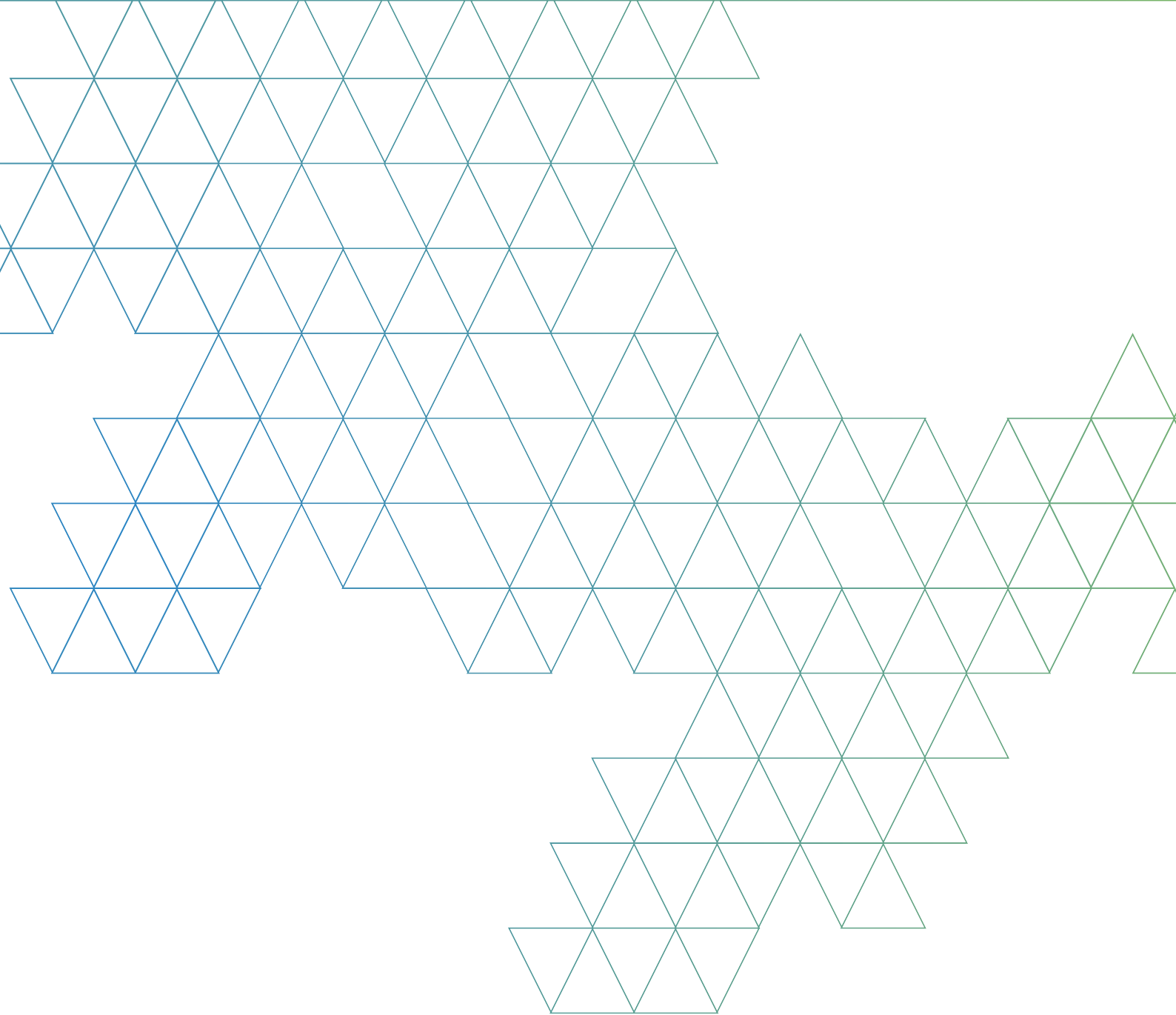
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Table of Contents

Abstract	9
Introduction	11
E-Waste Classification	12
Criteria for e-waste classifications	12
UNU-KEYS	12
Statistical use of the UNU-KEYS	14
EU-WEEE-Directives	14
International trade and production statistics	16
European List of Wastes	16
Classification of E-waste under the Basel Convention	16
System of Environmental-Economic Accounting	18
Correlations between the classifications	19
Framework on e-waste statistics	20
Reporting e-waste statistics and disseminating results	23
Indicators	24
Minimum requirements for e-waste statistics	25
Example 1: Use of trade and production codes to calculate sales	26
Example 2: E-waste Flows in the Netherlands	27
Example 3: E-waste in China	28
Conclusions	30
Literature	31
Annex 1: Link between the UNU-KEYS and HS code	32
Annex 2: Lifespan profiles of various EEE in the Netherlands, France and Belgium	46
Annex 3: Indication of average weight for EU-28	47



Abstract

Currently, countries lack a uniform measurement system for waste electrical and electronic equipment (e-waste or WEEE). However, there is already substantial data available for both developed and less-developed countries that relate to e-waste statistics. In order to improve comparability between countries, a sound measurement framework is proposed that integrates and validates available harmonized statistical data and other non-statistical data sources into e-waste statistics. This measurement framework is presented along with a classification of e-waste. Though the classification is, at this stage, standalone, it links to multiple data sources and data formats, such as the Harmonized Commodity Description and Coding System (HS) and the EU WEEE Directive reporting. The parameters in the measurement framework and classification can also function as a backbone for data gathering and thus enable the measurement of these flows. The framework captures the most important elements of e-waste and is relevant to all countries. Finally, indicators can be constructed from the framework, which can provide a useful overview of the size of the market for electronic and electrical products within a country, as well as its e-waste arising and e-waste treatment performance and serve as a resource for policymaking. In addition to the full measuring framework, minimum requirements are proposed to collect and report on e-waste statistics for countries that are embarking on this type of data gathering for the first time.



Introduction

The worldwide use of information and communications technology (ICT) equipment and other electronic equipment is growing. Consequently, there is a growing amount of equipment that becomes waste after its time in use. This growth is expected to accelerate, since equipment lifespans decrease over time [1-3]. Due to growing consumption and shorter lifespans, e-waste is one of the fastest-growing waste streams [4]. The United Nations University (UNU) calculates that about 42 Mt (million metric tons) of e-waste was generated globally in 2014 [5]. From this data, it is estimated that 6 Mt of this was ICT-related. The annual global consumption of new electrical and electronic equipment (EEE) was around 58 Mt in 2012.

The consumption and use of EEE is probably most prevalent in the developed world, but developing countries show a rapid growth of consumption and use of EEE. Some less-developed countries lack a waste treatment infrastructure and waste management laws and enforcement. As a result, the e-waste in those countries will often be treated in suboptimal ways by the informal sector. This leads to severe consequences for the environment and human health. In order to treat e-waste in an environmentally-sound manner, it needs to be regulated, a recycling infrastructure needs to be created or improved, and workers' health and safety standards need to be implemented [6, 7]. Those conditions aid in the creation of green jobs, one of the conditions to eradicate poverty and simultaneously "green" the economy, according to the UNEP [8]. However, suboptimal treatment and illegal activities are not limited to low and middle-income countries. In developed countries as well, large flows of undocumented e-waste are found that may be treated (illegally or semi-legal) with inferior standards [3, 9, 10].

In order to understand the dynamics of this complex waste stream, a framework is needed

to capture e-waste's most essential features. Currently, there is too much discrepancy between official/governmental data and academic data. All available data should feed into such a system, preferably linking to statistical classifications and existing frameworks. Such a harmonised framework and measurement would help to interpret e-waste-related data and to compile e-waste statistics that are comparable between countries worldwide.

Such a system should also address the practical challenges that inevitably occur during measurement. For example, part of the e-waste stream will be registered as metal waste. The part that is e-waste is not identifiable in registers and therefore difficult to assess. In addition, there is also trade in e-waste between countries, and the statistics should also capture this.

In the context of the Partnership Measuring ICT for Development, a Task Group on Measuring E-Waste (TGEW) was established to develop a framework for monitoring e-waste based on internationally-defined indicators and classifications that will help to develop e-waste statistics. The framework document could ultimately provide guidance to both developed and developing countries to measure e-waste more consistently.

E-Waste Classification

Before going into detail about the measurement framework, the issue of e-waste classification will be discussed. There are many types of EEE products on the market, which makes it difficult to group them into sensible and practically useful categories. There are many classifications that can be used to describe [W]EEE, and each of them is potentially valuable to form the basis of e-waste statistics in the proposed measurement framework. However, there are several criteria to which the classification should comply in order to effectively harmonise e-waste measurement, and thus lead to sensible indicators. In general, the categories should not be defined too specifically around products that are not posing a threat to the environment, or that do not contain valuable materials, nor having a large market share, as this leads to too many irrelevant codes and consequently imposes an unnecessary administrative burden on respondents. Moreover, there will be very few databases available to collect data from in the desired classification. On the other hand, the classification system should also not be too aggregated, as differences between countries will be difficult to interpret. For example, Cathode Ray Tube (CRT) monitors can be allocated to IT equipment, but other countries might allocate them to household appliances, whereas others can group them with screens. Another example is that microwaves can be either documented as small household appliances, or in other countries, as large household appliances. Consequently, those inconsistencies in reporting will affect data quality, and should be avoided, as they hamper the usability of the results for international benchmarking and effective policymaking.

Criteria for e-waste classifications

A classification system for e-waste statistics should categorise products by similar function, comparable material composition (in terms of hazardous substances and valuable materials) and related end-of-life attributes. In addition,

products within the same category should have a homogeneous average weight and lifespan distribution, which can simplify quantitative assessment for similar products. Finally, large or environmentally-relevant e-waste products, for which a lot of data is potentially available, should be assigned separately. Currently, there is only one classification system that fulfils those criteria: the classification developed by the UNU [11]. This classification is referred to as the UNU-KEYS.

UNU-KEYS

As mentioned above, the UNU-KEYS are constructed such that product groups share comparable average weights, material compositions, end-of-life characteristics and lifespan distributions. This makes the system very useful for compiling e-waste statistics. The full list of the UNU-KEYS is presented in Table 1. The 54 categories can be grouped into 10 primary categories, according to the original EU Waste Electrical and Electronic Equipment (WEEE) Directive. This link is shown in the fourth column in Table 1. The classification can also be linked to the new reporting categories for the recast of the WEEE-Directive, which will come into effect in 2017 in the EU. The UNU-KEYS classification is ideal to serve as a link between this and the existing classifications.

More specifically, the resulting UNU-KEYS encompasses all possible EEE (about 900 products, clustered into 660 main product types). Here, the system closely follows the harmonised statistical coding of the international trade codes, the harmonised system (HS) [12]. The HS codes link to the CPC product classification. The correspondence tables that translate UNU-KEY to the HS are shown in Annex 1.¹ National statistical institutes or custom organizations document all commodities and economic activities in society. Independent of current WEEE registers, this data can provide consistent and harmonised sales figures for all products through historical

¹ The indicative link between the UNU-KEYS and the HS codes can be downloaded here: <http://i.unu.edu/media/ias.unu.edu-en/project/2238/UNU-KEYS-to-HS-Codes.xls>

Table 1. Detailed description of the UNU product classification and its correlation to other e-waste classifications ²

UNU Key	Description	ANNEX III of Recast WEEE Directive	ANNEX I of old EU-WEEE Directive
0001	Central Heating (household installed)	Large equipment	out of scope
0002	Photovoltaic Panels (incl. converters)	Large equipment	out of scope
0101	Professional Heating & Ventilation (excl. cooling equipment)	Large equipment	01
0102	Dishwashers	Large equipment	01
0103	Kitchen (f.i. large furnaces, ovens, cooking equipment)	Large equipment	01
0104	Washing Machines (incl. combined dryers)	Large equipment	01
0105	Dryers (wash dryers, centrifuges)	Large equipment	01
0106	Household Heating & Ventilation (f.i. hoods, ventilators, space heaters)	Large equipment	01
0108	Fridges (incl. combi-fridges)	Cooling and Freezing	01
0109	Freezers	Cooling and Freezing	01
0111	Air Conditioners (household installed and portable)	Cooling and Freezing	01
0112	Other Cooling (f.i. dehumidifiers, heat pump dryers)	Cooling and Freezing	01
0113	Professional Cooling (f.i. large air conditioners, cooling displays)	Cooling and Freezing	01
0114	Microwaves (incl. combined, excl. grills)	Small equipment	01
0201	Other Small Household (f.i. small ventilators, irons, clocks, adapters)	Small equipment	02
0202	Food (f.i. toaster, grills, food processing, frying pans)	Small equipment	02
0203	Hot Water (f.i. coffee, tea, water cookers)	Small equipment	02
0204	Vacuum Cleaners (excl. professional)	Small equipment	02
0205	Personal Care (f.i. tooth brushes, hair dryers, razors)	Small equipment	02
0301	Small IT (f.i. routers, mice, keyboards, external drives & accessories)	Small IT	03
0302	Desktop PCs (excl. monitors, accessories)	Small IT	03
0303	Laptops (incl. tablets)	Screens	03
0304	Printers (f.i. scanners, multifunctionals, faxes)	Small IT	03
0305	Telecom (f.i. (cordless) phones, answering machines)	Small IT	03
0306	Mobile Phones (incl. smartphones, pagers)	Small IT	03
0307	Professional IT (f.i. servers, routers, data storage, copiers)	Large equipment	03
0308	Cathode Ray Tube Monitors	Screens	03
0309	Flat Display Panel Monitors (LCD, LED)	Screens	03
0401	Small Consumer Electronics (f.i. headphones, remote controls)	Small equipment	04
0402	Portable Audio & Video (f.i. MP3, e-readers, car navigation)	Small equipment	04
0403	Music Instruments, Radio, HiFi (incl. audio sets)	Small equipment	04
0404	Video (f.i. Video recorders, DVD, Blue Ray, set-top boxes)	Small equipment	04
0405	Speakers	Small equipment	04
0406	Cameras (f.i. camcorders, photo & digital still cameras)	Small equipment	04
0407	Cathode Ray Tube TVs	Screens	04

² The UNU-KEYS are also proposed as a part of the common methodology for making the target calculations for the recast of the EU WEEE Directive. In order to be adopted as a standard, countries should ideally comment on its practical use for measuring WEEE in their country. The link between the UNU-KEYS and the EU WEEE Directive can be downloaded here: <http://i.unu.edu/media/ias.unu.edu-en/project/2238/UNU-KEYS-and-EU-WEEE-Directive-Annex.xlsx>

UNU Key	Description	ANNEX III of Recast WEEE Directive	ANNEX I of old EU-WEEE Directive
0408	Flat Display Panel TVs (LCD, LED, Plasma)	Screens	04
0501	Lamps (f.i. pocket, Christmas, excl. LED & incandescent)	Lamps	05
0502	Compact Fluorescent Lamps (incl. retrofit & non-retrofit)	Lamps	05
0503	Straight Tube Fluorescent Lamps	Lamps	05
0504	Special Lamps (f.i. professional mercury, high & low pressure sodium)	Lamps	05
0505	LED Lamps (incl. retrofit LED lamps & household LED luminaires)	Lamps	05
0506	Household Luminaires (incl. household incandescent fittings)	Small equipment	05
0507	Professional Luminaires (offices, public space, industry)	Small equipment	05
0601	Household Tools (f.i. drills, saws, high pressure cleaners, lawn mowers)	Small equipment	06
0602	Professional Tools (f.i. for welding, soldering, milling)	Large equipment	06
0701	Toys (f.i. car racing sets, electric trains, music toys, biking computers)	Small equipment	07
0702	Game Consoles	Small IT	07
0703	Leisure (f.i. large exercise, sports equipment)	Large equipment	07
0801	Household Medical (f.i. thermometers, blood pressure meters)	Small equipment	08
0802	Professional Medical (f.i. hospital, dentist, diagnostics)	Large equipment	08
0901	Household Monitoring & Control (alarm, heat, smoke, excl. screens)	Small equipment	09
0902	Professional Monitoring & Control (f.i. laboratory, control panels)	Large equipment	09
1001	Non Cooled Dispensers (f.i. for vending, hot drinks, tickets, money)	Large equipment	10
1002	Cooled Dispensers (f.i. for vending, cold drinks)	Cooling and Freezing	10

years and serve as an alternative data source for the estimation of e-waste generation.

Statistical use of the UNU-KEYS:

UNU-KEYS can be used to collect statistical data on sales. This can be done via consumer surveys, or the UNU-KEYS can be used to link to available register data, which are based on HS coding (see Annex 1). In both cases, data on average weights might be needed to convert units to weight. An indication on the average weights is shown in Annex 3. The lifespans of the UNU-KEYS are homogeneous, which enables the system to be used to determine e-waste generated (See Annex 2). E-waste generation is based on a time-series of sales and the average lifespan of a product. Since the product composition of the products within a UNU-KEY is homogeneous, the classification is also suitable for material flow analysis of the

raw material components in EEE and WEEE.

EU-WEEE-Directives

Currently, the WEEE Directive is in force in the EU Member States [12]. The WEEE Directive lists 10 categories for which data is collected. Those are: (1) Large Household appliances; (2) Small Household appliances; (3) IT and telecommunications equipment; (4) Consumer equipment; (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; and (10) Automatic dispensers. The links from these categories to the UNU-KEYS are shown in Table 1 (right column, as Annex I). The categorisation and scope of products in the WEEE Directive

are broad enough to be relevant for the rest of the world. For instance, countries like Mauritius use the same categorization [13]. However, China applies a smaller scope that includes refrigerators (UNU-KEY 0108), monitors and TVs (UNU-KEYS 0308, 0309, 0407 and 0408), washing machines (UNU-KEY 0104) and air conditioners (UNU-KEY 0111 and 0113) [14]. The WEEE Directive imposes a flat collection target of 4 kg/inhabitant for each Member State in the EU. Since there is no target relative to the total size of e-waste generation, or the consumption within the Member State, it lacks the ability to capture the effectiveness of waste management. This was the one of the main reasons for the recast of the WEEE Directive.

The recast of the WEEE Directive lists six categories that should be reported [15], which are representative of the e-waste collection streams in practice. These categories are: (1) temperature exchange equipment (referred to as cooling and freezing in Table 1); (2) screens and monitors (referred to as screens), (3) lamps; (4) large equipment; (5) small equipment and (6) small IT and telecommunication equipment with an external dimension of less than 50 cm. The link between those categories to the UNU-KEYS is shown in Table 1. The Member States either have a collection target based on a percentage of the amounts put on the market (PoM) in the three preceding years, or as a percentage of e-waste generated. The change from a flat target towards to a relative target requires

Table 2. LoW codes that refer to e-waste

Hazardous

09 01 11*	Single-use cameras containing batteries included in 16 06 01, 16 06 02 or 16 06 03
16 02 09*	Transformers and capacitors containing PCBs
16 02 10*	Discarded equipment containing or contaminated by PCBs other than those mentioned in 16 02 09
16 02 11*	Discarded equipment containing chlorofluorocarbons, HCFC, HFC
16 02 12*	Discarded equipment containing free asbestos
16 02 13*	Discarded equipment containing hazardous components other than those mentioned in 16 02 09 to 16 02 12
20 01 21*	Fluorescent tubes and other mercury-containing waste
20 01 23*	Discarded equipment containing chlorofluorocarbons
20 01 35*	Discarded electrical and electronic equipment other than those mentioned in 20 01 21 and 20 01 23 containing hazardous components

Non - Hazardous

09 01 10	Single-use cameras without batteries
09 01 12	Single-use cameras containing batteries other than those mentioned in 09 01 11
16 02 14	Discarded equipment other than those mentioned in 16 02 09 to 16 02 13
20 01 36	Discarded electrical and electronic equipment other than those mentioned in 20 01 21, 20 01 23 and 20 01 35

improving e-waste statistics. Also, a relative target improves the ability to capture the effectiveness of e-waste collection.

International trade and production statistics

Foreign trade (import and export) statistics for each product are registered under the Harmonized Commodity Description and Coding System (HS codes) developed by the World Customs Organization [16]. Similarly, production statistics use the CPC, which is linked to the HS classification. Such an integrated system allows for comparability between statistics produced in different statistical domains. Virtually all countries compile data using the HS classification. The data are compiled by the UN Statistical division (UNSD) and published in the Comtrade database.

There are about 5.300 HS codes (six digits) describing all commodities per year. Within that group, there are about 270 codes regarded as relevant to EEE, according to their descriptions. Meanwhile, descriptions that refer to parts of EEE were excluded, as it would have created double counting. A list related to the UNU-KEYS is provided in Annex 1.

European List of Wastes

The European List of Wastes (LoW) is the waste classification in the EU for administrative purposes (i.e. for permits and supervision in the field of waste generation and management). Many European, as well as some Caucasian and central Asian, countries use the LoW as a central framework to gather data for waste statistics. Waste statistics reporting is typically done on an aggregated level, based on the type of waste. The LoW defines 839 waste types, which are structured into 20 chapters mainly

according to the source of the waste (i.e. the economic sector or process of origin). Each waste type is characterised by a six-digit code. The allocation of wastes to the defined waste types is laid out in the introduction of Decision 2000/532/EC and explained in a separate section. There are 13 LoW codes that refer to e-waste. They are subdivided into hazardous and non-hazardous waste, and listed in the Table 2. Fractions or components that can be generated during treatment of e-waste, such as metal scrap, plastics and lead glass, are not listed in this table.

Those codes describe e-waste very generally and are merely useful to measure e-waste that is registered as separately-collected e-waste. For compiling e-waste statistics however, it lacks the ability to distinguish between different types of e-waste, thus ignoring differences in environmental relevance and materials potential when recycled. Also, in practice, e-waste is collected and registered under other LoW codes, such as non-separately-collected domestic waste or metal scrap.

Classification of E-waste under the Basel Convention³

Article 2 (“Definitions”) of the Basel Convention defines waste as “substances or objects, which are disposed of or are intended to be disposed of or are required to be disposed of by the provisions of national law”. In paragraph four of that article, it defines disposal as “any operation specified in Annex IV” to the Convention.⁴ It is important to note that national provisions concerning the definition of waste may differ, and the same material that is regarded as waste in one country may be non-waste in another country.

³ Extracted from the 23 Dec 2013 version of the Draft technical guidelines on transboundary movements of e-waste and used electrical and electronic equipment, in particular regarding the distinction between waste and non-waste under the Basel Convention which is available at: <http://www.basel.int/Implementation/TechnicalMatters/DevelopmentofTechnicalGuidelines/Ewaste/tabid/2377/Default.aspx>

⁴ Extracted from the 23 Dec 2013 version of the Draft technical guidelines on transboundary movements of e-waste and used electrical and electronic equipment, in particular regarding the distinction between waste and non-waste under the Basel Convention which is available at: <http://www.basel.int/Implementation/TechnicalMatters/DevelopmentofTechnicalGuidelines/Ewaste/tabid/2377/Default.aspx>

E-waste is included in Annex VIII to the Convention with the following entry for hazardous wastes:

“A1180 Waste electrical and electronic assemblies or scrap 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).”⁶

E-waste is also included in Annex IX to the Convention with the following entry for non-hazardous wastes:

“B1110 Electrical and electronic assemblies:

- Electronic assemblies consisting only of metals or alloys;
- Waste electrical and electronic assemblies or scrap⁷ (including printed circuit boards) not 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 not contaminated with Annex I constituents (e.g., cadmium, mercury, lead, polychlorinated biphenyl) or from which these have been removed, to an extent that they do not possess any of the characteristics contained in Annex III (note the related entry on list A A1180);
- Electrical and electronic assemblies (including printed circuit boards, electronic components and wires) destined for direct reuse⁸, and not for recycling or final disposal.”⁹

Equipment will often contain hazardous components, examples of which are indicated in entry A1180 of Annex VIII. E-waste should therefore be presumed to be hazardous waste, unless it can be shown that it does not contain such components and in particular:¹⁰

(a) Lead-containing glass from cathode ray tubes (CRTs) and imaging lenses, which are assigned to Annex VIII entries A1180 or A2010 “glass from cathode ray tubes and other activated glass”. This waste also belongs to category Y31 in Annex I, “Lead; lead compounds” and is likely to possess hazard characteristics H6.1, H11, H12 and H13 included in Annex III;

(b) Nickel-cadmium batteries and batteries containing mercury, which are assigned to Annex VIII entry A1170 “unsorted waste batteries...”. This waste also belongs to category Y26 in Annex I, “Cadmium; cadmium compounds” or Y29 “Mercury, mercury compounds” and is likely to possess hazard characteristics H6.1, H11, H12 and H13;

(c) Selenium drums, which are assigned to Annex VIII entry A1020 “selenium; selenium compounds”. This waste also belongs to category Y25 in Annex I, “Selenium; selenium compounds” and is likely to possess hazard characteristics H6.1, H11, H12 and H13;

⁵ Extracted from the 23 Dec 2013 version of the Draft technical guidelines on transboundary movements of e-waste and used electrical and electronic equipment, in particular regarding the distinction between waste and non-waste under the Basel Convention which is available at: <http://www.basel.int/Implementation/TechnicalMatters/DevelopmentofTechnicalGuidelines/Ewaste/tabid/2377/Default.aspx>

⁶ PCBs are at a concentration level of 50 mg/kg or more.

⁷ This entry does not include scrap from electrical power generation.

⁸ Reuse can include repair, refurbishment or upgrading, but not major reassembly.

⁹ In some countries these materials destined for direct reuse are not considered wastes.

¹⁰ The following list of components or constituents are non-exhaustive examples.

(d) Printed circuit boards, which are assigned to Annex VIII entry A1180 “waste electronic and electrical assemblies.....”, and entry A1020 “antimony; antimony compounds” and “beryllium; beryllium compounds”. These assemblies contain brominated compounds and antimony oxides as flame retardants, lead in solder and beryllium in copper alloy connectors. They also belong in Annex I, to categories Y31, “Lead; lead compounds”, Y20, “Beryllium, beryllium compounds” and Y27 “Antimony, antimony compounds” and Y45, organohalogen compounds other than substances referred to elsewhere in Annex I. They are likely to possess hazard characteristics H6.1, H11, H12 and H13;

(e) Fluorescent tubes and backlight lamps from liquid crystal displays (LCD), which contain mercury and are assigned to Annex VIII entry A1030 “Mercury; mercury compounds”. This waste also belongs to category Y29 in Annex I, “Mercury; mercury compounds” and is likely to possess hazard characteristics H6.1, H11, H12 and H13;

(f) Plastic components containing brominated flame retardants (BFRs), in particular BFRs that are persistent organic pollutants according to the Stockholm Convention, which can be assigned to Annex VIII entry A3180 “Wastes, substances and articles containing, consisting of or contaminated with polychlorinated biphenyl (PCB), polychlorinated terphenyl (PCT), polychlorinated naphthalene (PCN) or polybrominated biphenyl (PBB), or any other polybrominated analogues of these compounds, at a concentration of 50 mg/kg or more.” This waste also belongs to category Y45 in Annex I, organohalogen compounds other than substances referred to elsewhere in Annex I and to category Y27 “Antimony, antimony compounds” and is likely to possess hazard characteristics H6.1, H11, H12 and H13;

(g) Other components containing or contaminated with mercury, such as mercury switches, contacts and thermometers, which are assigned to Annex VIII entry A 1010, A1030 or A1180. This waste also belongs to category Y29 in Annex I, “Mercury; mercury compounds” and is likely to possess hazard characteristics H6.1, H11, H12 and H13;

(h) Waste oils/liquids, which are assigned to annex VIII entry A 4060 “Waste oil/water, hydrocarbons/water mixtures, emulsions”. The waste belongs to category Y8 in Annex I, “Waste mineral oils unfit for their originally intended use” or Y9 in Annex I, “Waste oil/water, hydrocarbons/water mixtures, emulsions”, and is likely to possess hazardous characteristics H3, H11, H12 and H13;

(i) Components containing asbestos, such as in wires, cooking stoves and heaters, which are assigned to annex VIII entry A 2050. The waste belongs to category Y 36 in Annex I, “Asbestos (dust and fibres)” and is likely to possess hazardous characteristic H 11.

(j) Waste metal cables coated or insulated with plastics under A1190.

System of Environmental-Economic Accounting

The System of Environmental-Economic Accounting (SEEA) contains the internationally-adopted standard concepts, definitions, classifications, accounting rules and tables for producing internationally-comparable statistics on the environment and its relationship with

the economy. The SEEA framework follows a similar accounting structure as the System of National Accounts (SNA) and uses concepts, definitions and classifications consistent with the SNA's in order to facilitate the integration of environmental and economic statistics. In the SEEA, e-waste would fall under Chapter 3.6.5 on waste accounting. Following the concepts

of SEEA, e-waste statistics is a subset of the aggregates on waste from EEE and vehicles. The e-waste guidelines lack the origin of the waste generated (NACE or household), which is essential for SEEA. This requires additional modelling, which could be done on UNU-KEY level. SEEA also reports on import and export data, which is also part of those guidelines. However, at this moment, a good measurement of transboundary flows is very difficult to ascertain. The generation of secondary materials from e-waste (plastics, scrap metal, residues) is included in the concepts of SEEA, and these materials are excluded from e-waste statistics, but they could be modelled.

Correlations between the classifications

The correlations between the previously mentioned classifications are summarized in Table 3. The HS codes describe the products in the most detail. The UNU-KEYS are constructed from the HS codes, and this link is displayed in Annex 1. The UNU-KEYS, in turn, can be related the six or 10 categories in the WEEE

Directives, as indicated in Table 1. The Basel Codes and LoW codes, however, are difficult to relate to the HS codes. This mainly is due to the fact that the HS nomenclature defines waste as the residual streams. This is in conflict with the definition of waste in Article 1 of the Basel convention, which states that wastes are substances or objects, which are disposed of or are intended to be disposed of, or are required to be disposed of by the provisions of national law. Especially, the “intention to dispose” part, includes a larger variety of commodities that the HS would categorize as “products” in Chapters 84 and 85 of the HS as opposed to waste, which is their legal status according to the Basel convention. Thus, there is no direct correspondence between these classifications, due to these deviating definitions. The LoW and Basel codes are also currently not correlated to each other. However, the European Commission has adopted legislation and as a result is expected to publish an indicative correlation table in May 2015.

Table 3. Correlations between various classifications to gather or disseminate data for e-waste statistics

	UNU-KEYS	HS	LoW	Basel Code	WEEE Directive 6 categories
UNU-KEYS					
HS	1 HS codes unique links to the UNU-KEYS.				
EU List of Waste (LoW)	Not directly correlated	Not directly linked, due to differing concepts of waste in HS classification and LoW			
Basel Codes	Not directly correlated	Not directly correlated	Not directly correlated		
EU WEEE Directive, 6 categories	One UNU-KEY can be correlated to the 6 categories	1 HS codes can be correlated to the 6 categories of the WEEE-Directive	Not directly correlated	Not directly correlated	
EU WEEE Directive, 10 categories	One UNU-KEY links to a category in the WEEE Directive	1 HS codes can be correlated to the 10 categories of the WEEE-Directive	Not directly correlated	Not directly correlated	Not directly correlated

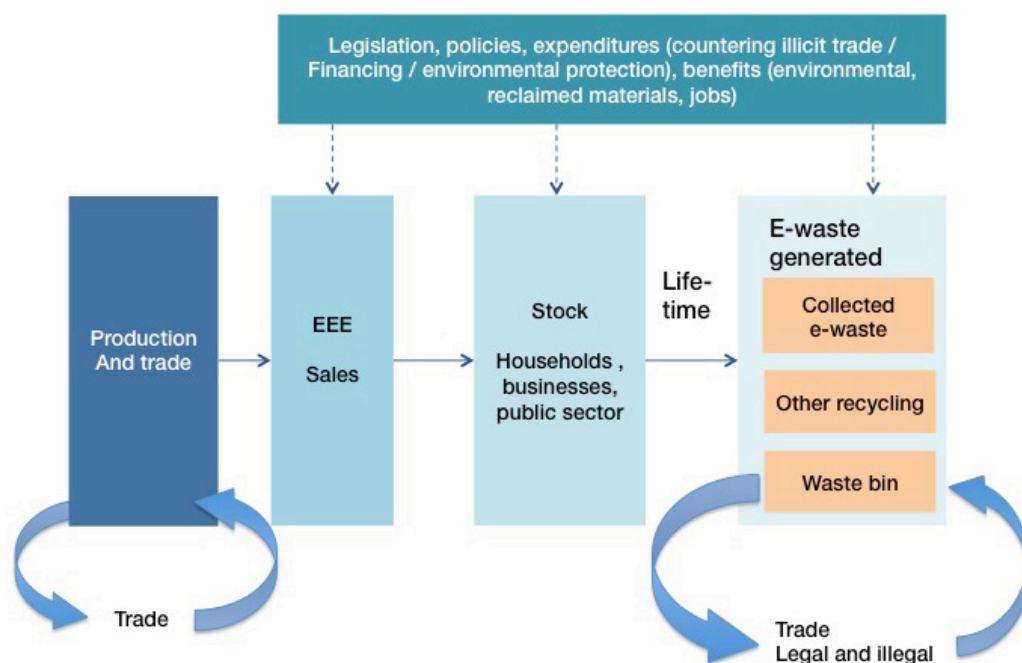
Framework on e-waste statistics

There are only a few comprehensive data sources on waste statistics that have a global coverage. Statistics on municipal waste and hazardous waste are compiled by the UNSD, and they are the most comprehensive database to date that has global coverage. However the compiled data are too generalized to obtain sufficient insight into e-waste. In Europe, the Waste Statistics Regulation in the EU is the main existing measurement framework for waste, but this is also too generalized to get sufficient insight into e-waste. For e-waste specifically, there is a reporting obligation and target setting in the WEEE-Directive. Here, reporting focuses on the amounts of EEE Put on the Market (POM) and e-waste collected for the current 10, and future six, e-waste categories (to be implemented after 2019). However, the reporting under the WEEE Directive does not capture the complete dynamics of the e-waste flows, such as trans-boundary movement. Other countries have no measurement framework at all. Therefore, there is a need for a measurement framework that considers these elements to help ensure effective policymaking.

Most countries lack any official measurement of e-waste. However, there are existing datasets, such as trade statistics or use of ICT equipment, in both developed and developing countries that strongly relate to e-waste. These data are already available from national statistical institutes or harmonised data at large international organizations like ITU, OECD or UNSD. In order to improve comparability between countries, a sound measurement framework that can integrate the harmonised existing data, and can serve as the basis for e-waste statistics and e-waste indicators, is highly desirable.

For example, in a certain country, there could be data available on the possession of cell phones and time-series for sales, while in another country, only data on the disposal of cell phones is known. The proposed measurement framework can integrate those parameters, such that directly comparable indicators could be constructed in order to allow further cross-country comparison. Additionally, some parameters can be transferred between countries, such as product

Figure 1. Proposed measurement framework for e-waste statistics



lifespan, discarding behaviour, knowledge of saturated markets and other non-statistical data sources. Such a measurement framework could only function if future data gathering is adjusted to this and if the framework is flexible enough to cope with various demands. A proposal for such a measurement framework is shown in Figure 1. It is based on flows and stocks of e-goods and e-waste. The model is constructed in such a way that the stocks and flows relate to one another.

The measurement framework starts with tracking the production and trade of EEE. There is a strong link between trade statistics and national production statistics. In this stage, the data is collected and published by custom organizations and/or national statistical institutes. This can serve as a very important and readily available data source to calculate sales. Ideally, domestic production plus imports, minus exports (the “apparent consumption method”) equals the domestic sales in a country. After the equipment has been sold, it stays in households or businesses for some time.

The equipment in households, businesses and public sector, is referred to as the “stock”. This is destined to become e-waste in the future and is also called the “urban mine”. There may be stock data available in some countries; sometimes, national statistical institutes survey households about their household possessions or penetration rate of several types of household EEE. This data can feed into the measurement framework. Other related information could include the number of subscriptions and penetration rates of ICT use, which are collected by ITU.

The time the equipment spends at a household, businesses or the public sector is called the lifespan or residence time. This timeframe includes the exchange of second-hand equipment among households and businesses. The residence times should ideally be determined empirically per product.

Although there is generally no official data collected around this by governments, several countries might have this information available through other studies. In addition, the UNU has published residence times as Weibull functions in the UNU classification for the Netherlands [2], this is shown in Annex 2.

After a certain residence time, the good is disposed of, and it becomes waste. This is referred to as e-waste generated, and it can be collected in various ways. The trade flows are theoretically already captured in international trade statistics. However, a typical problem is that shipments of e-waste and new commodities can be registered using the same codes, and therefore, they cannot be easily differentiated. There might be some data available after an analysis of detailed port shipment registers, like the one performed by the Massachusetts Institute of Technology for the U.S. EPA [17]. However, it would be easier if the coding of the harmonised system were extended to include a separate code for e-waste. It takes a long time to change the HS codes globally, as they are only revised every seven years, and amendments need to be announced in a timely manner for voting. Regional amendments may be implemented faster, as most regions or countries use more detailed trading codes that are fully compatible to the HS codes. The illegal trade flows are even more cumbersome to measure directly, due to the nature of the activity.

In conclusion, the e-waste that generated is collected in various channels. This is schematically broken down into three types of collection. The “formal collection” activities are (largely) carried out by specialized e-waste scrap treatment facilities. Those facilities might report to governments. The “other recycling” channel comprises e-waste that is being collected and treated but not registered as e-waste. Those are mostly metal scrap dealers. Here, the e-waste may be registered as metal scrap, and is mixed in the large bulk of other metal scrap. Finally, the e-waste can

also end up in non-separately collected waste (the waste bin). This waste is most likely incinerated or landfilled without material recycling, depending on the waste management infrastructure in a country. Disposing e-waste in residual waste is expected only to take place only in rich economies. For instance, sorting analysis of residual waste demonstrates that in Romania and Bulgaria, virtually no e-waste ends up in the residual waste [18], whereas in richer economies, such as France, around 1 kg of e-waste is found per inhabitant in the residual waste [19]. The amount of e-waste in

non-separately collected waste streams can be retrieved from a sorting analysis, which is sometimes performed by national governments or municipalities. The flows of electronic goods and waste can be influenced by international and national policies and enforcement. This is measured in a separate section and ideally allows for policy analysis of an individual country, or comparisons between different countries. A list of information that can be applied in the framework is shown in Table 4.

Table 4. List of parameters that can be used to gather data for e-waste statistics.

Parameter	Statistical Unit	Comment
Sales	Enterprises (in retail)	
Sales (apparent consumption method)	Register based: Trade: HS codes in registers from international trade Domestic production, mainly from NACE 25 ; 26	The classification should be linked to UNU-KEYS. A link between HS and UNU-KEYS is provided in Annex 1. Trade data is available for all countries. Imports and exports are sometimes mixed with e-waste. A small impact is expected.
Possession of EEE	Households and enterprises (based on kind of activity for whole NACE)	If households are enquired in related surveys, then also sales and disposal of e-waste can be enquired in the same questionnaire.
Official collection of e-waste	Enterprises with kind of activity collection of waste (NACE 38) and municipalities	
E-waste in waste bin	No statistical information	Sorting analysis of residual waste can be available for individual countries or regions. This is mainly an issue for rich economies.
Export of e-waste	Any exporter	Currently, HS codes are unsuitable to measure this, as there is no specific code for e-waste at HS level. E-waste is mainly traded using the same HS code as the new product, or waste processing as scrap (metal scrap, plastic scrap, etc.).
Import of e-waste	Any importer	Currently, HS codes are unsuitable to measure this, as there is no specific code for e-waste at HS level. E-waste is mainly traded using the same HS code as the new product, or waste processing as scrap (metal scrap, plastic scrap, etc.).
Lifetime of products	No statistical information	Mainly modelled through input-output analysis of stock levels and sales per UNU-KEY [2]. A Weibull distribution function is a suitable mathematical model. The lifetime profiles for the Netherlands (relevant for the rest of EU and other economies) are listed in Annex 2. Please be aware that sampling of the waste stream typically provides a biased result, as only the end-of-life characteristics from that waste stream are sampled, and may not be representative for e-waste generated.

Reporting e-waste statistics and disseminating results

After the data is collected, based on the classification, measurement framework and available data sources, the data can be compiled using a reporting matrix shown in Table 5. All indicators should be expressed as kg per inhabitant, or as tonnage. The parameters are defined as follows:

- Put on market is defined as any supply of a product for distribution, consumption or use on the market in the course of a commercial activity, whether in return for payment or free of charge.
- E-waste generated is defined as the amount of discarded electrical or electronic products (e-waste) due to consumption within national territory in a given reporting year, prior to any collection, reuse, treatment or export.
- E-waste collection represents the e-waste that is collected as e-waste and regulated by environmental protection laws specifically designed for e-waste. This includes e-waste that is collected and later exported and treated according to national standards in another country.
- Recycling with other waste streams involves recycling of e-waste with, for instance, metal scrap. This type of recycling does not always meet the same efficiency and environmental standards as the formal e-waste recycling, and is financed via other (mainly market)

mechanisms. The amount of e-waste treated this way is very difficult to quantify, and if data is available, it is mainly estimation.

- E-waste exported is comprised of the e-waste that is exported.
- The indicator e-waste in waste bin is defined by the amount of e-waste that ends up in non-separately collected waste. This can be household type waste or mixed bulky waste.

Once collected, the totals can be broken down into several categories. It is recommended that the recast of the WEEE Directive be used, as it provides the most harmonised categories. The categories from the WEEE Directive are as follows: Large equipment; Temperature exchange equipment; Small equipment; Screens and monitors, and equipment containing screens with a surface larger than 100 cm²; Lamps; IT and telecommunication equipment (no external dimension of more than 50 cm).

This reporting matrix provides sufficient insight to perform international comparisons, locate data gaps, perform imputations, apply statistical routines, etc. When this is done, the entries in the reporting matrix can be used to construct indicators. Those indicators can be extracted from the measurement framework and the parameters listed in Table 5.

Table 5. Reporting matrix in kg/inh (kilogram per inhabitant) (with simulated data). Find the definitions above.

	Total (kg/inh)	Temperature Exchange Equipment	Screens and Monitors	Lamps	Large Equipment	Small Equipment	Small IT Equipment
EEE put on market	26.5	9.8	...	...	...	...	3.6
E-waste generated	22.5	8.0	...	...	...	...	3.2
E-waste formally collected	7.4	6.1	...	...	...	...	3.2
E-waste recycled with other waste streams	10.1	2.3	...	...	...	...	1.1
E-waste exported	4.0	1.0	...	...	...	...	0.3
E-waste in waste bin	1.0	0.0	...	...	...	...	0.4

Indicators

Ideally, the indicators arising from the measurement framework should capture the most essential aspects of a country's performance of e-waste management. For e-waste, the indicators need to present a good overview of the size of a country's electronic market, national e-waste arising and the country's formal collection. Next, benchmarking should be possible, and differences in countries performances should be visible. From this reporting matrix, the following indicators can be constructed

Based on the country, studies performed by the UNU [3,9,10] and data published by Eurostat for formal collection [20] the following indicators could be constructed, shown in Table 6.

1) Total EEE put on market (unit kg/inh)

This represents the size of the national e-goods market.

2) Total e-waste generated (unit kg/inh)

This represents the size of the national e-waste market.

3) E-waste collection (unit kg/inh)

This represents the amount of e-waste that is collected as such.

4) E-waste collection rate = e-waste collected / e-waste generated * 100 per cent

This indicator represents the performance of the formal collection systems.

Table 6. Proposed indicators for measuring e-waste statistics in 2010 [3,9,10,19,20]

	Netherlands	Italy	Belgium	France
Total EEE put on market (kg/inh)	26.5	18.9	26.2	24.3
Total e-waste generated (kg/inh)	23.7	18.3	22.4	19.6
E-waste Collected (WEEE Directive reporting) (kg/inh)	7.7	9.6	9.7	6.9
E-waste Collection Rate (percentage)	32	52	43	35

Minimum requirements for e-waste statistics

In practice, there may be difficulties encountered in trying to collect the relevant information to construct the indicators in Table 6 with a full coverage for all UNU-KEYS. Therefore, institutes within countries can consider starting with a minimum set to collect and report on e-waste statistics by using the UNU-KEYS to select the most relevant items. A selection is made using the following criteria:

- The product comprises a significant share of the total market size in terms of weight. These products could include washing machines and refrigerators and air conditioners; or
- The product contains environmentally toxic components. Such products include refrigerators and air conditioners; or
- The product contains a very high concentration of valuable resources, which would otherwise be lost if they are not properly recycled. Such products include IT equipment, mobile phones and flat panel televisions or monitors; and
- The product should be on the market for both developing and developed countries.

When applying all those criteria: is is recommended to start to compile e-waste statistics for the following UNU-KEYS:

- Washing machines (UNU key: 0104)
- Fridge or combined fridge/freezer (UNU key: 0108)
- Household Air conditioner (UNU key: 0111)
- CRT monitors and TVs (UNU key: 0308 and 0407)

- Laptop, notebook, tablet (UNU key: 0303)
- Mobile phones (UNU key: 0306)
- Flat panel display for computer (UNU key: 0309)
- Flat panels televisions (UNU key: 0408)

The measurement should focus on: sales, stock and e-waste generated. Those can be obtained using household surveys, or through existing registers, such as the Comtrade database or production statistics. In countries where the reporting system is more developed, it may be more feasible to increase the amount of products and to move towards the other rows in Tables 4 and 5.

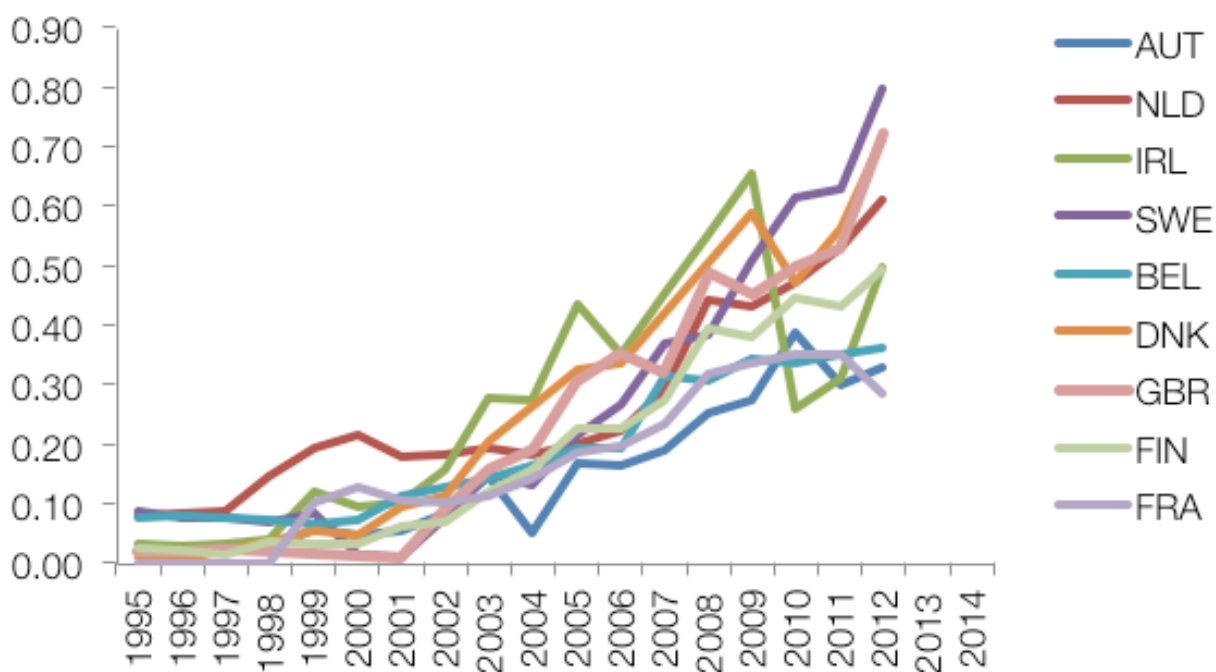
Example 1: Use of trade and production codes to calculate sales

In the following graph, an example is given for how the statistical codes from Prodcom and combined nomenclature can be used to calculate the sales (i.e. put on the market) of laptops in several countries. By doing this, the Prodcom code for laptops (26.20.11.00) was used, and the international trade code for laptops (84.71.30.00) was used to define imports and exports.

This was used in the “apparent consumption method”: Sales = Domestic Production (From Prodcom) + Import – Export (from international trade). Please note that the codes

are subject to annual change, which must be taken into account when constructing this time-series. This method has been used for several studies conducted by the UNU, and it leads to highly harmonised data. Helpful data to perform those calculations are provided in Annexes 1 and 3, though the outcomes may need to be statistically processed to detect outliers.

Figure 2. Preliminary sales data for laptops derived from Eurostat's database in kg of products per inhabitant for selected European countries.



Example 2: E-waste Flows in the Netherlands

The UNU has for the first time demonstrated this methodology together with Statistics Netherlands in an attempt to document all WEEE flows in the Netherlands [3]. When the project started, about 30 per cent (7.5 kg per inhabitant) of WEEE generated was being documented. As a result of this project, roughly 80 per cent of all WEEE flows are now being documented (19.1 kg per inhabitant). The following insights were obtained, summarized in Table 7 below.

1) Based on methodology that uses production, import and export data for EEE from Statistics Netherlands, combined and validated with other sources, it is calculated that 26,5 kg per capita (440 kt) of EEE was put on the market in 2010. The average for 2007-2009 is 26.8 kg/inh. This method is easily transferable to other countries.

2) In the Netherlands, the amount of e-waste generated including that generated for export is 23.7 kg/inh or 392 kt.

3) E-waste collected and exported (and not registered to national authorities) is estimated as 2.7 kg/inh, (44 kt).

4) The recycling of e-waste mixed with metals is estimated to be 6.6 kg/inh (110 kt).

5) In total, 2.3 kg/inh, mainly small appliances, is ending up in non-separately collected waste (38 kton).

Table 7. Summary table of the e-waste flows in the Netherlands

	Total (kg/inh)	Temperature Exchange Equipment	Screens and Monitors	Lamps	Large Equipment	Small Equipment	Small IT Equipment	Professional
Put on Market EEE	26.5	3.9	2.5	0.3	7.9	7.5	3.0	1.5
Total e-waste	23.7	3.0	3.7	0.2	6.4	6.4	3.0	1.0
E-waste: collection	7.5	1.5	1.9	0.1	1.9	1.6	0.6	0.0
E-waste: recycling with other waste streams	6.6	0.4	0.5	0.0	2.8	1.5	0.7	0.6
E-waste: collected and exported (estimate)	2.7	0.6	0.9	0.0	0.3	0.2	0.6	0.2
E-waste: in waste bin	2.3	0.0	0.0	0.1	0.0	1.6	0.5	0.0
Undocumented e-waste	4.6	0.5	0.5	N/A	1.4	1.5	0.6	0.2

Example 3: E-waste in China

The UNU conducted a project aimed at quantifying the e-waste market in China for six products [21]. Figure 3 shows the sales data of six EEE products on the Chinese market from 1995 to 2011. Annual sales data were calculated from the total quantity of domestic manufacturing, added to the quantity of import while subtracting the quantity of export for specific type of product (comparable

to the method in Example 1). The domestic manufacturing data were derived from the China National Statistic Yearbook 1996-2012 [14], while the international trade data were obtained from the UN COMTRADE database by tracking the corresponding Harmonized System Codes for international goods shipment [22]. Additional data sources were also applied to validate the data [23, 24].

Figure 3. Sales of major electrical and electronic equipment in China (1995-2011)

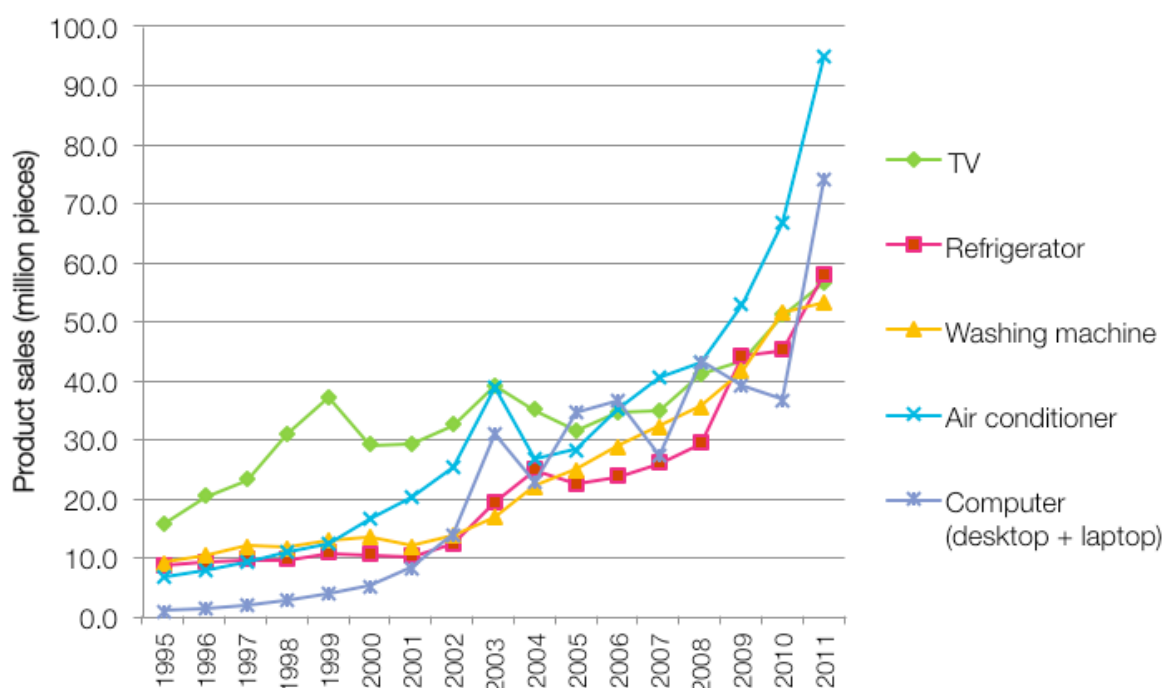


Figure 4 presents the stock of the six types of EEE in Chinese households from 2006 to 2011. The data was calculated from the statistic survey to ascertain the amount of possessed equipment in both urban and rural Chinese

households [14]. These indicators could be proposed as household indicators to be collected through household surveys for other countries.

Figure 4. Stock of EEE in Chinese households (2006-2011)

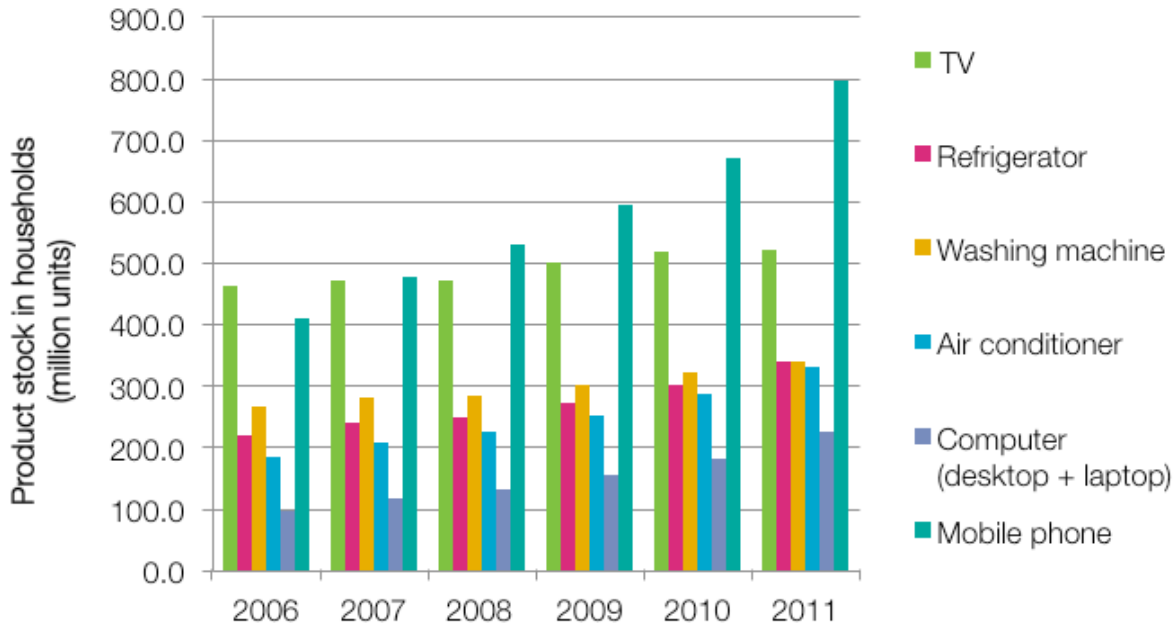
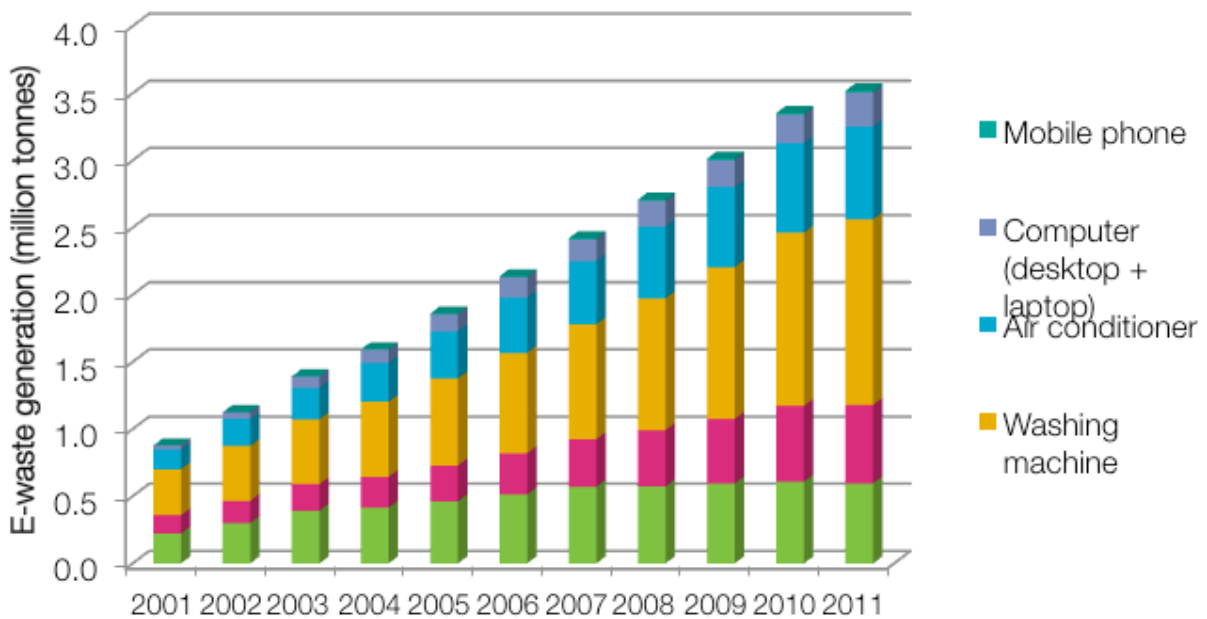


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households [14]. These indicators could be proposed as household indicators to be collected through household surveys for other countries.

Figure 5. Generation of e-waste in China 2001-2011 (in million of tonnes)



Conclusions

These guidelines describe a measurement framework presented that captures the dynamics of e-waste, in which the parameters relate to each other. A minimum requirement of e-waste statistics is also proposed, which can be obtained via household surveys. The central classification to categorise the data is called the UNU-KEYS. Existing harmonised statistical data, such as production statistics, international trade statistics and IT statistics, can be linked to this classification. The memo also presents indicators that can be compiled from the framework, and serve as a resource for policymaking. Harmonising the framework and indicators will be a substantial step towards reaching an integrated and comparable global measurement system for e-waste.

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Annex 1: Link between the UNU-KEYS and HS code

UNU-KEY	UNU Key Description	HS	HS Description
0101	Professional Heating & Ventilation (excl. cooling equipment)	845110	Dry-cleaning machines
0101	Professional Heating & Ventilation (excl. cooling equipment)	845130	Ironing machines and presses including fusing presses
0102	Dishwashers	842211	Dish washing machines (domestic)
0103	Kitchen (f.i. large furnaces, ovens, cooking equipment)	851660	Electric cooking, grilling & roasting equipment nes
0104	Washing Machines (incl. combined dryers)	845011	Automatic washing machines, of a dry capacity < 10 kg
0104	Washing Machines (incl. combined dryers)	845012	Washing machines nes, capacity <10 kg, built-in drier
0104	Washing Machines (incl. combined dryers)	845019	Household/laundry-type washing machines <10 kg, nes
0104	Washing Machines (incl. combined dryers)	845020	Household or laundry-type washing machines, cap >10kg
0105	Dryers (wash dryers, centrifuges)	842112	Clothes-dryers, centrifugal
0105	Dryers (wash dryers, centrifuges)	845121	Drying machines, capacity <10 kg, except washer-drier
0105	Dryers (wash dryers, centrifuges)	845129	Drying machines, nes
0106	Household Heating & Ventilation (f.i. hoods, ventilators, space heaters)	841460	Ventilating hoods having a maximum width < 120 cm
0106	Household Heating & Ventilation (f.i. hoods, ventilators, space heaters)	851621	Electric storage heating radiators
0106	Household Heating & Ventilation (f.i. hoods, ventilators, space heaters)	851629	Electric space heating nes and soil heating apparatus
0108	Fridges (incl. combi-fridges)	841810	Combined refrigerator-freezers, fitted with separate external doors, electric/ other
0108	Fridges (incl. combi-fridges)	841821	Refrigerators, household compression type
0108	Fridges (incl. combi-fridges)	841822	Refrigerators, household absorption type, electric
0108	Fridges (incl. combi-fridges)	841829	Refrigerators, household type, including non-electric
0109	Freezers	841830	Freezers of the chest type, < 800 litre capacity
0109	Freezers	841840	Freezers of the upright type, < 900 litre capacity

0111	Air Conditioners (household installed and portable)	841510	Air conditioners window/wall types, self-contained
0111	Air Conditioners (household installed and portable)	841581	Air conditioners nes with reverse cycle refrigeration
0111	Air Conditioners (household installed and portable)	841582	Air conditioners nes, with refrigerating unit
0112	Other Cooling (f.i. dehumidifiers, heat pump dryers)	841861	Compression refrigeration equipment with heat exchang
0113	Professional Cooling (f.i. large airconditioners, cooling displays)	841583	Air conditioners nes, without refrigerating unit
0113	Professional Cooling (f.i. large airconditioners, cooling displays)	841850	Refrigerator/freezer chests/cabinets/showcases
0113	Professional Cooling (f.i. large airconditioners, cooling displays)	841869	Refrigerating or freezing equipment nes
0114	Microwaves (incl. combined, excl. grills)	851650	Microwave ovens
0201	Other Small Household (f.i. small ventilators, irons, clocks, adapters)	630110	Electric blankets of textile material
0201	Other Small Household (f.i. small ventilators, irons, clocks, adapters)	841451	Table, window, ceiling fans, electric motor <125 watts
0201	Other Small Household (f.i. small ventilators, irons, clocks, adapters)	842310	Personal weighing machines, baby & household scales
0201	Other Small Household (f.i. small ventilators, irons, clocks, adapters)	845210	Household type sewing machines
0201	Other Small Household (f.i. small ventilators, irons, clocks, adapters)	850930	Domestic kitchen waste disposers
0201	Other Small Household (f.i. small ventilators, irons, clocks, adapters)	850980	Domestic appliances, with electric motor, nes
0201	Other Small Household (f.i. small ventilators, irons, clocks, adapters)	851640	Electric smoothing irons
0201	Other Small Household (f.i. small ventilators, irons, clocks, adapters)	910111	Wrist-watch, precious metal, battery, with hands
0201	Other Small Household (f.i. small ventilators, irons, clocks, adapters)	910112	Wrist-watch, precious metal, battery, opto/electric
0201	Other Small Household (f.i. small ventilators, irons, clocks, adapters)	910119	Wrist-watch, precious metal, battery, other
0201	Other Small Household (f.i. small ventilators, irons, clocks, adapters)	910191	Pocket-watch, precious-metal case, battery
0201	Other Small Household (f.i. small ventilators, irons, clocks, adapters)	910211	Wrist-watch, base-metal case, battery, with hands

0201	Other Small Household (f.i. small ventilators, irons, clocks, adapters)	910212	Wrist-watch, base-metal case, battery, opto/electric
0201	Other Small Household (f.i. small ventilators, irons, clocks, adapters)	910219	Wrist-watch, base-metal case, battery, other
0201	Other Small Household (f.i. small ventilators, irons, clocks, adapters)	910291	Pocket-watch, base-metal case, battery
0201	Other Small Household (f.i. small ventilators, irons, clocks, adapters)	910310	Clocks with watch movements, battery (except vehicle)
0201	Other Small Household (f.i. small ventilators, irons, clocks, adapters)	910390	Clocks with watch movements, nes (except vehicle)
0201	Other Small Household (f.i. small ventilators, irons, clocks, adapters)	910511	Alarm clocks, battery or mains powered
0201	Other Small Household (f.i. small ventilators, irons, clocks, adapters)	910521	Wall clocks, battery or mains powered
0201	Other Small Household (f.i. small ventilators, irons, clocks, adapters)	910591	Clocks, nes, battery or mains powered
0201	Other Small Household (f.i. small ventilators, irons, clocks, adapters)	910700	Time switches
0201	Other Small Household (f.i. small ventilators, irons, clocks, adapters)	910811	Assembled battery watch movement, mechanical display
0201	Other Small Household (f.i. small ventilators, irons, clocks, adapters)	910812	Assembled battery watch movement, opto-electric display
0201	Other Small Household (f.i. small ventilators, irons, clocks, adapters)	910819	Assembled battery watch movement, nes
0201	Other Small Household (f.i. small ventilators, irons, clocks, adapters)	910820	Watch movements, complete and assembled, auto-winding
0201	Other Small Household (f.i. small ventilators, irons, clocks, adapters)	910890	Watch movements, complete & assembled (excl. electrically operated), other ...
0201	Other Small Household (f.i. small ventilators, irons, clocks, adapters)	910911	Clock movements, complete and assembled, battery/alar
0201	Other Small Household (f.i. small ventilators, irons, clocks, adapters)	910919	Clock movements, complete and assembled, battery nes
0202	Food (f.i. toaster, grills, food processing, frying pans)	850940	Domestic food grinders, mixers, juice extractors
0202	Food (f.i. toaster, grills, food processing, frying pans)	851672	Electric toasters, domestic
0202	Food (f.i. toaster, grills, food processing, frying pans)	851679	Electro-thermic appliances, domestic, nes
0203	Hot Water (f.i. coffee, tea, water cookers)	851610	Electric instant, storage and immersion water heaters

0203	Hot Water (f.i. coffee, tea, water cookers)	851671	Electric coffee or tea makers, domestic
0204	Vacuum Cleaners (excl. professional)	850811	Vacuum cleaners, with self-contained electric motor; Of a power not > 1,500 W & having a dust bag/other receptacle capacity not > 20 l
0204	Vacuum Cleaners (excl. professional)	850819	Vacuum cleaners, with self-contained electric motor, other than of 8508.11
0204	Vacuum Cleaners (excl. professional)	850860	Other vacuum cleaners, not with self-contained electric motor
0204	Vacuum Cleaners (excl. professional)	850910	Domestic vacuum cleaners
0205	Personal Care (f.i. tooth brushes, hair dryers, razors)	851010	Shavers, with self-contained electric motor
0205	Personal Care (f.i. tooth brushes, hair dryers, razors)	851020	Hair clippers, with self-contained electric motor
0205	Personal Care (f.i. tooth brushes, hair dryers, razors)	851030	Hair-removing appl w/sel
0205	Personal Care (f.i. tooth brushes, hair dryers, razors)	851631	Electric hair dryers
0205	Personal Care (f.i. tooth brushes, hair dryers, razors)	851632	Electro-thermic hairdressing apparatus, nes
0205	Personal Care (f.i. tooth brushes, hair dryers, razors)	851633	Electro-thermic hand drying apparatus
0301	Small IT (f.i. routers, mice, keyboards, external drives & accessoires)	846900	Typewriters other than printers of heading 84.43; word-processing machines.
0301	Small IT (f.i. routers, mice, keyboards, external drives & accessoires)	846911	Word-processing machines
0301	Small IT (f.i. routers, mice, keyboards, external drives & accessoires)	846912	Automatic typewriters
0301	Small IT (f.i. routers, mice, keyboards, external drives & accessoires)	846920	Typewriters, electric, nes
0301	Small IT (f.i. routers, mice, keyboards, external drives & accessoires)	846930	Typewriters, non-electric
0301	Small IT (f.i. routers, mice, keyboards, external drives & accessoires)	847010	Electronic calculators operable with internal power
0301	Small IT (f.i. routers, mice, keyboards, external drives & accessoires)	847021	Electronic calculators, printing, external power
0301	Small IT (f.i. routers, mice, keyboards, external drives & accessoires)	847029	Electronic calculators, non-printing, external power
0301	Small IT (f.i. routers, mice, keyboards, external drives & accessoires)	847110	Analogue or hybrid computers

0301	Small IT (f.i. routers, mice, keyboards, external drives & accessoires)	847170	Storage units
0301	Small IT (f.i. routers, mice, keyboards, external drives & accessoires)	847180	Units of auto data proce
0301	Small IT (f.i. routers, mice, keyboards, external drives & accessoires)	847190	Automatic data processin
0301	Small IT (f.i. routers, mice, keyboards, external drives & accessoires)	854389	Electrical machines and
0302	Desktop PCs (excl. monitors, accessoires)	847141	Dig auto data proc w/cpu
0302	Desktop PCs (excl. monitors, accessoires)	847149	Dig auto data proc units
0302	Desktop PCs (excl. monitors, accessoires)	847150	Digital process units wh
0303	Laptops (incl. tablets)	847130	Portable digital data pr
0304	Printers (f.i. scanners, multifunctionals, faxes)	844331	Machines which perform two/more of the functions of printing, copying/facsimile transmission, capable of connecting to an automatic data processing machine/to a network
0304	Printers (f.i. scanners, multifunctionals, faxes)	844332	Other printers, copying machines & facsimile machines, whether/not combined , exclude the ones which perform two/more of the functions of printing, copying/facsimile transmission; capable of connecting to an automatic data processing machine/ to a network
0304	Printers (f.i. scanners, multifunctionals, faxes)	851721	Facsimiles machines
0304	Printers (f.i. scanners, multifunctionals, faxes)	851722	Teleprinters
0305	Telecom (f.i. (cordless) phones, answering machines)	851711	Line telephone sets,cord
0305	Telecom (f.i. (cordless) phones, answering machines)	851718	Other telephone sets, incl. telephones for cellular networks/for other wireless networks, other than 8517.11 & 8517.12
0305	Telecom (f.i. (cordless) phones, answering machines)	851719	Telephone sets, nes
0305	Telecom (f.i. (cordless) phones, answering machines)	851730	Telephonic or telegraphic switching apparatus

0305	Telecom (f.i. (cordless) phones, answering machines)	851750	Apparatus for carrier-cu
0305	Telecom (f.i. (cordless) phones, answering machines)	851769	Other apparatus for transmission/reception of voice, images/other data, incl. apparatus for communication in a wired/wireless network (such as a local/wide area network) , other than 8517.61 & 8517.62
0305	Telecom (f.i. (cordless) phones, answering machines)	851780	Elect apparatus for line
0305	Telecom (f.i. (cordless) phones, answering machines)	852020	Telephone answering machines
0305	Telecom (f.i. (cordless) phones, answering machines)	852790	Radio reception apparatus nes
0305	Telecom (f.i. (cordless) phones, answering machines)	903040	Gain, /distortion and crosstalk meters, etc
0306	Mobile Phones (incl. smartphones, pagers)	851712	Telephones for cellular networks/for other wireless networks, other than Line telephone sets with cordless handsets
0306	Mobile Phones (incl. smartphones, pagers)	851761	Base stations for transmission/reception of voice, images/other data, incl. apparatus for communication in a wired/wireless network (such as a local/wide area network)
0306	Mobile Phones (incl. smartphones, pagers)	851950	Telephone answering machines
0306	Mobile Phones (incl. smartphones, pagers)	852520	Transmit-receive apparatus for radio, TV, etc.
0307	Professional IT (f.i. servers, routers, data storage, copiers)	844312	Sheet fed, office offset printers, sheet < 22x36 cm
0307	Professional IT (f.i. servers, routers, data storage, copiers)	844339	Other printers, copying machines & facsimile machines, whether/not combined , excl. 8443.31 & 8443.32
0307	Professional IT (f.i. servers, routers, data storage, copiers)	847040	Accounting machines
0307	Professional IT (f.i. servers, routers, data storage, copiers)	847050	Cash registers
0307	Professional IT (f.i. servers, routers, data storage, copiers)	847090	Postage franking, ticket-issuing machines, etc
0307	Professional IT (f.i. servers, routers, data storage, copiers)	900911	Electrostatic photo-copyers, direct process

0307	Professional IT (f.i. servers, routers, data storage, copiers)	900912	Electrostatic photo-copyers, indirect process
0307	Professional IT (f.i. servers, routers, data storage, copiers)	900921	Photo-copying equipment with an optical system, nes
0307	Professional IT (f.i. servers, routers, data storage, copiers)	900922	Contact type photo-copying apparatus, nes
0307	Professional IT (f.i. servers, routers, data storage, copiers)	900930	Thermo-copying apparatus
0308	Cathode Ray Tube Monitors	852821	Color video monitors
0308	Cathode Ray Tube Monitors	852822	B & w video monitors
0308	Cathode Ray Tube Monitors	852841	Cathode-ray tube monitors , of a kind solely/principally used in an automatic data processing system of heading 84.71
0308	Cathode Ray Tube Monitors	852849	Other cathode-ray tube monitors , not of a kind solely/principally used in an automatic data processing system of heading 84.71
0309	Flat Display Panel Monitors (LCD, LED)	852851	Other monitors, of a kind solely/ principally used in an automatic data processing system of heading 84.71
0309	Flat Display Panel Monitors (LCD, LED)	852859	Other monitors, not of a kind solely/ principally used in an automatic data processing system of heading 84.71
0309	Flat Display Panel Monitors (LCD, LED)	853120	Indicator panels incorporating electronic displays
0401	Small Consumer Electronics (f.i. headphones, remote controls)	851810	Microphones and stands thereof
0401	Small Consumer Electronics (f.i. headphones, remote controls)	851830	Headphones, earphones, combinations
0402	Portable Audio & Video (f.i. MP3, e-readers, car navigation)	852712	Pocket-size radio-casset
0402	Portable Audio & Video (f.i. MP3, e-readers, car navigation)	852713	Radio apparatus w/sound
0402	Portable Audio & Video (f.i. MP3, e-readers, car navigation)	852719	Radio receivers, portable, non-recording
0402	Portable Audio & Video (f.i. MP3, e-readers, car navigation)	852731	Radio-telephony receiver, with sound reproduce/record
0402	Portable Audio & Video (f.i. MP3, e-readers, car navigation)	852732	Radio-telephony etc receivers, nes
0402	Portable Audio & Video (f.i. MP3, e-readers, car navigation)	852739	Radio-broadcast receivers nes

0402	Portable Audio & Video (f.i. MP3, e-readers, car navigation)	852791	Other reception apparatus for radio-broadcasting, combined with sound recording/reproducing apparatus.
0402	Portable Audio & Video (f.i. MP3, e-readers, car navigation)	852792	Other reception apparatus for radio-broadcasting, not combined with sound recording/reproducing apparatus but combined with a clock.
0402	Portable Audio & Video (f.i. MP3, e-readers, car navigation)	852799	Other reception apparatus for radio-broadcasting, excl. 8527.91 & 8527.92
0403	Music Instruments, Radio, HiFi (incl. audio sets)	847210	Office duplicating machines
0403	Music Instruments, Radio, HiFi (incl. audio sets)	847230	Machinery for processing mail of all kinds
0403	Music Instruments, Radio, HiFi (incl. audio sets)	847290	Office machines, nes
0403	Music Instruments, Radio, HiFi (incl. audio sets)	851762	Machines for the reception, conversion & transmission/regeneration of voice, images/other data, incl. switching & routing apparatus
0403	Music Instruments, Radio, HiFi (incl. audio sets)	851840	Audio-frequency electric amplifiers
0403	Music Instruments, Radio, HiFi (incl. audio sets)	851850	Electric sound amplifier sets
0403	Music Instruments, Radio, HiFi (incl. audio sets)	851910	Coin or disc-operated record-players
0403	Music Instruments, Radio, HiFi (incl. audio sets)	851920	Apparatus operated by coins, banknotes, bank cards, tokens/by other means of payment
0403	Music Instruments, Radio, HiFi (incl. audio sets)	851921	Record-players without built-in loudspeaker, nes
0403	Music Instruments, Radio, HiFi (incl. audio sets)	851929	Record-players with loudspeakers, nes
0403	Music Instruments, Radio, HiFi (incl. audio sets)	851930	Turntables (record-decks)
0403	Music Instruments, Radio, HiFi (incl. audio sets)	851931	Turntables with automatic record changing mechanism
0403	Music Instruments, Radio, HiFi (incl. audio sets)	851939	Turntables, without record changers
0403	Music Instruments, Radio, HiFi (incl. audio sets)	851940	Transcribing machines

0403	Music Instruments, Radio, HiFi (incl. audio sets)	851981	Other sound recording/reproducing apparatus, using magnetic, optical/ semiconductor media, other than 8519.20, 8519.30, 8519.50
0403	Music Instruments, Radio, HiFi (incl. audio sets)	851989	Other sound recording/reproducing apparatus, other n.e.s. in Ch. 85.19
0403	Music Instruments, Radio, HiFi (incl. audio sets)	851992	Pocket-size cassette-player
0403	Music Instruments, Radio, HiFi (incl. audio sets)	851993	Sound repr app, cassette
0403	Music Instruments, Radio, HiFi (incl. audio sets)	851999	Sound reproducing apparatus, non-recording, nes
0403	Music Instruments, Radio, HiFi (incl. audio sets)	852010	Dictating machine requiring external power source
0403	Music Instruments, Radio, HiFi (incl. audio sets)	852032	Magnetic tape rec digita
0403	Music Instruments, Radio, HiFi (incl. audio sets)	852033	Magnetic tape rec casset
0403	Music Instruments, Radio, HiFi (incl. audio sets)	852039	Non-cassette audio tape recorders, sound reproducing
0403	Music Instruments, Radio, HiFi (incl. audio sets)	852090	Audio recording equipment without sound reproduction
0403	Music Instruments, Radio, HiFi (incl. audio sets)	852721	Radio receivers, external power,sound reproduce/recor
0403	Music Instruments, Radio, HiFi (incl. audio sets)	852729	Radio receivers, external power, not sound reproducer
0404	Video (f.i. Video recorders, DVD, Blue Ray, set-top boxes)	852110	Video recording/reproducing apparatus, magnetic tape
0404	Video (f.i. Video recorders, DVD, Blue Ray, set-top boxes)	852190	Video record/reproduction apparatus not magnetic tape
0404	Video (f.i. Video recorders, DVD, Blue Ray, set-top boxes)	852530	Television cameras
0404	Video (f.i. Video recorders, DVD, Blue Ray, set-top boxes)	852560	Transmission apparatus for radio-broadcasting/television incorporating reception apparatus
0404	Video (f.i. Video recorders, DVD, Blue Ray, set-top boxes)	852830	Video projectors
0404	Video (f.i. Video recorders, DVD, Blue Ray, set-top boxes)	852861	Projectors, Of a kind solely/principally used in an automatic data processing system of heading 84.71

0404	Video (f.i. Video recorders, DVD, Blue Ray, set-top boxes)	852869	Projectors, not of a kind solely/ principally used in an automatic data processing system of heading 84.71
0404	Video (f.i. Video recorders, DVD, Blue Ray, set-top boxes)	852871	Reception apparatus for television, Not designed to incorporate a video display/screen
0404	Video (f.i. Video recorders, DVD, Blue Ray, set-top boxes)	900661	Photographic discharge lamp flashlight apparatus
0404	Video (f.i. Video recorders, DVD, Blue Ray, set-top boxes)	900669	Photographic flashlight apparatus, nes
0404	Video (f.i. Video recorders, DVD, Blue Ray, set-top boxes)	900711	Cinematographic cameras for film <16mm wide
0404	Video (f.i. Video recorders, DVD, Blue Ray, set-top boxes)	900719	Cinematographic cameras for film >16mm wide
0404	Video (f.i. Video recorders, DVD, Blue Ray, set-top boxes)	900720	Cinematographic projecto
0404	Video (f.i. Video recorders, DVD, Blue Ray, set-top boxes)	900810	Slide projectors
0404	Video (f.i. Video recorders, DVD, Blue Ray, set-top boxes)	900830	Image projectors, except slide/ microform
0404	Video (f.i. Video recorders, DVD, Blue Ray, set-top boxes)	900840	Photographic enlargers and reducers, other than cine
0404	Video (f.i. Video recorders, DVD, Blue Ray, set-top boxes)	901010	Equipment for automatic development of photo film
0404	Video (f.i. Video recorders, DVD, Blue Ray, set-top boxes)	901050	App & equip for ph labor
0404	Video (f.i. Video recorders, DVD, Blue Ray, set-top boxes)	901060	Projection screens
0404	Video (f.i. Video recorders, DVD, Blue Ray, set-top boxes)	903130	Profile projectors, nes
0404	Video (f.i. Video recorders, DVD, Blue Ray, set-top boxes)	903149	Optical instruments and
0405	Speakers	851821	Single loudspeakers, mounted in enclosure
0405	Speakers	851822	Multiple loudspeakers, mounted in single enclosure
0406	Cameras (f.i. camcorders, foto & digital still cameras)	852540	Still image video camara
0406	Cameras (f.i. camcorders, foto & digital still cameras)	852580	Television cameras, digital cameras & video camera recorders
0407	Cathode Ray Tube TVs	852812	Color television receive
0407	Cathode Ray Tube TVs	852813	B & W television receive

0407	Cathode Ray Tube TVs	852873	Other reception apparatus for television, whether/not incorporating radio-broadcast receivers/sound/video recording/reproducing apparatus, black & white/other monochrome.
0408	Flat Display Panel TVs (LCD, LED, Plasma)	852872	Other colour reception apparatus for television, whether/not incorporating radio-broadcast receivers/sound/video recording/reproducing apparatus,
0501	Lamps (f.i. pocket, christmas, excl. LED & incandescent)	851310	Portable battery and magneto-electric lamps
0503	Straight Tube Fluorescent Lamps	853941	Arc-lamps
0503	Straight Tube Fluorescent Lamps	853949	Ultra-violet or infra-red
0504	Special Lamps (f.i. professional mercury, high & low pressure sodium)	853931	Fluorescent lamps, hot cathode
0504	Special Lamps (f.i. professional mercury, high & low pressure sodium)	853932	Mercury or sodium vapour
0504	Special Lamps (f.i. professional mercury, high & low pressure sodium)	853939	Discharge lamps, other than ultra-violet lamps, nes
0506	Household Luminaires (incl. household incandescent fittings)	851210	Lighting/signalling equipment as used on bicycles
0506	Household Luminaires (incl. household incandescent fittings)	940510	Chandeliers, other electric ceiling or wall lights
0506	Household Luminaires (incl. household incandescent fittings)	940520	Electric table, desk, bedside and floor lamps
0506	Household Luminaires (incl. household incandescent fittings)	940530	Lighting sets of a kind used for Christmas trees
0507	Professional Luminaires (offices, public space, industry)	940540	Electric lamps, lighting fittings, nes
0601	Household Tools (f.i. drills, saws, high pressure cleaners, lawn mowers)	846721	Drills of all kinds, for working in the hand, with self-contained elec. mot ...
0601	Household Tools (f.i. drills, saws, high pressure cleaners, lawn mowers)	846722	Saws for working in the hand, with self-contained elec. motor
0601	Household Tools (f.i. drills, saws, high pressure cleaners, lawn mowers)	846729	Tools for working in the hand, with self-contained elec. motor (excl. drill ...
0601	Household Tools (f.i. drills, saws, high pressure cleaners, lawn mowers)	850810	Drills, hand-held, with self-contained electric motor
0601	Household Tools (f.i. drills, saws, high pressure cleaners, lawn mowers)	850820	Saws, hand-held, with self-contained electric motor
0601	Household Tools (f.i. drills, saws, high pressure cleaners, lawn mowers)	850880	Tools, hand-held, with electric motor, not drills/saw

0601	Household Tools (f.i. drills, saws, high pressure cleaners, lawn mowers)	850920	Domestic floor polishers
0601	Household Tools (f.i. drills, saws, high pressure cleaners, lawn mowers)	851511	Electric soldering irons and guns
0601	Household Tools (f.i. drills, saws, high pressure cleaners, lawn mowers)	851519	Electric brazing, soldering machines and apparatus ne
0601	Household Tools (f.i. drills, saws, high pressure cleaners, lawn mowers)	851521	Electric resistance welding equipment, automatic
0601	Household Tools (f.i. drills, saws, high pressure cleaners, lawn mowers)	851529	Electric resistance welding equipment, non-automatic
0601	Household Tools (f.i. drills, saws, high pressure cleaners, lawn mowers)	851531	Automatic electric plasma, other arc welding equipmen
0602	Professional Tools (f.i. for welding, soldering, milling)	843311	Mowers, powered, lawn, with horizontal cutting device
0602	Professional Tools (f.i. for welding, soldering, milling)	843319	Mowers, powered, lawn, nes
0701	Toys (f.i. car racing sets, electric trains, music toys, biking computers)	950300	Tricycles, scooters, pedal cars & similar wheeled toys; dolls' carriages; dolls; other toys; reduced-size (
0701	Toys (f.i. car racing sets, electric trains, music toys, biking computers)	950310	Electric trains, train sets, etc
0701	Toys (f.i. car racing sets, electric trains, music toys, biking computers)	950350	Toy musical instruments, apparatus
0701	Toys (f.i. car racing sets, electric trains, music toys, biking computers)	950490	Articles for funfair, table and parlour games, nes
0702	Game Consoles	950410	Video games used with a television receiver
0703	Leisure (f.i. large exercise, sports equipment)	920710	Keyboard instruments electrical/ requiring amplifier
0703	Leisure (f.i. large exercise, sports equipment)	920790	Musical instruments nes, electric/ requiring amplifier
0801	Household Medical (f.i. thermometers, blood pressure meters)	902140	Hearing aids, except parts and accessories
0802	Professional Medical (f.i. hospital, dentist, diagnostics)	901811	Electro-cardiographs
0802	Professional Medical (f.i. hospital, dentist, diagnostics)	901812	Ultrasonic scanning appr
0802	Professional Medical (f.i. hospital, dentist, diagnostics)	901813	Magnetic resonance imagi
0802	Professional Medical (f.i. hospital, dentist, diagnostics)	901814	Scintigraphic apparatus

0802	Professional Medical (f.i. hospital, dentist, diagnostics)	901819	Electro-diagnostic apparatus, nes
0802	Professional Medical (f.i. hospital, dentist, diagnostics)	901841	Dental drill engines
0901	Household Monitoring & Control (alarm, heat, smoke, excl. screens)	853110	Burglar or fire alarms and similar apparatus
0901	Household Monitoring & Control (alarm, heat, smoke, excl. screens)	853180	Electric sound or visual signalling apparatus, nes
0901	Household Monitoring & Control (alarm, heat, smoke, excl. screens)	854340	Electric fence energiser
0901	Household Monitoring & Control (alarm, heat, smoke, excl. screens)	854370	Other machines & apparatus for electrical machines & apparatus, other than than machines & apparatus for electroplating/ electrolysis/ electrophoresis/signal generators/ particle accelerators.
0901	Household Monitoring & Control (alarm, heat, smoke, excl. screens)	901730	Micrometers, callipers and gauges
0901	Household Monitoring & Control (alarm, heat, smoke, excl. screens)	902410	Machines for testing mechanical properties of metals
0901	Household Monitoring & Control (alarm, heat, smoke, excl. screens)	902480	Machines for testing mechanical properties nes
0901	Household Monitoring & Control (alarm, heat, smoke, excl. screens)	902519	Thermometers, except liquid filled
0901	Household Monitoring & Control (alarm, heat, smoke, excl. screens)	902580	Hydrometer, pyrometer, hygrometer, alone or combined
0901	Household Monitoring & Control (alarm, heat, smoke, excl. screens)	902610	Equipment to measure or check liquid flow or level
0901	Household Monitoring & Control (alarm, heat, smoke, excl. screens)	902620	Equipment to measure or check pressure
0901	Household Monitoring & Control (alarm, heat, smoke, excl. screens)	902680	Equipment to measure, check gas/ liquid properties nes
0901	Household Monitoring & Control (alarm, heat, smoke, excl. screens)	902710	Gas/smoke analysis apparatus
0901	Household Monitoring & Control (alarm, heat, smoke, excl. screens)	902780	Equipment for physical or chemical analysis, nes
0901	Household Monitoring & Control (alarm, heat, smoke, excl. screens)	903020	Cathode-ray oscilloscopes, oscillographs
0901	Household Monitoring & Control (alarm, heat, smoke, excl. screens)	903033	Other instruments & apparatus, for measuring/checking voltage, current, resistance/power, without a recording device, other than 9030.31 & 9030.32,

0901	Household Monitoring & Control (alarm, heat, smoke, excl. screens)	903039	Ammeters, voltmeters, ohm meters, etc, non-recording
0901	Household Monitoring & Control (alarm, heat, smoke, excl. screens)	903089	Electrical measurement instruments nes
0901	Household Monitoring & Control (alarm, heat, smoke, excl. screens)	903180	Measuring or checking equipment, nes
0901	Household Monitoring & Control (alarm, heat, smoke, excl. screens)	903210	Thermostats
0902	Professional Monitoring & Control (f.i. laboratory, control panels)	901510	Rangefinders
0902	Professional Monitoring & Control (f.i. laboratory, control panels)	901520	Theodolites and tacheometers
0902	Professional Monitoring & Control (f.i. laboratory, control panels)	901530	Surveying levels
0902	Professional Monitoring & Control (f.i. laboratory, control panels)	901540	Photogrammetrical surveying instruments, appliances
0902	Professional Monitoring & Control (f.i. laboratory, control panels)	901580	Surveying, etc instruments nes
1001	Non Cooled Dispensers (f.i. for vending, hot drinks, tickets, money)	847629	Autom bev-vendng mach ne
1001	Non Cooled Dispensers (f.i. for vending, hot drinks, tickets, money)	847689	Automatic vending mach n
1002	Cooled Dispensers (f.i. for vending, cold drinks)	847621	Aut bev-vend m heat/refr
1002	Cooled Dispensers (f.i. for vending, cold drinks)	847681	Autom vendng mach h/refr

Annex 2: Lifespan profiles of various EEE in the Netherlands, France and Belgium

EEE Category	Lifespan distribution (Weibull) [2]	
	α (shape)	β (scale)
1. Large household appliance		
0101	1.8	15.8
0102	1.6	13.1
0103	2.5	18
0104	2.2	13.9
0105	2.6	16.5
0106	2	13.5
0108	2.2	16.5
0109	2.6	23.2
0111	2.8	12.3
0112	2.4	13.6
0113	2.5W	20.6
0114	0.8	14.7
2. Small household appliances		
0201	1.3	9.4
0202	1.3	12.3
0203	1.8	7.9
0204	1.5	10.3
0205	1.3	10.8
3. IT and telecom equipment		
0301	1.3	5.9
0302	2.1	9.6
0303	1.5	5.2
0304	1.7	10.1
0305	2.1	6.5
0306	0.7	7.6
0307	1.5	7.8
0308	2.2	8.5
0309	2.5	7.5
4. Consumer equipment		
0401	1.4	10.2
0402	0.8	8
0403	2.1	15.6

0404	1.7	10.5
0405	1.5	10.8
0406	1.4	8.2
0407	2	12.6
0408	2.1	12
5. Lighting equipment		
0501	1.4	8.72
0502	1.6	8.43
0503	1.9	8.43
0504	1.6	6.9
0505	1.2	4.57
0506	2.3	16.59
0507	2	11.84
6. Electrical and electronic tools		
0601	2	6.6
0602	1.9	11.6
7. Toys, leisure and sports equipment		
0701	2.6	15.7
0702	1.5	4.7
0703	1.2	5.6
8. Medical devices		
0801	2.4	11.6
0802	1.4	7.6
9. Monitoring and control instruments		
0901	2.6	19.2
0902	1.7	9.6
10. Automatic dispensers		
1001	1.9	11.6
1002	2	10.1

Annex 3: Indication of average weight (kg/unit) for EU-28

UNU-KEY	1995	2000	2005	2010	2011	2012
0001	34,7	32,3	30,9	30,9	30,9	28,1
0002	12,0	12,0	12,0	20,0	20,0	20,0
0101	59,9	57,0	52,7	49,5	50,0	48,9
0102	76,8	49,5	45,5	43,3	43,3	42,7
0103	47,3	47,8	45,4	47,7	47,7	45,9
0104	72,6	73,1	71,4	72,4	72,4	71,5
0105	59,6	46,9	43,2	45,9	46,0	43,5
0106	7,6	5,9	5,6	5,3	5,1	5,2
0107	No longer used					
0108	40,2	47,0	52,3	55,0	55,2	54,1
0109	50,6	44,1	43,9	44,1	44,1	43,3
0110	No longer used					
0111	33,4	47,3	26,6	26,6	26,6	25,2
0112	46,2	42,5	41,2	41,0	41,0	38,8
0113	162,3	99,0	109,0	90,2	92,8	90,5
0114	17,6	19,2	20,6	22,9	22,9	22,2
0201	0,8	0,9	0,8	0,8	0,9	0,8
0202	3,1	5,0	4,5	3,0	2,7	2,6
0203	1,8	2,7	1,3	2,8	2,9	2,8
0204	5,3	5,5	5,5	5,9	5,9	5,8
0205	0,7	0,6	0,5	0,5	0,5	0,5
0301	0,6	0,6	0,9	0,3	0,4	0,3
0302	15,0	10,2	9,2	8,8	8,8	8,8
0303	4,9	4,3	3,7	3,2	3,2	3,0
0304	7,8	8,3	9,1	10,3	10,3	10,0
0305	0,9	0,6	0,5	0,5	0,5	0,4
0306	0,6	0,2	0,1	0,1	0,1	0,1
0307	40,0	40,0	40,0	40,0	40,0	40,0
0308	22,8	17,9	19,4	22,0	22,0	13,0
0309	5,0	5,6	5,3	5,5	5,5	5,4
0401	0,4	0,4	0,4	0,4	0,4	0,4
0402	0,3	0,3	0,3	0,2	0,2	0,2
0403	3,3	3,3	2,3	3,4	3,5	3,4
0404	4,9	4,2	4,0	2,6	2,9	2,7
0405	3,4	2,9	2,4	2,1	2,1	2,1

UNU-KEY	1995	2000	2005	2010	2011	2012
0406	1,0	0,9	0,5	0,3	0,3	0,3
0407	27,8	28,8	28,4			
0408			12,0	14,7	14,7	14,3
0501	0,1	0,1	0,1	0,1	0,1	0,1
0502	0,1	0,1	0,1	0,1	0,1	0,1
0503	0,1	0,1	0,1	0,1	0,1	0,1
0504	0,1	0,1	0,1	0,1	0,1	0,1
0505				0,08	0,08	0,08
0506	0,6	0,5	0,5	0,5	0,5	0,5
0507	3,1	4,9	2,7	2,7	2,7	2,6
0601	16,7	15,9	15,2	15,2	15,2	14,4
0602	2,8	3,0	3,0	3,5	3,4	3,3
0701	0,5	0,5	0,5	0,5	0,5	0,5
0702	2,4	2,1	2,0	2,0	2,0	1,9
0703	52,0	52,0	52,0	52,0	52,0	52,0
0801	0,3	0,2	0,2	0,2	0,2	0,2
0802	67,1	67,1	67,1	67,1	67,1	67,1
0901	0,8	0,3	0,3	0,4	0,3	0,3
0902	8,5	6,2	5,5	5,5	5,5	5,4
1001	51,0	46,4	44,0	44,0	44,0	43,2
1002	166,0	93,8	92,2	92,2	92,2	90,6



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of Sustainability

United Nations University (UNU)

The United Nations University is an international community of scholars engaged in research, postgraduate training and the dissemination of knowledge in furtherance of the purposes and principles of the United Nations, its Peoples and Member States. The University functions as a think tank for the United Nations system, contributes to capacity building, particularly in developing countries, and serves as a platform for new and innovative ideas and dialogue.

UNU Institute for the Advanced Study of Sustainability (UNU-IAS)

UNU-IAS is a new UNU institute, created in January 2014 by consolidating the former UNU Institute of Advanced Studies and UNU Institute for Sustainability and Peace (UNU-ISP). It is based at UNU Headquarters in Tokyo. The mission of UNU-IAS is to serve the international community through policy-relevant research and capacity development focused on sustainability, including its social, economic and environmental dimensions.

UNU-IAS applies advanced research methodologies and innovative approaches to challenge conventional thinking and develop creative solutions to emerging issues of global concern in these areas. The institute's research, education and training combine expertise from a wide range of areas related to sustainability, and engage a global network of scholars and partner institutions. Through postgraduate teaching UNU-IAS develops international leaders with the interdisciplinary understanding and technical skills needed to advance creative solutions to problems of sustainability.

UNU-IAS Operating Unit Sustainable Cycles (UNU-IAS SCYCLE)

UNU-IAS SCYCLE is an operating unit of UNU-IAS based in Bonn, Germany. Its activities are focused on the development of sustainable production, consumption and disposal scenarios for electrical and electronic equipment, as well as other ubiquitous goods. SCYCLE leads the global e-waste discussion and advances sustainable e-waste management strategies based on life-cycle thinking.

Within this context UNU-IAS SCYCLE:

- conducts research on eco-structuring towards sustainable societies;
- develops interdisciplinary and multi-stakeholder public-private partnerships;
- assists governments in developing e-waste legislation and standards, meeting a growing need for such support;
- undertakes education, training and capacity development; and
- facilitates and disseminates practical, science-based recommendations to the United Nations and its agencies, governments, scholars, industry and the public.



Partnership on Measuring ICT for development

The Partnership on Measuring ICT for development is aiming to create an internationally recognized framework for global statistics to evaluate the fate of electronic products and the resulting e-waste flows. This document has been gone through public consultation, and the approved version can be found here.

The central classification for e-waste are the so-called UNU-KEYS. The UNU-KEYS groups electronic products into homogeneous groups of average weight, market behaviour, and environmental relevance. UNU-KEYS have been developed as a backbone of data gathering and calculations. The international standardized Harmonized Commodity Description and Coding System, also known as the Harmonized System (HS) or tariff nomenclature, is globally used to classify traded products, including electronics. UNU-KEYS can be linked to the HS codes, as well to other and relevant applicable legislation.

Task Group on Measuring E-waste

The overall objective of the Task Group is to support the compilation of reliable data on e-waste as basis for political decision making and further action on the environmentally sound management of used and end-of-life ICT equipment. The immediate objective of the Task Group is to develop a framework for monitoring e-waste based on internationally defined indicators.

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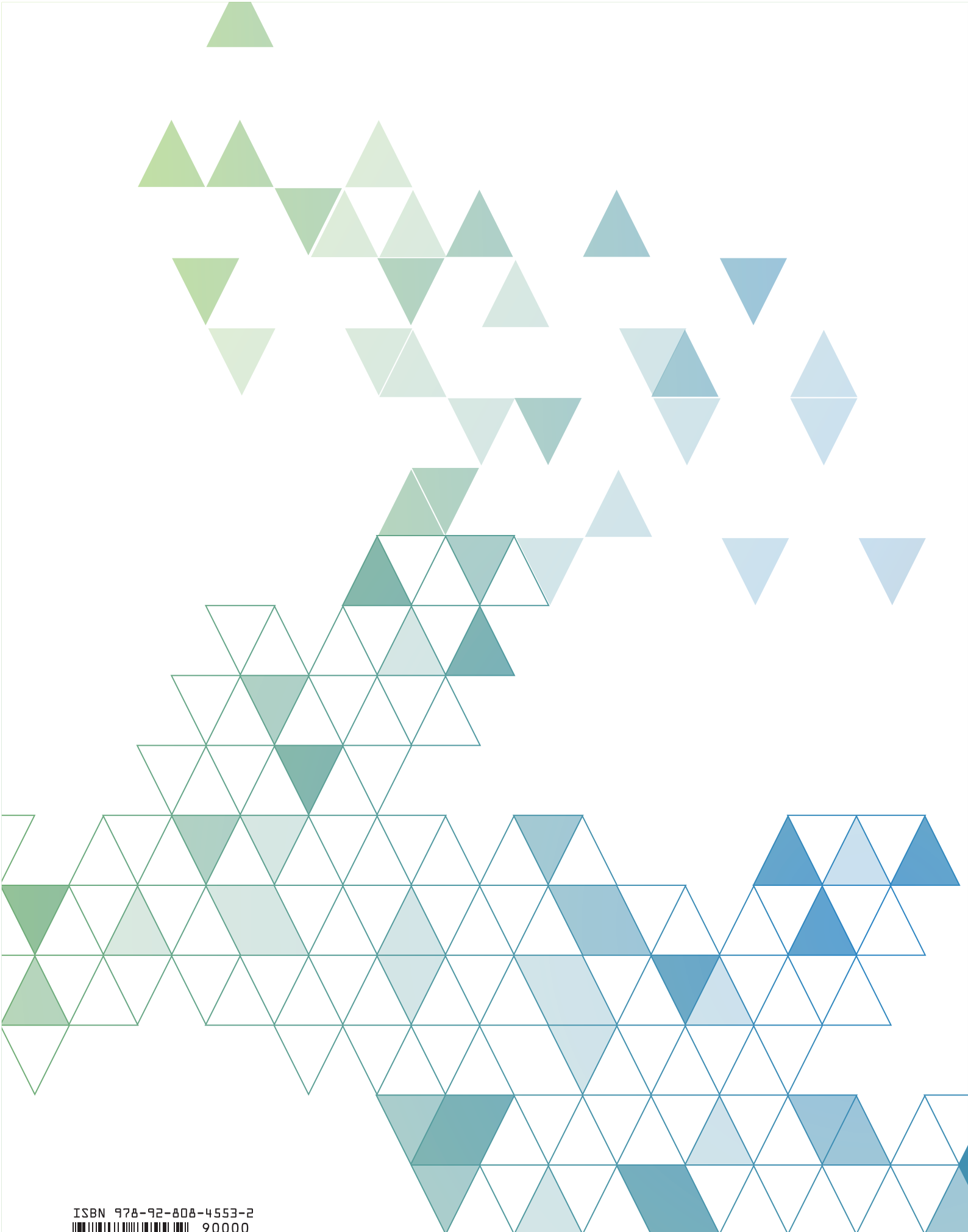
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