

# EVALUATION OF PROFESSIONAL WEEE ARISING IN FRANCE IN 2012

August 2014

Study performed for ADEME by BIO by Deloitte (Benoît TINETTI – Alice DEPROUW – Sarah GUILCHER), in collaboration with BVA (Régis OLAGNE – Delphine CHAMIGNON)

Contract N° 1302C0001

**Technical coordination :** Erwann Fangeat – Service Produits et Efficacité Matière – Direction Economie Circulaire et Déchets – ADEME Angers



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**FINAL REPORT**

## ACKNOWLEDGEMENTS

INYUMA Maïlys	CISMA
LEFEVRE Emmanuel	Défabnord
DEGAND Ludovic	Ecologic
PERRIER René-Louis	Ecologic
REYGNER Bertrand	Ecologic
ASSIMON Pierre-Marie	Eco-systèmes
YSERD Nathalie	Eco-systèmes
MABILEAU Stéphanie	EMMAÛS France
BADOU Philippe	ERP
COUTURIER Rémi	ERP
BAILLY Marie-Hélène	Fédération ENVIE
POZZI Tess	FEDEREC
DUGOURGEOT Julien	FEDEREC/Derichembourg
LERMECHIN Pascal	FEDEREC/Paprec
DRETSCH Gilles	FFT
BOURHIS Marc	FICAM
JAMMES Catherine	FICIME
WEDRYCHOWSKA Anne-Charlotte	FIEEC
de BAILLENX France	FIMECA
NOURY Lisa	FIMECA
BIZOT Pierre	FNADE
VERGNON Clotilde	FNADE
JAGU Catherine	Gimélec
HUIN Vincent	IGNES
CEZILLY Nolwenn	Ministry of Economy, Finances and Industry
HOSATTE Cyril	Ministry of Ecology, Sustainable Development and Energy
BODILIS-REGUER Nicolas	NAVSA
DECOEUR-MICHEL Myriam	NAVSA
GILLIER Sophie	PERIFEM
GRIMAUD Hervé	Récylum
LANDEROIN Fabienne	Récylum
MONTAGNE Vanessa	Récylum
ROYER François	SDMO
MORABITO Stella	SECIMAVI (FICIME)
FILLOUX Jaques	SERCE
COLIN Patrick	SERCE / Eiffage Energie
FILA Patrice	SERCE / Eiffage Energie
BOISANTE Sylvie	SFIB (Brother)
MARTIAL Catherine	SFIB (HP)
POCHITALOFF-HUVALE Michel	SFIB (IBM)
KOSSIVI Olympio	SFIB (Lexmark)
RIMBAULT Sylvie	SFIB (Lexmark)
MARCOUYOUX Caroline	SFIB
HEGER Bernard	SIMAVELEC
LACCOURREYE Jean-Lionel	SIRMIET
NAUCHE Patrick	SNCF
ROY Philippe	SNEFCCA
LEVISTRE Gérald	SNESSI
OLLÉ Florence	SNITEM
NAWROT Fleur	SYMOP
PARASCANDOLO Nicolas	SYMOP
RIMBAULT Sylvie	SYNAFEL
DUPRÉ Guy-Noel	UNICLIMA
HERAUD Marc	USPII

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## EXECUTIVE SUMMARY

According to the new EU legislation on Waste of Electrical and Electronic Equipment (WEEE)<sup>1</sup>, Electrical and Electronic Equipment (EEE) is considered as being professional use if it is not likely to be used by households, but by businesses alone. Holders of Pro EEE put on the market before 13/08/2005 are responsible for the end of life of this equipment, unless it is replaced by equivalent new equipment (and thus taken back by the supplier). In the case of equipment put on the market after 13/08/2005, or of older equipment acquired through a replacement, the producers are responsible for the end of life of the equipment. This survey, which follows on from the survey on household and similar WEEE<sup>2</sup> arisings undertaken for OCAD3E and ADEME in 2013 by BIO, sets out to answer the following questions:

- What quantity (tonnage) of professional WEEE was generated in France in 2012?
- How do businesses and local authorities manage their professional WEEE, and which collection and recycling channels are used for such flows?
- What actions would increase knowledge on professional WEEE arisings and increase collection rates as well as the quality of treatment?

### 1. What quantity (tonnage) of professional WEEE was generated in France in 2012?

The scope of professional (Pro) EEE was not easy to define because of the diversity of Pro equipment, the different interpretations of the WEEE II Directive (Directive 2012/19/EU) held by the parties involved and the change in scope by 2018 (this study is called "open scope"). Thus, in agreement with the members of this study's Steering Committee, the scope of Pro EEE was divided into **78 types of equipment** spread across **5 "sectors"** associated with five working groups (WG). In parallel, a sixth WG was formed, which focuses on Pro EEE in the industrial sector (EEE specific to factories). In this WG, the EEE have not been classified by equipment type, but by industry type (manufacturing industries versus process industries).

The calculation methodology used to evaluate the arisings of household and similar WEEE could not be used in the present study. To calculate the arisings of Pro equipment, BIO therefore identified **several possible calculation methods**, based on the data available (tonnage put on the market annually or installed base (in tonnage) of the equipment, lifetime for of the equipment, etc.).

In addition, a **"reliability index"** has been assigned to each arising ("+++": high reliability; "++": relatively high reliability; "+": limited reliability), according to the volume of "robust" data (e.g. issuing from surveys conducted by federations or other involved parties, recent statistics, etc.) and the volume of "estimated" data (hypothetical orders of magnitude presumed to be realistic) used in the calculation of each of the arisings. Reuse, a key element since it can significantly reduce the arising, is sometimes included in the total holding period for an equipment type. Where this is not the case, BIO has sought to evaluate it using the information available.

In the end, **the total Pro WEEE arisings**, as assessed by BIO, were **close to 210,000 tonnes in 2012**, and are distributed as shown in Table 1.

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<sup>1</sup> Directive 2012/19/EU of the European Parliament and of the Council of 4 July 2012 on waste electrical and electronic equipment (WEEE), published on 24 July 2012 in the Official Journal of the EU and coming into force on 13 August 2012. It repeals Directive 2002/96 with deferred effect to 15 February 2014 and provides for a transitional period.

<sup>2</sup> See Glossary on the concept of "similar household".

**Table 1: Summary of the assessment of French Pro WEEE arisings in 2012**

Sectors / Working Groups	French arisings in 2012 (tonnes)
WG A. "Construction"	104,578
	33,926
WG B. "ICT, office and audiovisual"	<i>[+ 43,500 tonnes of assimilated household WEEE not included in this study]</i>
WG C. "Network infrastructures"	16,514
WG D. "Industrial sector"	Not assessed
WG E. "Market services and service sector"	40,845
WG F. "Medical devices and instrumentation from laboratories and research institutions"	14,000
<b>Total Pro WEEE arisings in 2012</b>	<b>209,864</b>

It is difficult to quantify the margin of error for this estimate. However BIO believes that **44.5% of the professional arisings evaluated is reliable** ("+++ index), **46% is relatively reliable** ("++ index) and **9.5% is of limited reliability** ("+" index).

Professional WEEE arisings are about six times smaller than household and assimilated WEEE arisings, estimated at 1.3 million tonnes in the same year. However, it is important to emphasise that the **Pro WEEE arisings are considerably underestimated here**. In fact, due to the lack of available data, **arisings of 24 types of equipment** (out of the 78 defined in the WGs, apart from the specific industrial sector WG) **could not be estimated, seven of which**, a priori, are **not insignificant** (criteria defined in the report). Furthermore, "**industrial sector**" professional WEEE arisings could not be estimated due to lack of available data and the lack of clarity in French and European regulations on the scope of large-scale stationary installations and large-scale stationary industrial tools. Lastly, it is possible that certain types of equipment may have been "overlooked" in the theoretically exhaustive list of the 78 types of Pro WEEE mentioned in this study.

Nevertheless, the study has identified the largest arisings. **Six types of equipment account for 54% of the arisings that have been documented**. These are HVAC (excluding server cooling systems) (23.5%), other electrical installation and home automation systems equipment (excluding GLVUs<sup>3</sup>) (9.5%), medical devices and electrical medical furniture (7.0%), vending machines (food) and ATMs (cash) (5.8%), pumping and water supply systems<sup>4</sup> (4.6%), and lastly commercial food refrigerator and freezer equipment (4.3%).

### **1. How do businesses and local authorities manage their professional WEEE, and which collection and recycling channels are used for such flows?**

#### **BVA survey**

BIO supervised a statistical survey, subcontracting it to the BVA market and opinion research institute, to gather qualitative information on the way businesses handle their WEEE. This survey was conducted by

<sup>3</sup> GLVU: General Low Voltage Unit.

<sup>4</sup> There is some doubt remaining about 8,000 tonnes of water pump arisings, as such equipment could be considered as part of a large-scale fixed installation according to PROFLUID.

telephone with **1,003 organisations**, a sample stratified according to activity (5 major sectors were defined) and the size of the organisation, or the number of inhabitants in the case of local authorities.

**Microbusinesses and self-employed entrepreneurs** (e.g. doctors working in their account) represent a large proportion of the panel interviewed because the way they deal with their used EEE has a significant impact on the size of the arisings and the destinations of their flows.

It is important to note that the **answers** given are **declarative** and that **the results of the BVA survey reflect behaviours** and trends. From these, it is not possible to deduce quantitative data about the proportion of equipment dealt with in one way or another.

The BVA survey reveals that:

- When their equipment breaks down, almost all businesses repair or replace it, 22% retrieve the spare parts, and it is usually the suppliers who come to take back any leased equipment, as is the case with vending machines (93% of cases) and computer equipment (88% of cases).<sup>5</sup>
- Within each sector, differences in practices are observed according to the size of the company or local authority, and the type of equipment. As companies grow they tend, for example, to make fewer visits to the recycling centres, instead enlisting the services of specialists (result to be seen in relative terms as some respondents may have confused "waste treatment drop-off" with the conventional systems of waste management (residual, and bulky, household waste, etc.).
- For 38% of the respondents, after equipment has been taken away, it is usually sent to a treatment provider or a repair/resale business, preferably in France. 50% of respondents did not know where the WEEE was taken when it was collected by external service providers.
- 70% of respondents do not have any particular issues in managing their WEEE. The remaining 30% indicate a number of barriers to good WEEE management: lack of space, logistical complications, insufficient time and information.

### **Complementary survey by BIO**

In addition to the BVA survey, BIO canvassed players working on reuse, collection and processing to refine its information about the management and purpose of some equipment. It held 10 or so telephone interviews and visited a site (COREPA, a factory processing large refrigeration appliances).

**Health sector:** According to Récyllum, one of the leaders in the refurbishing and resale of professional used medical equipment, **at least 1,000 tonnes of electrical medical equipment coming from French facilities is given a second life every year**. In France, the black market is enjoying a flourishing trade in electrical medical devices. Hospital staff working in many of the French hospitals sell medical equipment to brokers on their own behalf. The interviewed refurbishing company stated that 10% of the equipment it recovers ends up in a WEEE processing centre (for recycling) and 90% is sold off, with the great majority (80%) exported (to Maghreb and sub-Saharan African countries). **Export is still ahead of resale in France**, but now that it is becoming important to cover public expenditure, the French market for used medical equipment is growing strongly among the hospital structures.

**ICT equipment:** For IT, electronic and pro-telecom EEE equipment, there are many reuse stakeholders, and we still know little about the process. It is estimated that approximately 20,000 tonnes of used professional ICT equipment is processed by refurbishing and resale operators (asset managers, members of SIRMIET), and an unknown quantity, but also probably equally important, by the brokers who do not refurbish the equipment. Out of all the purchases made by the asset managers, 15 to 20% of the tonnages are unsellable, and are therefore sent to the WEEE arisings.

**More than half the tonnages sold by the asset managers are to export markets and the figure is closer to 80% in the case of brokers.**<sup>6</sup> Illegal export, the export of equipment which is said to be

<sup>5</sup> It is strongly advised to refer to section III.4.1 before interpreting any of the results.

<sup>6</sup> SIRMIET estimations.

functional but which in reality is not (although there is some hope of it being repaired in the destination country), or the export of undeclared equipment, is very difficult to quantify today.

***Refrigeration and air-conditioning systems:*** As far as professional refrigeration systems are concerned, installers dismantle them, recover the refrigerant fluids which they pass on to fluids distributors (in more than 95% of the cases) who attempt to regenerate them if the fluids are sufficiently pure, and if different types of fluids have not been mixed together. For hermetically sealed equipment like refrigerated showcases and independent mobile air-conditioners (equipment similar to household equipment but used for commercial purposes), the equipment is generally recovered by WEEE processing centres which capture the types of mixed gases in order to destroy them.

**2. Are there any actions that would give us better knowledge of the arising and increase the collection factor and the processing quality?**

In this third and final phase of the study, BIO is making recommendations to:

- **Boost the collection or Pro WEEE in France:**
  - Communicate more about the various options of collecting and processing WEEE among the companies and administration/local authorities, and about the applicable regulations;
  - Optimise collection and sorting solutions to compensate for the lack of storage space among companies; and
  - Set up more stringent WEEE management policies among companies and in hospitals.
- **Make data collection systematic to evaluate the WEEE Pro arising:**
  - Clarify the perimeter of Pro EEE, of Large-Scale Stationary Installations (LSSI) and Large-Scale Stationary Industrial Tools (LSSIT), while improving the reliability of the WEEE reports of Pro EEE putting on the market in the ADEME Register;
  - Update the 2009 Ecologic study of the resale of ICT equipment sector;
  - Obtain reliable data about (W)EEE exports by reinforcing the action of the customs authorities (e.g. making the transmission of information from producer responsibility organisations, information to be fed back for instance to the Ministry of Ecology, in particular concerning facilities with processing methods not conforming to national regulations).

## I. GLOSSARY

ACRONYMS	
<b>WG</b>	Working Groups which bring together federations and professional unions concerned by each sector or type of equipment,
<b>POM</b>	Put On the Market
<b>SH4</b>	<p>SH4 is a four figure customs code; it uses the harmonised goods designation and codification nomenclature (SH) of the World Customs Organization (WCO). The SH4 code is part of the mandatory fields to be filled in by producers when registering their types of product equipment on the WEEE Register, in the same way as the equipment category indicated in appendix I of the WEEE decree.</p> <p>SH4 gives a higher level of detail than the 10 categories of EEE put on the market. However, it does not give an accurate identification of the equipment put on the market by the producer. In fact, each code combines a greater or lesser number of equipment types.</p>
<b>GLVU</b>	<p>The GLVU (General Low Voltage Unit) distribution cabinet distributes and manages energy. The GLVU is represented by a system of racks and cabinets. The racks and cabinets can be composed at will and must comply with the IEC standard 61 439-1.</p> <p>This unit is the link between the input of the distribution grid (ERDF in France) and the customer grid (customer, private user...). It may be followed by division units, depending on the size and the specification of the installation.</p>
<b>UNU</b>	United Nations University – This research centre has developed a method and model for evaluating a WEEE arising. The model was used for evaluating the household WEEE arisings in France, in the Netherlands, in Belgium and in Italy.
DEFINITIONS	
<b>Asset Managers</b>	Asset Managers buy and refurbish (sometimes) and sell equipment. In doing so, they supply supplementary services linked with company inventory management.
<b>Brokers</b>	Like the Asset Managers, the brokers buy and sell equipment but their action on the equipment is confined to its storage and sale by batches. Some of them do not handle the products, and some do not even see them. A broker is simply a trader.
<b>Waste</b>	According to the framework law of 15 July 1975, the term waste refers to any residue of a production, transformation or use process, any substance, material, products or more generally any unattached asset which is abandoned or which its owner intends to abandon.

<p><b>Assimilated wastes</b></p>	<p>Assimilated wastes include the wastes of economic activities which can be collected with household waste with respect to the characteristics and the produced quantities, without any special technical considerations. These are company wastes (from artisans or shopkeepers etc.) or waste from the tertiary sector (administrations, hospitals etc.) collected under the same conditions as household refuse.<sup>7</sup> It is therefore considered as household refuse.</p>
<p><b>Waste from Electronic and Electric Equipment (WEEE)</b></p>	<p>EEE becomes WEEE as soon as the owner abandons it or intends to abandon it because it is no longer of any use.<sup>8</sup></p>
<p><b>Household WEEE</b></p>	<p>WEEE of a household origin and WEEE deriving from commercial, industrial, institutional or other origins, which because of their type or quantity, are similar to household waste, Wastes coming from EEE and which are liable to be used both by households and by other users than households are considered in any case as being WEEE coming from households (see "assimilated wastes").<sup>8</sup></p>
<p><b>Professional WEEEs (Pro WEEE )</b></p>	<p>A WEEE is considered to be professional if it is not household waste under the terms of the above definition. It is equipment waste used specifically by professionals.</p>
<p><b>Lifespan</b></p>	<p>The concept of the "lifespan" refers to different periods, depending on the bibliographic source.</p> <p>The lifespan pertaining to use can be defined as the period of time between when the product is used, i.e., in operating condition and ready to use, by a given user. It is specific to a user/company. The total use lifespan is the sum of the use lifespans.<sup>9</sup></p> <p>The holding time corresponds to the time and lapsing between its date of entry into a home/company (not necessarily new) and the date it leaves it whatever the its condition (operational or not). This includes storage times before and after putting into use and after stoppage of its use. It is specific to a user and includes any possible repair. It can be expressed with the use lifespan.<sup>9</sup></p> <p>The total holding time is the sum of the holding times. It corresponds to the period of time between the purchase of a new device and its change to the status of waste, whatever the state of the device (operational or not). It includes the possible repair and reuse. The total holding time is therefore equal to or greater than the total use time, because of the possible storage of the devices in the homes or companies.<sup>9</sup></p> <p>In this study, the lifespan considered is the total holding time, <u>because what matters is the time when the equipment is collected for end-of-life processing.</u></p>

<sup>7</sup> 2ACR, Glossary of basic terms.

<sup>8</sup> WEEE Directive 2012/19/EU, Article 3.

<sup>9</sup> BIO Intelligence Service (2012), Study on lifespan of electrical and electronic equipment.

<b>Electrical and Electronic Equipment (EEE)</b>	Equipment running on electric current or electromagnetic fields, and equipment for the production, transfer or measurement of these currents and fields, designed for use at a voltage of no more than 1000 V AC and 1000 V DC. <sup>8</sup>
<b>Large-scale stationary industrial tools (LSSIT)</b>	A large-scale system of machines, equipment and/or components operating together for a specific application, installed permanently and disassembled by professionals at a given place and used and maintained by professionals in an industrial manufacturing centre or a research and development facility. <sup>8</sup>
<b>Large-scale stationary installation (LSSI)</b>	A large-scale combination of several types of appliances and where applicable other devices which: <ol style="list-style-type: none"> <li>i. are assembled, installed and disassembled by professionals;</li> <li>ii. are designed to be used permanently as an integral part of a construction or a structure at a pre-defined and dedicated place; and</li> <li>iii. can only be replaced by the same specifically designed equipment.<sup>8</sup></li> </ol>
<b>Put on the market</b>	The first time the product is put on the market, professionally, in France.
<b>Put on the "old" market</b>	Used for the method of calculation 1.2 explained in section III.3. ; representing putting on the market in the year 2012-n, where n is the lifespan of the equipment.
<b>Installed inventory</b>	Inventory of devices in operation/in use (EEE).
<b>Reuse</b>	Any operation by which products which are not waste are used again for the same use as for the one for which they were designed. <sup>10</sup>
<b>Preparation for reuse</b>	Any inspection, cleaning or repair operation aimed at recovery whereby products or components of products which have become waste are prepared for reuse without any other pre-processing. <sup>10</sup>
<b>Reuse</b>	Any operation whereby substances, materials or products which have become waste are used again. <sup>10</sup>
<b>Preparation for reuse</b>	Any inspection, cleaning or repair operation aimed at recovery whereby substances, materials or products which have become waste are prepared for reuse without any other preprocessing. <sup>10</sup>

<sup>10</sup> Environment code, L541-1-1.

## II. CONTEXT, GOALS AND STAKES

### II.1. CONTEXT

The revision of the WEEE Directive in 2012 (Directive 2012/19/EU) brought in the collection of objectives for the 2019 horizon: the minimum collection rate to be achieved each year, for each Member State, must amount up to 65% of the average weight of the electrical and electronic equipment (EEE) put on the national market during the three previous years or, otherwise, 85% of the WEEE arising in the country during the previous year. These are ambitious collection objectives and require better knowledge of the potential arising of WEEE.

In 2013, BIO by Deloitte (BIO) undertook a study of the household and assimilated WEEE<sup>11</sup> for OCAD3E<sup>12</sup> and ADEME. Accordingly, this study is a spinoff of the survey carried out for OCAD3E and ADEME because it is designed to focus more closely on the world of Pro EEE, a sector whose contours are not yet clearly defined.

Since 2012 (and the new version of the Directive), an EEE is considered to be professional if it is unlikely to be used by a household, but is used exclusively by professionals. Compared to household and assimilated EEEs, the perimeter of Pro EEEs is far more complex to determine from the WEEE Directive and the French regulatory texts, because of the diversity of professional equipment and the way the various players interpret them. In addition, the reports made to the WEEE Register of ADEME by Pro EEE producers do not yet accurately depict the reality of putting on the market because of the change of perimeters in 2018 (this study is referred to as an "open scope" study)<sup>13</sup>.

Therefore, this study offers better knowledge of the professional WEEE line in France, and of the destinations involved.

### II.2. OBJECTIVES AND STAKES

Within this context, ADEME commissioned a study into the professional WEEE arisings in September 2013 with the goals of:

- 1) Evaluating the quantity of professional WEEE study in France in 2012 (without making projections for the following years, unlike the survey of household WEEE);
- 2) Obtaining information about the destinations of the various professional WEEE flows in France; and
- 3) Identifying any lines of action for better knowledge of the arising and increasing that the collection fact and quality of processing.

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<sup>11</sup> See Glossary.

<sup>12</sup> OCAD3E is the coordinating organization of the WEEE producer responsibility organisations, representing a single interface for the communities.

<sup>13</sup> The period extending from 13 August 2012 to 14 August 2018 is a transient period for the field of application of the Directive. WEEE II is identical to the old Directive (10 EEE categories), except as regards photovoltaic panels which were added to the perimeter of the WEEE II Directive (immediate application). Starting from 15 August 2018, the application field of the Directive will be extended to include all the EEEs (except for those that are explicitly excluded). Every EEE will then have to be classified among 6 categories instead of 10.

Before evaluating the professional WEEE arising, there is a challenge which applies: defining the perimeter of the Pro EEEs. One consequence of forgetting to exclude or include certain types of equipment in the field of the Pro EEEs would be to under evaluate or over evaluate the quantities of WEEE to be collected by the sector and thus distort any collection objectives based on the evaluation of the arising.

Following the quantitative evaluation of the arising, the challenge is to carry out in-depth thinking about the organization of the sector and methods of the WEEE "owners" to understand by whom and how the equipment is managed at its "end-of-life".

## III. METHODOLOGY

### III.1. STUDY SCOPE

There are many questions regarding the perimeter of the Pro EEEs, or in the evaluation of the arisings closely linked to them. Depending on the definition chosen for a large-scale stationary industrial tool for instance, the arising can change entirely because these equipment assemblies weigh several tonnes.

Taking this into consideration, finely tuned work was undertaken into defining the perimeter of the Pro EEE sector, allowing for the criteria defined in the 2012 WEEE Directive and the probable, but as yet imprecise, inclusion of new equipment into the future perimeter for 2018 ("open scope")

Initially, two approaches have been considered:

- Limiting the calculation of the professional WEEE arising for which data is available and whose inclusion in the Directive is beyond appeal; or
- Estimating for the best the total professional WEEE arising with respect to the perimeter of the French regulation application field, despite the current inaccuracies concerning certain types of equipment.

Considering that it could be unfortunate to confine the evaluation to only those products covered by the federations wishing to become involved in the project, the Steering Committee found the second approach to be more satisfactory. Nevertheless, the second approach requires a considerable amount of cooperative work before data collection and evaluations as such can begin.

The initial specifications of the study suggested that the work should begin with a "data inventory" phase, without any deep research into the definition of the Pro EEE perimeter. This led to a preliminary clarification of the perimeter being added to the work initially proposed in the specification. In the course of the deliberations of the Working Groups (WG) established with and comprising the unions and professional federations, and of producer responsibility organisations, the Pro EEE perimeter was "segmented" (split into *sectors* or *types of equipment*) in order to be as exhaustive as possible, i.e. so that no types of equipment were omitted from the evaluation of the arising.

### III.2. SETTING UP THE WORKING

#### ▶ CHOICE OF WORKING GROUPS

It was decided to form six Working Groups (WG) during the first Steering Committee meeting concerning the study. Each WG corresponds to a specific sector and/or a specific type of EEE, for instance:

- WG A – Building / civil engineering: stationary electrical equipment / incorporated into a frame (central heating, air conditioning, lighting, electrical distribution, building sound system, etc.);
- WG B – ICT equipment (service, professional printers etc.) and audiovisual equipment;
- WG C – Network infrastructures (EEE from electricity transmission or distribution grids, etc.);
- WG D – Industrial sector: portable and semi-stationary professional electric tools;
- WG E – tertiary training and services sector (professional kitchens, automatic dispensers, refrigerated cabinets, coin slot machines etc.); and
- WG F – Professional medical devices and measuring instruments used for research.

## ▶ FORMAT AND CONTENT OF WORKING GROUPS

The WGs are attended by professional federations and producer responsibility organisations concerned by the sectors associated with the WGs. Two sessions lasting two days each were organised for each of the WGs on:

- 27 and 28 November 2013 to validate the perimeter of the equipment specific each WG, take stock of the available data and identify any specific aspects of the sector to be covered during interviews with the companies; and
- 28 and 29 January 2014 to take a closer look at each section and think about how to tackle each specific arising in the sector in question.

### III.3. EVALUATION OF ARISING

Discussions were opened on how to evaluate the arising because the data needed for its evaluation are numerous and especially inaccurate and difficult to gather. In the evaluation survey of the household and assimilated WEEE arising, the inaccuracy was estimated to be around 20%: but the percentage is very probably much higher in the case of professional WEEEs which are far more difficult to evaluate. In any case, if the data concerning the professional WEEEs is used to define the quantities of professional WEEE to be collected, BIO was very careful not to overestimate the arising because it could trigger a race to collecting non-existent tonnages for some equipment categories.

In estimating the professional WEEE arising, the question arose about whether the method used to evaluate the household WEEE arising should be the French method, based on the model<sup>14</sup> of the United Nations University (UNU)<sup>15</sup>. This model had already been used to evaluate the WEEE arising in the Netherlands<sup>16</sup>, in Belgium<sup>17</sup> and in Italy<sup>18</sup>.

This was the model used for producing a theoretical evaluation of the WEEE arising: for a given type of EEE, the model combines on the one hand the quantities put on the market (by unit and by weight) by year, and on the other, the holding times. For each UNU key<sup>19</sup> and each year of putting on the market, this method uses the holding time as a statistical distribution figure: the holding duration is expressed according to a Weibull distribution which depicts the probability of equipment being put on the market in a year  $n$  being found in the arising after  $x$  years (therefore in the year  $n+x$ ). It should be emphasised that the holding time in question corresponds to the total holding time, that is, after any reuses by different owners or after a period of storage by an owner. If the putting on the market data specific to a type of equipment is combined with the distribution of this holding time, the model can be used for evaluating the arisings (both as a tonnage as a number of units) for the type of equipment. In the study of the household and assimilated WEEE arising in France, the method was applied to all the equipment in the perimeter. Similar types of equipment were grouped together according to the 46 types of household and assimilated EEEs (UNU keys) contained in the model.

<sup>14</sup> Feng Wang, Jaco Huisman, Ab Stevels, Cornelis Peter Baldé, "Enhancing e-waste estimates: Improving data quality by multivariate Input-Output Analysis", Waste Management, Available online 28 July 2013.

<sup>15</sup> [www.unu.edu](http://www.unu.edu)

<sup>16</sup> Huisman, J., van der Maesen, M., Eijsbouts, R.J.J., Wang, F., Baldé, C.P., Wielenga, C.A. (2012), The Dutch WEEE Flows. United Nations University.

<sup>17</sup> FFact Management Consultants, United Nations University (2011), Bilan de masse et structure du marché des (D)EEE en Belgique, Rapport final pour le compte de Recupel FFact Management.

<sup>18</sup> F. Magalini et al. (2012), Household WEEE generated in Italy, United Nations University.

<sup>19</sup> A UNU key corresponds to an equipment category covering all the SH4 / SH8 codes (see Lexicon).

The model was relevant as a way of assessing the household and assimilated WEEEs because the input data needed was available; but the UNU tool is too big compared to the needs and accuracy of the available input data for the professional WEEEs. What is more, although the UNU model has 9 distribution keys for professional WEEEs, they do not cover the entire perimeter of the professional WEEEs and some of them grouped together equipment with very different weights and lifespans (e.g.: the "exclusively professional tools" key or the "exclusively professional medical appliance" key. During the working groups, of the calculation methodologies were proposed depending on the type of equipment in question.

Four methods of evaluating the professional WEEE arisings in France in 2012 were identified, based on putting on the market dates or the installed equipment inventory. These methods are described in the following paragraphs:

### ▶ ESTIMATION BASED ON PUTTING ON THE MARKET (POM) DATA

- **Method 1.1)** If the % of POMs allocated to renewal (i.e. the replacement of old equipment) is known and if the share of reuse can be estimated, i.e. the share of used equipment [and therefore replaced] which is in fact reused (extending the lifespan), we can evaluate the arising using the following formula:

$$\text{2012 arising} = [\text{POM 2012}] \times [\% \text{ of POMs allocated to renewal}] \times [1 - \text{share of reuse}]$$

- **Method 1.2)** Without any information about the % of POMs allocated to renewal, if it is possible to estimate the lifespan  $n$  of a piece of equipment and the POMs for the year [2012 -  $n$ ], there are two possible cases:

- Either the available lifespan  $n$  corresponds to the total holding time<sup>20</sup>, in which case the arising is considered to be equivalent to the "old" putting on the market figures:

$$\text{2012 arising} = [\text{POM (2012 - } n)]$$

- or the available lifespan  $n$  corresponds to the "technical lifespan"<sup>21</sup> (usually less than the total holding time because it does not include the reuse), then the arising will be considered equivalent to the "old" putting on the market figures less the reuse tonnage (if it can be estimated):

$$\text{2012 arising} = [\text{POM (2012 - } n)] - [\text{reuse in 2012}]$$

### ▶ ESTIMATION FROM INSTALLED INVENTORY

When the POMs are not available but the installed inventory (i.e. number of pieces of equipment in operation/in use in France in 2012) is known, there are two possible methods:

- **Method 2.1)** If the % of the inventory which is renewed every year (real or estimated %) is known and if the share of reuse can be estimated from what is renewed, the arising can be assessed using the following formula:

<sup>20</sup> See Glossary.

<sup>21</sup> The "technical lifespan" here corresponds to the average operating lifespan of the equipment. This time may have been measured under specific test conditions defined in the standards produced by organizations like AFNOR, CENELEC or IEC for instance, or by non-standards tests but with an implicit, transparent and recognised methodology; however, within the scope of this study, it may also have been estimated using the reports made by the manufacturers or the technical data sheets available on the Internet (average calculated on the basis of several technical data sheets). The "lifespan" data available in the preparatory studies produced for the European Commission as part of the Eco-Design Directive for products related to energy (2009/125/CE) correspond for instance to a "technical lifespan".

**2012 arising** = [Installed inventory in 2012] x [% of inventory allocated to renewal] x [1- share of reuse]

- **Method 2.2)** If the % of the inventory which is renewed every year is unknown but the lifespan is available, there are again two possible cases:
  - Either the available lifespan  $n$  effectively corresponds to the total holding time in which case the arising is calculated using the following formula:

**2012 arising** = [Installed inventory 2012] / [ $n$ ]

- or the available lifespan  $n$  corresponds to the "tactical holding" time (which does not include the reuse) so that the arising can be calculated using the following formula:

**2012 arising** = [Installed inventory for 2012] / [ $n$ ]- [reuse in 2012]

For method 2.2, BIO began with the principle that if equipment has a 10 year lifespan for instance, then 1/10<sup>th</sup> of the installed inventory enters into the 2012 waste arising, minus the share devoted to reuse. This approach becomes less robust when the POMs for the period [2012-  $n$ ] vary a great deal.

Table 2 refers to all the data that BIO attempted to obtain, and to the method used for evaluating the arising.

**Table 2: Method of evaluating arising used and data gathered**

DATA	METHOD 1.1	METHOD 1.2	METHOD 2.1	METHOD 2.2
POM 2012				
Old POMs				
% of POMs allocated to renewal				
Installed inventory in 2012				
% of inventory renewed in 2012				
Lifespan $n$				
% of arising allocated to reuse or quantity of reuse				

To collect this data, BIO first contacted the federations and professional unions because of their expertise in the sectors. When the specific producers of a given type of equipment were not organised into unions, BIO contacted the most representative companies in the market in question.

Because the federations did not always have access to this data, BIO extracted a great deal of information from bibliographical sources, as recent as possible, such as the preparatory studies for the European Commission as part of the Eco-Design Directive for energy products (2009/125/CE), or from databases like that of Eurostat (via Prodcom classification). Moreover, various sources like the Ministère des Droits des femmes, de la Ville, de la Jeunesse et des Sports, or the ADEME WEEE Register (in the specific case of professional printing systems) were also used.

Since these sources only rarely disclosed all the desired data, whenever possible, BIO made hypotheses in an effort to estimate the arisings of certain types of equipment. For instance, when the Putting On the Market (POM) figures were only available in the form of units, it was often necessary to estimate the average weight of a piece of equipment in order to convert units into tonnages (because the arising had to be estimated in tonnes). The hypotheses formulated by BIO or the interviewed players are given in full in the Appendices and those considered most noteworthy are presented before the results of each WG.

What is more, for the 15 types of the EEE, the WEEE arisings estimated by BIO were compared against the WEEE tonnages processed by several members of FEDEREC in 2012, to ensure that the tonnages were indeed below the evaluated arisings. For the types of equipment in question, it was found that the tonnages processed by the FEDEREC members were well below the arisings evaluated by BIO.<sup>22</sup>

Finally, each arising was given a "reliability index" ("+++": high reliability; "++": relatively high reliability; "+": poor reliability) depending on the number of "robust" data items (e.g.: derived from the survey of a federation/representative player, recent statistics, etc.) and the number of "estimated" data (hypothetical orders of magnitude assumed to be close to reality) used in calculating each of the arisings.

### ▶ GENERAL HYPOTHESIS

- Although BIO did not use the UNU methodology in this study, ADEME would like to be able to compare the arisings evaluated in the study of the professional WEEEs with those of the study into the household and assimilated WEEEs. To avoid any possibility of counting household assimilated equipment twice, BIO did not included in the calculation of the professional WEEE arising, the arising of certain professional printing systems and professional laptops and desktop computers. However, BIO did evaluate what the arising of this equipment represents, at least on an indicative basis, and because this equipment does not follow the same collection and processing routes as household equipment.
- The arising arising from the stoppage of activities could not be estimated because of a lack of available data. However, this arising can be considered to be small if we consider that in the case of a company shutting down, the assets are often resold for reuse. This is in particular the case of medical offices which, on stopping their activity, often sell off their equipment to refurbishing and resale companies<sup>23</sup>; and this often happens with factories, which in the event of bankruptcy, seek to amortise their equipment for the best in order to pay off part of the debts.
- When the first POM dated later than the year [2012- $n$ ], where  $n$  is the equipment like duration, the arising is considered to be negligible or even non-existent.

The results of evaluating the arisings are presented as tables. A single legend (colour code) shared by all the tables, as explained in Table 3.

**Table 2: Legend of tables presenting arising development results**

Data available
Data not available and 2012 arisings considered to be negligible
Data not available but 2012 arising potentially not negligible

When it was impossible to evaluate a arising, BIO considered it to be potentially "negligible" or not, depending on the criteria detailed in the sections of chapter 0. Analysis was carried out on a case-by-case basis, even if a arising was generally estimated as being "not negligible", if the equipment concerned was relatively heavy and, in theory, in large quantities. For instance, this is the case of equipment used in dry cleaners, other than professional washing machines and dryers, such as steam generators, ironing presses etc.

<sup>22</sup> EEE of road, rail, river and air transport networks (lights, signals, control instruments, signs, public lighting); electricity distribution grids; utility distribution networks; medical devices, medical equipment and electrical medical furniture; measuring instruments for scientific research centres and laboratories; GLVUs; climatic engineering EEE; safety systems; building safety systems, automatic dispensers; food refrigeration; professional printing/scanning systems; mobile network EEE; servers; and audiovisual equipment.

<sup>23</sup> Information obtained during an interview with a medical equipment refurbishing and resale company.

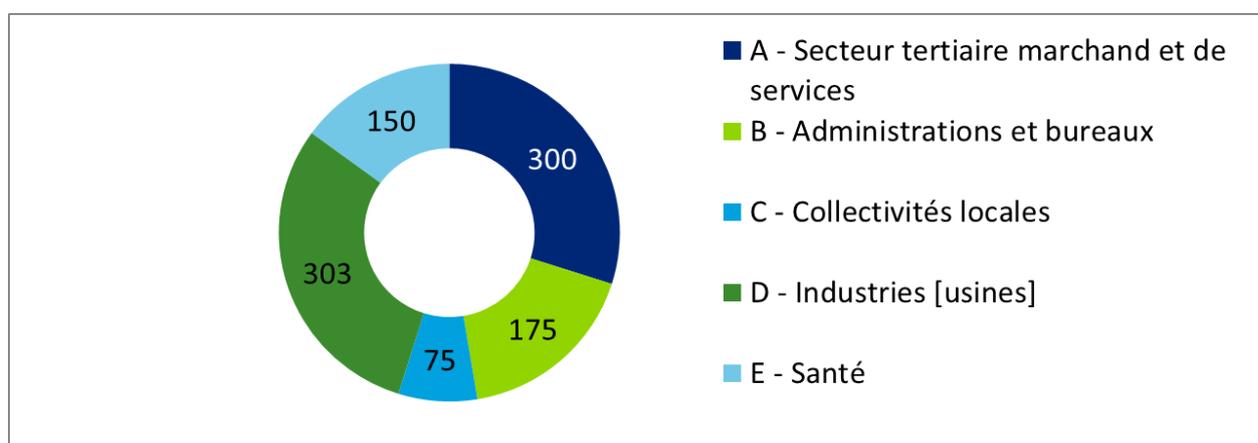
### III.4. IDENTIFICATION OF ARISING DESTINATIONS

#### III.4.1. Survey among WEEE owners

During this stage of the survey qualitative information was gathered about the usual ways companies handle their WEEE. To guarantee that the interior is panel was broad and representative, BIO subcontracted the statistical survey to the BVA service specialist while supervising it i.e. by participating in the setting up of the panel, the development of the questionnaire and the utilization of the results.

The survey consisted in 1,003 telephone interviews lasting 15 minutes between 24 March and 10 April 2014. The sample range was stratified according to the size and activity of the companies. With this sample, analyses were carried out for 5 major sectors and for each company size [or the number of inhabitants for local communities] as illustrated in Figure 1.

Figure 1: Share-out of the companies interviews by sector (total base: 1,003)



Following the service, the sample was processed to restore the real significance with respect to the population of the companies in the up-to-date INSEE database (see Appendices) for each activity area. The concept of "company" should be understood to mean a "facility". For instance, in the tertiary trading sector, shops may have been interviewed through the groups to which these facilities belong. BVA wanted to get in touch with the people in the field.

For instance, 4, the term "*gross*" refers to the percentage that the category represents in the sample range and "*processed*" is the percentage that the category represents in the *population*.

Table 3: Share-out of number of companies interviewed by sector, BVA survey

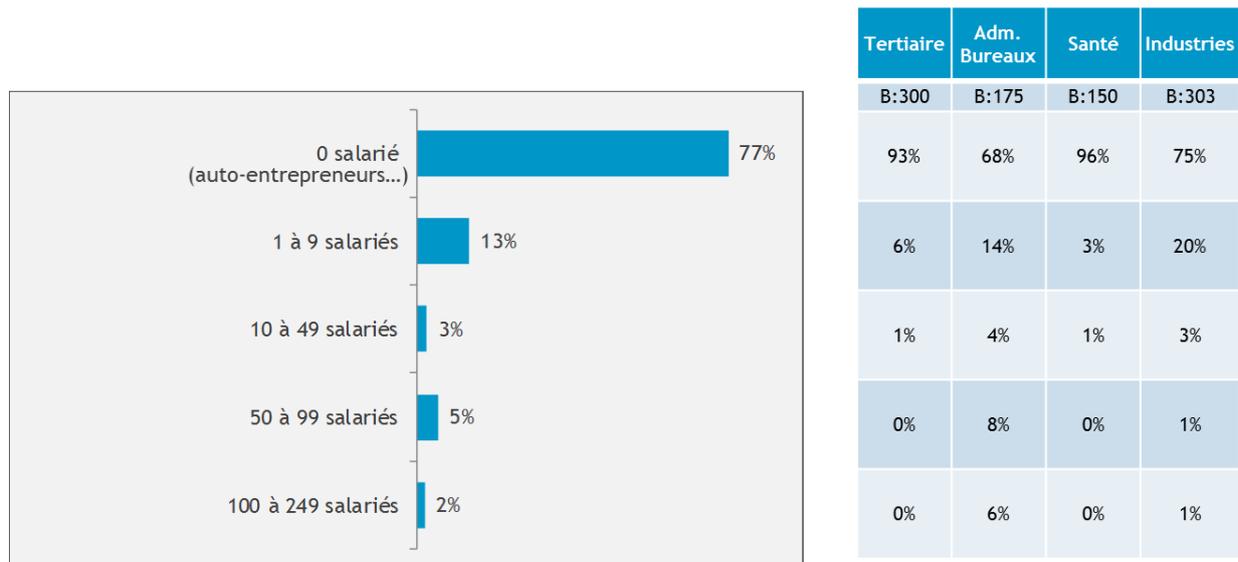
	Gross base	Processed base	TOTAL	
			Gross base	Processed base
Gross Total	1,003	1,003	1,003	1,003
A - Tertiary trading and services sector	300	348	29,9%	34,7%
B - Administrations and offices	175	185	17,5%	18,4%
C - Local communities [more than 30,000 inh.]	75	70	7,5%	7%
D - Industries [factories]	303	130	30,2%	13%
E - Health	150	270	15%	26,9%

As can be seen in In the "0 employee" category, there are sole traders, such as, in the health sector for instance, specialist doctors operating independently. Considering the number of sole traders in France, the way they manage their WEEE has definite consequences on the methods of reuse or collection and processing used by the professional WEEEs.

, a large proportion of TPEs (after processing) was interviewed.

In the "0 employee" category, there are sole traders, such as, in the health sector for instance, specialist doctors operating independently. Considering the number of sole traders in France, the way they manage their WEEE has definite consequences on the methods of reuse or collection and processing used by the professional WEEEs.

**Figure 2: Share-out of the companies interviews by company size (total base: 928)**



Furthermore, as shown in Table 5, 80% on the interviewed communities represent fewer than 30,000 inhabitants.

**Table 4: Share-out of communities interviewed by number of inhabitants**

	Number of inhabitants per community							
	0 to 10,000 inh.		10,000 to 19,999 inh.		20,000 to 29,999 inh.		30,000 inh. and more	
	Gross	Processed	Gross	Processed	Gross	Processed	Gross	Processed
Gross Total	25	25	20	20	15	15	15	15
C - Local communities [more than 30,000 inh.]	33,3%	94,7%	26,7%	2,8%	20%	1,1%	20%	1,5%

**Methodological details used for reading the results**

- All the percentages are calculated according to the numbers (number of individuals in base) and not according to the number of mentions;
- The rate given in the graphs and tables are rounded off to the higher 0.5% (from 0.6 to 0.9%) or to the lower 0.5% (from 0.1 to 0.4%);

- The persons interviewed gave their opinions by a statement without any detailed verification of the equipment owned and the management methods used: therefore it is a perception survey ;
- The questions asked about the equipment used, rented, or stored, or the methods of managing WEEEs are multiple answer questions with several possible answers, which is why the total number of answers does not come to 100%; and
- These questions allow the penetration of the various types of equipment or methods to be measured but not to quantify the volume. Accordingly, the answers give no information about the number of equipment of each type used or the quantities (tonnages) of equipment concerned by each WEEE management mode. It means that the answers are declarative and the results mirror the behaviour but do not serve to work out any quantitative data about the percentage of the inventory managed in the such and such a way. The data indicate trends concerning the managing of some WEEEs in the inventory of equipment held by companies of varied sizes and in various sectors.

#### **III.4.2. Survey to refine knowledge of destinations all biggest arisings**

A second survey, but this time not a statistical survey, was run by BIO to fill out the information relative to the destinations of professional WEEEs. During a series of telephone interviews, BIO attempted to refine its knowledge of the players involved in collecting and processing the biggest flows of professional WEEEs and the destinations of this equipment.

## IV. ANALYSIS AND EVALUATION OF ARISING

### IV.1. EVALUATION OF WEEE ARISING OF WG A. "BUILDING" WEEE ARISING

#### ▶ PERIMETER

The list of equipment in Table 6 is not exhaustive but results from discussions held in WG A.

**Table 5: Perimeter of WG A – Building EEE**

BUILDING EEE
GLVU (General Low Voltage Unit)
Thermostats
Other electrical and home automation installation apparatus
Interior light fittings
Exterior light fittings "hung" from buildings (public lighting except for illuminated signs)
Lighting power supplies and management systems
Emergency lighting
Illuminated signs
HVAC engineering (central heating, air conditioning, regulation etc.)
Personal safety
Building security (theft proofing etc.)
Logic controllers specific to buildings (electronic sections of gates, doors, shutters etc.)
Equipment in building sanitary facilities (hand dryers, etc.)
WEEE generated during cleaning out and post cleaning out of buildings (for demolitions)

There are three professional WEEE sources in the Building sector:

- The "waste" generated during building maintenance (old equipment replaced by new equipment);
- the "waste" generated during the "cleaning out" of the buildings, i.e., before demolition or extensive renovation; and
- The "waste" generated during building "post-cleaning out" i.e. in the course of building demolition.

It was impossible to calculate separately arisings resulting from cleaning out and those resulting from post cleaning out of the buildings (in the case of demolitions). In addition, BIO was only able to estimate the "cleaning out and post cleaning out" arising in the case of tertiary buildings.

## ▶ INFORMATION SOURCES

The following information sources were used for evaluating the WG A arising:

- IGNES, Industries du Génie Numérique, Énergétique et Sécuritaire ;
- Récyclum, an accredited producer responsibility organisation for some professional WEEEs;
- Gimélec, Groupement des industries de l'équipement électrique, du contrôle-commande et des services associés ;
- UNICLIMA, Syndicat des Industries Thermiques, Aérauliques et Frigorifiques – "2012 breakdown and 2013 perspectives for climatic engineering";
- SYNAFEL, Syndicat National de l'Enseigne et de la Signalétique; and
- The EEE manufacturers of sanitary facilities.

## ▶ MAIN HYPOTHESES

It is considered that reuse is almost nil for all the equipment of this WG.

### **GLVU**

The GLVU 2012 arising was calculated from Putting On the Market (POM) statistics, extrapolated to France, by Gimélec members in 2013 and from the share of the POMs allocated to renewal, that is 24% according to the survey among its members by Gimélec.

### **Thermostats**

Récyclum estimated to share of POMs allocated to renewal to be around 30%.

### **Other electrical and home automation installation apparatus**

This concerns individual electric panel equipment (excluding GLVU) and "wall-mounted" electrical apparatus in private homes, community buildings and tertiary buildings measuring less than 1000 m<sup>2</sup> in area. The data comes from the estimations of the IGNES union.

### **Indoor and outdoor light fittings**

Light fittings last much longer than their bulbs and therefore replaced much less often. According to Récyclum and the Syndicat de l'Eclairage, the share of POMs allocated to renewal would be around 30% for indoor and outdoor light fittings.

The 2013 POM data supplied by Récyclum were used for calculating this arising. Out of the 8500 tons of outdoor light fittings sold in France in 2012, approximately 1,000 tonnes were incorporated into the buildings and were therefore taken into consideration by WG A. The other light fittings were intended for roads and stadiums and the remaining 7,500 tonnes were included in WG C (Infrastructures and Networks).

### **Illuminated signs**

According to SYNAFEL (Syndicat National de l'Enseigne et de la Signalétique), the 550,000 points of sale in France each have, on average, two illuminated signs. On the basis of the reports by several members, SYNAFEL has estimated the average lifespan and average weight of an illuminated sign.

### **HVAC engineering**

The WEEE arising of HVAC engineering was calculated from the POM data supplied by members of UNICLIMA, extrapolated for France. Residential equipment and/or with power ratings of less than 17.5 kW was considered as "assimilated household" equipment. UNICLIMA considers that the sale of most HVAC equipment can be considered as constant between 1998 and 2005 and that the weight of new

equipment is approximately equal to that of the equipment it replaces. UNICLIMA finally considers that the share allocated to the renewable of old equipment is around 70%.

### **Personal safety and building security**

Figures come from estimations by the IGNES union (Industries du Génie Numérique Energétique et Sécuritaire).

### **Building sanitary facility equipment**

According to two electric and electronic sanitary product manufacturers (representing together at least 50% of the French market), almost 50% of the electrical product POMs intended for building sanitary facilities are allocated to the renewal of old equipment.

### **WEEE generated during the demolition of tertiary and residential buildings (cleaning out and post cleaning out)**

According to the statistical data of the CEREN (Centre d'Etudes et de Recherches Economiques sur l'Energie) in 2013, 922 Million m<sup>2</sup> were heated in the non-residential tertiary sector and 4.2 Million m<sup>2</sup> disappeared from the sector in 2012, representing 0.46% of the installed inventory. The figure seems low compared to the share of tertiary buildings demolished in Germany in 2009 (0.3%), when we consider that France and Germany have real estate inventories with similar characteristics.<sup>24</sup>

As far as residential buildings are concerned, 30,000 dwellings are demolished/year.<sup>25</sup> The average area of a dwelling is 90 m<sup>2</sup> meaning that 2.7 million m<sup>2</sup> of accommodation is destroyed every year.<sup>26</sup>

A field survey in the PACA (south-eastern France) region in 2004 for up an inventory of the lighting equipment used in tertiary buildings. The results indicate an average of 0.24 light fitting units per m<sup>2</sup>. According to Récyllum, the average weight of a light fitting is 1.7 kg and the average weight of light fittings per m<sup>2</sup> would therefore be around 0.408 kg/m<sup>2</sup>. This would mean that more than 1700 tonnes of light fitting waste would be generated per annum in the tertiary sector.

In a behavioural study in 2011 among 4,500 people (75 demolition companies, 1,475 companies, 1,608 electrician's and 1,345 lessors and institutional residence unions), Récyllum surveyed their methods (or those of them members) with respect to the recycling of lamps and professional WEEEs, estimating that in the tertiary building area, today, there is between 2 kg and 5 kg (an average of 3.5 kg /m<sup>2</sup>) of Pro EEE (attached to the building). According to this hypothesis, the arising resulting from the cleaning out and post-cleaning out of tertiary buildings can be evaluated at approximately 14,700 tonnes. A former representative of the SERCE who recently visited several tertiary and industrial sites being dismantled in northern France finds this figure realistic but suggests that it should be taken with a great deal precaution because there is no survey to date which really allows the formulated hypotheses to be validated.

For residential buildings, the Steering Committee of this study and the former representative of the SERCE considered that there would be at the most 1 kg/m<sup>2</sup> of Pro EEE (attached to the building) waste in the housing (most of the EEE attached to the building is to be found on technical premises and not in apartments), and at least 5 to 6 kg/m<sup>2</sup> in the industrial buildings (many control cabinets, fire safety equipment, energy distribution appliances, etc.). Based on these hypotheses, it would seem that approximately 2,700 tonnes of WEEE arise from residential buildings (for the institutional residential sector) and an unknown tonnage from industrial buildings (because the demolished area is not available).

<sup>24</sup> See the comparison of the age of the (non-residential) French and German real estate inventories in 2006 in *Panorama of the European non-residential construction sector*, ECOFYS.

<sup>25</sup> ENERTECH (2012), Thermal renewal of buildings in France: challenges and strategy.

<sup>26</sup> INSEE (2006).

## ▶ ARISING

The arising coming from maintenance operations (light maintenance, i.e. replacement of a few pieces of equipment, or heavy renovation/refurbishing) is estimated at approximately 87,000 tonnes in 2012.

The arising coming from building demolition (without cleaning out/post-cleaning out distinction), both tertiary and residential, is estimated at 17,400 tonnes in 2012.

The total arising of **WEEE arising in the "Building and Civil Engineering" sector** is therefore evaluated at almost **105,000 tonnes in 2012**, in consideration of the following elements:

- The arising generated by building demolition may be under evaluated because no data about industrial building demolition could be found; however, it should be underscored that the average of 1 kg of EEE/m<sup>2</sup> in the residential sector is perhaps over evaluated, i.e. that the WEEE arising coming from housing demolition might be less than 2,700 tonnes; and
- There is a margin of uncertainty which is difficult to quantify surrounding the arisings calculated on the basis of estimations rather than on databases are found to be accurate.

Overall, 81% of the estimated arising has the highest reliability index (+++) while one share of the arising is not estimated (blue line in Table 6: Results of the evaluation of WG A arising ).

Table 6: Results of the evaluation of WG A arising

Equipment	Lifespan (years)	POM 2012 (t)	Share of POMs allocated to renewal	Installed inventory (t)	Arising 2012 (t)	Arising reliability index
GLVU (General Low Voltage Unit)		15,568	24%		3736	+++
Thermostats		100	30%		30	++
Other electrical and home automation installation apparatus		25,000	80%		20,000	+++
Interior light fittings (industrial armatures, extension lights, flush fit units, ceiling lights, floodlights etc.)		22,500	30%		6,750	+++
Exterior light fittings "attached" to the buildings (watertight sconces and portholes; not including illuminated signs)		1,000	30%		300	+++
Lighting power supplies and management systems		250	5%		13	+++
Emergency lighting		2,600	20%		520	+++
Illuminated signs	11			27 500	2,500	+++
HVAC engineering (excluding server cooling systems)		70,492	70%		49,344	+++
Personal safety						
Building security (theft proofing, burglar proofing etc.)		7,000	20%		1,400	+++
Logic controllers specific to buildings (gates, doors, shutters etc.)		10,000 at least 50% of which does not generate return	30% maintenance on share generating return		1,500	++
Building sanitary facility equipment		2,170	50%		1,085	+
WEEE arising from cleaning out + post cleaning out of tertiary buildings	<i>Other calculation methods: see hypotheses</i>				14,700	++
WEEE arising from cleaning out + post cleaning out of tertiary buildings					2,700	+
WEEE arising from cleaning out + post cleaning out of other types of buildings (industries etc.)						
<b>TOTAL</b>					<b>104,578</b>	

## IV.2. EVALUATION OF WEEE ARISING OF GT B. "ICT EQUIPMENT"

### ► EQUIPMENT CONCERNED

The list of equipment in Table 8 is not exhaustive but results from discussions held in WG B.

**Table 7: Perimeter of WG B – ITC and audiovisual equipment EEE**

ITC EQUIPMENT EEE
MFP ( <i>Multifunction Printer</i> ) A3/professional copiers
Professional printers between 10 and 30 kg
Servers
Access network (AN) equipment to mobile stations (radio base stations, telephone switches, DSLAM, etc.)
Network core (NC) equipment of mobile networks (switching, call management or subscriber database (HLR) equipment developed specifically for the mobile network)
Professional fixed telephone sets
PABX (private automatic exchanges, for connecting inside lines to outside lines)
Routers
Switches
Electronic data storage and destruction systems
Franking machines+ Equipment for Points of Sale (Cash register PC, barcode reader, ticket printer, electronic currency etc.) + Electronic and printing equipment (e.g.: time-date stamping machines)
Other electronic and printing equipment like self-service bike terminals and automatic tollgate barriers)
Pro EEE embedded in professional vehicles not fitted as standard (e.g.: GPS driving assistance units, and in trucks and tractors)
Automobile diagnostic units, remote reading devices
AUDIOVISUAL EEE
Television network equipment: broadcast
Translation equipment (audio consoles connected in conference rooms), site inspection equipment (audio headphones)
Audio conference systems
Visio conference systems, video projectors, projection (electronic) screens
Shooting equipment (sound recording, camera etc.)

Concert hall sound systems, mixing tables
Minilabs (miniaturised photo laboratories)
Independent photo booths or connected to a minilab (found in airports, stations etc.)
Photography booths (Photomaton booth type)
Small and medium format, professional cameras
Dynamic display screens (airports, stations, underground, tramlines)

**▶ INFORMATION SOURCES**

The following information sources were used for evaluating the WG B arising:

- ADEME WEEE Register (2006-2012);
- Prodcod (codes 28231300, 26201200 and 28294350);
- Preparatory study of servers as part of the Eco-design Directive;
- ADEME study (BIO) 2012 into EEE lifespan;
- USPII, a union representing all the photo and storage media unions;
- SIPEC, a union covering such equipment as minilabs, photomatons and other photo equipment;
- UNIMEV, a union covering such equipment as public address and lighting for events;
- SEINEP, a union covering equipment like professional audio and video and broadcast equipment;
- FICAM, a union covering equipment such as film shooting equipment;
- SYNPASE, a union covering stage audiovisual equipment;
- SIRRMIET, a union for the refurbishing and resale of IPC equipment;
- GARTNER ;
- Hewlett Packard ;
- IBM ;
- Intel ;
- Bull ;
- Ricoh ;
- Xerox ;
- Lexmark ;
- Alcatel ; and
- JC Decaux.

## ▶ MAIN HYPOTHESES

### Professional printing systems

In order for this study to complement the study into household and assimilated WEEE only professional printing systems weighing more than 10 kg were taken into consideration. However, the methodology used to estimate the arising of household and assimilated printing systems (use of SH8 codes corresponding to UNU key No. 0304 [professional IT]) was not reproduced here because the results do not seem to mirror the actual market according to several producers who are representative of the sector (Ricoh, Lexmark, Xerox, HP).

Note: the assimilated printing equipment arising is actually "negligible", representing only 1.5% of the household and assimilated printing equipment arising (24,018 tonnes) in 2012, i.e. 366 tonnes.<sup>27</sup>

- **A3 MFP / professional copiers**

According to the ADEME register, approximately 25,000 tons of professional MFP A3/copiers were put on the French market in 2013 and according to several market sale representatives, 90% of the sales were allocated to the replacement of old equipment (an A3 MFP being replaced by an A3 MFP). In addition, between 50% and 80% of the professional A3 MFP A3/copiers which were used/replaced were reused (80% according to Ecologic), almost all of them going abroad. BIO used the average of this interval: approximately 65% of used equipment is directed towards the reuse sector (brokers and Asset Managers).

- **Professional printers of between 10 and 30 kg**

Analysis of the statistics given by *InfoSource regarding* professional printing systems (put on the market in 2013) indicates that approximately 10,000 tonnes of printers weighing between 10 and 30 kg were put on the French market in 2013 (beyond 30 kg it is not the same printer category and putting on the market is rare). According to **several distributors**, 90% of the sales went to the replacement of old equipment. In addition, approximately 30% of the used/replaced printers were reused, almost all of them going abroad.

### Servers

BIO is currently in the process of drawing up a preparatory study into servers as part of the Eco-Design Directive<sup>28</sup> and its hypothesis is that the percentage of Mainframes, X86s and UNIX servers (all three server categories) in the installed inventory would correspond to the share-out (in %) of Mainframes, X 86s and UNIX servers in the Putting On the Market statistics. The UNIX server arising is considered to be negligible because of the small annual tonnage put on the market.

The preparatory study was carried out at EU-27, meaning that the French data was deducted from European data in proportion to the population (12% in 2012).

Increasingly few companies (especially tertiary companies) are investing into servers, or at the least the investment processes are changing (data centres, outsourcing and cloud systems are on the upswing) and the renewal rate of the inventory is slowing down.

Also, according to SIRRMIET, the share of the potential arising of servers which is reusable equipment and which is (possibly) refurbished then sold by the Asset Managers is bringing the potential arising down to approximately 600 tonnes. This figure allows for the fact that 20% of the servers recovered by the Asset Managers are either obsolete or unsellable.

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<sup>27</sup> BIO Intelligence Service (2013), Study on arising and destinations of household and assimilated WEEE in France.

<sup>28</sup> [www.ecodesign-servers.eu](http://www.ecodesign-servers.eu)

### **EEE of the mobile network ("network core" and "access networks")**

Telecommunication network management involves a wide diversity of players: operators (Orange, Bouygues Télécom, etc.), producers (Alcatel, Ericsson, etc.), operating units, managers etc., all contributing to the subdivision of the usable information. There is very little consolidated data and it is often confidential and barely accessible. Therefore, calculations are based on the estimations of la Fédération Française des Télécoms (FFT).

SIRMIET estimated the reuse of telecommunication network equipment by Asset Managers while allowing for the fact that between 20 and 50% of the equipment that they recover (depending on the type of equipment in the sector) is obsolete or unsellable.

### **Electronic data storage and destruction systems**

Prodcom data are insufficient to allow the calculation of putting onto the market figures in France for 2012; the equipment covered by the Prodcom category corresponding to "Electronic data storage and destruction systems" is particularly extensive (many EEEs are probably household arisings); and BIO believes that this category concerns essentially storage or server EEEs – already allowed for in the arising calculation – very probably representing an accountable share of the EEE storage tonnage. For these three reasons, BIO was unable to calculate the electronic storage systems arising (other than servers) and data destruction, considering it to be negligible.

### **Self-service bicycle<sup>29</sup> terminals**

JC Decaux considers that this type of furniture lasts more than 10 years; the initial putting on the market in France dates back to 2007. Furthermore, JC Decaux carries out maintenance on the inventory of this equipment (replacing an electronic board for instance) but very rarely replaces the terminals themselves. In addition, many of the terminals are reused in other cities after being used in the original city for 10 years. In 2012, the arising can be considered to be almost zero.

### **Automatic tollgate barriers**

The replacement of motorway toll collectors by automatic terminals began in the early 2000's. BIO assumed that this equipment had long the lifespans (more than 10 years), considering that the 2012 arising of automatic toll terminals is likely to be around zero.

### **Pro EEE on board professional vehicles**

Although most professional vehicles (e.g.: HG these) are now designed with professional onboard electronics (e.g. GPS driving assistance units on trucks), BIO was unable to gather any relevant information on the subject but believes that this equipment will be a negligible arising compared to the remainder of the WG B arising (it is rather light and relatively recent).

### **Automobile diagnosis cases, remote reading units**

It is difficult to know which automobile diagnostic and remote-reading equipment used by professionals is specifically professional and which can be assimilated to household arisings Without any reliable information on the subject, and even for professional onboard EEEs, BIO opted for estimating that the automobile diagnostic and remote reading equipment represents a negligible arising compared to the remainder of the WGP arising (it is rather light and relatively recent).

### **Minilabs and photo terminals**

Used Minilabs cannot be included in the French arising: that is because, at their end-of-life the machines are recovered systematically and 99.9% of them are sold abroad, for reuse, especially in Africa.

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<sup>29</sup> These are not the same thing as the vehicle attachment terminals (bikes and autolib), in the "Networks" WG. The control terminals were integrated into the IT WG because they incorporate a ticket printing system.

Independent photo terminals or those connected to a minilab (found in airports, stations etc.) at their end-of-life are purchased by brokers who dismantle them and recover the parts. Some companies like Photomaton themselves deal with recovery and recycling.

### Dynamic display screens

According to JC Decaux, initial POM dates back to 2009 and the average lifespan of these screens is 5 years. The arising of this equipment for 2012 was therefore left out.

### Other audiovisual EEEs

Four unions – UNIMEV (event sound and lighting systems), SEINEP (professional audiovisual and broadcast equipment), FICAM (filming equipment) and SYNPASE (stage audiovisual equipment) – questioned by BIO were unable to supply any usable data to calculate the arising of "other audiovisual EEEs"<sup>30</sup>, but they do think that reuse is sizeable in this sector and that the arising should be considered as negligible.

### Computers and tablets

The computers arising was evaluated in the BIO study into household and assimilated WEEE, allowing for the specific nature of the professional equipment in terms of its weight and average total holding time. To complement the study into household and assimilated WEEE, BIO did not include the arising of laptop computers used professionally in the professional WEEE arising.

Nevertheless, although they are household assimilated, they do not always follow the same collection and processing routes as private computers. According to the Syndicat de l'Industrie des Technologies de l'Information (SFIB), it would be wrong to consider the entire arising of professional computers as being part of the household equipment arising. Therefore, simply for the sake of information, BIO calculated the professional computer arisings (laptop computers + tablets and desktop computers) drawing on data from the household and assimilated arising survey regarding computers (main sources: EITO for desktop computers, COMTRADE for laptops and tablets).

In 2012, the household and assimilated arising of desktop computers (UNU key 0302) was 34,921 tonnes, of which 59% or 20,603 tonnes was assimilated equipment. That very same year, the household and assimilated arising of desktop computers (UNU key 0303) was 15,697 tonnes, of which 30% or 4,790 tonnes was assimilated equipment. The calculation of these arisings allows for the total holding times per year and therefore includes any reuse.

Accordingly, the 2012 arising of laptops (including tablets) and professional desktop computers (which are all "household assimilated" under the terms of the WEEE II Directive is estimated at 25,393 tonnes

## ► THE ARISING

The reuse share considerably brings down the arising of some WEEEs. Details about the share of used ICT equipment which is exported, about its final destinations and its end-of-life situation (on becoming waste) will be given in chapter V.2.

The arising to which this WG corresponds is under evaluated because we have considered the pink flow in the table as negligible but the sum of these flows probably has some bearing on the arising.

The greater share of the arising is however represented by professional printing systems (38% of the arising as assessed today), by the mobile network EEEs (22%) and by servers (21%).

<sup>30</sup> Broadcast equipment, translation equipment (audio consoles connected to conference rooms), site inspection equipment (audio headphones), audioconference / visioconference, videoprojectors, (electronic) projection screens, film shooting equipment (sound recording, cameras etc.), and concert hall sound systems.

Furthermore, there is a margin of uncertainty concerning the EEEs whose arising was assessed from data taken from preparatory studies undertaken as part of the Eco-Design Directive because the available data was European data from which the French data was deduced.

Overall, only 2% of the arising estimated here has the highest reliability index (+++), and 91% has a reliability index of "++".

#### **ICT equipment: professional and household assimilated arising**

The 2012 professional arising comes to 33,926 tonnes.

The 2012 household assimilated arising comes to 43,501 tonnes, including:<sup>31</sup>

- Desktop computers: 20,603 tonnes (59% of household and assimilated arising for UNU key 0302);
- Laptop computers: 4,790 tonnes (30% of household and assimilated arising for UNU key 0303);
- Printers and fax machines weighing less than 10 kg: 366 tonnes (1.5% of household and assimilated arising for UNU key 0304);
- Fixed telephones and telephony equipment: 2,996 tonnes (39% of household and assimilated arising for UNU key 0305); and
- "Small IT hardware" (modems, hard disks, etc.): 14,746 tonnes (39% of household and assimilated arising for UNU key 0301).

The arising of professional equipment and household assimilated equipment is therefore 77,427 tonnes in 2012 for the ICT equipment WEEE.

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<sup>31</sup> BIO Intelligence Service (2013), Study on arising and destinations of household and assimilated WEEE.

**Table8 : Results of arising evaluation of WG B**

Equipment	Lifespan (years)	Historical POM (t)	2012 POM (t)	Share of POMs allocated to renewal	Installed inventory (t)	Installed inventory renewal factor	Reuse (1)	2012 Arising (t)	Arising reliability index
<b>IT EEE</b>									
A3 MFP / professional printers			25,000	90%			15,750	6,750	++
Professional printers of between 10 and 30 kg			10,000	90%			2,700	6,300	++
Servers	5 years for X86 servers, 10 years for Mainframes				57,688		600	7,188	++
Access network (AN) and mobile network equipment			7,000	50%			329	3,171	++
Network Core (NC) and mobile network equipment			34,417	13%			150	4,152	++
Fixed professional telephones			1,500	90%			240	1,110	++
PABX			750	90%			120	555	++
Routers			1,375	80%			413	688	++
Switches			1,500	75%			225	900	++
Electronic data storage and destruction systems									

Equipment	Lifespan (years)	Historical POM (t)	2012 POM (t)	Share of POMs allocated to renewal	Installed inventory (t)	Installed inventory renewal factor	Reuse (1)	2012 Arising (t)	Arising reliability index
Franking machines + Point SALE Equipment (cash register PC, barcode reader, ticket printer, electronic currency etc.) + Electronic printing equipment (e.g.: time-date stamps)	10	2,400						2,400	+
Other electronic and printing equipment such as self-service pica control terminals and automatic motorway tollgate barriers								0	++
EEE embedded in professional vehicles not fitted as standard (e.g. GPS driving assistance units, and in trucks and tractors)									
Automobile diagnosis cases, remote reading units									
Professional desktop computers (assimilated to household)								20,603 tonnes	<i>(outside survey perimeter)</i>
Laptop computers, professional tablets (assimilated to household)								4,790 tonnes	<i>(outside survey perimeter)</i>
<b>Audiovisual EEE</b>									

Equipment	Lifespan (years)	Historical POM (t)	2012 POM (t)	Share of POMs allocated to renewal	Installed inventory (t)	Installed inventory renewal factor	Reuse (1)	2012 Arising (t)	Arising reliability index
Television network equipment, broadcast									
Translation equipment (audio consoles connected in conference rooms), site inspection equipment (audio headphones)									
Audio conference systems									
Visio conference systems, video projectors, projection (electronic) screens									
Shooting equipment (sound recording, camera etc.)									
Concert hall sound systems, mixing tables									
Minilabs (miniaturised photo laboratories)								0	+++
Independent photo booths or connected to a minilab (found in airports, stations etc.)	9				1,500	10%		150	+++
Photography booths (Photomaton booth type)	6				3,750	15%		563	+++
Small and medium format,			negligible					0	+++

Equipment	Lifespan (years)	Historical POM (t)	2012 POM (t)	Share of POMs allocated to renewal	Installed inventory (t)	Installed inventory renewal factor	Reuse (1)	2012 Arising (t)	Arising reliability index
professional cameras									
Dynamic display screens (airports, stations, underground, tramlines).	5							0	+++
							<b>TOTAL</b>	<b>33,926</b>	

## IV.3. EVALUATION OF WEEE ARISING OF WG C. "INFRASTRUCTURES AND NETWORKS"

### ▶ PERIMETER

The list of equipment presented in Table 9 is not exhaustive but results from and discussions in WG C.

**Table 9 : Perimeter of WG C - EEE of infrastructures and networks**

TRANSPORT NETWORKS (ROAD, RAIL, RIVER, AIR)
Railway network EEE
Road network lights/signals
Airport network lights/signals
Maritime and fluvial network EEE
Other surveillance, control or test instruments specific to transport (e.g.: tunnel ventilation)
Outdoor light fittings (public lighting), not attached to buildings
Self-service vehicle connection terminals
ELECTRICITY DISTRIBUTION / ELECTRICAL SYSTEM GRIDS
Voltage transformers < 1000 V into alternating current and < 1500V into direct current
Electricity meters
Uninterruptible power supplies (UPS)
UTILITY DISTRIBUTION NETWORKS (WATER, GAS)
Water meters
Gas meters
Water pumping and distribution systems
Gas distribution systems

### ▶ INFORMATION SOURCES

The following is sources of information were used for evaluating the WG C arising:

- Récylum;
- PROFLUID, French Association for pumps and stirrers, compressors and valves;
- Gimélec / CEMEP, European Committee of Electrical and Electronic Power machine constructors;
- USIRF, Union des Syndicats de l'Industrie Routière Française;

- SER, Syndicat des Equipements de la Route;
- SATELEC, company for design, engineering and maintenance of electrical installations in major infrastructure networks and motorway, highway and urban connections;
- JC Decaux;
- SNCF;
- Aéroports de Paris;
- Prodcum (codes 26516350, 26516330 and 26516370); and
- Several preparatory studies carried out as part of the Eco-Design Directive.

## ▶ MAIN HYPOTHESES

### Road signage

The installed traffic light inventory was evaluated on the basis of the number of lights per km in a built-up area (10 lights/km, with a complete traffic light weighing an average of 8 kg, including 400 g of LED source; SATELEC source) and an urban road network (650,000 km, USIRF data) According to SER, the traffic light market is a renewal market and according to SATELEC, 7% of the traffic light inventory (and 14% of the LED inventory – although this data has not been taken into consideration because the LED source weighs so little compared to the weight of the complete traffic light) is renewed on average every year. When they are replaced, LED sources are generally and systematically recycled in the WEEE sector; For the traffic light boxes (metal and plastic), local authorities and in some cases maintenance and work companies take charge of the end-of-life and therefore the final destination of these WEEE arisings is difficult to identify (probably scrap metal dealers).

### Railway network signalling equipment

The installed inventory (in units) of this equipment (switching equipment, junction boxes, signals, control posts, track controllers, switch motors, markers, IT stations, detectors, level crossing equipment etc.) is known as is the average renewal factor of the inventory but there was no way of calculating the arisings in the time afforded by the survey because neither the signalling department at SNCF or RFF were able to calculate the average weight of this equipment.

### Maritime and fluvial network EEE

Essentially, this is an electrical waterway and port signalling equipment The arisings on this equipment is unknown (no available data) but BIO hypothesises that the numbers of this type of equipment are small compared to the electrical signalling the equipment used in the rail and road networks which carry far denser traffic and include much more signalling equipment and that their lifespans (technical and total holding) were high.

### Other transport network surveillance, control and management instruments

This covers small equipment like electrical tunnel ventilation equipment and their arising is in theory low compared to the rail and road electrical signalling equipment.

### Exterior light fittings

See explanations in WG A (section IV).

### Self-service vehicle connection terminals

These EEEs have a life span of approximately 10 years and having been put on the market starting in 2007, the arising can be considered negligible.

## Electricity meters

The installation of the Linky meters to begin in 2005 will generate 36,000,000 m (mechanical and electrical) to be recycled between now and 2020, representing 50,000 tonnes. This means that there will be a arising of around 10,000 tonnes / year between 2015 and 2020, then nothing more for 15 years. However, the share of defective or worn meters already replaced in 2012 cannot be defined by ERDF.

## Uninterruptible power supplies (UPS)

According to Gimélec, among the professional uninterruptible power supplies (UPS), only those rated at less than 200 kW are considered by the study. USPs with higher power come from large-scale fixed installations which do not fall into the perimeter of the study. In general, items put on the French market correspond to an investment resulting from the creation of new installations to be protected, or to a capacity increase. The installed USP inventory is rarely renewed and relatively few USPs join the WEEE arising every year. According to the profession, the share of POM units allocated to renewal varies between 10 and 20%.

## Water and gas meters

Récylum considers that the great majority of gas and water meters are mechanical. Their share in the WEEE tonnage is estimated to be negligible.

### ▶ THE ARISING

The arising is evaluated at **16,514 tonnes**, a figure considered to be underestimated because data from three arisings which are potentially not negligible have been left out (highlighted in blue). In addition, there is some bias because the pink flows in the table are considered as negligible but when some together perhaps they are not.

Furthermore, there is a margin of uncertainty concerning the EEEs whose arising was assessed from data taken from preparatory surveys undertaken as part of the Eco-Design Directive because the available data was European data from which the French data was deduced.

Finally, there was also the possibility that part of the water pumps (data emanating from preparatory studies forming part of the Eco-Design Directive) and counted in the arising in fact refer to the fixed installations (and therefore fall outside the perimeter of the WEEE Directive), while the applications and the installation methods may be highly variable.

Overall, only 37% of the estimated arising wins the highest reliability index (+++) due to the uncertainty prevailing in the water pumping and distribution systems.

Table10 : Results of arising evaluation of WG C

Equipment	POM 2012 (t)	Share of POMs allocated to renewal	Installed inventory (t)	Installed inventory renewal factor	Arising 2012 (t)	Reliability index
<b>Transport networks (road, rail, river, air)</b>						
Railway network EEE						
Road network lights/signals			52,000	7%	3,640	+++
Airport network lights/signals			375	4% for Roissy CDG, 3% elsewhere	12	+++
Maritime and fluvial network EEE						
Other transport network surveillance, control and management instruments (e.g.: tunnel ventilation)						
Outdoor light fittings (public lighting), not attached to buildings	7,500	30%			2,250	+++
Self-service vehicle connection terminals					0	+++
<b>Electricity distribution / electrical system grids</b>						
Voltage transformers < 1000 V into alternating current and < 1500V into direct current			8,224	10%	822	++
Electricity meters			43,000			
Uninterruptible power supplies (UPS)	2,241	10%			224	+++
<b>Utility distribution networks (water and gas)</b>						

Water meters						
Gas meters						
Water pumping and distribution systems	10,629	90%			9,566	+
Gas distribution systems						
				<b>TOTAL</b>	<b>16,514</b>	

## IV.4. EVALUATION OF WEEE ARISING OF WG D. "INDUSTRIAL SECTOR"

### ▶ PERIMETER

This WG perimeter includes professional portable electric tools (cf. NF standard EN 50144) and semi-fixed tools (cf. NF standard EN 61029).

The perimeter excludes:

- "Large-Scale Stationary Industrial Tools" (LSSIT): an LSSIT is a set of devices equipped with a driving system other than human or animal force, applied directly; comprising parts or devices connected together and at least one of which is mobile and which are connected jointly for a defined application; which neither portable nor semi-fixed; and which is designed for use as part of industrial processes and manufacturing, or of R&D facilities. " (cf. article R.543-172-1 III of the environment code). This definition corresponds to the criteria given in the document entitled "FAQ WEEE" which refers to FAQ RoHS 2.<sup>32</sup>
- "Large Stationary Installations" (LSI): set of machines/parts attached together, on a large scale having a specific application; permanent installation which is installed, maintained and disassembled by professionals.

In practice, BIO looked at professional portable and semi-fixed electrics tools having measuring < 2.5 x 2.5 x 2.5m and weighing < 2 tonnes.

### ▶ INFORMATION SOURCES

The following is sources of information were used for evaluating the WG C arising:

- GIGREL, Groupement des Industries du Groupe Électrogène;
- SYMOP, Syndicat des machines et technologie de la production;
- French Customs;
- Schneider; and
- Various industries using types of equipment included in this WG.

### ▶ MAIN HYPOTHESES

#### Generators

Only generators producing low-voltage electricity (voltage less than 1000 of the AC and 1000 V DC) are covered by this study. For exemptions, analysis of the weight of the different generators is used as a way of linking a power level to a weight. Accordingly, generators > 240 kWe are large-scale stationary installations (weighing more than 2 tonnes) and do not enter into the perimeter of the WEEE Directive. Because these are backup applications operating only between 30 and 50 hours per year for between 25 and 30 years, they do not generate end-of-life waste in the emergency generator status but are resold on the used market as "almost new".

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<sup>32</sup> FAQ WEEE : [http://ec.europa.eu/environment/waste/weee/pdf/faq\\_weee2.pdf](http://ec.europa.eu/environment/waste/weee/pdf/faq_weee2.pdf)

FAQ RoHS 2 : [http://ec.europa.eu/environment/waste/rohs\\_eee/events\\_rohs3\\_en.htm](http://ec.europa.eu/environment/waste/rohs_eee/events_rohs3_en.htm)

Concerning generators at < 240 kWe, there are two families to be taken into consideration:

- Diesel and gas generators systematic or the corresponding to backup applications and not generating end-of-life waste. Because of their almost new nature, these generators are sold after 25 years of service as backup equipment. The holders are hospitals, the nuclear sector, the industrial sector and facilities open to the public. It is barely probable that these holders accept giving up a source of income. Therefore, this arising can be considered to be zero.
- Portable generators with power  $\leq 10$  kWe: the  $\leq 6$  kWe category corresponds to this household equipment used for do-it-yourself and caravan applications and the  $> 6$  kWe category corresponds to use on sites by sole traders and therefore falls within the perimeter of the study. The manufacturers are unaware of the methods for holding these generators.

Statistics produced by members of the Gigrel cover all the products manufactured and put on the market by these manufacturers (261 tonnes in 2012) but do not include putting on the market resulting from imports (especially from China). The customs authorities sent BIO of the import/export figures for generators, allowing it to calculate the real tonnage is put on the French market in 2012, as shown in the last column of Table 11.

**Table 11: Putting On the Market (POM) of generators in France in 2012**

NACE code (NC8)	NACE code tag	Imports 2012 (tonnes)	Exports 2012 (tonnes)	POM by manufacturers who are members of Gigrel (tonnes)	Total quantity of French POM in 2012 (tonnes)
85021180	Diesel/semi-diesel units with power > 7,5 kVA but $\leq 75$ kVA	2,581	8,649	201	<b>2,782</b>
85022040	Petrol units with power > 7,5 kVA but $\leq 375$ kVA	165	414	60	<b>225</b>

According to Gigrel, there are several factors suggesting that the generated arising is very small compared to the putting on the market figures. First of all, the total holding time of the generators is far greater than the use duration explaining the behaviour of the following portable generator holders:

- There is a large used resale market on the Internet;
- There is a big offer for rental and recovery; and
- The share of metals in the generators (approximately 95% copper, aluminium, steel) suggests is that scrap metal dealers have a healthy appetite for this type of life end product.

However, BIO was unable to estimate the arising because it would mean a specific and in-depth survey of the subject.

### Other equipment of WG D

BIO contacted 12 companies (process industries and manufacturing industries) to evaluate the inventory of typical industrial electrical tools in these industries. Only 4 answered: Schneider, Total, Sanofi, L'Oréal. In Schneider's factories (and in those operated by ABB and Siemens, according to Schneider) and at Sanofi, there are essentially assembly lines (LSSI) with very few electric portable and semi-fixed tools. As far as oil refineries are concerned, the WEEE is essentially IT hardware (specific control computers) or machines weighing far more than 3 tonnes. No usable information could be obtained by L'Oréal. One of the difficulties encountered during the interviews is the lack of clarity in the French and European regulations concerning the perimeter of large-scale stationary installations and large scale stationary industrial tools

Furthermore, SYMOP, Gimélec and DGCIS are carrying out a study into the machine inventory in France but the results which will be available in the summer of 2014 concern only POM (production, imports, exports) and not all the data that BIO requires (average weight, % allocated to renewal).

▶ **THE ARISING**

In the light of the aforementioned points, BIO was unable to estimate the WG D arising because of the shortage of available data and the lack of clarity in the regulations.

## IV.5. EVALUATION OF WEEE ARISING OF WG E. "TERTIARY GOODS AND SERVICE SECTOR"

### ▶ PERIMETER

The list of equipment presented in Table 12 is not exhaustive but results from and discussions in WG E.

**Table 12 : Perimeter of WG E – EEE of tertiary goods and service sector**

EEE OF TERTIARY GOODS AND SERVICE SECTOR
EEEs specific to artisan bakeries-pastry makers (excluding ovens)
Automatic dispensers
Bars: beer pumps
Other food preparation equipment (excluding dough mixers)
Professional ovens
Professional hotplates
Professional dishwashers
Commercial refrigeration (supermarkets)
Refrigeration (restaurants, hotels, etc.)
Drycleaners, Laundries: professional washing machines and dryers
Other dry cleaner and laundry EEEs (spin dryers, steam generators in dry cleaner's, ironing units, etc.)
Monitors without tuners (hotel keeping)
Floor washing machines
Professional vacuum cleaners
EEEs specific to indoor sports facilities
EEEs in casinos (slot machines)
EEEs in beauty parlours
EEEs in tanning centres (tanning booths)
EEEs in hairdressers' (hairdryers)
EEEs in massage centres (massaging armchairs)
EEEs specific to craft workshops (jewellery, watchmakers, shoemakers, tailors, etc.)
EEEs specific to vehicle maintenance companies

## ▶ INFORMATION SOURCES

The following sources of information were used for evaluating the WG E arising:

- ADEME WEEE Register;
- INSEE (code NAF 56.30Z) ;
- Perifem, Technical Association for Commerce and Distribution;
- SNPBC, National Booth Tanning Professionals Union;
- NAVSA, National Union for Automatic Sales and Services;
- LEMPA, testing the boric free-form fruit equipment and products (essentially for bakery and pastry making);
- FBF, Fédération Bancaire Française ;
- Ministry of Youth and Sports:
- LPG, companies selling specific machines for beauty salons;
- Yves Rocher ;
- Several preparatory studies carried out as part of the Eco-Design Directive
- Xerfi studies into "The automatic distribution sector" and "Casino and gambling games".
- Samsung Electronics ;
- AMDTechnic, a company selling used or new solariums; and
- Technical data sheets by slot machine makers/distributors.

## ▶ MAIN HYPOTHESES

### **Equipment covered by preparatory studies carried out as part of the Eco-Design Directive:**

- Professional ovens;
- Hot plates;
- Professional dishwashers;
- Commercial foodstuff refrigeration (in supermarkets, among small businesses, etc.);
- Non-commercial foodstuff refrigeration (in restaurants and hotels, canteens/cafeterias, etc.); and
- Professional washing machines and dryers

With the exception of foodstuff refrigerator and freezer equipment for which the surveys indicate POM in 2012 and the share of POM items allocated to renewal, the arisings of this equipment was evaluated on the basis of the "old" POM figures (see Glossary).

The old POM figures for the French market were deduced from the European data using different methods adapted to the equipment in question. The information given in the preparatory studies conducted within the framework of the Eco-Design Directive helped BIO estimate the share of the used equipment allocated to reuse: 50% for food refrigerators and freezers, 25% for others, 10% for dishwashers and laundry equipment. Reuse was considered to be negligible for hotplates.

As far as the EEE of commercial food refrigerators and freezers are concerned, i.e. refrigerated cabinets and showcases found in supermarkets and among small retailers (e.g.: refrigerated - but not automated - drink dispensers in bakeries), a distinction has to be made between refrigerated cabinets "with inboard

generators" or "independent" generators of cabinets installed "in a network" with the latter being considered by Perifem as forming part of the large-scale stationary installations. Networked cabinets which represent 55% of the commercial food refrigerator and freezer tonnage were there for excluded from the scope of this study.

**Figure 3: Examples of commercial food refrigerator and freezer equipment**



**Figure 4: Examples of non-commercial food refrigerator and freezer equipment**



### Automatic dispensers

As far as automatic food and drink dispensers are concerned, NAVSA believes that 20% of the inventory is renewed every year. Reuse in the sector is also significant but less than 50%; therefore, BIO considered it to be 30%. Finally, non-food dispensers (excluding ATMs), far less numerous than the other types of automatic dispensers, have a arising considered as negligible.

### Beer pumps

BIO estimated that 45,079 drink purveying enterprises (Code NAF 56.30Z) each have a beer pump. BIO's hypothesis is that the machines last at least 5 years. The average weight was worked out on the basis of several manufacturer technical data sheets.

### Other food preparation equipment (excluding dough mixers)

This category includes many types of equipment (e.g.: beaters-mixes, ham slices, hamburger meat forming machines, kitchen scales, chip cutters, etc.) and it is not clear whether they belong to the Pro EEE field (compared to the assimilated EEEs). What is more, a great deal of this equipment could just as well be encountered in agro-food factories (therefore in the "industrial sector" WG) as it could in the restaurant sector. Finally, BIO chose the hypothesis - unverified - that the reuse of this type of equipment would probably be considerable. For these reasons, the arising of "others with preparation equipment", despite the numbers and weight (an automatic steak shaping machine weighs up to 50 kg for instance) was considered to be "negligible" by this WG.

### PRD professional monitors without tuners (i.e. without assimilated EEEs)

Professional monitors without tuners could have been considered as audiovisual equipment and therefore appear in the specific arising of WG B but since they are to be found in the tertiary goods and services sector, BIO has chosen to "classify" them among the WG E. The POMs and the average weight of this equipment were given very accurately by Samsung (to within the unit) for monitors without a tuner put on the French market (by all the distributors), without any visible fee (and they are therefore not household assimilated). BIO's hypothesis is that of the share of POM items allocated to renewal is 50%.

### **Dry cleaning and laundry EEE**

As far as the dry cleaning and laundry EEEs are concerned, other than a professional washing machines and dryers, the arising was considered as being potentially not negligible. Indeed, for instance, there are more than 4,000 dry cleaners in France and these businesses use equipment such as steam generators or ironing presses (weighing on average more than 10 kg), a weight not considered insignificant. However, the average total holding time and the methods applicable to reuse are unknown to us regarding this equipment and we were unable to verify our hypothesis. What is more, we do not know how many laundries there are in France and cannot put forward any hypotheses about these facilities.

### **Sports machines and fitness rooms**

According to the survey by the Ministry of Youth and Sports, there are 41 sports machines per 10,000 French people. The average weight was worked out on the basis of several manufacturer technical data sheets. The lifespan was considered to be equal to the average guarantee period (10 years) and the share allocated to reuse (30%) was estimated on the basis of a discussion with a distributor.

### **EEEs in beauty salons**

There are 14,000 institutes and centres proposing a facial care, manicures or depilation in France<sup>33</sup>. According to Yves Rocher, there are approximately 3 booths per Institute each containing a bed and a wax heater. The average weights and lifespans were estimated by Yves Rocher.

### **EEEs in beauty parlours**

According to the SNPBC, there is an inventory of 15,600 UV machines shared between beauty salons, hair dressers, sports rooms and swimming pools. The average weight was worked out on the basis of several manufacturer technical data sheets.

### **EEE of hairdressing salons (hairdryers) and massage centres (massage armchairs)**

Lifespans are in theory long because of the widely practice of reuse (there are many resale sites for this type of equipment). The arising was therefore considered as negligible.

### **EEEs specific to crafts workshops**

The lifespans are very long and the arising is widely scattered. In addition, there is apparently a great deal of reuse in this sector and the arising was therefore considered to be negligible.

### **EEEs specific to vehicle maintenance companies (garages)**

Equipment like this can include garage lifts the holding times of which are very long and which could be considered as LSSIT and therefore outside the scope of the WEEE (the Steering Committee was unable to deliberate on this point); or specific tools for vehicle maintenance activities. Tools like this are not found only in the industry (to be included in the WG D. "Industrial sector") but can also belong to household EEE arisings in some cases. That is why specific garage EEE arisings are considered negligible compared to the remainder of the professional WEEE arising.

## **▶ THE ARISING**

The two types of equipment that represent the larger share of the arising are commercial food refrigeration and freezer equipment (sales refrigerated cabinets to be found in supermarkets for instance) and automatic dispensers (AD), while allowing for reuse. Food and drink ADs represent a total of almost 90% of the installed inventory of ADs compared to almost 10% for ATMs. There are still very few non-food ADs other than ATMs (e.g.: prismatic product dispensers).

<sup>33</sup> <http://www.annoncebeaute.com/Articles/Etudes/Le-marche-de-la-beaute-et-du-bien-etre>.

In the case of commercial foodstuff refrigeration at its end-of-life (weighted average lifespan = 8.3 years), the reuse share is considered to be around 50%. For automatic dispensers, the biggest companies develop their own reconditioning services. According to a number of interviews by BIO, reuse is significant but still less than 50%. BIO considers the hypothesis that approximately 30% of the 80s which reach their end-of-life for the first user are reused.

The arising corresponding to this WG - 40,845 tonnes - is underwritten any rated because there is no data about two arisings which are potentially not negligible (highlighted in blue) and five arisings which may be negligible but are nevertheless unknown.

Furthermore, there is a margin of uncertainty concerning the EEEs whose arising was assessed from data taken from preparatory studies undertaken as part of the Eco-Design Directive because the available data was European data from which the French data was deduced.

Overall, only 5% of the arising estimated here has the highest reliability index (+++), and 87% has a reliability index of "++".

Table13 : Results of arising evaluation of WG E

Equipment	Lifespan (years)	Historical POM (t)	POM 2012 (t)	Share of POMs allocated to renewal	Installed inventory (t)	Installed inventory renewal factor	Share of used EEE which is reused	Arising 2012 (t)	Arising reliability index
EEEs specific to artisan bakeries-pastry makers	10				20,000			2,000	++
Automatic dispensers					104,418	20% for food ADs and 10% for ATMs	30%	12,262	++
Bars: beer pumps	5				360			72	+
Other food preparation equipment (excluding dough mixers)									
Ovens	10	2,898					25%	2,174	++
Hotplates	11	203					0%	203	++
Dishwashers	8	2,327					10%	2,095	++
Commercial food refrigerators and freezers (supermarkets)			20,258	78% to 90% depending on the equipment			50%	9,116	++
Food refrigerators and freezers (restaurants, hotels, etc.)			9,933	92% to 98% depending on the equipment			50%	4,666	++
Laundries: washing machines and dryers	12	2,578					10%	2,320	++
Other dry cleaner and laundry EEEs (steam generators in dry cleaners', ironing units, etc.)									

Equipment	Lifespan (years)	Historical POM (t)	POM 2012 (t)	Share of POMs allocated to renewal	Installed inventory (t)	Installed inventory renewal factor	Share of used EEE which is reused	Arising 2012 (t)	Arising reliability index
Professional monitors without tuners (hotel keeping)			30	50%				15	++
Floor washing machines									
Professional vacuum cleaners	8	1,918						1,918	+++
EEEs specific to indoor sports facilities	10				39,975		30%	2,798	+
EEEs of casinos (slot machines)	7				2,894			413	+
EEEs of beauty salons (electric mattresses, wax heaters)	5 to 9 years depending on equipment				2,163			247	++
EEEs of tanning centres (tanning booths)	10				5,460			546	++
EEEs in hair dressers' (hairdryers)									
EEEs in massage centres (massaging armchairs)									
EEEs specific to craft workshops (jewellery, watchmakers, shoemakers, tailors, etc.)									
EEEs specific to vehicle maintenance companies									
<b>TOTAL</b>								<b>40,845</b>	

## IV.6. EVALUATION OF WEEE ARISING OF WG F. "MEDICAL DEVICES AND MEASURING INSTRUMENTS"

### ► PERIMETER

The list of equipment presented in Table 14 is not exhaustive but results from and discussions in WG F.

**Table 14 : Perimeter of WG E – Medical devices and measuring instruments**

EEE OF THE MEDICAL SECTOR
Diagnostic and care equipment (imagery, surgery, respiratory assistance, in vitro diagnosis, etc.)
Electrical medical furniture (beds, operating tables, examination armchairs, etc.)
Hygiene equipment (steriliser, oven, instrument washer, etc.)
Refrigerating equipment (blood bank, cryogenic chamber, cold chamber, etc.)
Dental equipment (workstation, amalgam suction system, tools, etc.)
MEASURING INSTRUMENTS OF SCIENTIFIC RESEARCH LABORATORIES AND CENTRES
Measuring instruments (e.g.: voltmeters) used in research and industry (not attached to frame).
Satellite control equipment and other measuring devices with application on the ground

### ► THE ARISING

The data come from estimations by Récyllum. The annual arising of medical devices and electrical medical furniture was estimated at 14,000 tonnes of which 1,000 tons would have a second life.

As far as measurement instruments used in scientific research laboratories and centres are used, the market is highly fragmented in terms of tonnages put on the market and regarding union representation; however, considering the tonnages reported by some of the major players in the sector to Récyllum, the arisings (waste) of measuring instruments appear to be around 1,000 tonnes. This arising, with its limited reliability, is represented essentially by small equipment because large pieces of equipment are often integrated into the data of the industrial arising.

**Table15 : Results of arising evaluation of WG F**

Equipment	Estimated reuse (t)	Arising 2012 (t)	Arising reliability index
Medical devices and electric medical furniture	1,000	13,000	++
Measuring instruments of scientific research laboratories and centres		1,000	+
<b>TOTAL</b>		<b>14,000</b>	

## IV.7. TOTAL ARISING AND MAIN FLOWS

Out of the 78 types of Pro EEE counted in the study (excluding household assimilated EEE and outside the industrial sector EEE), the arisings of 54 types of equipment (i.e. 68% of equipment types) were assessed by BIO, leaving 24 not assessed.

**The total arising of professional WEEE evaluated by BIO for the year 2012 is almost 210,000 tonnes.** As explained previously, with respect to the results of the WG evaluations, this arisings is and/or evaluated because the arisings of seven types of equipment, apparently not negligible, could not be documented. In addition, the "Industries" WG could not be estimated.

Overall, **only 44.5% of the arising estimated here has the highest reliability index (+++), 46% has a reliability index of "++" and 9.5% a limited reliability index (+).**

Six types of equipment (other than WEEE arisings arising from building demolitions) represent 54% of the arising which we were able to document:

- The HVAC engineering WEEE (except for the server cooling systems) (23.5%);
- Electric and home automation installation equipment (9.5%);
- Medical devices and electric medical furniture (6.2%);
- Automatic dispensers (5.8%);
- Water pumping and distribution systems (4.6%)<sup>34</sup>; and
- Commercial food refrigerator and freezer equipment (4.2%).

Table 16 is a summary of the arisings that could be documented.

**Table 16 : Professional WEEE arisings documented for the year 2012**

Types of equipment	2012 WEEE arising (tonnes)	re of total arising	Arising reliability index
HVAC engineering (other than server cooling systems)	49,344	23.5%	+++
Other electric and home automation installation equipment (excluding GLVU)	20,000	9.5%	+++
WEEE generated during cleaning out + post-cleaning out of tertiary buildings	14,700	7.0%	++
Medical devices and electric medical furniture	13,000	6.2%	++
Automatic dispensers	12,262	5.8%	++
Water pumping and distribution systems	9,566	4.6%	+
Commercial food refrigerators and freezers (supermarkets)	9,116	4.3%	++
Servers	7,188	3.4%	++
A3 MFP / professional copiers	6,750	3.2%	++
Interior light fittings (industrial armatures, extension lights, flush fit lights, ceiling lights, floodlights etc.)	6,750	3.2%	+++

<sup>34</sup> There is a doubt about 8000 tonnes of water pump arisings; this equipment can be considered as an integral part of the GIF according to PROFLUID.

Types of equipment	2012 WEEE arising (tonnes)	re of total arising	Arising reliability index
Professional printers of between 10 and 30 kg	6,300	3.0%	++
Food refrigerators and freezers (restaurants, hotels, etc.)	4,666	2.2%	++
Network Core (NC) and mobile network equipment	4,152	2.0%	++
GLVU (General Low Voltage Unit)	3,736	1.8%	+++
Road network lights/signals	3,640	1.7%	+++
Access network (AN) and mobile network equipment	3,171	1.5%	++
EEEs specific to indoor sports facilities	2,798	1.3%	+
WEEE generated during cleaning out + post-cleaning out of residential buildings (housing)	2,700	1.3%	+
Illuminated signs	2,500	1.2%	+++
Franking machines + Point of Sale Equipment (cash register PC, barcode reader, ticket printer, electronic currency etc.) + Electronic printing equipment (e.g.: time-date stamps)	2,400	1.1%	+
Laundries: washing machines and dryers	2,320	1.1%	++
Outdoor light fittings (public lighting), not attached to buildings	2,250	1.1%	+++
Ovens	2,174	1.0%	++
Dishwashers	2,095	1.0%	++
EEEs specific to artisan bakeries-pastry makers	2,000	1.0%	++
Professional vacuum cleaners	1,918	0.9%	+++
Specific logic controllers for buildings (for gates, doors, shutters, etc.)	1,500	0.7%	++
Personal safety	1,400	0.7%	+++
Fixed professional telephones	1,110	0.5%	++
Equipment in building sanitary facilities	1,085	0.5%	+
Measuring instruments of scientific research laboratories and centres	1,000	0.5%	+
Switches	900	0.4%	++
Voltage transformers < 1000 V into alternating current and < 1500V into direct current	822	0.4%	++
Routers	688	0.3%	++
Photography booths (Photomaton booth type)	563	0.3%	+++
PABX	555	0.3%	++

Types of equipment	2012 WEEE arising (tonnes)	re of total arising	Arising reliability index
EEEs of tanning centres (tanning booths)	546	0.3%	++
Emergency lighting	520	0.2%	+++
EEEs of casinos (slot machines)	413	0.2%	+
Exterior light fittings "hung" from buildings (sponsors and sealed portholes; not including illuminated signs)	300	0.1%	+++
EEE of beauty salons (electric mattresses, wax heaters)	247	0.1%	++
Uninterruptible power supplies (UPS)	224	0.1%	+++
Hotplates	203	0.1%	++
Independent photo booths or connected to a minilab (found in airports, stations, etc.)	150	0.1%	+++
Bars: beer pumps	72	< 0.1%	+
Thermostats	30	< 0.1%	++
Professional monitors without tuners (hotel keeping)	15	< 0.1%	++
Lighting power supplies and management systems	13	< 0.1%	+++
Airport network lights/signals	12	< 0,1%	+++
Other electronic and printing equipment such as self-service pica control terminals and automatic motorway tollgate barriers	0	0%	++
Minilabs (miniaturised photo laboratories)	0	0%	+++
Small and medium format, professional cameras	0	0%	+++
Dynamic display screens (found in airports, stations, underground, tramlines, etc.)	0	0%	+++
Self-service vehicle connection terminals	0	0%	+++
<b>TOTAL, estimated</b>	<b>209,864 tonnes</b>		

According to the *WEEE 2012 annual report* published by ADEME, 17,504 tonnes of professional WEEE was reported as treated<sup>35</sup> (29% reuse of whole WEEE<sup>36</sup>, 1% reuse of parts, 50% recycling, 15% energy recovery and 5% destruction) in 2012 (53% of the treatment took place in France) by four eco-organizations approved for professional collection and 279 producers who have set up an individual system (other than zero reports). However, according to a survey by ADEME into the WEEE treatment centres, at least 140,000 tonnes of professional WEEE were treated by the WEEE treatment centres in 2010 and almost 108,000 tonnes of professional WEEE might have been treated in 2012<sup>37</sup> (that is, more than half of the 2000 short arising evaluated in this study). Data from the WEEE Register are therefore

<sup>35</sup> The treatment includes the reuse and preparation for reuse of parts, recycling, energy recovery and destruction.

<sup>36</sup> In the annual WEEE report, the term "reuse" is used but in reality it refers to "preparation for reuse" because the equipment has already become "waste" (if it is abandoned by users) when it arrives at the WEEE treatment center.

<sup>37</sup> ADEME (2012), 2012 inventory of WEEE treatment sites. The estimations of the professional WEEE tonnages are an extrapolation of the reports made by 91 sites (representative of the sector) treating professional WEEE.

not representative of the total quantities of professional WEEE arising, collected and treated in France. In fact, the data in the Register does not include:

- The waste derived from equipment put on the market before 13 August 2005, referred to as "historical", unless it is collected as part of a "one for one" exchange; and
- The WEEE whose management was delegated to the user.

Some historical WEEE or whose end-of-life management was entrusted to the user is therefore treated in France but is not entered into the WEEE Register report as required by regulations. But this will change in 2015 with the establishing of an observatory for the treatment of WEEE <sup>38</sup> in which the treatment operators and professional users will need to enter the treated WEEE tonnages every year.

When we observe the "treatment modes" by waste destination country (i.e. EEE abandoned by users but not potentially functional or repairable) for the tonnages reported in the Register, we see that the reuse of complete equipment takes place outside the European Union for 47% of the tonnage and for 29% in France whereas the use of parts, recycling, energy recovery and elimination almost solely take place in the European Union (more than 99% of the tonnages for each of these four types of treatment).

BVA and BIO have carried out surveys to refine their knowledge of the destinations of the arisings and the results are given in chapter V.

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<sup>38</sup> Provided for in articles R.543-200 and R. 543-202-1 of the environment code.

## V. ARISING DESTINATIONS

### V.1. RESULTS OF SURVEY AMONG WEEE HOLDERS

Note: Note that the results in this section come from a statistical survey consisting of telephone interviews with around 1003 respondents. Therefore, the answers are based on declarative mode results and have not been verified.

Out of the 1003 interrogated companies, almost all of them use "ICT equipment" (specific to WG B) (97%) and "equipment linked to building" (specific to WG A) (81%). In theory, 100% of the companies should use this equipment even if it is not impossible that some French companies (individual companies, TPE, independent, small operations, etc.) do not actually have specific IT equipment for the activity (but for instance, use their personal computer from time to time). The difference between the theory and the results of the survey on this point is perhaps due to an era in the understanding of the respondents.

With respect to these respondents, the measuring equipment (used by 40% of the interviewed people), the "specific equipment (32%) and the automatic dispensers (10%) concern very specific sectors:

- Measurement EEE: found in the health sector, industries and in the tertiary sector (bars, hotel keeping, etc.);
- Specific EEE: found in the tertiary sector (beauty, bars, hotel keeping, sports rooms, etc.), industry, health and
- Automatic dispensers, found in the tertiary sector and the Administration

What is more, 22% of the holders state that they rent or store equipment.<sup>39</sup> As far as rented EEE is concerned, a high proportion of the respondents (73%) **rents IT and audiovisual equipment** and 70% rent equipment which is specific to their activity.

In addition, a high proportion of the respondents (60%) **stores IT and audiovisual equipment** and one third stores **equipment specific to their activity** when they are no longer in use. Companies which store equipment do so **pending its recovery** by an outside service provider (whether it is a supplier, broker or other) **or in the hope of reusing it**. It is companies with more than 100 employees who affirm most frequently at that they store equipment with a view to reuse.

**In the event of failure**, almost all of them **repair or replace** their equipment, 22% recover spare parts and the recovery of rented equipment is essentially handled by the supplier, especially for automatic dispensers (93% of cases) and **IT equipment** (88% of cases). For building equipment, specific equipment and measuring equipment, recovery is handled by the supplier or the maintenance company.

Generally speaking, when equipment is used, holders call in (in order of priority) companies in charge of maintenance, installers or manufacturers, or otherwise take their WEEE to a waste processing drop-off. More specifically, there are differences depending on the equipment and the sector:

- In the case of equipment specific to an activity and to building equipment, recovery is first by the company in charge of maintenance, the installer or the manufacturer and some equipment is taken to a **waste drop-off**;

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<sup>39</sup> 22% of the companies and institutions rent EEE arisings and not *all* their WEEE, which does not mean that 22% of the EEE in the inventory is on rental.

- for measuring equipment and ICT and audiovisual equipment, taking the waste to the waste drop-off predominates, followed by recovery by the company in charge of maintenance, or the installer; and
- Automatic dispensers are generally taken back by the installer or the company handling their maintenance.

Note : The responses concerning waste taken to a drop-off should be considered with much precaution because some respondents perhaps confuse the "waste drop-off" with conventional waste management systems (residual household refuse, bulky refuse etc.).

Furthermore, within each section, differences in methods are observed depending on the size of the company or the local authority: **there is a tendency for equipment taken to the waste drop-off to decrease as the company size increases**, to the benefit of specialist intervention.

After the recovery of the equipment, more often than not it is sent to a treatment supplier or to a preparation/resale player, more particularly in France (for 38% of the respondents while considering that almost **half of them are unaware of the geographical destination of the equipment**).

Within these companies, it is often the manager decides on the "WEEE policy" of the company and the WEEE management policy is more often than not fully integrated into the "Sustainable Development" policy of the firm. In the following, we will see that the information derived from the takes hours to answers is to be considered with some precaution because in reality, in some sectors such as the medical environment (hospitals and clinics), the actual situation is not that clear-cut.

According to the survey, **70% of the interviewees have no particular issues with the management of their WEEE**. The remaining 30% mentioned several impediments regarding their management of WEEE:

- Lack of room;
- Logistical complications;
- Lack of time; and
- Lack of information.

Finally, the priority solutions or improvements expected are the optimization of collection and sorting solutions and complementary information.

## V.2. RESULTS OF COMPLEMENTARY SURVEY INTO DESTINATIONS OF CERTAIN WEEE FLOWS

### (W)EEE specific to the health sector

We have seen that the annual arising of medical devices and electrical medical furniture was estimated at 14,000 tons of which 1000 tons would have a second life.

BIO questioned the Logistical Manager of a company which is one of the biggest refurbishing and resale companies for used medical equipment. This company proposes a more transparent model than its competitors (requested without any conclusive return), many of whom are on the borderline of what is the legal. In France, the black market is enjoying a flourishing trade in electrical medical devices. Hospital staff working in many of the French hospitals sell medical equipment to brokers on their own behalf.

Whereas informal players, or certain "above board" players but whose methods are sometimes questionable, managed to recover high value added electrical medical equipment (recent equipment); the company interviews by BIO essentially recovers relatively old equipment, more particularly operating accessories (electric scalpels, patient ventilation equipment, etc.), imagery equipment (ultrasound, etc.)

and hospital beds. Out of the 200 to 300 tonnes recovered every year, it then sends approximately 10% to WEEE treatment centres (for recycling) and sells off 90%, essentially to export (between 75 and 80% of sales) and more especially to the hospitals in Maghreb and sub-Saharan countries (Ivory Coast, Gabon, Congo, Senegal, etc.).

Generally speaking, in this sector, export is still ahead of resale in France, but now that it is becoming important to cover public expenditure, the French market for used medical equipment is growing strongly among the hospital structures. According to the interviewed company, more than 1,000 tonnes of medical devices and electrical medical furniture coming from French facilities begin a second life every year

### ICT equipment

For IT, electronic and telecom EEE, there are many reuse stakeholders, and we still know little about the sector. However, a distinction can be made between IT service and distribution companies and the researchers who recover most of the equipment<sup>40</sup> and who then sell it off to the brokers or the "asset managers"<sup>41</sup> or the French or foreign. The brokers therefore procure equipment directly from the companies who are the owners of the inventory. This is followed by insertion companies and associations generally having direct contacts with the companies like ATF Gaïa (exclusivity for Dell and Apple customers) and Ateliers du Bocage.<sup>42</sup>

To refine knowledge of the flows of (W)EEE<sup>43</sup> handled by the refurbishing/reuse players of ICT, BIO has questioned SIRRMIET, the union of Asset managers in France. According to SIRRMIET, the Assets managers recover more than 20,000 tonnes of ICT equipment second-hand from the companies. Out on these 20,000 tonnes, the tonnage which is found to be obsolete (WEEE) or unsellable is estimated at approximately 3600 tonnes by SIRRMIET. The recovered tonnage which is (in some cases) refurbished and resold by the Asset Managers would therefore be around 14,000 tonnes per annum. More than half of the ICT tonnages resold by members of the SIRRMIET go to export and it is rather 80% in the case of brokers according to SIRRMIET. This percentage is very different according to the type of product and depends on geographical proximity. Overall, as all the exports, the main destinations are Eastern Europe (30%), Western Europe (20%), Asia (20%), the Middle East (15%), North Africa(5%), and the USA (5%), while the other destinations come to less than 5% of the exported total. These rates, like the above figures, needs to be considered with a great deal of circumspection because:

- This corresponds to the real conditions specific to the Asset Managers and not to the brokers, or traders, who buy and sell equipment certified to be operational, but without testing or refurbishing the products; and
- it refers to "direct sales" and not to final destinations Indeed, the packages are also sold by the Asset Managers two European brokers in England, the Netherlands, Germany etc., who themselves handle resale on other continents, especially in Africa. As far as professional multifunction printers (MFP) are concerned, for instance, according to Ricoh, the greater part of the used equipment is intended for Asia, Africa and the Middle East.

The volumes handled by the brokers are unknown and a specific survey into this subject would be required to estimate them.

Whatever the case, if 50% and 20% of the ICT tonnage is sold in France and not on export, in the respective cases of the Asset Managers and the brokers, meaning that there are French buyers who subsequently sell the equipment off to export (this flow is indeed outside the arising), or that the buyers

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<sup>40</sup> Ecologic (2007), Market survey into refurbishing and resale of ICT equipment.

<sup>41</sup> See Glossary.

<sup>42</sup> BIO Intelligence Service (2013), Study on arising and destinations of household and assimilated WEEE in France.

<sup>43</sup> (W)EEE: waste equipment which is potentially WEEE.

are French users all that the flows reach their end-of-life in French arisings (meaning that it need to be included in this arising). Having no information on this subject, BIO was unable to take this parameter which adds a touch of uncertainty to the waste arising of ICT equipment into consideration.

Some refurbishing and trade players, but also certain holders, sometimes under the cover of humanitarian action, export broken or irreparable IT hardware (sometimes discovered by the Customs although they cannot put a figure on the phenomenon), or equivalent whose hard disks still include confidential data. However, there is still considerable prejudice prevailing on the aspect and the reuse sector of ICT equipment EEE is still somewhat unknown. It would require an in-depth survey into this sector to find out more about it. In any case, Asset Manages day are expressing their wish to become involved in the matter of WEEE and to find solutions (by developing traceability and reporting services etc.) even if they do not internalise the WEEE treatment activity. It is in this direction that SIRRMIET, the leading professional union for refurbishing and sale players of ICT equipment EEE is developing.

### Refrigeration and air-conditioning systems:

We looked at the destination and treatment of professional refrigeration and air-conditioning systems<sup>44</sup> because they represent a considerable share of the total arisings assessed in this study<sup>45</sup>, and because they contain refrigerants (used because of their capacity to absorb heat); and the recovery of these foods is a large-scale environmental consideration.

In 2010, HFC gas emissions represented 3% of the greenhouse effect gas emissions in France (17 eq. mt of CO<sub>2</sub> out of a total of 552 eq. mt CO<sub>2</sub>). According to CFE (Ecological Taxation Committee) concerning fluorinated gases<sup>46</sup>, the sectors concerned by HFC emissions are essentially commercial refrigeration (36% of emissions in 2010), automobile air-conditioning (27%), industrial refrigeration (17%, essentially in the agro-food industry), air-conditioning (6%) and refrigerated transportation (5%).

The first generation of refrigerant fluids, CFC<sup>47</sup> and HCFC<sup>48</sup>) was gradually prohibited by the Montreal protocol (whether as cooling agent or as insulating agent for the manufacturing of insulating foam) because of their potential to cause the depletion of the ozone layer. In France, since 1 January 2000, they have been replaced by fluorinated fluids of the HFC type, whose "global climatic heating capacity still remains very high) in the opinion of the CFE. Furthermore, since 2006, the handling (confinement, use, recovery and destruction) of fluorinated greenhouse gases (GG) is highly regulated in the European unit because of the "F-Gas" regulation [adopted definitively on 14 April 2014 by the Council) imposing conditions on the marketing of HFCs (targeting a drastic decrease in its use starting from 2015) and of certain products and equipment containing or depending on fluorinated GGs and certain conditions of use specific to these gases.

CFC and HCFC gases are nevertheless still present in cold WEEE arisings manufactured some time ago and France has only the means of handling them since 8 years ago. The treatment centres, of which

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<sup>44</sup> In definite terms, professional cooling systems can be, for instance, air-conditioners, so-called "self-service" drink dispensers [that is not automatic), or the refrigerated showcase Windows in the supermarket.

<sup>45</sup> This equipment is encountered in the "HVAC engineering EEE" categories, and "automatic dispensers" (refrigerated dispensers), "commercial foodstuff refrigerators and freezers" and "non-commercial refrigerators and freezers", or even in other types of equipment, such as professional beer pumps (which include a cooling system).

<sup>46</sup> Notice No. 4 of the Ecological Taxation Committee of 18 April 2013, Opportunity for taxing refrigerating fluids.

<sup>47</sup> CFC = Chlorofluocarbons. CFCs are chemical compounds commercially known as Freon. They are colorless, odorless and non-inflammable, noncorrosive in the state of gas and liquid and are not intrinsically toxic but some of their decomposition products can be dangerous. They are responsible for the degradation of the ozone protecting Earth at a high altitude (in the stratosphere), absorbing high-energy ultraviolet radiation, thus contributing actively to greenhouse effect increases. In Europe, since 1 October 2000, CFCs cannot be put on the market and must be recovered and destroyed, starting on 1 January 2002 (WEEE).

<sup>48</sup> HCFC = Hydrochlorofluorocarbons.

there are 10 in France, are managed by seven independent operators: Coolrec, Derichebourg, Remondis, Sita, Terecoval, Frigopolis and Triade.

A refrigerant can be used on the spot (if it has not lost its physical-chemical properties, after filtration or regeneration by a refrigerant distributor. If a fluorinated gas is of poor quality (for instance, mixed with too much oil contained in the equipment), or if it is not confined separately from the other types of fluorinated gases, then it is destroyed, i.e. incinerated.

According to the vice president of the CFE, works with the Technical Division of Cofely Services (a subsidiary of GDF Suez which offers its customers solutions for reducing their energy consumption and which therefore buys regularly **the cooling systems from large equipment manufacturers**), **through the installers, the manufacturers now tend to take back cooling equipment when new installations are set up**. However, according to this expert on regulations in terms of fluorinated GES, although some factories specializing in the treatment of LARGE REFRIGERATION APPLIANCES have a very accurate traceability of the future of the refrigerant fluids they extract<sup>49</sup>, others know little about the final use of their refrigerant fluids.

**Confronted by this low visibility factor, BIO questioned the director of the "Industry and Commerce" Business unit at Climalife**, a company specialised in refrigerant fluids for refrigeration and air-conditioning professions in Europe. According to him, concerning the equipment recovery and treatment sectors, it is essential to make a distinction between household WEEE and professional WEEE:

- The refrigerant fluids contained in household equipment is almost never regenerated but is destroyed (incinerated) because of the storage costs of the various fluorinated gases. It happens that some large domestic appliances (LARGE REFRIGERATION APPLIANCES), before being taken to a WEEE treatment centre and/or a scrap crusher, no longer to contain the gases already (it is simply necessary to open a valve or for the refrigerating circuit to be pierced accidentally for the fluorinated gases to escape into the atmosphere).
- As far as professional refrigeration systems are concerned (e.g., bakery lifting ovens), installers dismantle them, recovered the refrigerating fluids which they pass on to fluids distributors (in more than 95% of the cases) who attempted to regenerate them if the fluids are sufficiently pure, and if the different types of fluids have not been mixed together. For hermetically sealed equipment like refrigerated showcases and independent mobile air-conditioners (equipment similar to household equipment but used for commercial purposes), the equipment is generally recovered by WEEE processing centres which captured the types of mixed gases in order to destroy them. This was checked out by BIO on 17 July 2014 when it visited the treatment station run by COREPA, a subsidiary of Derichebourg which processes 15 kt of WEEE/year including approximately 2 kt our professional equipment and which specialises in the devolution of large household refrigeration appliances (with all ecological bodies taken into consideration together) and professional appliances.

The COREPA factory specialises in the treatment of large refrigeration appliances, household refrigeration, but also the pollutants professional refrigeration equipment (drink dispensers, professional ice boxes, drinking water fountains etc.) and air-conditioners (heat pumps, etc.). First of all, this involves a preparatory phase during which the external power supply cables, the glass sections (racks, doors etc.) and the waste (wood, packaging, carton etc.) are removed by hand. The equipment is then de-polluted regarding any capacitors or mercury components (fluorescent tubes, switches etc.). The de-pollution process produces pollutant-free polyurethane foam powders; these fractions can be recycled as

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<sup>49</sup> This is the case of the COREPA factory (Derichebourg) inspected by BIO on 17/07/2014.

insulating panels or energy recovered for cement making (as a substitution fuel). Finally, all the fluorinated and hydrocarbon bearing gases are captured in a mixture (then destroyed)<sup>50</sup>.

In addition to the de-pollution of the refrigerant fluids contained in the circuits, and the insulating foam on this equipment, the final purpose of these dedicated installations is to guarantee the achievement of high recycling and recovery factors (of around 95%) which are more particularly the recycling of the plastics and the recovery of the polyurethane foams. The stakes are important because operators have observed, over several years now, a reduction in the metallic contents of this equipment. If the plastics and polyurethane foam is not extracted separately, the recovery factor would drop by approximately 30% (20% plastics and 10% foams). It should be borne in mind that the large refrigeration appliances comprise essentially styrene polymers (HIPS, ABS) which are light-coloured, greatly facilitating their subsequent recycling.

### **Generators**

According to Gigrel, generators have a lot in common with ELV (petrol, oil etc.) and have the potential of being treated in the same installations.

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<sup>50</sup> It would be difficult and time-consuming to separate them (checking the floor and native gases contained in the equipment requires additional manipulation, and therefore additional costs), if they are subsequently to be recovered/regenerated.

## VI. PERSPECTIVES AND RECOMMENDATIONS

### VI.1. PERSPECTIVES

The drop in putting on the market in 2012 is liable to last, even to become greater according to the *WEEE 2012 Annual Report* by ADEME. Because of technical changes, equipment is becoming lighter and multifunctional, leading to a drop in tonnages and/or the number of units put on the market. These trends may be more visible in the household area but will definitely become so in the professional area too because of the optimization of space, the progression of dematerialization within the corporate world (cost, practicality etc.), increasing ecological concerns (e.g.: cropping the use of printing), and the increased technical life duration of the products etc.

Furthermore, the approval of eco-organisms for the collection and treatment are professional equipment is pushing the latter to make companies more aware of their obligations with respect to the sector. There is a possibility that the declared tonnages and professional units increase in 2014 if many producers come into line with the regulation. This would ensure better control of the quantities put on the market, collected and treated.

Finally, starting from 2018, the application field of the Directive will be extended to all the electronic waste categories (a new open scope parameter), contingent upon prior impact analysis: equipment containing substances detrimental to the ozone layer, fluorescent lamps etc. This will mean developing new sectors for collecting electrical and electronic waste and improving the efficiency of the existing sectors.

Whatever the case, Member States are expected to have transposed the new Directive<sup>51</sup> into their national legislation starting from 14 February 2014. Completing the transposition decree of the Directive, a notice to producers indicatively listing by categories the EEE coming under the provisions of the Decree will soon be published. This notice will complete the FAQ of the European commission and specify more particularly the properties of some of the equipment defined in the decree as falling outside the regulatory field of the WEEE, and any applicable distinction criteria for certain types of equipment, between household and professional equipment and between the EEE of large scale industrial stationary industrial tools or large-scale stationary installations.<sup>52</sup>

### VI.2. RECOMMENDATIONS

#### VI.2.1. Boost the collection or professional WEEE in France:

- Communicate more extensively about the various options of collecting and processing WEEE among the companies and about the applicable regulations;
- Compensate for the lack of storage space among companies by optimising collection and sorting solutions; and
- Set up more stringent policies for managing WEEE in certain companies and in hospital facilities where members of the personnel continue to sell off used medical equipment privately.

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<sup>51</sup> Directive 2012/19/EU of the European Parliament and Council of 4 July 2012 relative to Waste of Electrical and Electronic Equipment (WEEE).

<sup>52</sup> See the consultation of the draft rulings relative to waste of electrical and electronic equipment from 17/04/2014 to 09/05/2014: <http://www.consultations-publiques.developpement-durable.gouv.fr/consultation-sur-les-projets-d-a369.html>.

## **VI.2.2. Make data collection systematic to evaluate the professional WEEE arising in France**

### **"Arising evaluation" part**

- Clarify the perimeter of Pro EEEs and that of LSSI and LSSIT; and
- Improve the reliability of reports of putting on the market of professional equipment in the ADEME EEE Register of producers.

### **"Identification of destinations" part**

- Update the 2009 Ecologic study of the refurbishment and resale of ICT equipment sector to obtain more information about:
  - The volumes which go through the "broker" market, their final destinations and the way the equipment is transported; and
  - All of the devices for the management of individual systems or of management by the user, especially as part of the revised WEEE Directive (integration of "mixed" household assimilated equipment into the collection of household WEEE).
- Obtaining reliable data about the export of (W)EEE – the exports of professional (W)EEE to date are covered little by documentation and the sources on which the studies base their hypotheses do not allow any quantitative position to be reached on the subject. To identify these data, cooperation with the appropriate administrations would need to be strengthened in order to fight against the illegal sectors (with the Ministry of the Interior, Customs, the Ministry of Ecology). To strengthen customs action, it might be possible to make the transmission of information from Eco-organizations systematic with such information fed back, for instance, to the Ministry of Ecology especially concerning:
  - Facilities with treatment methods which are not compliant with respect to national regulations; and
  - Suspicions of documented illegal exports (WEEE exported as used EEE exported to reuse).

## **VI.2.3. Technical requirements if the UNU model is required to include professional WEEE in the future**

- Adapting the reporting data to the estimation requirements of the arising according to the UNU method.

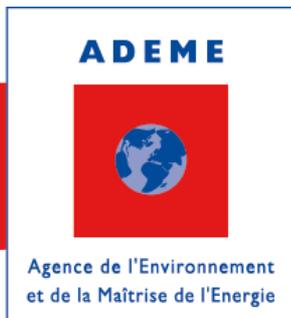
Register reports made according to the SH4 nomenclature have an insufficient level of precision to be connected directly to the types of equipment considered for evaluating the arising. For later revaluations, one option which would increasingly refine the evaluation would be to ask all the producers to report the equipment put on the market using the SH8 code.

However, before considering that, we would have to see whether the UNU is really adaptable to Pro EEE and to evaluate the feasibility and utility of producers generating a conforming report.

## ABOUT ADEME

The French Environment and Energy Management Agency (ADEME) is a public agency under the joint authority of the Ministry of Ecology, Sustainable Development and Energy, and the Ministry for Higher Education and Research. The agency is active in the implementation of public policy in the areas of the environment, energy and sustainable development.

ADEME provides expertise and advisory services to businesses, local authorities and communities, government bodies and the public at large, to enable them to establish and consolidate their environmental action. As part of this work the agency helps finance projects, from research to implementation, in the areas of waste management, soil conservation, energy efficiency and renewable energy, air quality and noise abatement.



ADEME  
20, avenue du Grésillé  
BP 90406 | 49004 Angers Cedex 01

[www.ademe.fr](http://www.ademe.fr)