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**Access, Terminals, Transmission and Multiplexing (ATTM);  
Broadband Deployment and Lifecycle Resource Management;  
Part 8: Implementation of WEEE practices for ICT equipment  
during maintenance and at end-of-life**

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**Reference**

RTS/ATTM-0251

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# Foreword

This Technical Specification (TS) has been produced by ETSI Technical Committee Access, Terminals, Transmission and Multiplexing (ATTM).

The present document is part 8 of a multi-part deliverable. Full details of the entire series can be found in part 1 [i.1].

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# Modal verbs terminology

In the present document "**shall**", "**shall not**", "**should**", "**should not**", "**may**", "**need not**", "**will**", "**will not**", "**can**" and "**cannot**" are to be interpreted as described in clause 3.2 of the [ETSI Drafting Rules](#) (Verbal forms for the expression of provisions).

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# Introduction

There is a permanent and exponential growth in the amount of ICT equipment due to the deployment of new generations of networks to support Cloud technologies, Big Data and Artificial Intelligence concepts. The ICT market has to consider the consequences of, and anticipate the impact of, this trend.

The reality is that many ICT users will have to continually change or upgrade a large part of their ICT equipment estate. It is therefore critical to consider the end-of-life (EoL) management of the ICT equipment, including components and subassemblies replaced during maintenance, especially in terms of sustainability.

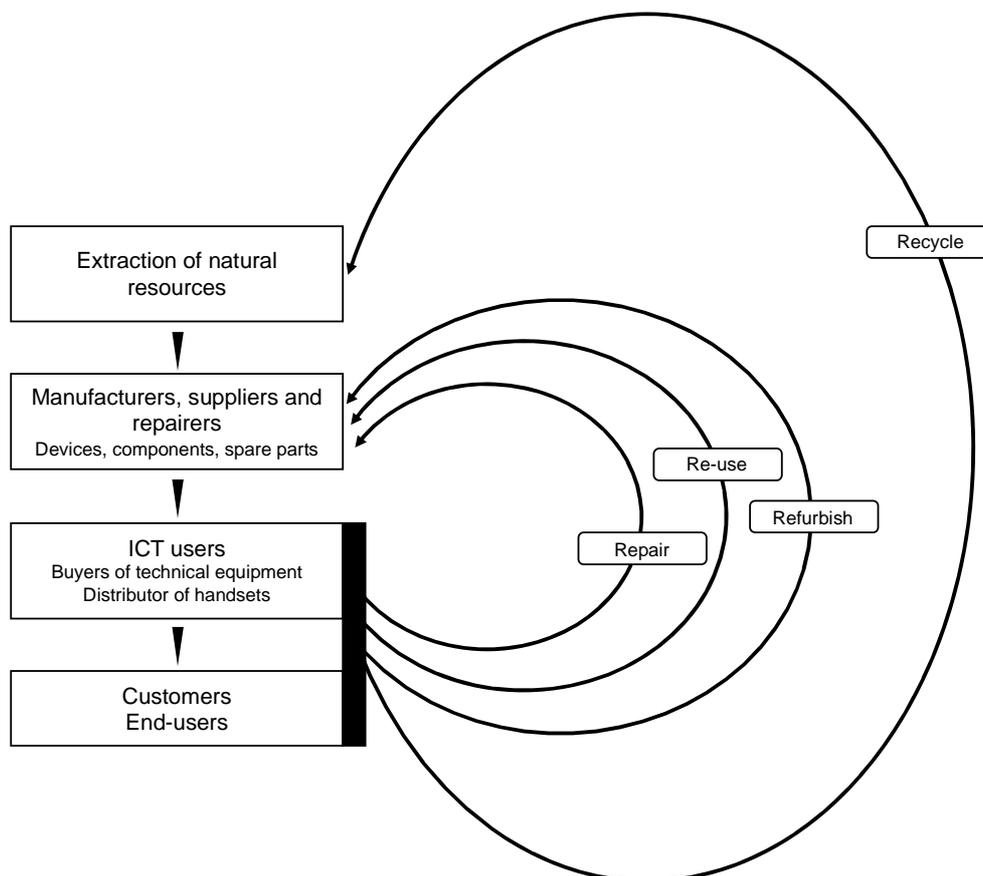
The purpose of the present document is to provide help to ICT users and companies involved in treatment of Waste Electrical and Electronic Equipment (WEEE) for the ICT sector which is, as described in ETSI EN 305 174-8 [9], composed of different types of ICT sites (Operator Sites (OS), Network Data Centres (NDC), and Network Distribution Nodes (NDN). Each ICT site accommodates ICT equipment in the form of Information Technology Equipment (ITE) or Network Telecommunications Equipment (NTE).

All ICT equipment is considered as Electrical and Electronic Equipment (EEE) and will follow the same rules and standards concerning their maintenance process and their EoL.

ICT sites normally accommodate equipment for power supply and distribution, environmental control and other security systems. This ancillary equipment is outside the scope of the present document.

The present document supports ETSI EN 305 174-8 [9] and provides guidance for the collection, storage, transport, treatment, recovery, refurbishing operations, including eco-design requirements to facilitate EoL treatment. In addition, it provides guidance for the management of maintenance operations during the use phase of the ICT equipment.

Overall, the goal of the present document is to contribute to the "4 R" strategy: that is "Re-use, Repair, Refurbish and Recycle" as described in Figure 1.



**Figure 1: Lifecycle for equipment**

The following three levels are considered:

- operational: during the operational period of the ICT equipment, the main concern is the monitoring of energy efficiency;
- maintenance: addressing evolution of components or sub-assemblies within the ICT equipment (new generation, new release, upgrade, etc.) or the intervention of a maintenance company in the case of hardware or software issue;
- EoL: ICT equipment to be re-used or repaired if possible, or refurbished or dismantled/disassembled in order to be recycled where no other solution exists.

ETSI EN 305 174-8 [9] has defined a set of KPIs to measure the following parameters (see clause 9):

- collection rate of WEEE;
- re-use rate of materials;
- valorisation and recovery rate.

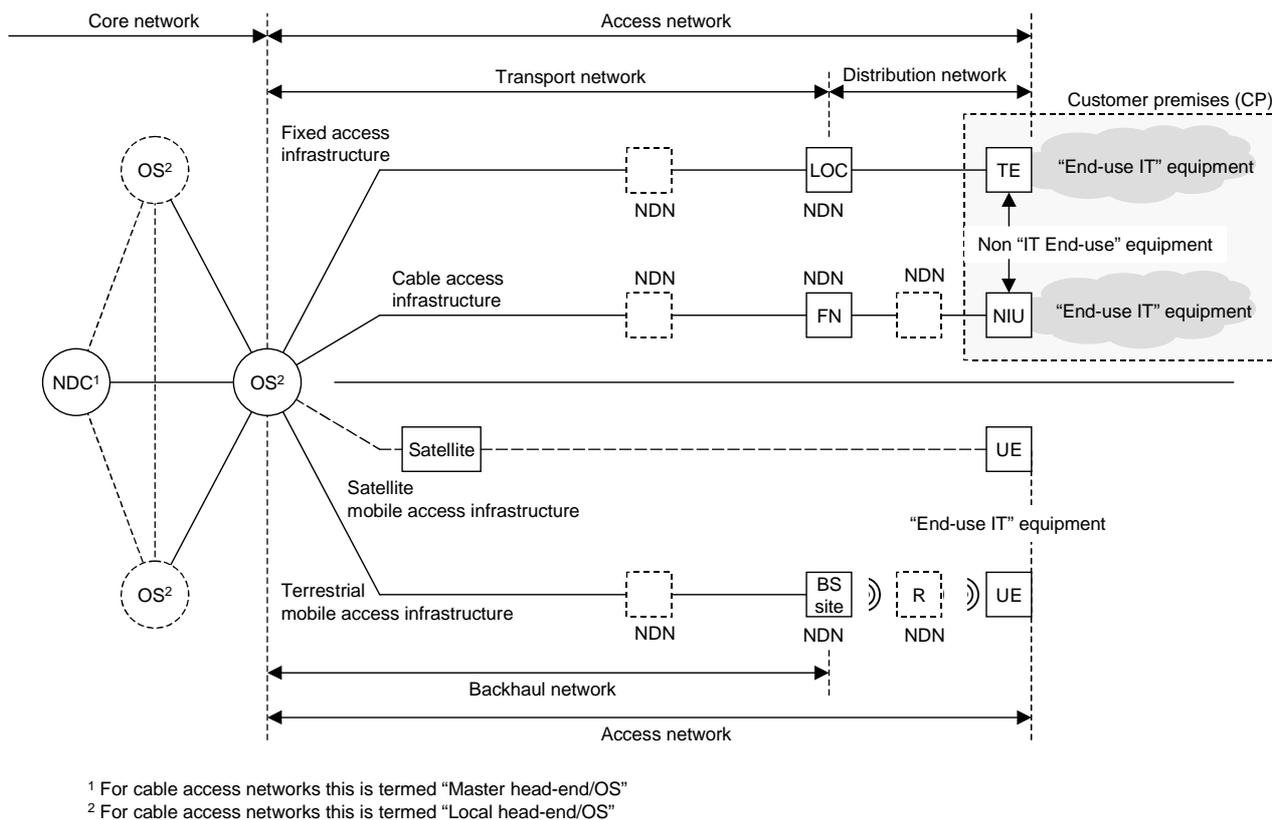
Forthcoming innovations in the ICT domain, including 5G, network virtualization and large-scale IoT deployment are expected to increase the volume of ICT equipment employed and the associated impact on EoL actions.

# 1 Scope

The present document supports the requirements of ETSI EN 305 174-8 [9] providing a framework for, and detailing, the necessary implementation procedures.

The present document specifically extends the end-of-life aspects of ICT equipment to the treatment of components and sub-assemblies replaced during maintenance procedures.

With reference to Figure 2 (from ETSI EN 305 174-8 [9]), which is a schematic representation of the different broadband networks implemented by telecommunications operators, the ICT equipment covered comprises the ITE and NTE in ICT sites together with the Terminal Equipment (TE) and Network Interface Unit (NIU) at the Customer Premises (CP) together with other User Equipment (UE) such as mobile telephones and other devices.



**Figure 2: Schematic of fixed and mobile communication networks**

Annex A details all actions in terms of treatment of e-waste, in accordance with the standards, from the perspective of recycler.

## 2 References

### 2.1 Normative references

References are either specific (identified by date of publication and/or edition number or version number) or non-specific. For specific references, only the cited version applies. For non-specific references, the latest version of the referenced document (including any amendments) applies.

Referenced documents which are not found to be publicly available in the expected location might be found at <https://docbox.etsi.org/Reference>.

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The following referenced documents are necessary for the application of the present document.

- [1] CENELEC EN 50614: "Requirements for the preparing for re-use of waste electrical and electronic equipment".
- [2] CENELEC EN 50625-1: "Collection, logistics & Treatment requirements for WEEE - Part 1: General treatment requirements".
- [3] CENELEC EN 50625-2-1: "Collection, logistics & Treatment requirements for WEEE - Part 2-1: Treatment requirements for lamps".
- [4] CENELEC EN 50625-2-2: "Collection, logistics & Treatment requirements for WEEE - Part 2-2: Treatment requirements for WEEE containing CRTs and flat panel displays".
- [5] CENELEC EN 50625-2-3: "Collection, logistics & Treatment requirements for WEEE - Part 2-3: Treatment requirements for temperature exchange equipment and other WEEE containing VFC and/or VHC".
- [6] CENELEC CLC/TS 50625-3-1: "Collection, logistics & Treatment requirements for WEEE - Part 3-1: Specification for de-pollution - General".
- [7] CENELEC CLC/TS 50625-3-2: "Collection, logistics & Treatment requirements for WEEE - Part 3-2: Technical specification for de-pollution - Lamps".
- [8] Directive 2012/19/EU of the European Parliament and of the Council of 4 July 2012 on waste electrical and electronic equipment (WEEE).
- [9] ETSI EN 305 174-8: "Access, Terminals, Transmission and Multiplexing (ATTM); Broadband Deployment and Lifecycle Resource Management; Part 8: Management of end of life of ICT equipment (ICT waste/end of life)".

## 2.2 Informative references

References are either specific (identified by date of publication and/or edition number or version number) or non-specific. For specific references, only the cited version applies. For non-specific references, the latest version of the referenced document (including any amendments) applies.

NOTE: While any hyperlinks included in this clause were valid at the time of publication, ETSI cannot guarantee their long term validity.

The following referenced documents are not necessary for the application of the present document but they assist the user with regard to a particular subject area.

- [i.1] ETSI TS 105 174-1: "Access, Terminals, Transmission and Multiplexing (ATTM); Broadband Deployment and Energy Management; Part 1: Overview, common and generic aspects".
- [i.2] CENELEC CLC/TS 50625-3-3: "Collection, logistics & treatment requirements for WEEE. Technical Specification for de-pollution. WEEE containing CRTs and flat panel displays".
- [i.3] CENELEC TS 50625-4: "Collection, logistics & treatment requirements for WEEE - Technical Specification for the collection and logistics associated with WEEE".
- [i.4] CENELEC TS 50625-5: "Collection, logistics & Treatment requirements for WEEE - Technical Specification for the final treatment of WEEE fractions - Copper and precious metals".
- [i.5] CENELEC EN 50625-2-4: "Collection, logistics & Treatment requirements for WEEE. Treatment requirements for photovoltaic panels".
- [i.6] CENELEC CLC/TS 50625-3-4: "Collection, logistics & treatment requirements for WEEE. Technical Specification for de-pollution. Temperature exchange equipment".
- [i.7] CENELEC CLC/TS 50625-3-5: "Collection, logistics & Treatment requirements for WEEE. Technical specification for de-pollution - Photovoltaic panels".

[i.8] CENELEC CLC/TS 50625-6: "Collection, logistics & treatment requirements for WEEE - Report on the alignment between Directive 2012/19/EU and EN 50625 series standards and EN 50614".

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## 3 Definition of terms, symbols and abbreviations

### 3.1 Terms

For the purposes of the present document, the terms given in ETSI EN 305 174-8 [9] apply.

NOTE: ETSI EN 305 174-8 [9] uses the terms "reuse" and "re-use" as synonyms whereas the present document adopts the sole use of the term "re-use".

### 3.2 Symbols

For the purposes of the present document, the symbols given in ETSI EN 305 174-8 [9] apply.

### 3.3 Abbreviations

For the purposes of the present document, the abbreviations given in ETSI EN 305 174-8 [9] and the following apply:

VFC	Volatile FlouroCarbons
VHC	Volatile HydroCarbons

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## 4 EoL process involvement

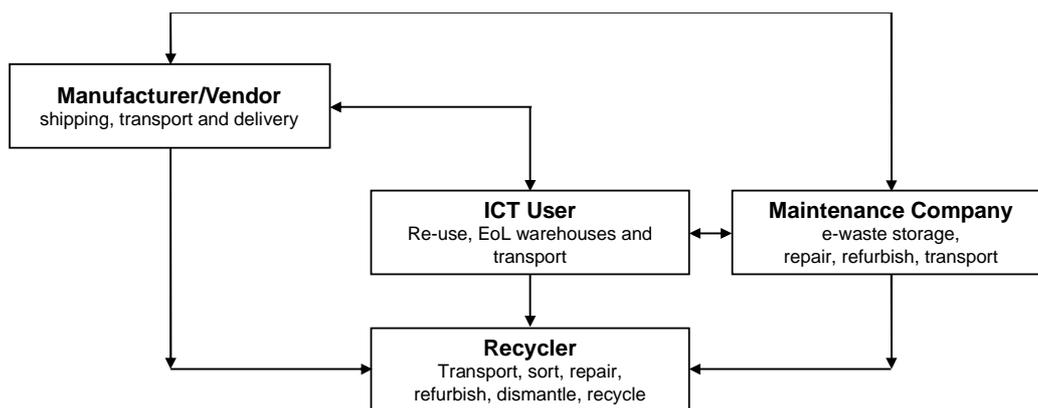
### 4.1 General

When looking at the whole process from equipment delivery to the ICT user to the EoL and the recycling of all the components and materials, several actors are involved and all actors shall respect the rules and the standards applying to the sustainable management of ICT.

The level of involvement of each actor is not the same level but all actors has responsibilities for the storage and transport of WEEE. Obviously, the recyclers, who are the last link of the EoL chain have the greatest involvement.

As shown schematically in Figure 3, the main actors involved in the lifecycle of an ICT equipment are:

- the Manufacturer (see clause 4.2);
- the Vendor (see clause 4.2);
- the ICT user (see clause 4.3);
- the Maintenance Company during the lifecycle of the equipment (see clause 4.4);
- the Recycler: responsible for the equipment EoL (see clause 4.5).



**Figure 3: Actors of the ICT equipment lifecycle and involvement in the EoL cycle**

## 4.2 Vendor

The vendor of the ICT equipment can be the manufacturer, or any other subsidiary or reseller. Their responsibilities are to ship, deliver and install the equipment in the user's facility. The vendor will have to produce all necessary guarantees of compliance with the standards related to transport (national or trans-boundary), especially in case of hazardous materials (RoHS) or pollutants.

The procurement between the vendor and the user shall include a clause specially focused on the equipment EoL.

In order to comply with Extended Producer Responsibility rules of the WEEE Directive [8], the vendor can either:

- implement an individual collection and treatment scheme subject to approval by public authorities; or
- join an approved Producer Responsibility Organisation responsible for the collection and treatment of household equipment., to remove from site any obsolete equipment delivered by the vendor, and guarantee that the next steps of the EoL process will be done in accordance with the standards.

## 4.3 ICT User

The ICT user is the organization (e.g. the telecommunications operator) that operates the ICT equipment to provide the function for which it is deployed.

An ICT user does not have to manage all aspects asked of vendors or maintenance companies. The user is not directly involved in the recycling process, but shall ensure that every stakeholder involved in the process (from shipping to EoL) are in line with the standards and recommendations referenced in ETSI EN 305 174-8 [9]. This should be clearly specified in all contracts between the equipment manufacturer, vendor, the maintenance company and the recycler.

The user can assume that the equipment will be installed in a secure place, compliant with the standards related to ICT sites. At EoL, the equipment or, in the case of maintenance, its components and/or subassemblies, will be moved from operation at the ICT site and stored in a location provided by the user pending removal by the recycler for processing at in their facilities. The location shall be compliant with the standards in terms of e-waste storage, especially in case of hazardous equipment or pollutants substances.

To summarize a user's responsibility is to:

- have a clear view of its own ICT equipment assets;
- provide the appropriate processes for tracking all ICT equipment assets including operational and maintenance status during their lifecycle;
- dispose from sufficient and appropriate facilities to store the obsolete materials waiting transportation to the recycler facilities, in accordance with European standards related to WEEE and e-waste transportation and storage. The user has no responsibility for the management of the equipment after its EoL.

## 4.4 Maintenance company

The maintenance company is often a subsidiary of the manufacturer or an agreed company and assumes the maintenance for the ICT equipment under its responsibility during its "lifetime".

All items of ICT equipment, components or subassemblies replaced by the maintenance company, due to upgrade or malfunction, shall be removed from the ICT user's location and transported to its own facilities. The contract established between the maintenance company and the ICT user shall clearly specify the compliance with the standards related to transport and storage of e-waste, including hazardous materials such as mercury lamps, batteries, and all pollutant substances. The maintenance company can impose, on the ICT user, the installation and operating conditions (including conditions of location, security, temperature and humidity ranges). Such conditions shall be specified in the maintenance contract.

## 4.5 Recycler

The recycler is the main actor in the EoL process for ICT equipment. The recycler has a direct relationship with all the other actors (as indicated in Figure 3).

The recycler is involved in different steps of the EoL process for any equipment or component including transportation, storage, sorting, repairing, dismantling/disassembly, refurbishing and recycling. Recycling can address different types of materials (common or rare metals, plastic, rare earth, hazardous material, pollutants, etc.).

The recycler is the most deeply involved in the respect of all standards related to the type of waste. When a recycling company deals with another company, the contract shall refer to the standards related to the type of material processed (e.g. plastic, metals, integrated circuits, batteries, lamps, etc.). The recycler shall comply with the present document and has to be regularly audited by an independent certification body.

Treatment facilities have to be certified against the relevant CENELEC standards for WEEE treatment (see clauses 2.1 and 2.2).

## 4.6 Summary

Table 1 presents the standards applying for each actor involved in the WEEE EoL process.

**Table 1: WEEE standards and relevance to actors**

Relevant document	WEEE topic	Vendor	User	Maintenance company	Recycler
CENELEC EN 50625-1 [2]	Collection, logistics & Treatment requirements for WEEE. General treatment requirements	✓	✓	✓	✓
CENELEC EN 50625-2-1 [3]	Collection, logistics & Treatment requirements for WEEE. Treatment requirements for lamps	✓	✓	✓	X
CENELEC EN 50625-2-2 [4]	Collection, logistics & Treatment requirements for WEEE. Treatment requirements for WEEE containing CRTs and flat panel displays	✓	✓	✓	X
CENELEC EN 50625-2-3 [5]	Technical Specification for de-pollution. WEEE containing CRTs and flat panel displays	✓	✓	✓	X
CENELEC CLC/ TS 50625-3-1 [6]	Transport and logistics - Temperature exchange equipment and other WEEE containing volatile fluoro- or hydro-carbons (VFC and/or VHC)	X	X	X	X
CENELEC CLC/ TS 50625-3-2 [7]	Collection, logistics & Treatment requirements for WEEE. Specification for de-pollution - General	X	X	X	X
ETSI EN 305 174-8 [9]	Management of EoL of ICT equipment	✓	✓	✓	✓

Table 2 presents the ACTIONS applying for each actor involved in the WEEE EoL process.

**Table 2: WEEE standards and relevance to actors**

Action	Vendor	User	Maintenance company	Recycler
Collection of obsolete ICT equipment, components or sub-assemblies	✓	✓	✓	✓
Storage of obsolete ICT equipment, components or sub-assemblies	✓	✓	✓	✓
Transportation of e-waste	✓	✓	✓	✓
Re-use of ICT equipment, components or sub-assemblies	x	✓	✓	x
Repair of ICT equipment, components or sub-assemblies	x	✓	✓	x
Refurbishment of ICT equipment, components or sub-assemblies	x	x	✓	x
Sorting of obsolete ICT equipment, components or sub-assemblies	x	x	x	✓
Dismantling/disassembly of obsolete ICT equipment, components or sub-assemblies	x	x	x	✓
Depollution of obsolete ICT equipment, components or sub-assemblies	x	x	x	✓
Recovery of basic elements	x	x	x	✓
Final treatment	x	x	x	✓
Reporting and assessment	✓	✓	✓	✓
Production of KPIs	✓	✓	✓	✓

## 5 ICT domains to promote best practices for WEEE treatment

The objective of the present document is to provide practical guidance on the implementation of requirements and recommendations to improve collection, transport, treatment, recycling and recovery for WEEE coming from ICT sector as shown in Table 3.

**Table 3: Types, and examples, of ICT equipment**

ICT domain	Equipment types	Examples of equipment
ICT sites (including datacentres, OS, NDN)	NTE	Core network equipment Access network equipment Base stations
	ITE	Server Switch Routers Disk Arrays Backup robots Hard disk drives (HDD) Solid state drives (SSD)
	Overhead function	Fixed PC and laptops Monitors, screens Printers, scanners Accessories Other peripherals
External infrastructure	NIU	WiFi hotspots, Radio Units, antennas
Customer premises	TE	Fixed telephones, Internet boxes, TV boxes, connected devices including those for IoT
	UE	Mobile telephones, laptops, tablets and other connected devices including IoT

Although there are many differences between components of ITE and NTE in terms of usage and function, all ICT equipment is composed of the same materials and electronics and shall respect the same standards with regard to management of EoL.

As indicated in Figure 3, the vendor or the maintenance company should engage contractually with the recycler to guarantee conformance to the relevant CENELEC standards (see clauses 2.1 and 2.2).

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## 6 Operational recommendations for maintenance during usage phase

### 6.1 General

Maintenance is an essential element in the operational lifecycle for ICT equipment.

This also applies to the equipment for power supply and distribution, environmental control and other security systems within ICT sites supporting core networks and both fixed and mobile access networks.

There are two main reasons for which hardware maintenance is imperative in the lifecycle of ICT equipment:

- Evolution of the equipment, by upgrading (e.g. boards, memory) or replacing existing components or sub-assemblies with those of a newer generation.
- Correction of a hardware issue if a component is to be repaired or replaced.

### 6.2 ITE and NTE

In the case of a replacement of an ITE or NTE component or sub-assembly, due to an evolution of the hardware, the recommendation for the changed component or sub-assembly follows the same rules as for all other ICT equipment.

In such a case, re-use (if possible), refurbish or repair will be the priorities for the recycler. If any of these methods are available, the component will have to follow the process and the standards applied to EoL of WEEE.

This will concern the equipment vendor, who will have to put in place the adequate processes for treatment of its equipment directly or through recyclers.

The ICT user shall ensure these standards are applied by the recycler. This can be implemented by audits performed by a certified assessor (either on demand by the ICT user or periodically). The maintenance contract shall specify these points in accordance with the necessary list of standards to be applied.

In case of replacement of a component or the whole equipment, due to hardware issues, the above process shall be applied for the total recycling phase.

### 6.3 Other WEEE in ICT sites

For all equipment other than ITE or NTE components, the applicable rules are those related to the type of the equipment including:

- Cathode Ray Tubes (CRT) and flat panel displays: CENELEC EN 50625-2-2 [4];
- lamps: CENELEC EN 50625-2-1 [3], CENELEC CLC/TS 50625-3-2 [7];
- printers, scanners: for further study.

The existing standards for those kinds of material should be applied for all equipment related to the power supply systems, such as transformers, rectifiers, UPS, batteries then. The present document does not address the ICT user's technical environment such as power supply and distribution, environmental control and other security systems within ICT sites.

In the case of risks of contamination of people or property, the appropriate standard shall be applied.

## 7 Operational recommendations for each domain for the End-of-Life

### 7.1 General

Figure 4 shows the framework for EoL of ICT equipment of Table 3 together with references to the relevant CENELEC standard or Technical Specification. It is clear that the main part of the EoL actions such as sorting, dismantling/disassembling etc. is the responsibility of the recycler unless the ICT equipment is re-used directly by the ICT user.

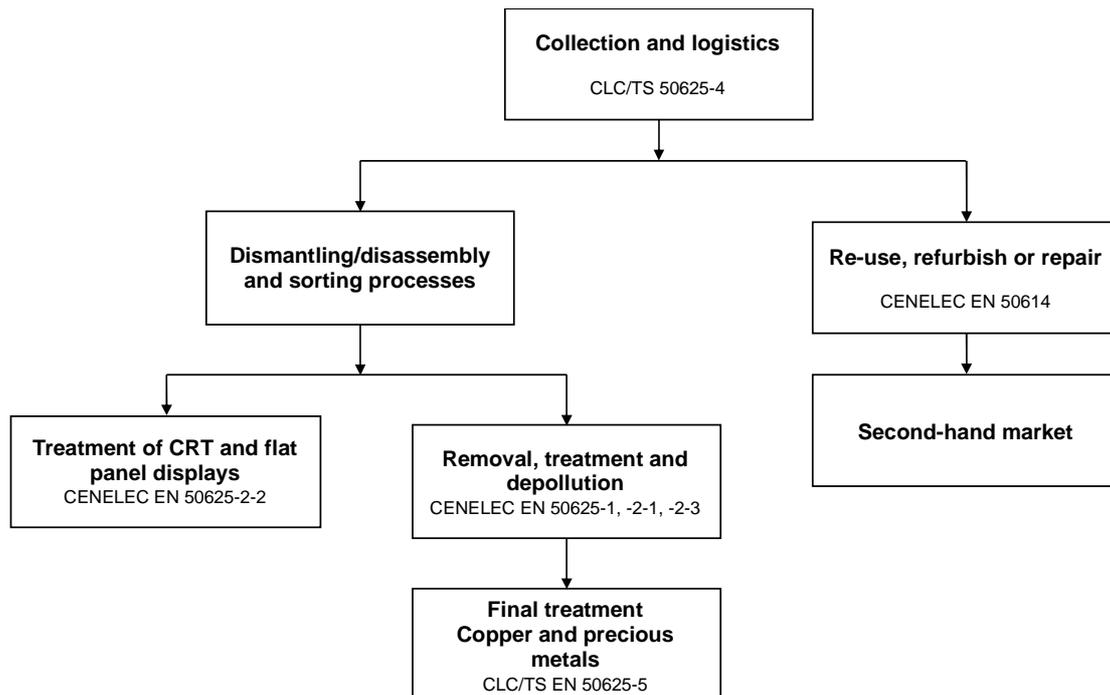


Figure 4: Framework for EoL processing of ICT equipment

### 7.2 The "4R" strategy for ICT equipment

#### 7.2.1 General

EoL of an ICT equipment from the current ICT user does not automatically mean EoL for the ICT equipment.

An item of ICT equipment is not necessarily obsolete just because it is no longer able to meet current needs. It may be possible to extend its life and it can be re-used (in part or in total) for other purposes or by other ICT users (either internal or external to the current ICT user's organization).

In such a case, other processes such as re-use (see clause 7.2.2), repair (see clause 7.2.3) and refurbishment (see clause 7.2.4) can extend the life of the equipment and avoid generation of e-waste and the associated recycling process.

In case of true obsolescence, and if there are no other alternatives, the EoL recycling process (see clause 7.2.5) will apply.

#### 7.2.2 Re-use

ETSI EN 305 174-8 [9] defines re-use as "any operation by which products or components that are not waste are used again for the same purpose for which they were conceived".

Re-use of ICT equipment could be considered as a "second life" for the whole equipment, its components or subassemblies. It could be re-used directly by the ICT user for another purpose or support its new operational cycle towards a more optimal use. Alternatively, the ICT equipment can be sold on the second-hand market.

NOTE: Re-use may involve specific additional services such data destruction and the provision of a new environmental certification.

Re-use of ICT equipment brings value by extending equipment life, by reducing waste generation and by creating value for the owner. However, it should be noted that the energy efficiency of older equipment may be significantly worse than that of newer products.

Further information is provided in CENELEC EN 50614 [1].

### 7.2.3 Repair

In the context of this clause, repair focusses on correction of a hardware malfunction.

Repair of the ICT equipment comprises the replacement of one or more components or sub-assemblies. This may be undertaken on-site during the operational period of the ICT equipment through the maintenance process (see clause 5) or be undertaken by the maintenance company if the ICT equipment, component or subassembly is removed from the operational site.

Once repaired, the equipment is fully operational for the ICT user or can be sold on the second-hand market.

### 7.2.4 Refurbish

Refurbishment can be defined as "any operations to ICT equipment considered as waste to operate again including both hardware and software functions".

The refurbishing company may be a vendor's affiliate, or any other company (brokers, maintenance, recyclers) operating in the market for second-hand ICT equipment.

In addition to physical re-conditioning, the refurbishment process can be split in two stages:

- 1) to check all hardware functionalities, to remove old data and software, and to install the hardware components to be changed or upgraded;
- 2) to install new operating system(s) and applications software.

Those undertaking refurbishment shall ensure that components and sub-assemblies (e.g. batteries, boards, power supplies) removed from ICT equipment are stored in appropriate facilities and processed as described in the relevant CENELEC standards (see clauses 2.1 and 2.2).

Specifically:

- all equipment, component or sub-assemblies destined for re-use shall be handled and stored in a suitable manner to preserve their value and avoid risks of pollution, where they exist;
- all equipment, component or sub-assemblies destined for recovery and recycling shall be stored in safe and secure locations that are compliant with the relevant standards (e.g. hazardous equipment storage).

### 7.2.5 Recycle

If neither re-use, repair or refurbishment are viable, recycling begins with the dismantling/disassembly of the ICT equipment. As ICT equipment comprises a large variety of materials, components, the first steps of dismantling/disassembly generally focus on:

- the removal of hazardous components, such as ink cartridges from printers, printed circuit boards, mercury lamps from scanners, batteries, etc.;
- the removal, for re-use where possible, of valuable components like hard disks, memory, cards, power supplies, etc.

This process is followed by the sorting of the components and sub-assemblies.

The first step in the sorting process is to isolate groups of common components. Subsequent sorting prepares specific types of component for separate recycling and treatment processing in accordance with the relevant standards applying for that material.

## 8 Collection of data

### 8.1 General

For having a clear view of generated e-waste, the ICT user will have to know precisely what types and quantities of e-waste are produced. The ICT user shall also define the processes to determine the appropriate application of the 4R strategy (see clause 7.2).

The ICT user shall track, from the receipt of ICT equipment (including any components or sub-assemblies used for repair) to either its re-use internally or its storage until the recycler collects the ICT equipment (including any components or sub-assemblies).

For ICT equipment these requirements are generally the responsibility of the "IT department". However, for large telecommunications operators the separate responsibilities for ITE and NTE can be split across different departments.

For all other e-waste, the responsibility lies with the department allocated the role of reporting of corporate sustainability actions. The information from the "IT department" is considered part of the overall reporting.

### 8.2 What data is to be collected?

It is necessary to have a clear and comprehensive view of the type and quantity of e-waste that will be generated by the EoL of the ICT equipment. This can be obtained from a simple asset management process.

The vendor, the ICT user and the maintenance company shall track and store information including:

- the source of waste;
- the type of waste;
- the quantity of waste for each type (kg per annum).

Suitable software with asset management functionality can ensure a global and clear tracking of the equipment and identify equipment which is approaching its EoL.

The recycler requires the following information for calculation of the KPIs (see clause 9):

- quantity of WEEE processed (kg per annum) - *WEEE processed* in ETSI EN 305 174-8 [9];
- quantity of WEEE prepared for re-use (kg per annum) - *WEEE prepared for reuse* in ETSI EN 305 174-8 [9];
- quantity of WEEE re-used for parts (kg per annum) - *WEEE reused by parts* in ETSI EN 305 174-8 [9];
- quantity of WEEE recycled (kg per annum) - *WEEE recycled* in ETSI EN 305 174-8 [9];
- quantity of WEEE from which energy is recovered energy (kg per annum) - *WEEE recovered energy* in ETSI EN 305 174-8 [9];
- quantity of WEEE destroyed (kg per annum) - *WEE E destroyed* in ETSI EN 305 174-8 [9].

In addition to these values, the recycler will have to produce an overall assessment of the recovered resources such as metals (nickel, lithium, steel, aluminium, copper, lead, gold, etc.), plastics, and other resources such as rare earth materials.

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## 9 Operational KPIs in WEEE treatment

### 9.1 Reporting by the recycler

ETSI EN 305 174-8 [9] specifies the following KPIs:

- WEEE *treated*;
- Reuse and recycling rate;
- Valorisation/recovery rate.

The recycler shall prepare annual reports for the three KPIs, for each category, by dividing the weight of the WEEE that enters the recovery or recycling/preparing for re-use facility, after proper treatment in accordance with Article 8(2) of WEEE 2012/19/EU Directive [8] with regard to recovery or recycling, by the weight of all separately collected WEEE for each category, expressed as a percentage.

### 9.2 Reporting by other actors

The reporting by vendors, ICT users and maintenance companies provides a clear view of the total quantities (kg per annum) and the ratios of equipment re-used, repaired and refurbished (as appropriate) or stored waiting treatment by the recycler.

The following values, in addition to those described in clause 8.1, shall be reported by the actor:

- Number and type of equipment under maintenance contract.
- Number and type of equipment entering EoL process.
- Ratio of re-used equipment/Number of equipment entering EoL process.
- Ratio of repaired equipment/Number of equipment entering EoL process.
- Ratio of refurbished equipment/Number of equipment entering EoL process.

## Annex A (normative): Recommendations for the different stages in the treatment of e-waste

Table A.1 provides guidance on requirements concerning handling and storage of ICT equipment defined as WEEE.

**Table A.1: Handling and storage of WEEE**

<b>Domain</b>	<b>Handling of Devices/WEEE</b>
<b>Requirements</b>	Handling equipment adapted to the devices.
<b>Avoid</b>	Breaking of screens, lamps, temperature exchanges devices. Damaged devices impossible to depollute or valorise. Emissions of pollutants/hazardous substances.
<b>Domain</b>	<b>Storage of WEEE</b>
<b>Requirements</b>	CENELEC EN 50625-1 [2] requires that: <ul style="list-style-type: none"> <li>the maximum quantity of stored WEEE is the maximum of the quantity that can be processed in 12 months;</li> <li>the premises shall have impervious surfaces with water collection;</li> <li>some devices and some fractions shall be stored under cover to avoid damage and/or result in the emission of pollutants.</li> </ul>
<b>Avoid</b>	Excessive levels of stocks. Pollutant leaks. Damage to the devices.

Table A.2 provides guidance on requirements concerning depollution of ICT equipment defined as WEEE.

**Table A.2: Actions and associated requirements for depollution**

<b>Action</b>	<b>Protection against accidents to, and contamination of, personnel by dangerous substances</b>
<b>Requirements</b>	A management system shall be in place and up to date for all health and safety activities. There shall be a process of identification and risk management to limit or eliminate risks which includes places and activities that require personal protective equipment and operating procedures. Relevant personnel shall have undertaken training (in the situations and risks of the installation).
<b>Avoid</b>	Risk situations for operators.
<b>Action</b>	<b>Depollution procedures for the ICT equipment.</b>
<b>Requirements</b>	There shall be procedures for the identification of WEEE to be cleaned up and actions to be taken for the depollution. The depollution shall not damage the components to extract or disperse the polluting substances to the other fractions.
<b>Avoid</b>	Imperfect depollution. Emissions of pollutants into the environment or other fractions.
<b>Action</b>	<b>Monitoring of depollution activity including:</b>
	<ul style="list-style-type: none"> <li><b>incoming, processed, outgoing quantities;</b></li> <li><b>downstream processing.</b></li> </ul>
<b>Requirements</b>	The quantities managed by the recyclers shall be recorded as well as the sources and destinations of the inputs and outputs. Recyclers shall provide documented information on fractions and their recovery, according to their typology. Recyclers shall employ a process for depollution performance monitoring which uses a systematic approach that documents each step of the process.
<b>Avoid</b>	Activity not mastered. Resumption of fractions not adapted. Imperfect depollution.

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## History

<b>Document history</b>		
V1.1.1	January 2018	Publication as ETSI EN 305 174-8
V1.2.1	December 2019	Publication