



Local Action Plan for the Alentejo Region, Portugal

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EXECUTIVE SUMMARY

The growing integration of electronic devices into everyday life has led to a pressing issue: the surge in electronic waste, or e-waste. As more devices become obsolete, the urgency for responsible and sustainable waste management intensifies. To address this challenge, the eWAsTER project—funded by the Interreg Euro-Med program—has been launched as a collaborative effort across eight European regions.

eWAsTER's mission is to close the gap between current local and regional policies and the ambitions of the EU's Circular Economy Action Plan. It encourages a move away from the outdated "take, make, dispose" approach toward a more circular model that emphasizes prolonged resource use and efficient recycling. By optimizing how e-waste is handled, eWAsTER is a driving force in this necessary transition.

More than just ensuring legal compliance, the project nurtures cooperation among participating regions by promoting the exchange of knowledge and best practices. This shared learning process allows each region to adapt strategies to their specific context, enhancing their ability to implement effective and sustainable e-waste solutions. The collaborative nature of the initiative ensures that its impact is both widespread and deeply rooted in local needs, paving the way for more resilient circular practices across Europe.

Partners such as PACT play a crucial role by supporting the businesses, such as the ones involved in repair and reuse, key actions that embody the principles of a circular economy. Through such contributions, eWAsTER not only fills policy gaps but also turns circular economy ideals into tangible environmental and developmental progress.





ABBREVIATIONS

AP	Action Plan
APA	Portuguese Environmental Agency
BP	Best Practices
CPU	Central Processing Unit
CWC	Chemical Weapons Convention
DGAE	General Directorate Economic Activities
EC	European Commission
EEE	Electrical and Electronic Equipment
EP	European Parliament
EPR	Extended Producer Responsibility
ERDF	European Regional Development Fund
ERSAR	Regulatory Authority for Water and Waste Services
EU	European Union
E-waste	Electronic waste
GWMR	General Waste Management Regime
HS	Harmonized System
KPI	Key Performance Indicator
LAP	Local Action Plan
LoW	European List of Wastes
NGO	Non-Governmental Organization
OECD	Organization for Economic Co-operation and Development
OECD	Organization for Economic Co-operation and Development
PAPERSU	Municipal, Intermunicipal and Multi-municipal Action Plans
PERNU	Strategic Plan For Non-Urban Waste
PERSU	Strategic Plan for Urban Waste
PNGR	National Strategic Waste Plan
POM	Put on Market
PRO	Producer Responsibility Organization
RoHS	Restriction of the use of certain Hazardous Substances in electrical and electronic equipment
TBD	Take-back scheme
SGRU	Urban Waste Management Systems
SWOT	Strengths, Weaknesses, Opportunities, and Threats
UWMS	Urban Waste Management Service
WCO	World Customs Organization
WEEE	Waste Electrical and Electronic Equipment





1. PURPOSE AND METHODOLOGY

The Local Action Plan (LAP) for Waste Electrical and Electronic Equipment (WEEE) provides a strategic approach to managing e-waste within the local context. Its main objective is to advance sustainable waste practices by ensuring the responsible collection, processing, and disposal of electronic waste, while reducing potential harm to the environment and human health. A key focus is on recovering and recycling valuable resources—like metals and plastics—to reintegrate them into manufacturing processes and support the broader move toward a circular economy.

An essential component of the plan is increasing awareness among both citizens and key stakeholders about the importance of proper electronic waste disposal. By promoting active involvement in collection initiatives, the plan encourages more responsible waste management behaviors. It also ensures that local actions are in line with broader legal frameworks, such as the WEEE Directive and the Basel Convention, maintaining consistency with both national and international standards.



To strengthen implementation, the plan emphasizes cooperation between local governments, manufacturers, recyclers, and community members. This collaborative approach supports the rollout of Extended Producer Responsibility (EPR) programs and contributes to economic development by fostering green job creation and advancing recycling technology.

The planning process begins with a thorough assessment and baseline study to pinpoint the sources, categories, and quantities of local e-waste. It also involves mapping out the current systems for collection, recycling, and disposal. A critical review of existing practices helps identify shortcomings in infrastructure, policy, and public understanding. Through participatory workshops and stakeholder engagement, these issues are explored collectively, leading to the development of tailored and effective solutions.

The plan's strategic framework is built around well-defined goals, policy measures, and financial strategies. It outlines specific, measurable objectives, reinforces regulatory frameworks, and identifies potential funding sources—including local government budgets, Extended Producer Responsibility (EPR) programs, and external grant opportunities. Key actions include upgrading e-waste collection and processing systems, launching focused public awareness initiatives, and implementing tracking tools to monitor the movement and treatment of WEEE.

Implementation is organized in distinct phases, with short-, medium-, and long-term actions assigned to clearly designated actors. To support effective execution, the plan incorporates training programs aimed at building workforce capacity and ensuring adherence to best practices in e-waste management. Progress is monitored through the use of key performance indicators (KPIs), supported by systems for ongoing evaluation and transparent reporting to maintain accountability.

Through this holistic and structured approach, the LAP promotes efficient and sustainable WEEE management. It delivers benefits for the environment, public health, and local economic development. Adapted to the specific conditions and capacities of the area, the plan provides a long-term roadmap for responsible and resilient e-waste handling.



2. INTRODUCTION TO THE TOPIC

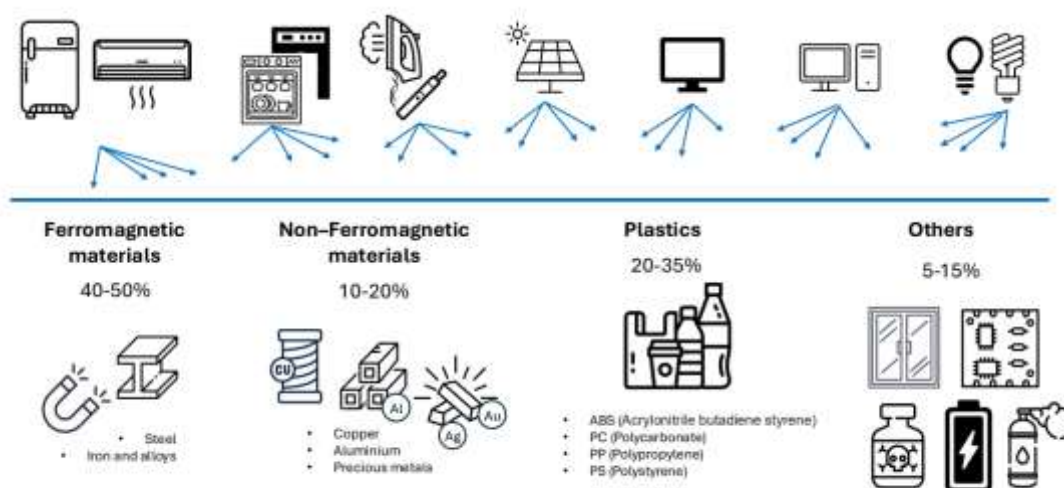
2.1. Introduction to WEEE challenge

Electrical and electronic equipment—ranging from everyday appliances like vacuum cleaners and washing machines to essential personal devices such as smartphones and laptops—plays a central role in our daily lives, making modern living nearly impossible without them.

"WEEE" (Waste Electrical and Electronic Equipment), commonly referred to as e-waste, describes electronic and electrical devices that have reached the end of their useful life. The emphasis lies on the term "waste," indicating that these items are no longer operational or needed and must be disposed of responsibly. WEEE includes a wide variety of products used in households and businesses, powered by electricity or batteries, that contain electronic components.

Managing e-waste across Europe presents a growing challenge, driven by the rising volume of obsolete electronics. The complexity of WEEE lies in its composition—containing both hazardous materials, such as brominated flame retardants (BFRs) and polychlorinated biphenyls, and valuable elements, including rare earth metals. Effective management is crucial not only for reducing environmental and health risks but also for enhancing the recovery and reuse of precious resources.

Below is an overview of the primary materials and their proportions in commonly used electronic products. Electrical and electronic equipment (EEE) typically contains metals like iron, copper, and aluminium, along with plastic and glass. Given this composition, establishing an effective and efficient waste management system—focused on recycling and reuse—is crucial.



Ewaste Materials. Source: Own

Across Europe, WEEE management is governed by a robust set of directives and policies aimed at minimizing environmental harm and supporting the shift toward a circular economy. These regulatory measures define clear guidelines for the collection, treatment, and recycling of electronic waste, with a strong focus on the safe handling of hazardous substances and the recovery of reusable materials.





Despite this unified legislative framework, the effectiveness of WEEE implementation differs from one country or region to another. Variations in the availability of collection infrastructure, the performance of recycling and recovery systems, and the degree of stakeholder engagement all play a role in shaping the outcomes of local WEEE management efforts. These disparities present ongoing challenges for achieving consistent and efficient e-waste practices across the continent.

In response to the increasing volume of discarded electronic and electrical equipment, the European Parliament introduced the Waste Electrical and Electronic Equipment (WEEE) Directive in February 2003. Known as Directive 2002/96/EC, its core objectives were to:

- Prevent and reduce the generation of e-waste,
- Enhance the reuse, recycling, and recovery of electronic devices, and
- Ensure environmentally responsible treatment of discarded equipment.

A revised version—Directive 2012/19/EU—was formally adopted on August 13, 2012. This updated directive places stronger emphasis on promoting sustainable production and consumption, with a focus on preventing e-waste before it arises. It also aims to improve recycling and recovery efforts, thereby reducing landfill use, increasing resource efficiency, and reclaiming valuable secondary raw materials.

In addition, the directive seeks to elevate the environmental performance of all actors involved in the lifecycle of electronic products—from manufacturers and retailers to end-users. Special attention is given to those responsible for the collection and treatment of WEEE, ensuring that these processes are carried out in a safe, efficient, and environmentally sound manner.





2.2. eWAsTER project

The “Preventing e-waste from polluting MED water by turning waste into a resource (eWAsTER)” project is c-funded by the European Union (Interreg Euro-Med project) consisting of 10 partners from 8 European countries namely:

- Portugal: Parque do Alentejo de Ciência e Tecnologia (PACT)
- Greece: Rethymno Municipality
- Italy: Marche Region
- Slovenia: Environmental Research Institute (ORZ)
- Bosnia and Herzegovina: Neum Municipality
- Bulgaria: Union of Bulgarian Black Sea Local Authorities
- Italy: Union of the Municipalities Pian del Bruscolo (UCPB)
- Spain: Provincial Waste Consortium of Malaga (RSU Malaga)
- Bosnia and Herzegovina: Association LINK Entrepreneurial Center (LINK)
- Cyprus: Aradippou Municipality

The project eWAsTER aims to promote local and regional policies for better e-waste management, to reduce e-waste environmental damage in the selected areas, while promoting new innovative eco-business models based on the conversion of the currently linear electrical and electronic (E&E) sector into a sustainable circular model. There are three main Work Packages (WP) which are briefly described as follows:

- WP1: To create local and regional Action Plans for e-waste prevention and management, based on the project self-assessment tools and the project “Methodology for designing Strategies for Mediterranean e-waste prevention and management”
- WP2: To demonstrate and test the feasibility and effectiveness of 8 innovative solutions selected from the 8 consortium LAPs, providing validation at small scale prior to applying the solution at full scale and to transfer them to the programme Area.

WP3: To enlarge the number of institutions up-scaling tested solutions from WP2, and increase the number of institutions using the project tools to create new Action Plans and Strategies for Mediterranean e-waste prevention and management.

2.3. Introduction to main WEEE Waster key concept

Before exploring the different elements that shape national and local WEEE management policies, it is important to first clarify several key terms that will be central to the development and implementation of this Action Plan.

WEEE classification.



There are main classifications launched by the EU and international organisms that will be of



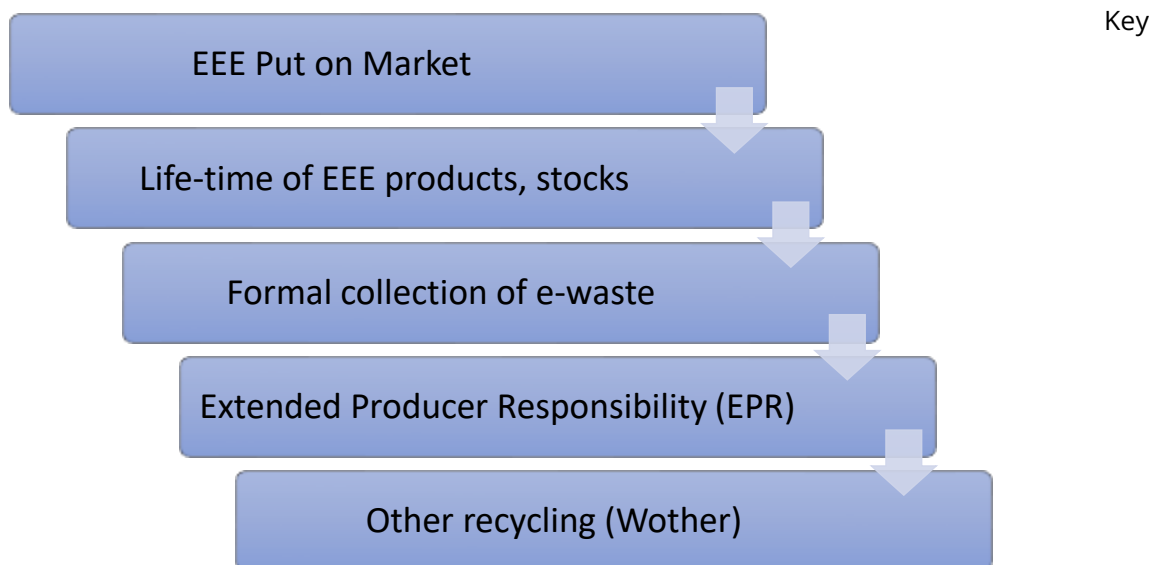
WEEE Classification: Source own

common use in the document.

- WEEE 2017 and 2018 refer to classification schemes established by the European Union under the WEEE Directives, outlining specific categories for electrical and electronic equipment.
- UNU-KEYS is a product classification system developed by the United Nations University. It groups items based on shared functions, similar material compositions, and related characteristics at the end of their life cycle.
- HS 2022 codes are internationally harmonized statistical codes used in trade. These codes include specific designations that support countries in aligning with the Basel Convention and are connected to the CPC (Central Product Classification) system for consistency in classification.

WEEE Monitoring Systems and Key Concepts

When establishing data sources for monitoring and calculation purposes, a variety of systems are employed globally. Within the European Union, several core tools and methodologies are particularly important for understanding and managing e-waste effectively.



Stakeholders





This section explores the range of actors involved in the e-waste lifecycle—from manufacturers and consumers to regulatory bodies and enforcement agencies.

Currently, there is a notable imbalance in how responsibilities and capabilities are distributed across the WEEE value chain. In many EU Member States, Producer Responsibility Organizations (PROs) and manufacturers are held primarily accountable for achieving national collection and recycling targets. However, this model often overlooks a critical challenge: PROs and producers do not have full access to all waste streams. A significant portion of WEEE is handled outside formal systems by other actors, making it difficult for PROs to meet their obligations. In some countries, PROs have even faced penalties for failing to meet targets, despite their limited control over collection logistics.

Since their establishment, PROs—representing over 31,000 brands and producers of electrical and electronic equipment—have worked closely with transport and recycling partners to collect, safely treat, and recover nearly 26 million tonnes of WEEE. These efforts are carried out in line with the highest environmental and technical standards. Eurostat data shows that the amount of WEEE collected in the EU grew from 3.0 million tonnes in 2012 to 4.9 million tonnes in 2021, highlighting steady progress.

The WEEE Forum, the largest global network of PROs, plays a key role in this effort. It oversees a vast infrastructure, managing more than 114,000 collection points—demonstrating the system's extensive reach and capacity.



3. BACKGROUND TO THE LOCAL ACTION PLAN

3.1. Introduction to Local Action Plan

Managing Authorities are tasked with enhancing WEEE management policies across national, regional, and local levels, aligning their efforts with the European Union's Circular Electronics Initiative, which is part of the broader Circular Economy Action Plan. This process begins with a comprehensive evaluation of the existing WEEE landscape and related policies in the selected area. Known within the eWAsTER project as the "Action Plan," this regional assessment—often referred to as a state-of-the-art or benchmarking study—compares the area with neighbouring regions to uncover discrepancies that might contribute to illegal WEEE transfers. As part of this initial phase (Phase 1), a SWOT analysis will also be conducted.

WEEE management involves a complex array of challenges. Local authorities must navigate technical, regulatory, financial, and educational hurdles that influence everything from system design and governance to the efficiency of collection, sorting, and treatment. These local and national nuances will directly impact the content and effectiveness of the Action Plan, as well as the Key Performance Indicators (KPIs) used to measure success.

The insights gathered during this first phase will be consolidated into the Action Plan and will lay the groundwork for the upcoming Pilot Action. This pilot phase will not only test but also provide feedback to improve the Action Plan. Based on the findings from the sector-specific analysis, the Plan will outline new policy instruments and detail targeted actions to be executed during Phase 2.



3.2. Methodology to be implemented in eWAsTER

The methodology behind the Action Plan followed a structured, multi-phase approach encompassing data collection, analysis, validation, and final delivery—ensuring alignment with the objectives of relevant Policy Instruments. In addition to ensuring technical accuracy, all data were reviewed by experts and stakeholders to guarantee their relevance and integration into the final Action Plan.

The process began with a desk-based analysis, relying on macro-level data sourced from national and European statistical bodies, as well as sector-specific reports at both national and EU levels. This phase gathered information on key areas such as economic activity, education, industry trends, and in some cases, energy usage patterns and market structures. Existing policies—at the EU, national, and regional levels—were mapped, along with their targets and current levels of achievement.

To complement the high-level overview, sector-specific research and on-site data collection were carried out using targeted tools. These efforts provided detailed, context-sensitive insights that informed the formulation of Key Performance Indicators (KPIs), which were later refined as additional data became available in the following phases





With this foundation, preliminary KPIs were defined to offer a first layer of measurement for evaluating WEEE management practices. These indicators were compared against performance data from identified best practices and subsequently adjusted as needed. The updated KPIs, alongside initial findings, were compiled into a Draft Action Plan, which also included a comprehensive SWOT analysis.

This draft was presented to stakeholders for review and validation, ensuring the indicators and insights were both accurate and actionable. The feedback gathered during this stage was critical to finalizing the KPIs and shaping the plan's recommendations.

The findings and conclusions from this process directly inform the structure of the Pilot Action, which will be tailored to address the specific needs of the regional WEEE sector. Ultimately, the Action Plan aims to identify:

- Key challenges,
- Existing tools and actors, and
- Innovative pathways and solutions for improving WEEE management.



4. WEEE CONCEPTUAL FRAMEWORK

4.1. E-WASTE/WEEE CLASSIFICATION

Before introducing the measurement framework, it is essential to first consider the classification of e-waste. E-waste refers to all discarded electrical and electronic equipment (EEE), including its components, that the owner has no intention of reusing. Due to the wide variety of EEE, categorization is necessary to manage it effectively.

Although several classification systems for e-waste are available—each potentially useful for building statistics within our proposed framework—certain standards must be upheld to ensure harmonization and the development of robust, internationally comparable indicators.

Classifications should avoid unnecessary detail for items that pose minimal environmental risk, contain little valuable material, or hold a negligible market share. Excessive specificity leads to numerous non-essential categories, increasing the administrative load for data reporters, especially when relevant data is limited. On the other hand, classifications that are too broad make it difficult to distinguish differences between countries, reducing data quality and limiting the usefulness of international comparisons for policy development.

Currently, two main classification systems are in use: those established under the EU Directives (both pre- and post-2017 versions) and the UNU classification.



Eu directives WEEE classifications: Source: Own

4.2. EU classifications

European List of Wastes

The European List of Wastes (LoW) serves as the official waste classification system within the EU, primarily for administrative functions such as permitting and regulatory oversight related to waste generation and management. Numerous European countries, along with some in the Caucasus and Central Asia, rely on the LoW as a foundational tool for compiling waste statistics. These statistics are generally reported in aggregated form, categorized by waste type.



The LoW outlines 839 distinct waste types, organized into 20 chapters that are mainly based on the origin of the waste—typically the economic sector or process that generated it. Each waste type is identified by a unique six-digit code. Guidance on assigning waste to specific types is provided in the introduction to Decision 2000/532/EC and elaborated in a separate explanatory section. Among these, 13 codes pertain specifically to e-waste. These are classified as either hazardous or non-hazardous and are listed in Table 2 below. It should be noted that components resulting from e-waste treatment—such as plastics, metal scraps, and leaded glass—are excluded from this list.

The LoW codes that do relate to e-waste tend to be broadly defined and are primarily suitable for tracking e-waste that is recorded as separately collected. However, these codes are insufficient for compiling detailed e-waste statistics, as they fail to differentiate among types of e-waste, thereby overlooking variations in environmental impact and recycling potential. In practice, much e-waste is recorded under other LoW categories, such as general household waste or metal scrap.

At present, EU Member States are governed by the WEEE Directive, which mandates data collection across 10 specific e-waste categories. These categories are:

Large house hold appliances

Large cooling appliances; Refrigerators; Freezers; Other large appliances used for refrigeration, conservation and storage of food; Washing machines; Clothes dryers; Dish washing machines; Cookers Electric stoves; Electric hot plates; Microwaves; Other large appliances used for cooking and other processing of food; Electric heating appliances; Electric radiators; Other large appliances for heating rooms, beds, seating furniture; Electric fans; Air conditioner appliances; Other fanning, exhaust ventilation and conditioning equipment

Small household appliances

Vacuum cleaners; Carpet sweepers; Other appliances for cleaning; Appliances used for sewing, knitting, weaving and other processing for textiles; Irons and other appliances for ironing, mangling and other care of clothing; Toasters; Fryers; Grinders, coffee machines and equipment for opening or sealing containers or packages; Electric knives; Appliances for hair cutting, hair drying, tooth brushing, shaving, massage and other body care appliances; Clocks, watches and equipment for the purpose of measuring, indicating or registering time; Scales

IT & Telecommunications equipment

Centralised data processing;; Mainframes; Minicomputers; Printer units; Personal computing; Personal computers (CPU, mouse, screen and keyboard included); Laptop computers (CPU, mouse, screen and keyboard included); Notebook computers; Notepad computers; Printers; Copying equipment; Electrical and electronic typewriters; Pocket and desk calculators and other products and equipment for the collection, storage, processing, presentation or communication of information by electronic means; User terminals and systems; Facsimile machine (fax); Telex; Telephones; Pay telephones; Cordless telephones; Cellular telephones; Answering systems and other products or equipment of transmitting sound, images or other information by telecommunications

Consumer equipment





Radio sets; Television sets; Video cameras; Video recorders; Hi-fi recorders; Audio amplifiers; Musical instruments and other products or equipment for the purpose of recording or reproducing sound or images, including signals or other technologies for the distribution of sound and image than by telecommunications; Photovoltaic panels

Lighting equipment

Luminaires for fluorescent lamps with the exception of luminaires in households; Straight fluorescent lamps; Compact fluorescent lamps; High intensity discharge lamps, including pressure sodium lamps and metal halide lamps; Low pressure sodium lamps; Other lighting or equipment for the purpose of spreading or controlling light with the exception of filament bulbs

Electrical & Electronic Tools (with exception to large scale stationary Industrial Tools)

Drills; Saws; Sewing machines; Equipment for turning, milling, sanding, grinding, sawing, cutting, shearing, drilling, making holes, punching, folding, bending or similar processing of wood, metal and other materials; Tools for riveting, nailing or screwing or removing rivets, nails, screws or similar uses; Tools for welding, soldering or similar use; Equipment for spraying, spreading, dispersing or other treatment of liquid or gaseous substances by other means; Tools for mowing or other gardening activities

Toys leisure and sports equipment

Electric trains or car racing sets; Hand-held video game consoles; Video games Computers for biking, diving, running, rowing, etc; Sports equipment with electric or electronic components; Coin slot machines

Medical Devices (with exception of all implanted and infected products)

Radiotherapy equipment; Cardiology equipment; Dialysis equipment; Pulmonary ventilators nuclear medicine equipment; Laboratory equipment for in vitro diagnosis; Analysers; Freezers; Fertilization tests; Other appliances for detecting, preventing, monitoring, treating, alleviating illness, injury or disability

Monitoring & control instruments

Smoke detector; Heating regulators; Thermostats; Measuring, weighing or adjusting appliances for household or as laboratory equipment; Other monitoring and control instruments used in industrial installations (e.g., in control panels)

Automatic dispensers

Automatic dispensers for hot drinks; Automatic dispensers for hot or cold bottles or cans; Automatic dispensers for solid products; Automatic dispensers for money; All appliances which deliver automatically all kinds of products

As of 15 August 2018, the revised WEEE Directive specifies six categories to be reported, reflecting the actual streams through which e-waste is collected in practice. These categories include:





Group of EEE	Details
1	Temperature exchange equipment Refrigerators, Freezers, Equipment which automatically delivers cold products, Air conditioning equipment, Dehumidifying equipment, Heat pumps, Radiators containing oil and other temperature exchange equipment using fluids other than water for the temperature exchange.
2	Screens, monitors, and equipment containing screens having a surface greater than 100 cm² Screens, Televisions, LCD photo frames, Monitors, Laptops, Notebooks.
3	Lamps Straight fluorescent lamps, Compact fluorescent lamps, Fluorescent lamps, High intensity discharge lamps - including pressure sodium lamps and metal halide lamps, Low pressure sodium lamps, LED.
4	Large equipment Washing machines, Clothes dryers, Dish washing machines, Cookers, Electric stoves, Electric hot plates, Luminaires, Equipment reproducing sound or images, Musical equipment (excluding pipe organs installed in churches), Appliances for knitting and weaving, Large computer-mainframes, Large printing machines, Copying equipment, Large coin slot machines, Large medical devices, Large monitoring and control instruments, Large appliances which automatically deliver products and money, Photovoltaic panels.
5	Small equipment Vacuum cleaners, Carpet sweepers, Appliances for sewing, Luminaires, Microwaves, Ventilation equipment, Irons, Toasters, Electric knives, Electric kettles, Clocks and Watches, Electric shavers, Scales, Appliances for hair and body care, Calculators, Radio sets, Video cameras, Video recorders, Hi-fi equipment, Musical instruments, Equipment reproducing sound or images, Electrical and electronic toys, Sports equipment, Computers for biking, diving, running, rowing, etc., Smoke detectors, Heating regulators, Thermostats, Small Electrical and electronic tools, Small medical devices, Small Monitoring and control instruments, Small Appliances which automatically deliver products, Small equipment with integrated photovoltaic panels.
6	Small IT and telecommunication equipment (no external dimension more than 50 cm) Mobile phones, GPS, Pocket calculators, Routers, Personal computers, Printers, Telephones.





EU Member States follow collection targets that are set either as a percentage of the Electrical and Electronic Equipment (EEE) placed on the market (POM) over the previous three years or as a percentage of the e-waste generated. The shift from a fixed target to a relative one highlights the need for more accurate and comprehensive e-waste statistics.

EEE CATEGORY UNDER EU-6 (2018)	EEE CATEGORY UNDER EU-10 (2017)
Lamps	Lighting equipment
Large equipment	Large household appliances
Large equipment	Consumer equipment
Large equipment	IT and telecommunications equipment
Large equipment	Electrical and electronic tools
Large equipment	Toys
Large equipment	Medical devices
Large equipment	Monitoring and control instruments
Large equipment	Automatic dispensers
Screens and monitors	IT and telecommunications equipment
Screens and monitors	Consumer equipment
Small equipment	Large household appliances
Small equipment	Small household appliances
Small equipment	Consumer equipment
Small equipment	Lighting equipment
Small equipment	Electrical and electronic tools
Small equipment	Toys
Small equipment	Medical devices
Small equipment	Monitoring and control instruments
Small IT	IT and telecommunications equipment
Small IT	Toys
Temperature exchange equipment	Large household appliances
Temperature exchange equipment	Automatic dispensers



Category	Q1 2021 WEEE collections	Q1 2022 WEEE collections	Q1 2023 WEEE collections	Progress toward 2023 target
1. Large household appliances	47,635	45,407	44,260	27%
2. Small household appliances	7,499	8,291	8,226	25%
3. IT and telecoms equipment	8,272	9,200	9,670	26%
4. Consumer equipment	5,024	5,414	5,069	24%
5. Lighting equipment	1,256	1,288	1,341	26%
6. Electrical and electronic tools	5,476	5,621	6,029	26%
7. Toys, leisure and sports	1,077	1,138	1,208	26%
8. Medical devices	1	1	3	27%
9. Monitoring and control instruments	278	245	265	24%
10. Automatic dispensers	0	1	0	0%
11. Display equipment	9,866	10,558	11,046	27%
12. Cooling appliances	33,184	31,624	32,208	24%
13. Gas discharge lamps and LED light sources	922	1,033	1,026	25%
14. Photovoltaic panels	64	50	80	26%
TOTAL	120,554	119,871	120,433	26%

EEE data collection. Source: 2bcompliance.org.uk/news/q1-2023-weee-data-shows-promising-collection-figures/

4.3. Other classification system outside the EU

Classification of e-waste under the Basel Convention

Article 2 ("Definitions") of the Basel Convention describes waste as "substances or objects which are disposed of, intended to be disposed of, or required to be disposed of under national legislation." Additionally, paragraph 4 of the same article defines disposal as "any operation listed in Annex IV" of the Convention.

UNU-KEYS

The UNU-KEYS system is structured so that product groups exhibit similar average weights, material compositions, end-of-life characteristics, and lifespan distributions. These shared traits make the classification especially valuable for compiling e-waste statistics. The complete list of UNU-KEYS is presented in Table 1. The 54 product categories can be grouped into 10 main categories, corresponding to those in the original EU Waste Electrical and Electronic Equipment (WEEE) Directive (refer to the fourth column in Table 1). Additionally, the classification aligns with the updated reporting categories introduced in the recast of the WEEE Directive, which took effect in the EU in August 2018 (see third column in Table 1). Serving as an effective bridge between the original EU categories and other existing classification systems, the UNU-KEYS framework is also referenced in implementing legislation to define the common methodology for calculating WEEE collection targets under Article 7 (European Commission, 2017/2018).

UNU-KEY	DESCRIPTION	EEE CATEGORY UNDER EU-6	EEE CATEGORY UNDER EU-10
0001	Central Heating (household installed)	Large equipment	Large household appliances
0002	Photovoltaic Panels (incl. inverters)	Large equipment	Consumer equipment





0101	Professional Heating & Ventilation (excl. cooling equipment)	Large equipment	Large household appliances
0102	Dishwashers	Large equipment	Large household appliances
0103	Kitchen equipment (e.g., large furnaces, ovens, cooking equipment)	Large equipment	Large household appliances
0104	Washing Machines (incl. combined dryers)	Large equipment	Large household appliances
0105	Dryers (wash dryers, centrifuges)	Large equipment	Large household appliances
0106	Household Heating & Ventilation (e.g. hoods, ventilators, space heaters)	Large equipment	Large household appliances
0108	Fridges (incl. combi-fridges)	Temperature exchange equipment	Large household appliances
0109	Freezers	Temperature exchange equipment	Large household appliances
0111	Air Conditioners (household installed and portable)	Temperature exchange equipment	Large household appliances
0112	Other cooling equipment (e.g. dehumidifiers, heat pump dryers)	Temperature exchange equipment	Large household appliances
0113	Professional cooling equipment (e.g. large air conditioners, cooling displays)	Temperature exchange equipment	Large household appliances
0114	Microwaves (incl. combined, excl. grills)	Small equipment	Large household appliances
0201	Other small household equipment (e.g. small ventilators, irons, clocks, adapters)	Small equipment	Small household appliances





0202	Equipment for food preparation (e.g. toaster, grills, food processing, frying pans)	Small equipment	Small household appliances
0203	Small household equipment for hot water preparation (e.g. coffee, tea, water cookers)	Small equipment	Small household appliances
0204	Vacuum Cleaners (excl. professional)	Small equipment	Small household appliances
0205	Personal Care equipment (e.g. toothbrushes, hairdryers, razors)	Small equipment	Small household appliances
0301	Small IT equipment (e.g. routers, mice, keyboards, external drives & accessories)	Small IT	IT and telecommunications equipment
0302	Desktop PCs (excl. monitors, accessories)	Small IT	IT and telecommunications equipment
0303	Laptops (incl. tablets)	Screens and monitors	IT and telecommunications equipment
0304	Printers (e.g. scanners, multi - functionals, faxes)	Small IT	IT and telecommunications equipment
0305	Telecommunication equipment (e.g. cordless phones, answering machines)	Small IT	IT and telecommunications equipment
0306	Mobile Phones (incl. smartphones, pagers)	Small IT	IT and telecommunications equipment
0307	Professional IT equipment (e.g. servers, routers, data storage, copiers)	Large equipment	IT and telecommunications equipment
0308	Cathode Ray Tube Monitors	Screens and monitors	IT and telecommunications equipment
0309	Flat Display Panel Monitors (LCD, LED)	Screens and monitors	IT and telecommunications equipment





0401	Small Consumer Electronics (e.g. headphones, remote controls)	Small equipment	Consumer equipment
0402	Portable Audio & Video (e.g. MP3, e-readers, car navigation)	Small equipment	Consumer equipment
0403	Music Instruments, Radio, Hi-Fi (incl. audio sets)	Small equipment	Consumer equipment
0404	Video (e.g. Video recorders, DVD, Blue Ray, set-top boxes) and projectors	Small equipment	Consumer equipment
0405	Speakers	Small equipment	Consumer equipment
0406	Cameras (e.g. camcorders, photo & digital still cameras)	Small equipment	Consumer equipment
0407	Cathode Ray Tube TVs	Screens and monitors	Consumer equipment
0408	Flat Display Panel TVs (LCD, LED, Plasma)	Screens and monitors	Consumer equipment
0501	Small lighting equipment (excl. LED & incandescent)	Small equipment	Lighting equipment
0502	Compact Fluorescent Lamps (incl. retrofit & non-retrofit)	Lamps	Lighting equipment
0503	Straight Tube Fluorescent Lamps	Lamps	Lighting equipment
0504	Special Lamps (e.g. professional mercury, high & low pressure sodium)	Lamps	Lighting equipment
0505	LED Lamps (incl. retrofit LED lamps)	Lamps	Lighting equipment
0506	Household Luminaires (incl. household incandescent fittings & household LED luminaires)	Small equipment	Lighting equipment
0507	Professional Luminaires (offices, public space, industry)	Small equipment	Lighting equipment
0507	Professional Luminaires (offices, public space, industry)	Small equipment	Lighting equipment
0601	Household Tools (e.g. drills, saws, high pressure cleaners, lawn mowers)	Small equipment	Electrical and electronic tools

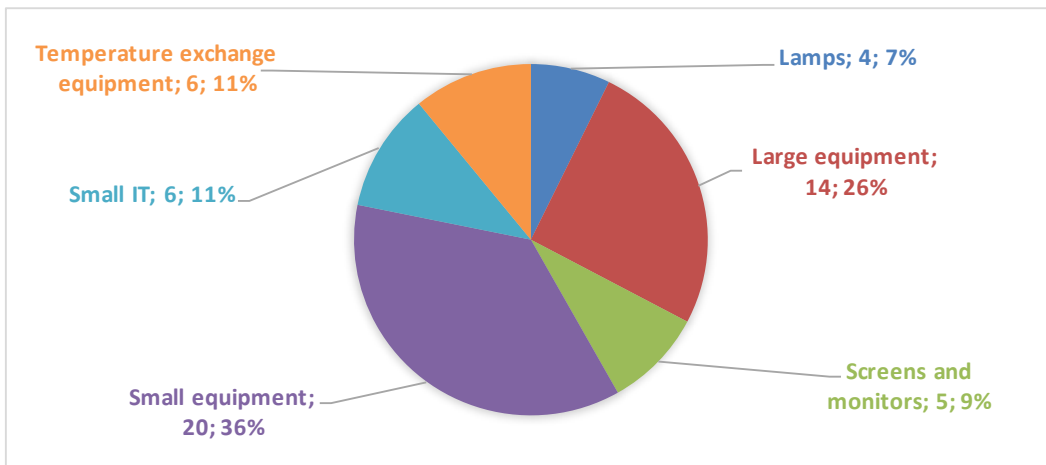




0602	Professional Tools (e.g. for welding, soldering, milling)	Large equipment	Electrical and electronic tools
0701	Toys (e.g. car racing sets, electric trains, music toys, biking computers, drones)	Small equipment	Toys
0702	Game Consoles	Small IT	Toys
0703	Leisure equipment (e.g. sports equipment, electric bikes, juke boxes)	Large equipment	Toys
0801	Household medical equipment (e.g. thermometers, blood pressure meters)	Small equipment	Medical devices
0802	Professional medical equipment (e.g. hospital, dentist, diagnostics)	Large equipment	Medical devices
0901	Household Monitoring & Control equipment (alarm, heat, smoke, excl. screens)	Small equipment	Monitoring and control instruments
0902	Professional Monitoring & Control equipment (e.g. laboratory, control panels)	Large equipment	Monitoring and control instruments
1001	Non- cooled Dispensers (e.g. for vending, hot drinks, tickets, money)	Large equipment	Automatic dispensers
1002	Cooled Dispensers (e.g. for vending, cold drinks)	Temperature exchange equipment	Automatic dispensers



EEE CATEGORY UNDER EU-6	Account	EEE CATEGORY UNDER UNU-KEY
Lamps	4	
Large equipment	14	
Screens and monitors	5	
Small equipment	20	
Small IT	6	
Temperature exchange equipment	6	



EEE category under EU-6. Source: Own

4.4. HS 2022 codes

The World Customs Organization (WCO) introduced the seventh edition of the Harmonized System (HS) nomenclature—HS 2022—effective from January 1, 2022. This edition includes 351 amendments, impacting a broad spectrum of globally traded goods.

HS 2022 improves the classification of key product categories to better reflect current trade dynamics. Among the updates, e-waste—an area of increasing policy focus and substantial trade volume—now benefits from dedicated HS codes, aiding countries in aligning with Basel Convention obligations.



Other significant revisions include new entries for emerging tobacco and nicotine products, specific classifications for unmanned aerial vehicles (UAVs or drones), and a distinct subheading for smartphones. Substantial updates have also been made to the classification of glass fibers (heading 70.19) and metal forming machinery (heading 84.62), ensuring that technological progress is accurately captured and trade data gaps are minimized.

In recognition of Customs' expanding responsibilities in societal protection and anti-terrorism, HS 2022 also introduces revised classifications for items regulated under various international agreements. This includes new subheadings for persistent organic pollutants (POPs) covered by





the Stockholm Convention, chemicals under the Chemical Weapons Convention (CWC), and hazardous substances addressed by the Rotterdam Convention.

The WCO, founded in 1952, is an independent intergovernmental body representing 183 customs administrations, which collectively oversee around 98% of global trade. Its core objective is to enhance the performance and efficiency of customs operations worldwide.

4.5. Correlations between the classifications

The relationships between the various classification systems discussed earlier are summarized in the table below. Among them, the Harmonized System (HS) codes offer the most detailed descriptions of products. The UNU-KEYS are derived from HS codes, and this connection is outlined in Annex 1. These UNU-KEYS can then be mapped to the six or ten categories defined in the WEEE Directives, as shown in the following table.

In contrast, establishing clear links between HS codes and the Basel or European List of Waste (LoW) codes proves challenging. This difficulty stems largely from differing definitions of waste. The HS system classifies waste primarily as residual materials, whereas Article 1 of the Basel Convention defines waste as substances or objects that are disposed of, intended to be disposed of, or legally required to be disposed of under national legislation. These differing perspectives hinder direct alignment between the systems.

	UNU-KEYS	HS	EU LIST OF WASTE (LoW)	BASEL CODES	SEEA	EU WEEE DIRECTIVE, 6 CATEGORIES
HS	One HS code unique links to the UNU-KEYS					
EU LIST OF WASTE (LoW)	Not directly correlated	Not complete match, due to differing concepts of waste in HS classification and LoW				
BASEL CODES	Not directly correlated	EU has published a correlation table	Not directly correlated			
SEEA	One UNU-KEY can be linked to SEEA	One HS code is linked to SEEA	Not directly correlated	Not directly correlated		
EU WEEE DIRECTIVE, 6 CATEGORIES	One UNU-KEY can be correlated to the 6 categories, with the exception of the size distinction	One HS code can be correlated to the 6 categories of the WEEE Directive with the exception of the size distinction	Not directly correlated	Not directly correlated	Not directly correlated	
EU WEEE DIRECTIVE, 10 CATEGORIES	One UNU-KEY links to a category in the WEEE Directive	One HS code can be correlated to the 10 categories of the WEEE Directive	Not directly correlated	Not directly correlated	Not directly correlated	Not directly correlated, but can be linked with UNU-KEYS

Correlation between various classifications (source: UNU VIEW)





5. The phrase “intended to be disposed of,” as used in the Basel Convention, encompasses a broader range of items—including many that the HS system still classifies as “products” under Chapters 84 and 85. Although these items may legally be considered waste under the Basel Convention, the HS treats them as tradable goods. To help bridge this gap, the European Commission published a preliminary correlation table linking customs nomenclature codes to waste codes in Commission Implementing Regulation (EU) 2016/1245. However, there is currently no established correlation between the European List of Waste (LoW) codes and Basel codes.



6. ACTORS INVOLVED IN THE SYSTEM

The “all actors” approach to WEEE management encompasses all stakeholders with legal obligations, including those involved in the handling of WEEE—such as collection, logistics, preparation for reuse, refurbishment, and treatment—as well as those responsible for oversight and enforcement of WEEE-related legislation. Each of these actors is subject to the requirements of the WEEE Directive, including obligations related to compliance, monitoring, and reporting. Collectively, they are expected to support responsible WEEE management and ensure transparent regulatory oversight.

Central to this framework is the principle of mandatory handover, which requires that all WEEE be managed exclusively by certified collectors and recyclers. If WEEE is initially collected by uncertified parties, it must be transferred to certified operators, potentially with compensation for the transfer. This mechanism is designed to improve both the collection and registration rates of WEEE across the system.

6.1. Producers and producer responsibility organizations (PRO)

A Producer Responsibility Organisation (PRO) is a collective body operating at the national level that assists producers in fulfilling their legal obligations. Funded by the contributions of its members, a producer typically joins a PRO by paying fees calculated according to the type, quantity, and specific characteristics of the products they place on the market. Once a producer becomes a member, the PRO takes on the legal responsibility for achieving regulatory targets and compliance requirements on their behalf.

In Europe, the Extended Producer Responsibility (EPR) system for Waste Electrical and Electronic Equipment (WEEE) is governed by the EU WEEE Directive, which outlines the obligations of producers. Under this system, producers must finance the collection, transportation, and environmentally sound treatment of WEEE, either individually or through collective schemes. In several European countries, producers are also required to register with a national WEEE management organization that manages these processes on their behalf.



Source: <https://www.vana.dk/en/producer-responsibility/producer-responsibility-organisations-pros/>

Producers are encouraged to design products that are easier to recycle and contain fewer hazardous substances, promoting better material recovery and reducing environmental harm.





They must comply with collection and recycling targets set by each member state and regularly report on their WEEE management efforts, including data on quantities collected, treated, and the costs involved. Additionally, producers are obligated to provide consumers with clear information on how to properly dispose of WEEE, including details about collection points and return procedures.

Overall, the EPR system in Europe ensures producers are accountable for their products throughout the entire lifecycle—from production to disposal. By requiring producers to cover the costs of WEEE management and encouraging eco-friendly product design, the system fosters sustainable waste handling and supports the transition toward a circular economy.

6.2. Extended Producer Responsibility (EPR)

Extended Producer Responsibility (EPR) is a key policy mechanism for managing Waste Electrical and Electronic Equipment (WEEE) in Europe. Established through the EU WEEE Directive, EPR assigns producers full responsibility for the entire lifecycle of their electronic products, including financing their collection, transportation, and environmentally sound treatment. This approach has been successful in promoting sustainable WEEE management by motivating producers to design products that are easier to recycle and by reducing the environmental impact of electronic waste. As a result, many European countries have adopted EPR policies, recognizing producers as essential players in advancing the circular economy and mitigating the environmental risks of WEEE.

The OECD defines EPR as an environmental policy strategy that extends producer responsibility beyond the point of sale to include the post-consumer phase of a product's lifecycle. Practically, this means producers must ensure their products are collected at end-of-life and properly sorted before final treatment, preferably recycling. EPR schemes may require producers to provide financial support or to take over operational and organizational roles, sometimes relieving municipalities from these duties (as seen in packaging waste management).



In Europe, two main EPR system types exist for WEEE: individual and collective.

- Individual EPR systems: Here, each producer finances the collection, transport, and treatment of WEEE originating from their own products. Producers either manage these processes themselves or contract service providers, and they are responsible for reporting their WEEE management activities to relevant authorities.
- Collective EPR systems: In this model, multiple producers collaborate within a collective scheme that manages and funds the collection, transport, and treatment of WEEE from all member products. By pooling resources, producers share the costs and administrative burden. The collective scheme handles environmental compliance and reporting obligations on behalf of its members.

Both systems aim to ensure that WEEE is managed responsibly while supporting producers' accountability in the circular economy.





The implementation of WEEE Extended Producer Responsibility (EPR) across Europe varies from country to country, with each nation adopting its own tailored system. The general steps involved in establishing a WEEE EPR system can be outlined as follows:

- Develop legislation: Countries first enact national laws to transpose the EU WEEE Directive into their legal frameworks. This legislation sets out producer obligations, WEEE management requirements, and penalties for non-compliance.
- Choose an EPR system: Each country decides whether to adopt an individual or collective EPR model. This choice depends on factors such as market size, number of producers, and available resources.
- Establish a Producer Responsibility Organisation (PRO): For countries opting for a collective EPR system, a PRO is formed to handle the collection, transportation, and treatment of WEEE on behalf of producers.
- Develop collection and recycling infrastructure: Nations must create the necessary infrastructure for WEEE management, including collection points, recycling facilities, and transportation networks.
- Set up monitoring and reporting systems: To ensure compliance, countries establish mechanisms to monitor and report on the collection, transport, and treatment of WEEE, verifying that producers meet their legal obligations.

Examples across Europe illustrate these different approaches: Germany employs a collective EPR system where producers join a PRO responsible for WEEE management; France follows a similar collective model. Italy, in contrast, uses an individual EPR system where each producer manages their own products' collection and recycling. Spain applies a hybrid approach, requiring larger producers to handle their own WEEE, while allowing smaller producers to participate in a collective scheme.

Overall, implementing WEEE EPR in Europe requires a blend of legislative, organizational, and infrastructural efforts. The exact system adopted in each country reflects its unique national context and available resources.



Extended producer responsibility (EPR). Source: <https://500earth.com/what-is-extended-producer-responsibility-epr/>





6.3. Retailers

Retailers play a key role within the WEEE collection network. It is recommended that each Member State consider expanding the existing 1x0 obligation to include additional retailers beyond those specified in the WEEE Directive (which currently applies to stores with sales areas over 400 m²), provided that such expansion is both economically viable and environmentally sustainable.

Beyond their legal responsibilities, retailers are encouraged to:

- Engage actively in coordination bodies.
- Collect small WEEE items, including from non-household retailers, both in-store and during delivery.
- Report on the WEEE they receive, ideally by using tools designed to reduce administrative burdens.
- Promote the adoption of reverse logistics.
- Contribute financially to central bodies that run consumer awareness campaigns.
- Support efforts to prevent irregular WEEE flows and improper treatment, particularly during delivery take-back processes.

For example, in the Netherlands, some retailers offer a pick-up service for small appliances, showcasing an extended retail role.

In a fully implemented “all actors” (AAA) system, retailers should have the option to manage and finance the treatment of WEEE collected at their premises if they choose. They would be responsible for reporting these activities, provided they ensure proper treatment or hand over the waste to Producer Responsibility Organisations (PROs), who have the right to free uplift and cover treatment costs.

Retail associations and sector representatives are encouraged to actively involve their members in awareness campaigns, ideally partnering with PROs through a coordination body. It is also proposed that retail associations participate in research and development initiatives promoting reverse logistics as a method to enhance WEEE collection.

6.4. National competent authorities and Enforcement bodies

In the “all actors approach” (AAA), national competent authorities play a crucial role in establishing a robust legislative framework that ensures every stakeholder involved in WEEE collection contributes according to their responsibilities to meet national collection targets.



Key actions envisioned for national (waste) competent authorities under the AAA include:

- Establishing a coordination body to oversee and facilitate cooperation among all stakeholders.
- Ensuring effective coordination through this body, fostering regular communication and synergy between policymakers and enforcement agencies such as customs and inspection authorities.





- Providing legislative support to boost collection efforts by:
 - Mandating reporting obligations for all actors.
 - Regulating and enforcing comprehensive reporting, including tracking of used electrical and electronic equipment (UEEE) and WEEE imports and exports.
 - Creating legal frameworks that encourage the use of reverse logistics for WEEE collection.
 - Enforcing mandatory handover of WEEE to Producer Responsibility Organisations (PROs).
 - Making CENELEC standards compulsory.
- Participating in monitoring and measurement initiatives for complementary waste flows (e.g., municipal solid waste).
- Supporting targeted national awareness campaigns.
- Offering clear, harmonized guidance on collection and sorting to local authorities.

Enforcement agencies, particularly inspection bodies, are vital to the success of the AAA. Alongside legislative measures and incentives, inspection campaigns help maintain a level playing field by ensuring compliance.

Enforcement bodies should implement national, targeted inspections and enforcement actions focused on:

- Verifying reporting accuracy of WEEE received and UEEE exported/imported by all actors.
- Ensuring proper treatment of WEEE.
- Addressing producer reporting to combat freeriding.

Customs authorities are responsible for overseeing import and export reporting of UEEE and WEEE. A thorough review of current practices is essential to develop an improvement plan aimed at:

- Enabling clear traceability of UEEE and WEEE shipments across borders.
- Ensuring WEEE is treated appropriately outside Europe.
- Enhancing reporting compliance from shipment companies.

Additionally, international multi-stakeholder groups are encouraged to collaborate on managing transboundary movements, improving knowledge sharing, and providing relevant training.

6.5. Coordination body

In an All Actors Approach (AAA), every stakeholder with potential influence on WEEE collection rates should actively contribute toward achieving national collection targets. Ensuring efficient resource use and effective monitoring demands strong coordination and seamless communication among all parties involved. Ideally, a coordination body should include representatives from all actors impacting collection rates. Producer Responsibility Organisations (PROs) must play a central role in this body's governance to guarantee that initiatives are cost-effective, proportionate, and fair.





It is proposed that the coordination body will:

- Oversee and monitor the allocation of collection responsibilities.
- Track compliance with collection obligations and overall progress toward national collection goals.
- Establish and manage a reporting framework and tools, coordinating data submission from all actors.
- Facilitate agreements between PROs and local authorities to enhance the collection of household WEEE.
- Develop strategies to expand and improve the collection network, including optimizing current collection points and incentivizing new collectors to join the system.
- Coordinate with other sectors (e.g., construction, automotive) to support monitoring and traceability efforts.
- Finance research and development activities, such as studies on WEEE flows and best practice technical developments.
- Lead national and local communication campaigns to ensure efficient use of resources and deliver consistent, well-informed messaging.
- Participate in enforcement planning and provide support for enforcement activities.

The coordination body may receive funding from public and/or private sources. Although the body manages responsibilities assigned to producers (e.g., under Articles 14 and 15 of the WEEE Directive) to ensure resource efficiency and consensus, financing for these responsibilities will remain the producers' obligation.

6.6. Local authorities

Local authorities should be recognized as the cornerstone of the WEEE collection network. Within the framework of the AAA, municipalities are encouraged to take a proactive and engaged role in promoting WEEE collection among their residents.

Specifically, local authorities, beyond their legal obligations, are recommended to:

- Participate in the coordination body.
- Establish agreements with PROs for transferring WEEE received at municipal facilities. When not legally mandated, and municipalities are authorized to hand over WEEE to downstream processors, additional controls, traceability measures based on evidence, and guarantees of proper treatment should be ensured—such as through laws that define tendering conditions.
- Conduct targeted, harmonized, and clear awareness-raising campaigns.





- Implement measures to prevent theft and scavenging of WEEE.
- Monitor and benchmark rates of WEEE collection, scavenging, and theft.
- Collaborate with enforcement agencies to address theft and scavenging issues by reporting incidents, training staff at collection points, and implementing strategies to reduce such activities.
- Where legally empowered, carry out enforcement campaigns against illegal treatment and misreporting of WEEE.

Activities identified with “should” are preferably facilitated by the coordination body.

6.7. Other collection channels (e.g. B2B collection points, installers, demolition companies, social economy, etc)

The AAA encourages expanding the collection network by including all actors with access to WEEE. This encompasses businesses, installers of equipment like PV panels or air conditioners, demolition and construction companies, social economy organizations, repair services, public institutions, and others.

To ensure their contributions to WEEE collection rates are traceable and follow official channels, it is recommended that these collectors:

- Register as official WEEE collectors when required, adhering to take-back and collection obligations. The registration or authorization process should be straightforward and free of charge to avoid discouraging participation in the collection network.
- Report all received WEEE and its subsequent handling in an official database.
- Guarantee the traceability and proper treatment of collected WEEE at authorized facilities.
- Provide necessary support to combat practices that cause irregular flows or improper treatment of WEEE.

These collection channels are encouraged to establish agreements with national PROs, enabling them to benefit from resources available to ensure proper WEEE management.



6.8. Preparing for reuse organizations

Preparing for reuse organisations are gaining increasing importance and support within the WEEE sector due to their vital role in advancing the circular economy. In some Member States, they provide an effective collection network that should be leveraged for WEEE collection wherever possible. Successful collaborations between preparing for reuse organisations and PROs have been demonstrated in several Member States, and it is encouraged that PROs and preparing for reuse organisations in other countries learn from these examples and strive to replicate them. Ensuring proper traceability of WEEE transferred to preparing for reuse organisations is crucial.





The AAA approach recommends that preparing for reuse organisations:

- Participate in a coordination body.
- Become authorised WEEE collectors.
- Report all received WEEE and its subsequent fate to an official database.
- Establish partnerships with PROs to guarantee accurate reporting and proper management of WEEE.
- Comply with recognised preparation for reuse standards, such as EN50614.
- Provide support to address and prevent irregular flows and improper treatment of WEEE.

Additionally, exploring efficient and safe methods to facilitate access to WEEE for preparation for reuse is strongly encouraged.

6.9. WEEE treatment companies

In many Member States, recyclers often perform multiple roles beyond treatment, including logistics and collection, making them an integral part of the WEEE collection network. By having access to WEEE, they contribute directly to achieving national WEEE collection targets under this AAA. However, some Member States do not authorise companies treating scrap to handle specialist WEEE treatment, despite these companies receiving WEEE mixed with scrap and processing it as scrap. To fully implement this AAA, such companies should either become authorised WEEE treatment facilities or separate WEEE from scrap and forward it to authorised treatment centres.

It is recommended that metal recycling companies:

- Comply with standards that include traceability protocols.
- Report the quantities of WEEE received, the categories involved, activities performed, and the fate of WEEE or resulting fractions, either through agreements with PROs, authorities, or via a national database.
- Ensure that scrap facilities receiving WEEE mixed with scrap under a licence or registered exemption report the WEEE received and treated, or send it to authorised WEEE treatment facilities.
- Provide treatment quality reports to the coordination body.
- Support law enforcement efforts by participating in audits and inspection programs.

Brokers, dealers, traders, and other actors involved in the legal export of UEEE/WEEE (including producers, NGOs, facility managers, etc.)

Certain types of WEEE circulate as valuable commodities. Brokers, dealers, traders, and similar actors play a role in the WEEE value cycle and, as entities with access to WEEE, must contribute to meeting national collection targets according to their capacities and limitations.

It is recommended that these actors:





- Report all WEEE received and its fate to a national database.
- Report all UEEE exported or imported, either through agreements with PROs, authorities, or directly to a national database.
- Provide evidence of proper treatment for WEEE traded.
- Assist efforts to combat irregular flows and improper treatment of WEEE.

6.10. Citizens/Business/Public sector-WEEE generators

Hoarding and improper disposal of WEEE are significant issues in some Member States and occur to varying degrees in all. As the first holders of WEEE, citizens and other WEEE generators play a crucial role in determining disposal routes and are therefore key to ensuring correct disposal and boosting collection rates.

Citizens should be encouraged to:

- Reduce hoarding of WEEE.
- Avoid disposing of WEEE through incorrect channels.



7. STANDARD MONITORING SYSTEMS

A primary goal of the policies outlined earlier is to enhance the collection and recycling of WEEE, with specific targets set for each EU Member State. The approaches to WEEE collection and recycling vary across countries and waste categories, often involving a mix of government-led initiatives, producer responsibility schemes, and private sector participation.

In e-waste management, standard monitoring systems refer to structured frameworks designed to track, record, and oversee electronic waste throughout its lifecycle. These systems are essential for ensuring regulatory compliance, evaluating performance, and improving the efficiency of e-waste management practices.



Key components of such monitoring systems include:

- **Tracking and tracing mechanisms:** These follow e-waste from collection points to recycling facilities, often employing barcodes, digital tags, or other technologies to verify proper handling and prevent illegal diversion.
- **Data management systems:** They compile and store detailed information on the types and quantities of e-waste collected, processed, recycled, or disposed of, ensuring transparency and data accuracy.
- **Compliance monitoring:** This ensures adherence to regulations, recycling targets, and environmental standards.
- **Performance assessment:** Evaluates metrics such as recycling rates, resource recovery efficiency, and reductions in hazardous substances.
- **Reporting and transparency:** Enable regulatory authorities, stakeholders, and the public to access information on e-waste management and its environmental impacts.
- **Auditing and verification:** Confirm that e-waste is managed according to established protocols and best practices, supporting accountability.

These monitoring systems also support continuous improvement by identifying areas for enhancement and optimizing management strategies. Often, they are integrated into broader policy frameworks such as Extended Producer Responsibility (EPR) programs, ensuring alignment with legal obligations.

Overall, these systems are vital for effective oversight and governance, allowing all stakeholders to track, regulate, and improve the environmental sustainability of e-waste management.

7.1. POM

The POM method calculates the WEEE collection rate as the mass of WEEE collected divided by the average amount of Electrical and Electronic Equipment (EEE) Placed on the Market (POM) in the three preceding years. Between 2013 and 2016, the collection rate calculated by this method increased from 39% to 50%. However, from 2016 to 2020, the collection rate dropped to 44%. This decline, despite a significant increase in WEEE collection, was driven by even larger increases in the





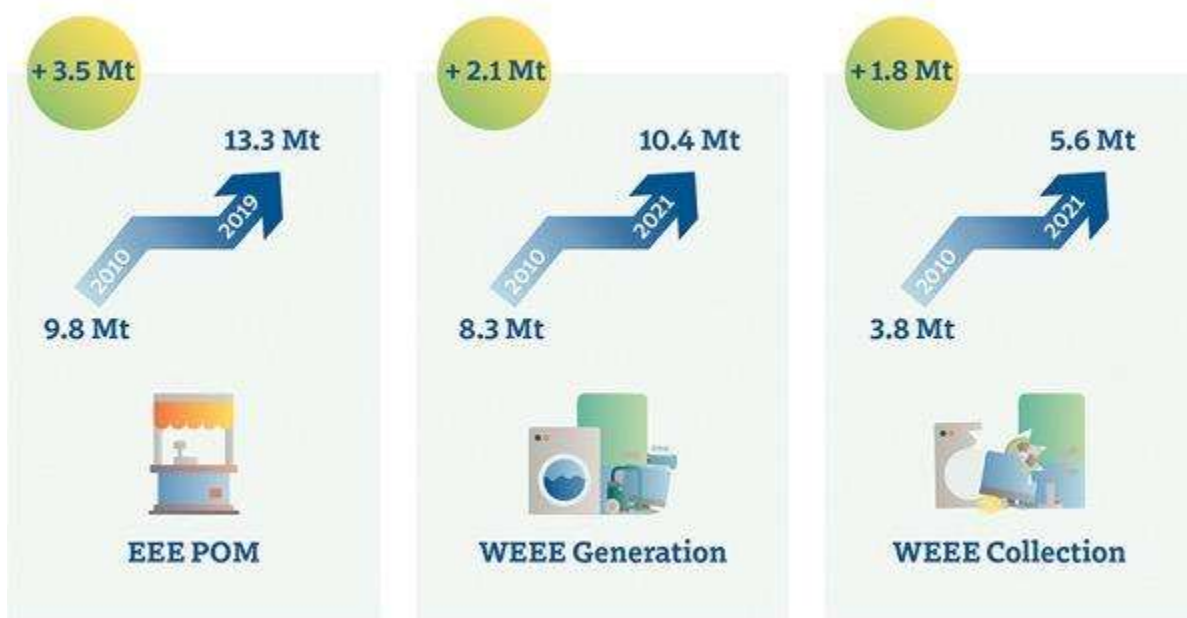
amount of EEE placed on the market, which caused the collection rate to decrease when measured by this method.

The POM method offers a longer-term perspective on collection rates and is less sensitive to short-term fluctuations in WEEE generation and collection. However, it can be affected by factors such as the accuracy of POM data and changes in the product mix of EEE placed on the market.

Governments typically rely on information reported by producers and importers to determine the weight of appliances placed on the market. In accordance with the WEEE Directive, producers and importers are required to report the quantities of EEE they place on the market to national authorities. These authorities use the data to verify whether collection targets for different WEEE categories are met.

The initial method to calculate the collection rate involved dividing the mass of WEEE collected by the average amount of EEE POM in the preceding three years, implemented in 2016. Since then, the collection target has been defined as the ratio between the collected WEEE and the average weight of EEE placed on the market over the previous three years. The target was set at 45% for 2016 and later increased to 65% in 2019.

Regulations and directives govern the responsibilities of manufacturers, distributors, and consumers in e-waste management from the point of "putting on the market" through disposal or recycling. These obligations ensure that all parties involved handle electronic waste in an environmentally responsible manner.



The amount of EEE POM (Source: <https://www.scycle.info/new-study-update-of-weee-collection-rates-targets-flows-and-hoarding/>)





7.2. Life time

The lifetime of Electrical and Electronic Equipment (EEE) is defined as the period during which the equipment is expected to function correctly and efficiently before reaching the end of its usable life.

EEE product lifetimes can vary depending on the type of product and the country. The figure below illustrates example lifetime profiles, expressed as Weibull functions, for different product types in the European Union. Generally, there is no official government data collection on EEE lifetimes, although some countries may have relevant information available through scientific studies or research conducted locally.

As noted, EEE lifetimes differ by product and country. A sensitivity analysis performed across various EU countries estimated that the margin of error in e-waste generation due to lifetime variability is approximately 10% per country. Therefore, it is advisable for countries to determine product lifetimes empirically, specific to their context. Overall, the variation in lifetimes among EU countries has been relatively small for most product categories.

When defining EEE lifetimes, it is crucial to consider these factors to set realistic expectations for how long equipment will operate optimally. This is also important for sustainability and responsible consumption, as lifetime directly influences the volume of electronic waste generated and the product's overall environmental footprint.

7.3. System of Environmental-Economic Accounting (SEEA)

The System of Environmental-Economic Accounting (SEEA) provides internationally recognized standards for concepts, definitions, classifications, accounting rules, and tables, enabling the generation of comparable statistics on environmental-economic accounts and their integration with economic data. SEEA's framework aligns with the System of National Accounts (SNA), ensuring consistency in terminology and classifications to effectively combine environmental and economic information.

Within SEEA, e-waste is addressed under Chapter 3.6.5 on Waste Accounting. According to SEEA principles, e-waste statistics are considered a subset of the overall waste stream generated from electrical and electronic equipment (EEE) and vehicles. However, current e-waste guidelines do not specify the origin of waste generation, such as whether it stems from industrial classifications like ISIC/NACE 18 or from households, which is a crucial distinction for SEEA reporting. To fill this gap, additional modeling—potentially using the UNU-KEY framework—may be required.

SEEA also includes the reporting of import and export data, consistent with e-waste guidelines. Yet, accurately measuring transboundary flows of e-waste remains a significant challenge due to the complexity of tracking such movements.

Moreover, SEEA accounts for secondary materials derived from e-waste, such as plastics, scrap metals, and residues. Although these secondary materials are excluded from direct e-waste statistics, they can be incorporated into broader analytical models to provide a more comprehensive view of resource flows and material recovery.





7.4. Framework for the Development of Environment Statistics (FDES)

The Framework for the Development of Environment Statistics (FDES) is a versatile and comprehensive conceptual and statistical framework designed to be both integrative and adaptable. It defines the scope of environmental statistics and provides a structured approach for collecting, compiling, and synthesizing data from various sources and subject areas. This framework supports the analysis of environmental issues critical for policy formulation and decision-making.

Within FDES, Subcomponent 3.3: Generation and Management of Waste covers statistics on the quantity and characteristics of waste, including e-waste. Waste is defined as discarded material no longer needed by its owner or user, arising from production and consumption activities. The FDES provides a systematic framework for identifying and collecting waste statistics, including e-waste data. Furthermore, it aligns waste statistics with the International Standard Industrial Classification (ISIC) to ensure better integration with economic statistics.

7.5. Stock (S)

The stock (S) refers to the total equipment owned by households, businesses, and the public sector. However, comprehensive and harmonized stock data across all 54 UNU-KEYs—especially for household and business appliances—is generally lacking. Some countries collect stock data for specific products through household surveys conducted by national statistical institutes. These surveys typically assess household ownership or penetration rates of various electrical and electronic equipment (EEE), which can support the overall measurement framework.

This methodology requires counting both functional and non-functional appliances. An alternative, though less precise, data source is the number of service subscriptions, with one subscription assumed to represent at least one appliance. However, this can be inaccurate since some appliances may have multiple subscriptions, while others may have none. Additionally, some countries use ICT penetration rates to estimate minimum stock levels, but such surveys often overlook households with multiple devices.

7.6. Formal collection of e-waste (W_{formal})

Data on the formal collection of e-waste is not typically modeled and must be gathered by each country using methods best suited to their situation. When we talk about “formal collected e-waste,” we mean the amounts of e-waste that have been collected and recycled according to specific national e-waste management laws, ensuring that recycling meets environmental standards. Ideally, these laws regulate the entire system—from setting collection and recycling targets to defining minimum requirements or certifications for proper recycling practices.

The formal e-waste management system involves multiple actors, all of whom can be sources of data. For example, when e-waste is collected through official take-back systems, it is often assumed that the collected e-waste is also recycled, though there can be some losses during treatment. Data on formally collected and recycled e-waste can be obtained by tracing the waste from its generation to treatment, verifying that it is recycled in certified facilities either domestically or



abroad. If data is collected based on treatment facility records, imported e-waste must be subtracted to avoid counting it twice.

In many countries, data collection is supported by legal frameworks, such as licensing and monitoring requirements for recycling operators. These legal provisions allow authorities to maintain registers that serve as a key source for official e-waste statistics. This is particularly true in countries that have adopted Extended Producer Responsibility (EPR) schemes, where producers and designated organizations must gather data on e-waste collected from retailers, municipal points, or pick-up services and ensure it is sent to certified treatment facilities. Even in countries without formal EPR schemes or official registers, e-waste can still be recycled properly if it is handled by certified treatment plants.

Several types of data sources can be used to gather information on formal e-waste collection. Household surveys are one approach, where a representative sample of households is asked about discarded electrical and electronic equipment, how long it was used, and how it was disposed of. Although these surveys often report quantities in units rather than weight, this data can be converted to weight estimates. Another important source is collection points—either municipal or private—where e-waste may be dropped off or collected during bulky waste pick-ups. Increasingly, stores are also becoming collection points, though it is critical that the e-waste gathered there is sent to certified recyclers.

Additionally, treatment facilities themselves are a vital source of data. Registers of e-waste entering certified treatment plants help track the volumes processed. However, some challenges exist, such as differences between the original waste and what actually arrives for treatment after dismantling, as well as distinguishing domestic waste from imports and exports. To accurately report domestically generated e-waste, imported waste must be subtracted.



Possible flows to trace and potential data sources to gather data on formal collection

Other data may come from waste companies' registers, NGO reports, environmental surveys, or scientific studies. Many industry and public associations compile their own statistics to monitor e-waste streams, and these can be valuable if they meet national quality standards. Moreover,





ongoing research contributes to a growing body of knowledge that can support official data collection efforts.





8. THE AREA UNDER ANALYSIS – Alentejo, Portugal

8.1. WEEE CONTEXT IN THE AREA UNDER ANALYSIS

This work, 'Regional Study of Portugal and the Alentejo for the Local Action Plan', is part of the 'Euro-MED0200699 - eWAsTER' project, funded by the 'Interreg 2021-2027 European Territorial Cooperation Programme', and its main objective is to present the state of the art of life cycle management of electrical and electronic waste in Portugal and the Alentejo, as well as to present solutions to be applied at local, regional or national level to achieve better life cycle management of electrical and electronic waste.

This work analyses the context of electrical and electronic waste in Portugal and Alentejo region. It analyses lifecycle treatment, public policies and the regulatory and legislative framework, electrical and electronic waste management plans, opportunities and challenges, progress over time in the region, lifecycle treatment networks, the main players involved in treatment, and the environmental and industrial impact in Portugal and the Alentejo. At the end, potential solutions to be adopted at local, regional and national level are presented.

Portugal has made significant strides in managing electrical and electronic waste (e-waste) in recent years, although it still faces challenges compared to the European average. Here's an overview of Portugal's situation regarding the collection, treatment, and management of e-waste, along with some relevant numbers.

Collection and Recycling Rates

- [E-Waste Collection Rate](#): As of 2022, Portugal achieved a collection rate of approximately **5,4** kilograms of e-waste per inhabitant, which is slightly below the EU average of around **11,2** kilograms per inhabitant.)
- Electrical and electronic equipment (EEE) put on the market and WEEE collected by country: *"WEEE collected is shown as the share of the EEE put on the market. The share is calculated as the ratio of the amount of collected WEEE in 2022 in relation to the average amount of EEE put on the market in the 3 preceding years, i.e. 2019-2021. These ratios provide an overview of the EU countries' performance towards the collection **targets of 45% and 65%**, respectively."* In 2022 The average in the European Union was 40.1%, while Portugal was at the bottom of the list with **26%**. There is still a long way to go to improve its performance.

Treatment and Recycling Infrastructure

- Recycling Facilities: Portugal has established various facilities for dismantling and recycling e-waste, with organizations like ERP Portugal and ELECTRÃO leading the efforts and the only ones that are certified by national Authority", the **Portuguese Environment Agency (APA)**.

Public Awareness and Initiatives

- Awareness Campaigns: The Portuguese government and various NGOs have initiated campaigns to educate the public about proper e-waste disposal and encourage recycling. Examples of NGO and Active Entities:





- **Electrão** – Waste Management Association: Runs numerous campaigns such as "**Electrão School**" in schools and projects like "**Electrão Barracks**," involving volunteer fire departments in awareness activities for the proper disposal of electrical equipment out of use.
- **ERP Portugal** (European Recycling Platform): Develops campaigns in partnership with organizations and companies, such as the "**Geração Depositário**" project in **Eco-Schools** and joint actions with the Os Mosqueteiros Group to mobilize the population.
- **ABAAE** (Blue Flag Association of Europe): Partner in the "**Geração Depositário**" project, reaching thousands of children and young people through the Eco-Schools Program.
- **APED** (Portuguese Association of Distribution Companies): Although more closely linked to the business sector, it conducts public awareness campaigns, promoting collection and recycling points for end consumers.
- **Ambisousa**: Conducts local awareness campaigns about WEEE (Waste Electrical and Electronic Equipment), for example, in Vale do Sousa.
- **Maiambiente**: Develops general environmental awareness initiatives, including the proper management of electrical waste.

All these entities organize campaigns that reach schools, communities, companies, and the general public, promoting the proper disposal and recycling of electrical and electronic waste, emphasizing the importance of environmental education and the circular economy in Portugal.

- **Drop-off Points:** The number of collection points for e-waste has increased across the country, making it easier for citizens to recycle their old electronics.

Comparison to European Standards

Portugal, like all EU member states, is subject to the EU's WEEE Directive, which sets targets for the collection and proper treatment of WEEE. However, Portugal's performance in this area lags behind the EU average and targets.

Portugal's Performance in Context

Portugal's WEEE collection rate was 26% in 2022, significantly below the EU average of 40.1% and far from the 65% target set by the WEEE Directive.

While the EU average for WEEE collected per inhabitant was **11.2 kg** in 2022, Portugal collected less than half of this amount, with figures around **5.4 kg** per inhabitant.

There is no evidence of a significant increase in Portugal's WEEE collection rate in recent years, and the country remains among the lower performers in the EU for this waste stream.

Implications and Challenges

Portugal is not meeting the EU's WEEE collection targets, indicating challenges in the effectiveness of collection systems, public participation, or both.



Low collection rates mean more e-waste may be improperly disposed of, increasing environmental and health risks.

Underperformance in WEEE collection undermines Portugal's contribution to the circular economy and resource efficiency goals set by the EU.

Portugal's WEEE collection performance is substantially below the EU average and does not meet the targets established by EU legislation. The country collects less than half the e-waste per inhabitant compared to the EU average. This highlights a need for significant improvements in collection infrastructure, public awareness, and policy enforcement to align with European standards and environmental objectives.



1. Source: Portugal and Alentejo Region (Source: Alentejo Tourism Entity)

8.1.1. Methodology

To carry out this work, different documents and data produced by the official entities, scientific articles, and magazine articles were analyzed. National and European statistical data were analyzed (INE and EUROSTAT). Interviews and questionnaires with the main players involved in the issue were also considered. One Focus Group had been organized.





8.2. SITUATION OF THE WEEE POLICY

8.2.1. Legal Framework in Portugal

8.2.1.1 Recent Legislative Updates

Portugal has recently updated its national legal framework for the management of Waste Electrical and Electronic Equipment (WEEE) with the publication of Decree-Law No. 102-D/2020 (December 10), which amends Decree-Law No. 152-D/2017 (December 11) for the fourth time and unifies the regime for the management of specific waste streams under the principle of extended producer responsibility.

This transposes Directive No. 2012/19/EU and establishes measures to protect the environment and human health, focusing on preventing or reducing adverse impacts from waste production and management, decreasing overall resource use impacts, and contributing to sustainable development.

A Declaration of Rectification No. 3/2021 to Decree-Law No. 102-D/2020 was published on January 21, 2021.

Law No. 52/2021 (August 10) further amends Decree-Law No. 102-D/2020, approving the general waste management regime and new rules for landfill operation and specific waste streams. It transposes Directives EU 2018/849, 2018/850, 2018/851, and 2018/852.

8.2.1.2 Key Legal Instruments

Below is an overview of the main legislation relevant to WEEE management and regulation in Portugal:

- Decree-Law No. 152-D/2017 (December 11)

Establishes the legal framework for managing specific waste streams under the extended producer responsibility principle.

- Law No. 69/2018 (December 26)

Creates an incentive system for returning beverage packaging and updates waste management regulations.

- Law No. 41/2019 (June 21)

Removes deadlines for dismantling end-of-life vehicles in recycling centers.

- Decree-Law No. 86/2020 (October 14)

Transposes directives related to end-of-life vehicles and the restriction of hazardous substances in electronics.

- Decree-Law No. 102-D/2020 (December 10)

Approves a new general regime for waste management, landfill operations, and implements several EU directives.

- Law No. 52/2021 (August 10)

Amends the general waste management regime.





- Decree-Law No. 9/2021 (January 29)

Establishes the legal regime for administrative offenses related to waste management.

- Declaration of Rectification No. 3/2021 (January 21)

Updates aspects of the general waste management regime.

- Decree-Law No. 11/2023 (February 10)

Reforms and simplifies environmental licensing processes.

- Decree-Law No. 106/2023 (November 17)

Amends the legal framework for the classification and management of waste.

- Decree-Law No. 24/2024 (March 26)

Introduces further regulations related to waste management.

Key Insights

- These updates align Portuguese law with updated European standards and national waste plans (PNGR 2030, PERSU 2030, PERNU 2030).
- Objectives include waste prevention, reduction, proper management, and strong support for the circular economy.

8.2.1.3 Extended Producer Responsibility (EPR)

The updated regulations reinforce the principle of extended producer responsibility for WEEE and other designated waste streams. Producers are financially responsible for the proper management of waste generated by their products—covering the entire life cycle, especially end-of-life disposal and recycling.

New RAP Regimes by 2025:

- Furniture, mattresses, and related waste: New regime operational by December 31, 2025.
- Self-care health waste (e.g., needles, syringes, diagnostic equipment): Management requirements equivalent to hospital waste.
- 2.1.4 Municipal and Licensing Responsibilities
 - Municipalities are tasked with ensuring the selective collection of designated waste and can enter into agreements to implement collection networks.
 - Selective collection is mandatory for waste not covered by the public service reserve.
 - Waste management licenses are issued by the APA (Portuguese Environmental Agency) and DGAE (General Directorate of Economic Activities), now valid for up to ten years.
- 2.1.5 Financial and Stakeholder Management
 - Producers must bear the necessary costs to achieve waste management targets. Cost-sharing is only permitted to ensure viability.
 - Avoidance of cross-subsidization between different waste streams is mandated.





- Stakeholder consultation included regional governments, municipal associations, competition and data protection authorities, and waste management actors.

8.2.1.4 Recent Changes and Key Areas

Area	Main Change
Waste Management Regimes	Updated RGGR, landfill, and specific waste stream regimes
RAP Regimes	New RAP for furniture/mattresses and self-care health waste
Waste Prevention	Stricter objectives and alignment with EU and national plans
Used Oil Management	New containment and storage requirements
Licensing	Licenses now valid up to 10 years, new registration obligations
Financial Management	Clearer cost allocation, avoidance of cross-subsidization
Municipal Collection	Mandatory selective collection, expanded municipal roles
Packaging Waste	Temporary change for industrial/professional packaging (2024 only)

8.2.1.5 European Directive EU 2024/884 – WEEE Amendments

- This directive amends financial obligations for WEEE, particularly for photovoltaic panels and newly included electronic equipment.
- No retroactive financial obligations for producers on products placed before the scope or dates in question.
- Marking and traceability requirements updated to match EN 50419:2022.
- Portugal must transpose the directive into national law by October 9, 2025.

8.2.1.6 Responsibilities & Implementation

- The **APA (Portuguese Environmental Agency)** manages WEEE policy and oversees the transposition and implementation of EU Directives.
- Producers' financial responsibility applies only to products placed on the market after set dates, as clarified in recent legislation.

8.2.2. Waste Management Plan(s)

In Portugal, the fundamental guidelines of waste policy are provided by the following instruments (taking in account WEEE):

- **National Waste Management Plan** (PNGR);





- **Strategic Plan for Urban Waste** (PERSU);

- **Municipal, intermunicipal, and Multi municipal action plans** (PAPERU).

The plans are developed in planning cycles (preparation, implementation, evaluation, revision) that incorporate a public participation process aimed at actively involving key stakeholders and the public.

In 2020, public consultations were launched regarding the ongoing preparation of the PNGR, PERSU, and PERNU for the horizon of 2030.

In 2022, the proposed plans were put out for public consultation, with the PERSU and PERNU including their respective Environmental Assessments.

The PNGR 2030 and PERSU 2030 were published in March 2023.

The preparation and implementation of these plans, including their monitoring, is the responsibility of the APA (Portuguese Environment Agency), with approval granted by a resolution of the Council of Ministers, after hearing from the entities that make up the Waste Management Monitoring Commission (CAGER) for the PNGR and PERNU, and the National Association of Portuguese Municipalities for the PERSU.

Considering the REEE the most important plans are **PNGR 2030** and **PERSU 2030**. There are also **some municipalities that have a Local Action Plan for REEE** articulated with the PERSU 2030.

PNGR 2030

The National Waste Management Plan (PNGR 2030) ([Plano Nacional de Gestão de Resíduos](#))¹ outlines the strategies and targets for waste management in the country, aligning with European Union directives on waste and recycling.

These plans typically include initiatives for reducing landfill use, increasing recycling rates, and improving waste treatment technologies. Additionally, local municipalities might also have their own specific waste management plans tailored to their regions.

The National Waste Management Plan (PNGR) of Portugal outlines the strategic framework for waste management in the country, with a particular focus on promoting sustainability, reducing waste generation, and enhancing recycling and recovery processes. Here's a summary of the key points of the plan, specifically regarding the management of Waste Electrical and Electronic Equipment (WEEE):

Overview of the National Waste Management Plan (PNGR) - Objectives:

- Promote the protection of the environment and public health.
- Ensure the sustainable management of resources.
- Encourage the circular economy model by minimizing waste generation and maximizing reuse and recycling.

WEEE Management Focus:

¹ APA – Portuguese Environment Agency





- **Extended Producer Responsibility (EPR):** Producers of electrical and electronic equipment are responsible for the entire lifecycle of their products, including end-of-life management.
- **Collection and Recycling Targets:** The PNGR establishes specific targets for the collection and recycling of WEEE in alignment with EU directives, aiming for increased recovery rates.
- **Public Awareness Campaigns:** The plan emphasizes the importance of educating the public about proper e-waste disposal and promoting established collection points.

Strategies for Improvement:

- **Strengthening Collection Systems:** Enhance the infrastructure for the collection and recycling of WEEE, including the establishment of more drop-off points and participation in producer take-back schemes.
- **Regulation and Compliance:** Ensure compliance with existing regulations governing WEEE management through better monitoring and enforcement mechanisms.
- **Data Management:** Implement robust systems for tracking and reporting the generation, collection, and recycling of WEEE to assess progress and identify areas for improvement.

Collaboration and Stakeholder Involvement:

- Encourage cooperation among government entities, industry stakeholders, NGOs, and the public to achieve waste management goals effectively.
- Involve local municipalities in implementing collection and recycling initiatives tailored to their communities.

Monitoring and Evaluation:

- Regularly evaluate the effectiveness of WEEE management strategies through key performance indicators.
- Adjust policies and strategies based on data collected and changing environmental and economic conditions.

The National Waste Management Plan of Portugal outlines a comprehensive approach to managing WEEE that fosters environmental protection, promotes circular economy principles, and enhances recycling efforts. By focusing on producer responsibility, collection improvements, public awareness, and stakeholder collaboration, the plan aims to address the challenges of e-waste effectively and sustainably.

Key WEEE-related Targets in PNGR 2030

While the PNGR 2030 sets broad waste prevention and recycling objectives, it specifically identifies WEEE as a priority waste stream for prevention, collection, and recycling. The main quantitative targets and strategic directions relevant to WEEE are:

Preparation for Reuse and Recycling Rate:

- 55% by 2025
- 60% by 2030





These percentages refer to the overall preparation for reuse and recycling of municipal waste, which includes WEEE as a critical component.

Reduction in Landfilling:

- Maximum 10% of municipal waste to landfill by 2035

This target indirectly impacts WEEE, as increased recycling and recovery rates should reduce the amount of e-waste sent to landfill.

Waste Generation Reduction:

- Reduce total waste generation to 85.6% of the amount generated in 2018 by 2030
- Reduce hazardous waste share in total waste from 7.0% (2018) to 4.4% (2030)

WEEE, often containing hazardous substances, is included in these prevention and reduction efforts.

Alignment with EU Directives:

- The plan explicitly aligns with the revised EU Waste Framework Directive and the WEEE Directive, which require Portugal to collect at least 65% of the average weight of EEE placed on the market in the three preceding years, or 85% of WEEE generated.

These specific collection targets are reflected in national policy, but the PNGR 2030 document highlights the need to reinforce collection systems and public awareness to achieve them.

Strategic Measures

- Promotion of Separate Collection: Expansion and improvement of separate collection systems for WEEE, including public awareness campaigns and infrastructure investments.
- Circular Economy: Measures to promote repair, reuse, and recycling of WEEE, in line with circular economy principles.

Main PNGR 2030 Targets Relevant to WEEE

Target Area	2025 Target	2030 Target	2035 Target
Preparation for reuse/rec. (all waste)	55%	60%	—
Landfill share (all municipal waste)	—	—	10%
Waste generation (vs. 2018)	—	85.6%	—
Hazardous waste share (total)	—	4.4%	—





WEEE collection (EU Directive)	65% of EEE placed on market or 85% of WEEE generated (annual)	—	—
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Portugal's PNGR 2030 sets ambitious targets for waste management, including for WEEE. The plan aims for at least 60% preparation for reuse and recycling by 2030, a significant reduction in waste to landfill, and full alignment with EU WEEE collection requirements. Achieving these goals will require continued investment in collection systems, public engagement, and circular economy initiatives.

PERSU 2030

The Strategic Plan for Urban Waste (PERSU) in Portugal focuses on managing urban waste effectively and sustainably, with a particular emphasis on encouraging recycling and the responsible disposal of a variety of waste types, including Waste Electrical and Electronic Equipment (WEEE). Below is a summary of the key aspects of PERSU, specifically considering the management of WEEE:

Summary of the Strategic Plan for Urban Waste (PERSU) - Objectives:

- Promote the prevention and reduction of waste generation.
- Enhance recycling rates and recovery of materials, particularly for WEEE.
- Support the transition towards a circular economy.

WEEE Management Integration:

- Extended Producer Responsibility (EPR): PERSU reinforces the accountability of producers for the entire lifecycle of their electrical and electronic products, including their end-of-life disposal and recycling.
- Collection Targets: The plan sets specific collection targets for WEEE to ensure adequate recovery and recycling in alignment with EU standards, aiming to increase the amount of e-waste diverted from landfills.

Action Plans:

- Improving Collection Systems: Development of accessible collection points for e-waste and encouraging the use of deposit and return schemes to facilitate consumer participation.
- Public Awareness Campaigns: Initiatives to inform and educate citizens on the importance of recycling e-waste and proper disposal practices.

Monitoring and Evaluation:

Regular assessment of performance against established recycling and recovery targets for WEEE, allowing for adjustments and improvements in strategies.

Collaboration and Stakeholder Engagement:

Encouragement of partnerships between municipalities, waste management authorities, the private sector, and civil society to enhance the effectiveness of WEEE management.



**Legislative Alignment:**

PERSU operates in compliance with relevant EU directives and national regulations regarding the management of WEEE, ensuring that Portugal meets its legal obligations.

The PERSU is a comprehensive framework that aims to manage urban waste responsibly, with significant attention to Waste Electrical and Electronic Equipment (WEEE). By promoting recycling, improving collection systems, and implementing producer responsibility, the plan seeks to minimize the environmental impact of e-waste while fostering sustainable practices that contribute to a circular economy. Through ongoing monitoring and public engagement, PERSU aims to effectively enhance WEEE management in Portugal.

PAPERSU

The General Waste Management Regime (GWMR) stipulates that **municipal, intermunicipal, and multimunicipal action plans** (PAPERSU) are to be prepared by the managing entities of municipal and multimunicipal systems, in coordination with the national waste management plans (PERSU 2030), with the aim of implementing actions to comply with the national strategy for the respective geographical area.

The publication of PERSU 2030 established an 8-month deadline, following its publication, for the submission of PAPERSU, both for Urban Waste Management Systems (SGRU) and for municipalities, ensuring that both strategies are properly aligned with each other to clearly identify the path to achieving community targets.

The **PAPERSU should include information** such as:

- The trajectory associated with meeting the interim goals set by the APA, I.P. (goals for selective collection and treatment at the source of organic waste, as well as selective collection of multi-material);
- Necessary investments to meet these targets, with a forecast of required investments to be secured.
- A comparative assessment, prior to the choice of the collection model and treatment process to be implemented, aimed at demonstrating the effectiveness and efficiency of the chosen solution for the management of each waste fraction.

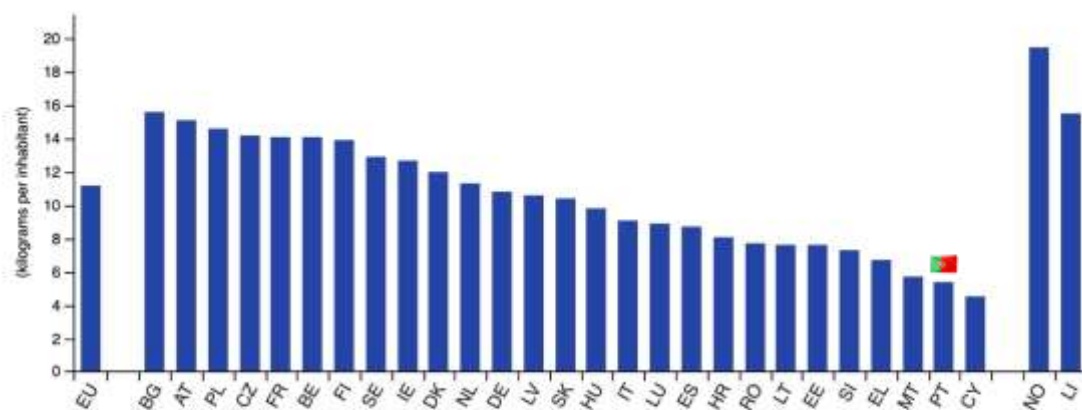
The GWMR also establishes that the structure and guidelines for the plans to be developed are defined jointly between ANR and ERSAR.

Thus, a structure is provided for the preparation of PAPERSU, which consists of a guiding document for creating a descriptive memory and a file where quantitative information necessary for meeting its targets should be reported.

8.2.3. Rates and figures related to the country and region

Portugal has a long way to go and a lot of hard work to do to get closer to the European average in terms of WEEE collection. As you can see in the figure below, Portugal is well below the European average (**11,2kg/inhabitant**), being one of the countries that collects the least e-waste per inhabitant (**5,4Kg/inhabitant**).





EU: Eurostat estimates

Romania, Sweden: 2021 data.

Source: Eurostat (online data code: env_wasteec)

eurostat

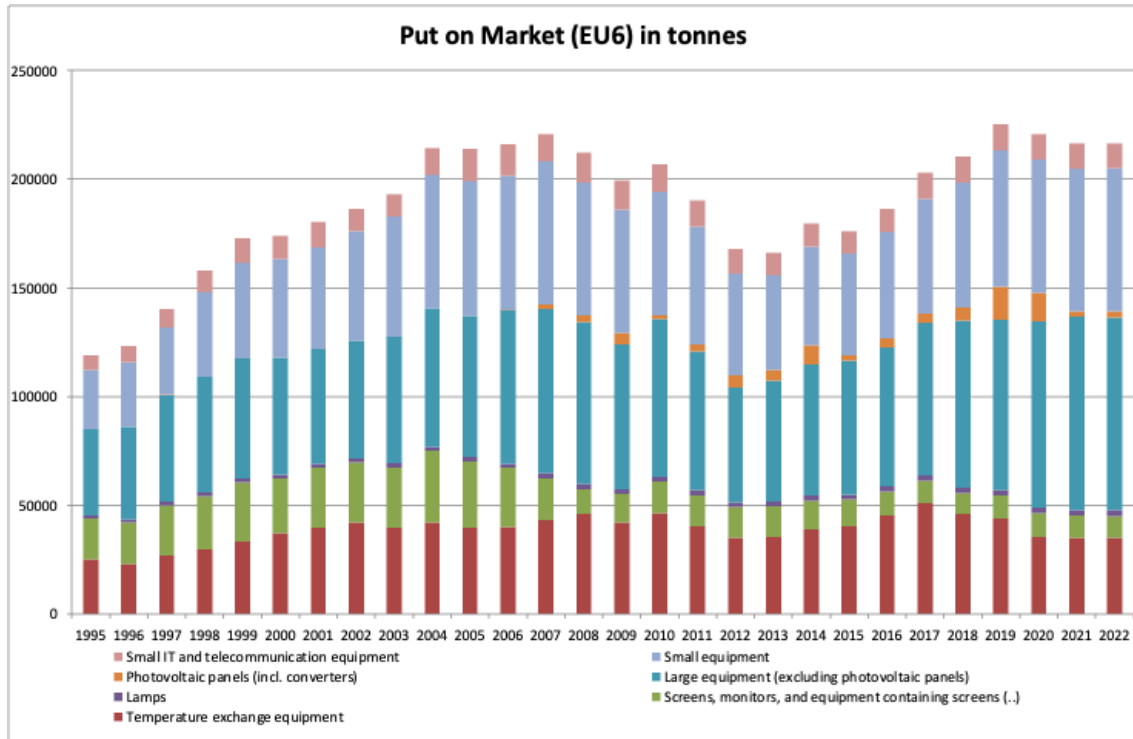
2. Waste electrical and electronic equipment collected, 2022(Kg/inhabitant) (Source: Eurostat, 2023)

"Portugal calculates the weight of EEE placed on the market based on the information provided by producers of EEE or their authorized representatives. For data reported in 2017 regarding EEE placed on the market, there was a change in the entity responsible for receiving the data. Until 2016, data which was reported against the national register was managed by ANREEE (National Association for Registration of Electrical and Electronic Equipment). In the beginning of 2018, with effects regarding the 2017 data, the national register was taken over by APA (Environmental Protection Agency). During this change the registry which was previously managed by a private entity is now managed by a public entity. Producers are required to inform the national register APA on the number of EEE (by category) placed on the market and their respective weight. Portugal states that some free riders continue to exist on the market, although it is assumed that they can mainly be associated with small companies; they thus represent a small market share in terms of weight of the EEE placed on the market. Data on WEEE contains data from the national collective schemes (by category) and WEEE that is not assigned to the collective schemes although it is collected by the waste treatment operators belonging to the collective schemes network. Also, WEEE collected by other waste treatment operators outside the collective schemes and WEEE exported to foreigner waste treatment operators is included. Data on WEEE treatment stems from the reporting obligations of collective schemes, waste treatment operators, WEEE producers, quantities of WEEE sent for treatment outside the country and information on shipments of WEEE. WEEE which is exported for treatment outside Portugal and outside the European Union is not considered for the calculation of the recovery rates and the reuse and recycling rates if there is no evidence that the treatment took place in conditions that are equivalent to the requirements of the Directive. From the reference year 2016 onwards, Portugal does not have separate information for 'collection from private households' and for 'collected other than from private households. Until 2018 Portugal states that no distinctive information on the treatment of photovoltaic panels is available. Therefore, this category is reported under the total value of category 4 (large equipment). Please refer to general note (10) for further information. Between 2018 and 2019 a significant drop in the collection and treatment of WEEE can be observed. The reason is a change in the legislation that requires reporting only the separately collected WEEE. Substantiated estimates: In 2019, Portugal only accounted for the

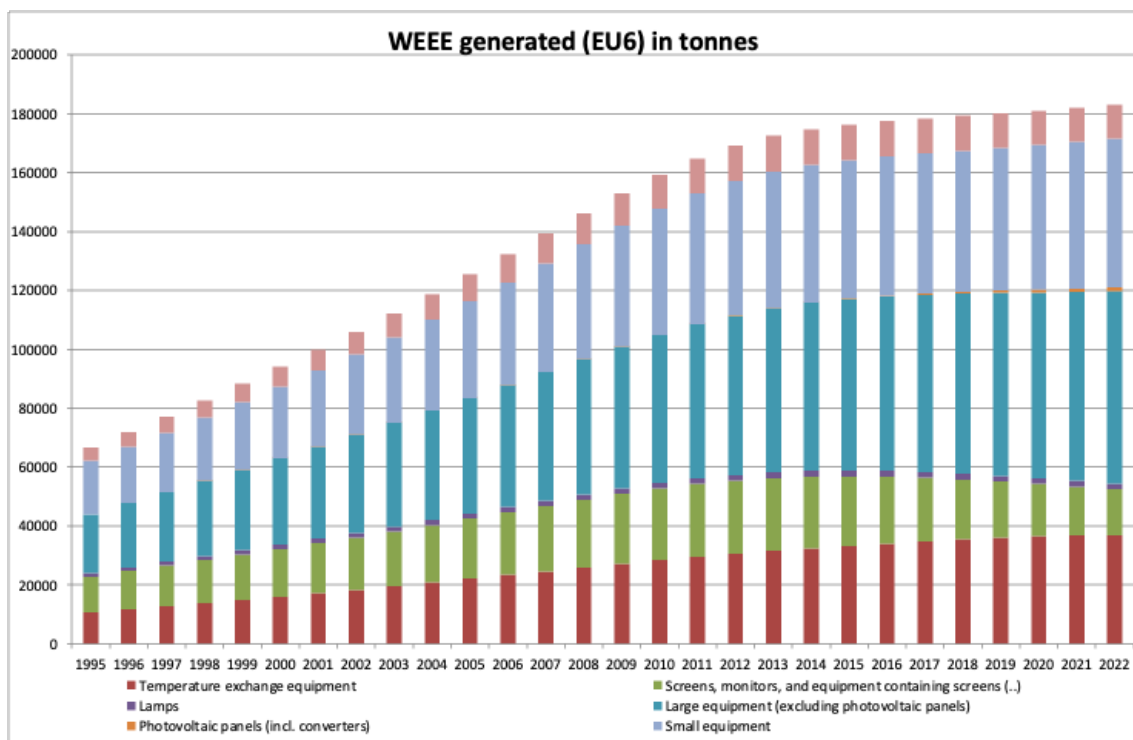


quantities separately collected. The quantities of WEEE collected with other types of Waste are no longer accounted for in the calculation of the collection target" (EUROSTAT, 2023).

Looking for the Fig.3 and Fig.4 below we can see the evolution of the EEE put on Market in Portugal (Fig.3) and the REEE generated (Fig.4) between 1995 and 2022.



3. EEE put on Market in tonnes in Portugal (1995 – 2022) (Source: INE, 2023)



4. REEE generated in tonnes in Portugal (1995 – 2022) (Source: INE, 2023)



As we can see the WEEE generated had been also grew over time, with only a small drop during the years of the financial crisis in Portugal (2011-2013).

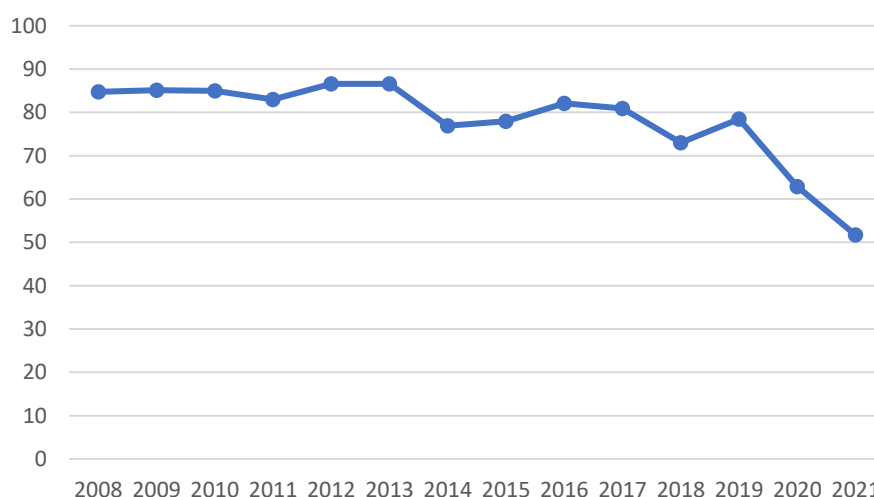
The International and European trend is to observe a continuous growing of the EEE put on market and consequentially the growing of the REEE generated and is obviously the same for Portugal.

If we look only for Portugal and NUTS III, we can see that the proportion of selectively collected municipal waste (Fig.5) is 24% and for Alentejo region is 19%. Alentejo and the Centro regions are the worst in this field.

Proportion of selectively collected municipal waste (%) by geographical localisation (NUTS - 2013)	
Geographical location	%
Portugal	24
Continente	24
Norte	21
Centro	18
Área Metropolitana de Lisboa	32
Alentejo	19
Algarve	33
Região Autónoma dos Açores	33
Região Autónoma da Madeira	22

5. Proportion of selectively collected municipal waste (%) by geographical localization (Source: INE, 2023)

If we observe the Recycling rate of separately collected waste electrical and electronic equipment (WEEE) in Portugal between 2008 and 2021, the figures are not very encouraging as they have been falling, even if we consider the years of the COVID-19 pandemic. We must wait to see the numbers in the next years to see if we can confirm that the trend is reversing.



6. Recycling rate of separately collected waste electrical and electronic equipment (WEEE) % (INE, 2024)

We can look now for the Municipal waste collected (in tonnes) by Geographical localization (NUTS - 2013) and Type of recyclable material (Fig.7), taking in account only the REEE. We can see that the



percentage of WEEE collected in relation to all the waste collected selectively is very small indeed, being 1,17% for the country as a whole and 1,40% for the Alentejo region.

Municipal waste collected (t) by Geographical localisation (NUTS - 2013) and Type of recyclable material			
Geographical location	2023		
	Type of recyclable material		
	Total t	WEEE t	% of weee
Portugal	1087135	12706	1,17
Continente	1020764	11454	1,12
Norte	307786	2793	0,91
Centro	143379	2807	1,96
Área Metropolitana de Lisboa	428900	4203	0,98
Alentejo	62772	877	1,40
Algarve	77927	775	0,99
Região Autónoma dos Açores	45524	886	1,95
Região Autónoma da Madeira	20848	366	1,76

7. Municipal waste collected (t) by Geographical localization (NUTS - 2013) and Type of recyclable material (INE, 2023)

If we look closely at the Alentejo region and the municipalities that make it up, we can see that there are several municipalities that do not have WEEE collection figures, even though all the municipalities have certified and identified WEEE collection sites (<https://sniamb.apambiente.pt/recolhareee>).

As can be observed in the Fig. 8: Municipal waste collected (t) by Geographical location (NUTS - 2024) and Type of recyclable material, 17 municipalities didn't collected REEE in 2023. All this municipalities have collection site certificated in their territory, what makes we put the question: what is happening in these municipalities that has led to this situation? We know that all this thematic, the regulation, and the investments are very new in Portugal and in Alentejo region, but we should pay attention to this phenomenon.



Geographical location	Type of recyclable material		
	Total	REEE	
	t	t	%
Portugal	1087135	12706	1,17
Alentejo	46877	499	1,06
Alentejo Litoral	7242	163	2,25
Alcácer do Sal	584	43	7,36
Grândola	2031	23	1,13
Odemira	1958	55	2,81
Santiago do Cacém	1637	25	1,53
Sines	1032	16	1,55
Baixo Alentejo	13463	205	1,52
Aljustrel	642	26	4,05
Almodôvar	497	10	2,01
Alvito	208	2	0,96
Barrancos	220	7	3,18
Beja	4884	29	0,59
Castro Verde	829	13	1,57
Cuba	372	17	4,57
Ferreira do Alentejo	278	18	6,47
Mértola	614	2	0,33
Moura	1689	12	0,71
Ourique	654	19	2,91
Serpa	1959	17	0,87
Vidigueira	617	34	5,51
Alto Alentejo	9876	38	0,38
Alter do Chão	477	0	0,00
Arronches	208	0	0,00
Avis	434	0	0,00
Campo Maior	973	7	0,72
Castelo de Vide	262	7	2,67
Crato	389	0	0,00
Elvas	1577	0	0,00
Fronteira	508	0	0,00
Gavião	243	9	3,70
Marvão	257	0	0,00
Monforte	342	0	0,00
Nisa	502	0	0,00
Ponte de Sor	1084	0	0,00
Portalegre	2269	13	0,57
Sousel	350	0	0,00
Alentejo Central	16296	93	0,57
Alandroal	295	0	0,00
Arraiolos	843	0	0,00
Borba	484	4	0,83
Estremoz	1145	4	0,35
Évora	5770	11	0,19
Montemor-o-Novo	1203	6	0,50
Mora	294	0	0,00
Mourão	152	0	0,00
Portel	516	37	7,17
Redondo	2177	0	0,00
Reguengos de Monsaraz	867	6	0,69
Vendas Novas	1786	1	0,06
Viana do Alentejo	443	23	5,19
Vila Viçosa	321	0	0,00

8. Municipal waste collected (t) by Geographical location (NUTS - 2024) and Type of recyclable material (INE, 2024)

8.2.4. Regional status: Improvements and challenges



The legislation is up to date and in line with the EU, but in terms of implementation and results achieved it is still a long way off. It is important to act at various levels to achieve the defined objectives and considerably improve the situation. The major challenges are to involve everyone in the process: citizens, local authorities, intermunicipal communities and the national government so that there is mutual harmony and reinforcement in implementing an effective and efficient model.

We should focus on local action plans, at municipal level, and encourage investment in infrastructure and equipment to support collection, the implementation of collection models (community and door-to-door) and a major focus on raising awareness / educating the population to encourage the selective collection of WEEE. It will also be important to evaluate the possibility of creating compensation mechanisms for the delivery of certain types of equipment.



8.2.5. Collection network in Portugal

In Portugal, the collection and management of electronic waste (e-waste) are governed by regulations that align with European Union directives on waste electrical and electronic equipment (WEEE). The country has established a network for the collection and recycling of e-waste to facilitate the proper disposal of electronic products.

Key aspects of the **e-waste collection network in Portugal** include:

Collection Points: There are designated collection points throughout the country where consumers can drop off their e-waste. These can be found at local waste management facilities or specific collection centers (<https://sniamb.apambiente.pt/recolhareee>).

Reverse Logistics: Retailers selling electronic products are required to take back old devices when a new product is purchased, as part of the WEEE directive. This helps ensure that consumers have a convenient method for disposing of e-waste.

Awareness Campaigns: The Portuguese government and various organizations run awareness campaigns to educate the public about the importance of recycling e-waste and the available collection options. Some current and ongoing campaigns in Portugal in 2025 regarding the recycling of electrical and electronic waste (WEEE) include:

- **Quartel Electrão:** Electrão's campaign ongoing until November 2025 involving firefighter corporations collecting WEEE from the population.
- **Geração Depositário:** A project in partnership with ABAE, active in 2024-2025, involving schools nationwide to collect electrical and electronic waste encouraging students and teachers.
- **"Transforma Tudo em TUMO"** Campaign: A partnership between ERP Portugal and the Worten chain, active until October 2025, encouraging consumers to bring used appliances to Worten stores, with discounts and social support linked.





- **European Week for Waste Reduction (EWWR) 2025:** Taking place in November with electronic waste as the central theme, involving various Portuguese entities as local partners promoting reduction, reuse, and recycling actions.
- **Reciclar dá Sorrisos:** Campaign by Samsung Portugal in partnership with Electrão for collection and social support, still active in 2025.
- **Free door-to-door collection of large appliances:** A service by Electrão that has grown in 2025 and is active in various regions (mostly around Lisbon), facilitating the safe recycling of these appliances.

Recolha Porta-a-Porta

Estejam na cozinha ou na garagem, o Electrão leva-os para reciclagem.



Recycling and Treatment: Collected e-waste is processed and treated by licensed facilities that separate recyclable materials from hazardous substances, ensuring that dangerous materials are properly handled.

Extended Producer Responsibility (EPR): Producers of electronic goods are responsible for financing the collection and treatment of e-waste, encouraging them to design products with recycling in mind.

8.2.6. Collection and processing of WEEE in Portugal

Waste Electrical and Electronic Equipment (WEEE) collection and processing in Portugal follows European Union directives aimed at promoting the recycling and proper disposal of electronic waste. Here are some key points regarding WEEE management in Portugal:

Collection

Collection Points: Portugal has a network of collection points, including recycling centers ([Ecocentros](#)) and designated drop-off locations where citizens can safely dispose of their electronic waste.

Mobile Collection: The country often organizes mobile collection campaigns to reach remote areas, enhancing accessibility for residents. The mobile collection campaigns currently active in Portugal are:

LIPOR Mobile Drop-off Site

Objective: To increase accessibility to waste recycling, including electrical and electronic waste (WEEE), by reaching residents in smaller towns and remote areas.





Activities: A mobile recycling unit visits various municipalities, setting up temporary collection points where local residents can bring household recyclable waste. The unit collects and manages large volumes of waste materials.

Locations: 41 locations across municipalities associated with LIPOR in northern Portugal.

Period: Active throughout 2025, with regular visits to predefined municipalities in the first half of the year and ongoing planning for the remainder of the year.

Electrão Mobile Collection Campaigns (<https://electrao.pt/equipamentos-electricos/pt/recursos/campanhas>)

Objective: To facilitate WEEE collection and promote recycling awareness among the public, especially in hard-to-reach areas.

Activities: Mobile collection units operate temporarily in various regions, organizing WEEE collection drives often connected to local events, schools, and community gatherings. The campaign also includes sensitization actions to educate and motivate population participation.

Locations: Multiple regions across Portugal, adapting locations periodically based on logistics and demand.

Period: Continuous campaign active in 2025, including the "Quartel Electrão" campaign which runs until November 2025.

ERP Portugal Mobile Collection Initiatives

Objective: Complement fixed collection points and door-to-door services by reaching underserved or rural areas for proper WEEE disposal.

Activities: Temporary collection points established by mobile units sometimes in partnership with local municipalities or during community events, aiming to boost collection volumes and citizen engagement.

Locations: Various rural and urban localities across Portugal, adjusted per campaign planning.

Period: Ongoing campaign throughout 2025.

All campaigns aim to expand the coverage and convenience of WEEE recycling services, reduce illegal dumping, and increase community awareness and participation in circular economy practices.

"Unidade Especial de Recolha de Resíduos Perigosos" (UER2P) campaign by Gesamb:

Objective: To provide a safe, free, and accessible service for the collection of hazardous household waste, including electrical and electronic waste (WEEE) containing harmful substances. The aim is to prevent environmental contamination and promote responsible hazardous waste management.

Activities: Mobile collection units operate on scheduled itineraries, staying between 5 and 21 days in each municipality. Residents can bring small quantities of hazardous waste items such as small electronics, batteries, cables, lamps, aerosol cans, and other WEEE components. The collected waste is then properly transported and treated following environmental standards.





Locations: The campaign operates itinerantly across multiple municipalities in the district of Évora and surrounding areas in Alentejo, including Évora, Mourão, Reguengos de Monsaraz, Alandroal, Redondo, Vila Viçosa, Borba, Estremoz, Arraiolos, Mora, Montemor-o-Novo, Vendas Novas, among others.

Period: The campaign runs from November 2024 through mid-2025, with the mobile units visiting each municipality for several consecutive days as per the defined schedule.

UER2P represents a key step towards increasing the reach and effectiveness of hazardous waste collection in the Alentejo region, contributing actively to environmental protection and public health.

Processing

Recycling Facilities: WEEE is processed in specialized facilities where it undergoes mechanical separation and recycling to recover valuable materials like metals, plastics, and glass.

Treatment Standard: Processing must comply with European standards, ensuring that hazardous components are dealt with correctly, minimizing environmental impact.

Recovery Rates: Portugal aims to meet EU targets for WEEE recovery and recycling, which have been established under the WEEE Directive (2012/19/EU). This includes recycling a minimum of 65% of the weight of WEEE collected.

There is a national network of WEEE disposal sites in every municipality. Any such waste will be stored for a short period of time, without any kind of treatment or dismantling, after which it will be sent for recovery, in accordance with the requirements of the legislation in force.

The **Urban Waste Management System (UWMS)** is the structure of human resources, logistics, equipment, and infrastructure established to carry out operations related to the management of Urban Waste (UW) where is included the REEE.

For the integrated management of UW and the pursuit of priorities defined in legislation, two types of entities were provided: municipalities or associations of municipalities, where the management





of the system can be contracted to any company, and multimunicipal entities, whose systems are managed by concessionary companies.

There are **23 UWMS covering the entire continental territory**, of which 12 are Multimunicipal (operated by companies controlled by Environment Global Facilities - EGF) and 11 Intermunicipal (see list below). Each of these systems has infrastructure to ensure an appropriate final disposal for the UW produced in their respective areas.

The specific targets for each Waste Management System and the measures to be implemented within the framework of urban waste management are established in the **PERSU** and associated documents. The monitoring of UWMS activities is carried out annually in the Annual Urban Waste Report.

Northern Region

Multimunicipal: Valorminho, Resulima, Resinorte, Suldouro, Braval

Intermunicipal: Ambisousa, Lipor, Resíduos do Nordeste

Central Region

Multimunicipal: Valorlis, Ersuc, Resiestrela, Valnor

Intermunicipal: Ecobeirão

LVT (Lisbon) Region

Multimunicipal: Valorsul, Amarsul

Intermunicipal: Resitejo, Ecolezíria, Tratolixo

Alentejo Region

Intermunicipal: Ambital, Gesamb, Resialentejo, Amcal, Valnor

Algarve Region

Multimunicipal: Algar



8.3. ACTORS INVOLVED IN THE POLICY INSTRUMENT

8.3.1. Main actors in the policy

The **Portuguese Environment Agency (APA)** is the state agency whose mission is the integrated management of environmental and sustainability policies.

They work in conjunction both with other sectoral policies and with a wide range of partners, including municipalities and the Plan and Autonomous Regions of the Azores and Madeira.

They work on issues such as Climate Change, Water and the Coast - in this case with deconcentrated management in the 5 hydrographic regions of mainland Portugal - as well as **Waste**, Air, Noise, Radiological Emergencies, Environmental Impact Assessment, Circular Economy and Environmental Education.

The **APA** is responsible for monitoring, planning and evaluation, licensing and inspection, and is therefore the main environmental regulator in Portugal.



The legislation regulating the flow of WEEE (Waste Electrical and Electronic Equipment) is based on the principle of extended producer responsibility, assigning the producer of EEE the responsibility for managing the waste when it reaches the end of its life. This responsibility can be assumed individually or transferred to an integrated system. The implementation of the measures and actions established in national legislation was carried out through the licensing, in April 2006, of the following managing **entities for collective WEEE management systems**:

- **Electrão** Management Entity (<https://electrao.pt/>)
- Management Entity **ERP Portugal** (<https://erp-recycling.org/pt-pt/>)
- **E-CYCLE** Management Entity – LOOSE IS LICENCE ON 31/12/2023.

Electrão

WEEE Collected	27693
Target	83963
Result	- 56270

ERP Portugal

WEEE Collected	18026
Target	58129
Result	- 40103

e-Cycle

WEEE Collected	1264
Target	7149
Result	- 5900

9. Results on the WEEE collected in 2023 per Management Entities (APA, 2024)

All the 3 entities fell far short of achieving their goals.

8.4. THE WEEE INDUSTRIAL AND ENVIRONMENTAL IMPACT

8.4.1. The WEEE environmental impact

If not properly treated, WEEE is harmful to the environment, as it often contains complex combinations of toxic substances. The proper treatment of WEEE can have significant economic benefits, as well as reducing the demand for raw materials, particularly regarding critical materials.

However, there have been difficulties in recovering these products when they reach the end of their life. The crisis in raw materials on the international market may be exacerbating the phenomenon of diversion of this equipment, and the problem of the supply of materials, which began to be felt during the height of the pandemic, but intensified after Russia invaded Ukraine, given that these two countries are major suppliers of raw materials, including metals. Some of the materials that make up EEE, such as aluminium or copper, are valuable and are increasingly sought





after in informal circuits, which is why the parallel market is also growing. However, WEEE also contains components that are considered hazardous, which, when diverted from recycling centers that guarantee their decontamination, could be processes that do not safeguard the protection of human health and the environment.

The environmental impact of the vandalization of refrigeration equipment diverted to the parallel circuit, is mainly the uncontrolled release into the atmosphere of dozens of tonnes of polluting gases into the atmosphere.

As a result of the **National WEEE Supervision Campaign** (APA, 2024), it is important to act energetically and decisively, innovating in terms of models for collecting this waste by investing in strong consumer awareness, which could include incentives for delivery. Similarly intensified monitoring and inspection and reinforcement of the appropriate penal framework for offenders, by the competent authorities.

8.4.2. The WEEE industrial sector

The WEEE (Waste Electrical and Electronic Equipment) industrial sector in Portugal, particularly in the Alentejo region, encompasses various activities related to the collection, recycling, and proper disposal of electronic waste. Here are some key points regarding this sector:

Regulatory Framework: The sector is governed by national legislation that aligns with the European Union's directives on waste management and extended producer responsibility (EPR). Producers are required to take responsibility for their products at the end of their life cycle.

Collection and Recycling Initiatives: Several initiatives and programs are in place in the Alentejo region to facilitate the collection and recycling of WEEE. This includes the establishment of collection points, public awareness campaigns, and partnerships with local municipalities and businesses (see some examples on page 31, 33 and 34).

Industry Players: The region hosts a variety of stakeholders, including approved producers, waste management companies, and recycling facilities. These entities play a crucial role in ensuring that WEEE is collected responsibly and recycled efficiently.

Environmental Impact: Proper management of WEEE is essential for minimizing environmental impact and promoting sustainable practices. Recycling electronic waste helps recover valuable materials, reduces landfill waste, and mitigates pollution risks.

Challenges: The sector faces challenges such as increasing e-waste generation, the need for public awareness about proper disposal methods, and the importance of collaboration among stakeholders to improve collection rates.

Prospects: With advancements in technology and increasing regulations, the sector is expected to grow, focusing on developing more efficient recycling processes and expanding the infrastructure necessary for effective WEEE management.

In summary, the WEEE industrial sector in Portugal and the Alentejo region is an essential component of sustainable waste management, promoting responsible practices and environmental protection through effective collection and recycling of electronic waste.





8.5. POTENTIAL SOLUTIONS TO BE ADOPTED

After a brief characterization of the EWASTE management system in Portugal and in the Alentejo region, we consider it important to consult the main stakeholders in the region to gather their input on three main questions:

- The current situation of electrical and electronic waste in the region is very far from the targets defined. What are the reasons behind it?
- What are the main challenges faced in the collection and treatment of WEEE?
- What are the potential solutions and how can the entities collaborate to improve the situation?

To consult the stakeholders, individual interviews were conducted, and a regional Focus Group was held.

The results of this auscultation, as well as the characterization of the management system in Portugal and in the Alentejo region, were used to draft this chapter 5 - POTENTIAL SOLUTIONS TO BE ADOPTED.

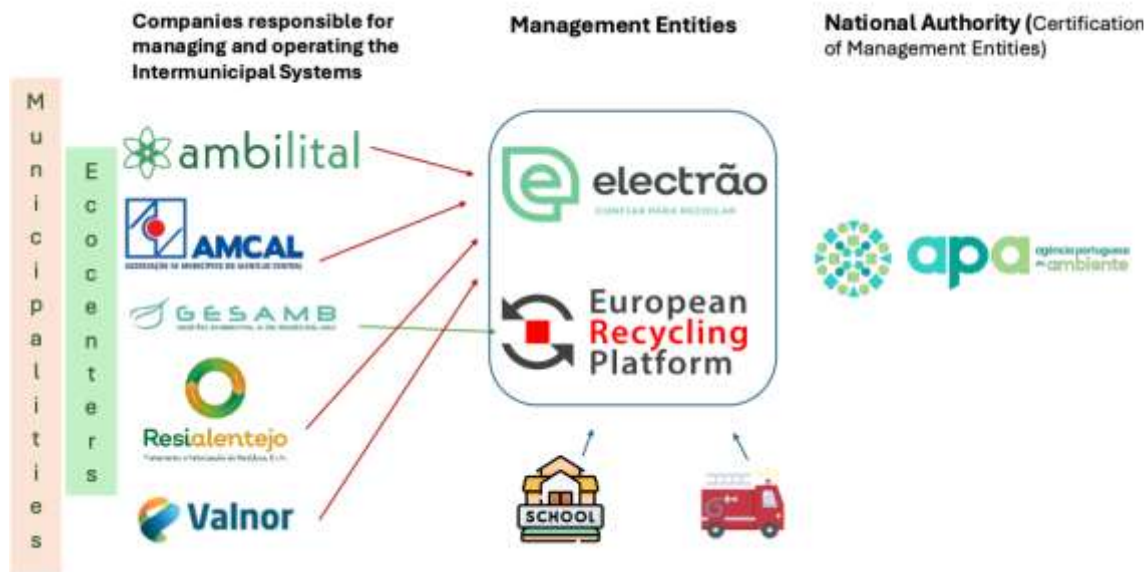
First, we tried to characterize the situation and better understand how the electrical and electronic waste collection and disposal system works in the Alentejo region.

The management of urban waste produced in the area of intervention of each of the management and operating entities is shared between the respective entity and the municipalities that comprise it. There are slight variations in the circuits and responsibilities of each, but there is always collaboration between the entities and the municipalities. In each intervention area (group of municipalities), there is a set of eco-centers spread across different locations where e-waste can be delivered by citizens and companies. Some of the entities mention that it will be necessary to rethink the location of some of these eco-centers, as they are too isolated and far from the locations where people live and businesses operate, making them difficult to access. Others suggested that there should be an eco-center in every parish.

All entities mentioned that the main problem in the collection and processing of electrical and electronic waste is the black market, i.e., the amount of waste that is diverted from the system because it has value and can be sold, either in parts or as a whole. There are even thefts at sites certified by the system for the collection of this waste. Many people dismantle appliances, for example, and sell their various components (e.g., copper, iron, etc.) to scrap dealers.

However, potential loopholes in management systems are not the only weakness in international and national collection. The lack of awareness among the population also contributes to the sharp increase in quantities of WEEE that are not treated or are processed in non-dedicated treatment facilities.





10. Alentejo Ecosystem in 2024 (Author)

Schools and different kind of non-profit and for public interest organizations can receive WEEE that will be directly collected by one of the tow Managements Entities.

This channel for the direct collection of electrical and electronic waste from schools and other public interest social solidarity entities ends up being seen as competition for intermunicipal companies responsible for managing the electrical and electronic waste collection system. This fact was mentioned by all the entities we spoke to and was even confirmed by one of the management entities. In addition to being competitors in e-waste collection, it was noted that these entities do not have the same obligations regarding the conditions of the space where they receive waste, which was considered unfair.

QUESTIONS	ANSWERS (resume)
The current situation of electrical and electronic waste in the region is very far from the targets defined. What are the reasons behind it?	▪ Deviations – Parallel market; ▪ Vandalism at collection points (theft of the most valuable materials); ▪ People dispose of waste in the general waste bin and in the yellow recycling bin (1/3 of WEEE is sorted from these two sources); ▪ There is no habit of using the Recycling Centre; ▪ The requirements at recycling centres are high and affect the results; ▪ There is no clear message for citizens; ▪ There is insufficient inspection;





	▪ The managing entities do not weigh at the collection site, but rather at their facilities, which may lead to reliability issues with the information;
What are the main challenges faced in the collection and treatment of WEEE?	▪ There is a parallel market that is not properly inspected; ▪ Managing entities collect directly from some social solidarity institutions (e.g., schools and fire departments) and compete with regional systems, so this situation needs clarification; ▪ Citizens' mentality; ▪ Lack of knowledge about what WEEE is and current legislation;
What are the potential solutions and how can the entities collaborate to improve the situation?	▪ Information and awareness campaigns that explain what WEEE is and the logistics of the collection process (preferably using TV and other wide-reaching media); ▪ Involve stores and shopkeepers in the campaigns; ▪ Encourage managing entities to invest more in the sector and particularly in communication; ▪ Avoid the multiplicity of entities involved and parallel circuits to minimize losses; ▪ Create a balance between the level of requirements for schools and fire departments on one hand and recycling centres on the other; ▪ Coordinate and complement the data presented by the entities, ensuring their reliability so they can effectively contribute to goal-setting and planning; ▪ The perspective of repair and reuse should always be present in potential waste management solutions, creating alternatives to disposal; ▪ Revive the culture of shared discussion among the entities involved for greater confrontation with realities and the search for joint and responsible solutions (recycling centres; municipalities; managing entities; national and regional authorities; security forces).

11. Synthesis of the interviews and focus group carried out (Author)





Portugal's low collection rates of electrical and electronic waste (WEEE) compared to the European average have been analyzed through focus groups, interviews, and extensive research into the local Alentejo ecosystem and national systems. The potential solutions proposed reflect a deep understanding of the underlying issues, which can be summarized as follows:

8.5.1. Reasons for Low WEEE Collection in Portugal

1. Parallel Market and Diversion of Waste:

A significant portion of WEEE is diverted into informal, parallel markets where valuable materials like copper and aluminum are extracted and sold illegally. This practice is encouraged by insufficient inspection and ineffective enforcement, undermining the formal collection system.

2. Vandalism and Theft at Collection Points:

Collection points, even certified ones, face theft and vandalism, especially of valuable components. This demotivates formal collection operators and reduces collection effectiveness.

3. Improper Disposal by Citizens:

Many citizens dispose of WEEE improperly, mixing it with general waste or recyclable waste bins. Approximately one-third of WEEE is found in these inappropriate waste streams, reflecting a lack of habit or knowledge about proper disposal routes.

4. Lack of Habit and Accessibility to Recycling Centers:

There is an evident absence of routine use of recycling centers by the public. Some recycling centers are seen as inaccessible due to their location, infrastructure, or operational conditions, leading to lower user engagement.

5. Lack of Clear and Coordinated Communication:

Public messaging about what constitutes WEEE, how and where to dispose of it properly, is unclear or insufficient. Without clear awareness campaigns using broad-reaching media such as television and involvement of retail stores, citizen participation remains low.

6. Multiple Collectors and Competing Systems:

The existence of various entities collecting WEEE, including direct collection by managing entities from schools or fire departments, has created competition within the system. There's also a perception of unfairness as some collectors have fewer obligations regarding site conditions, complicating coordination.

7. Insufficient Inspection and Data Reliability Issues:

Current inspections are inadequate, allowing leakage into parallel circuits. Furthermore, managing entities weigh collected WEEE at their own facilities rather than collection sites, leading to potential discrepancies and unreliable data that hamper accurate performance assessment.

8. Citizens' Mentality and Knowledge:

A general lack of awareness about WEEE legislation and the environmental and health risks of improper disposal affects the willingness of citizens to engage in proper disposal.





8.5.2. MEASURES TO IMPROVE WEEE MANAGEMENT IN PORTUGAL

The critical problems and opportunities for improvement can be divided into two areas, according to their impact on collection and treatment and recovery, as follows:

Collection

- Diversions into parallel circuits are the biggest threat to SIGREEE and the management of WEEE.
- Specialized WEEE collection channels need to be created.
- Awareness-raising campaigns are needed among WEEE holders.

Treatment and recovery

- There should be specific certification for treatment activities and WEEE that has been properly processed should be accounted for in the targets.
- Processing carried out by certified operators should be accounted for in the SIGREEE, regardless of the circuits they have taken over.
- Remuneration for the treatment of WEEE should consider the levels of service provision.

To respond to the set of critical problems, measures defined, if adopted, will lead to improvements in the results of the collection and treatment of WEEE and contribute to promoting SIGREEE as the preferred system, instead of parallel circuits.

8.5.3. MEASURES TO IMPROVE WEEE COLLECTION AND MANAGEMENT IN ALENTEJO

There are some initiatives that can be implemented and developed to improve WEEE collection and management in Alentejo region, that can be part of a future action plan:

Training and Awareness-raising

- Social media campaigns + door-to-door campaigns + local radios and newspapers campaigns.
- Work with schools (produce learning material; organizing sessions with children and young people of various ages; developing local projects with the involvement and initiative of young people, etc.).
- Organize events [REPAIR CAFÉS](#) and other similar initiatives at local level.



- Organize courses and workshops to teach to repair electric and electronic equipment's (for citizens in general).
- Organize training courses for workers in the municipalities and other institutions involved in the process of collecting WEEE.
- Disseminate examples of good practices of business with the utilization of WEEE. See the examples of:





- **TRASH4GOODS** – GAMIFICATION AND REWARDS - Created in January 2020 at Junitec, the Junior Enterprise of the Instituto Superior Técnico, and having been part of its internal acceleration programme, Trash4Goods aims to create a gamification system that allows WEEE to be collected by rewarding those who recycle. The simple solution, which integrates two components, a portable module and an application, and the team's vision of always trying to cover as much waste as possible, maximizing the impact on recycling
- **BYEWASTE** – APP TO CONNECT CITIZENS AND WASTE MANAGEMENT COMPANIES - This technological platform, in the form of an app, was created in Rotterdam, the Netherlands, and aims to increase the redirection and recycling of household electronic waste by connecting citizens and waste companies through convenient and simple door-to-door collection. To this end, the platform uses two tools – behavioral science and technology – which, on the one hand, promote the forwarding of WEEE among citizens through social incentives, discounts and environmental awareness and, on the other hand, allow waste companies to outline specific collection areas to minimize costs.
- Collaborate with Social Innovation Incubators in the region to stimulate social business with reuse/recycling of WEEE. See the examples of FEA – Social Innovation Center: <https://www.fea.pt/social/centro-de-inovacao-social> , and of the Social Innovation Incubator of Baixo Alentejo: <https://iisba.org/>.

Improve WEEE collection:

- Doorstep collection (create a model and a system to implement this where it doesn't exist).
- Compensation for e-waste exchange.
- Monitor and encourage producers to comply with the law and assume their responsibilities.

Improve infrastructures and get more and better equipment

Municipalities should take advantage of European Community funds to improve services, infrastructures and equipment's (Alentejo 2030; PRR; Fundo Ambiental: eeagrants, etc.). Many municipalities need help to develop the technical projects to access the funds (PACT could facilitate this?).

Stimulate knowledge and research

- Involve University of Évora, and Polytechnic Institute of Portalegre and Polytechnic Institute of Beja.
- Create competitions and prizes for work on the subject involving companies and other stakeholders.

One of the main challenges for the future (Short and medium term) is to collect and reuse/recycling of air condition equipment's and Solar Pannels equipment's, as the current investments in the region are enormous.





The country and the region should already get prepared for this. It is a challenge, but it can be also an opportunity to do business and create new companies in Alentejo.



9. THE EEE/WEEE ECONOMIC CONTEXT

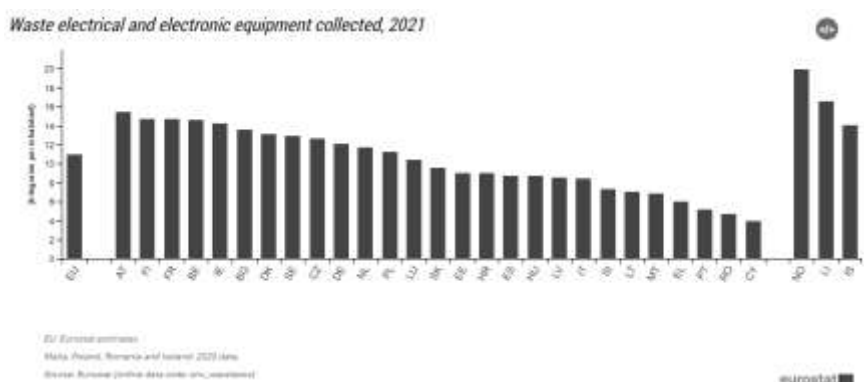
Annex V of the WEEE Directive outlines the minimum recovery targets that producers must meet, as stated in Article 11. These targets apply to all WEEE that is separately collected according to Article 5 and sent for treatment following Articles 8, 9, and 10. Annex V is divided into three parts, but only the third part is currently relevant, having been in effect since August 15, 2018. This part sets minimum recovery targets by category, based on the categories listed in Annex III of the Directive.

For example, WEEE in categories 1 or 4 must achieve an 85% recovery rate, with at least 80% prepared for reuse and recycling. Category 2 items require an 80% recovery rate, with 70% prepared for reuse and recycling. Categories 5 and 6 must reach 75% recovery and 55% reuse and recycling rates. For category 3, an 80% recycling target applies.

Looking at the broader picture, the volume of electrical and electronic equipment (EEE) placed on the EU market grew significantly over recent years, rising from 7.6 million tonnes in 2012 to a peak of 12.4 million tonnes in 2020. The lowest point during this period was 7.3 million tonnes in 2013. Overall, from 2012 to 2020, EEE placed on the market increased by over 60%.

At the same time, the total amount of WEEE collected increased from 3.0 million tonnes to 4.7 million tonnes, reflecting a 58% rise. The amount of WEEE treated also grew, from 3.1 to 4.6 million tonnes, a 49% increase. Meanwhile, recovered WEEE increased by over 65%, from 2.6 to 4.3 million tonnes, and the combined total of WEEE recycled and prepared for reuse rose by nearly 62%, from 2.4 to 3.9 million tonnes.

Overall, there has been a clear upward trend not only in the quantity of EEE entering the market but also in the collection, treatment, recovery, and recycling or reuse of WEEE during this period.



WEEE collected in 2021 (https://ec.europa.eu/eurostat/statistics-explained/index.php?title=Waste_statistics_-_electrical_and_electronic_equipment)

9.1. EEE/WEEE BUSINESS ENVIRONMENT AND EMPLOYMENT

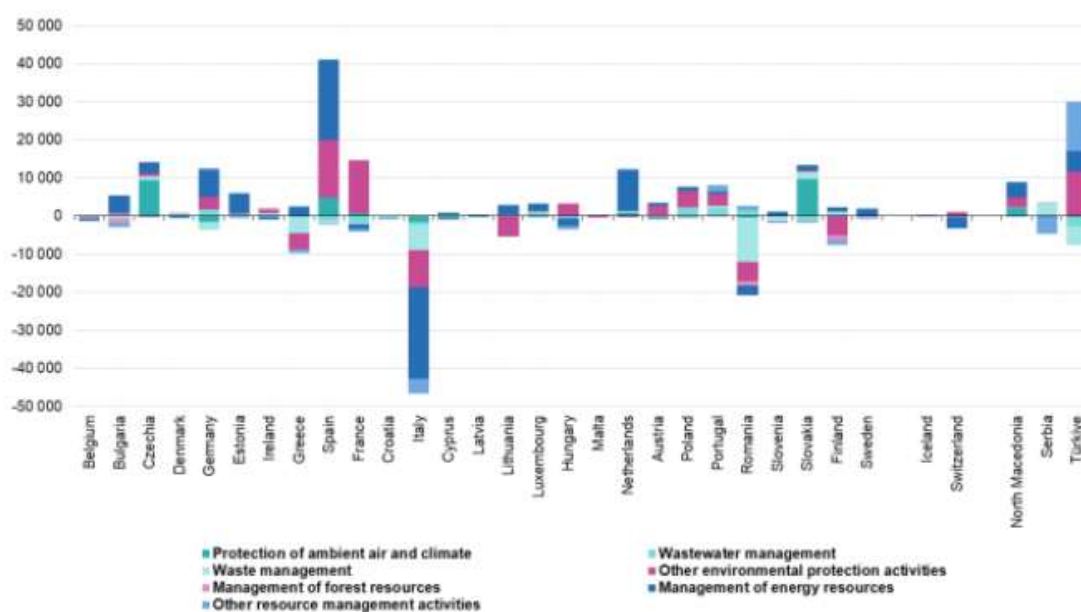
According to the European Environment Agency, employment in the EU's environmental goods and services sector has grown faster than overall EU employment over the past decade. The sector's share of total employment rose from 2.1% in 2010 to 2.5% in 2020, with the number of full-time jobs reaching 5.1 million. This growth has been mainly driven by new jobs in renewable energy, energy efficiency, and waste management.



The EU's ambitious goals to accelerate the green transition and achieve carbon neutrality by 2050 are expected to further boost job creation in the green economy, increasing the share of green employment in the overall EU workforce in the coming years.

In 2020, the production of environmental goods and services generated jobs in 15 EU Member States. The countries with the largest growth in this sector were Spain, France, the Czech Republic, the Netherlands, and Slovakia, which together added around 87,000 new jobs that year. However, 12 Member States experienced declines in environmental sector employment, with Italy seeing the largest loss of 46,000 jobs, followed by Romania with 18,000 fewer jobs. Most jobs in the environmental economy are concentrated in waste management and energy resource management.

Job creation in the environmental economy, by country, 2019-2020



Source: Eurostat (online data code: env_ac_egss1)

eurostat

Job creation in the environmental economy in 2019-2020 ([Environmental economy – statistics by Member State - Statistics Explained \(europa.eu\)](#))

9.2. EEE/WEEE EDUCATION, SKILLS AND CAPACITY BUILDING

Education on e-waste in the EU has become increasingly important as environmental concerns, resource conservation, and the need for sustainable practices continue to grow. Efforts to raise awareness and understanding of e-waste are being approached in several ways.

In many EU countries, environmental topics are now part of school curricula. Students learn about the impact of improper e-waste disposal, the importance of recycling, and strategies to reduce the amount of waste generated from electronics.





Governments and NGOs across the EU are running campaigns aimed at informing the public about the dangers of e-waste, the benefits of proper disposal, and how to access recycling services. These campaigns help build awareness among citizens of all ages.

At the community level, local groups and organizations regularly host events, workshops, and educational sessions focused on responsible e-waste management. These gatherings help spread knowledge and offer practical guidance on recycling and reusing electronics.

Some programs place emphasis on digital literacy and responsible tech use, encouraging individuals to consider the environmental cost of their electronics and explore options such as repair and reuse before replacing devices.

Businesses are also playing a growing role in educating consumers. Many companies now provide take-back programs, share recycling guidance, and promote awareness about how to properly dispose of electronic products.

While these initiatives mark significant progress, challenges remain. Many people still lack awareness of the environmental risks linked to e-waste and are unfamiliar with responsible disposal practices. In some areas, access to clear information about recycling centers and repair services is limited. Additionally, encouraging long-term behavioral change remains a hurdle, as convenience often leads to unsustainable disposal choices.

To address these issues, efforts continue throughout the EU to strengthen education, improve access to resources, and promote a mindset of responsible consumption. The ultimate goal is to support a circular economy where electronic devices are used more efficiently, disposed of responsibly, and their materials recovered for future use.

Erion Weee

The Erion WEEE Academy model can be easily adapted in other EU Member States, especially where education gaps exist in WEEE handling. Source: https://weee-forum.org/ws_members_map/erion-weee/





10. THE STRATEGIC AND POLICY CONTEXT

10.1. EU POLICY CONTEXT

10.1.1. WEEE EU POLICY

The European Union's environmental policy on waste management focuses on achieving a high level of environmental protection while taking into account the different regional challenges across the EU. At the core of this policy lies Directive 2008/98/EC on waste, which sets the legal foundation for waste management throughout the Union. This directive has been strengthened by later updates, such as Directive (EU) 2018/851, which reflect the EU's growing commitment to the circular economy.

The directive aims to safeguard both the environment and human health by promoting proper waste management practices. It encourages techniques that recover and recycle waste, reducing pressure on natural resources and improving their efficient use. A central concept in the directive is the waste hierarchy, which prioritizes waste prevention first, followed by preparing waste for reuse, recycling, and then other recovery methods like energy recovery. It also establishes the "polluter pays" principle, which makes those generating waste responsible for the costs associated with managing it—this acts as a key incentive for producers and consumers to adopt more sustainable behaviors.



With the 2018 amendment, the EU raised its ambitions further, tightening targets for waste prevention and recycling to support a transition to a resource-efficient, sustainable economy where valuable materials are kept in circulation for longer periods.

The directive also sets out measures tailored for specific waste streams, such as electronic and electrical equipment waste (WEEE), packaging waste, and hazardous substances in electronics regulated by the RoHS Directive. Directive 2018/852, for example, focuses on packaging waste, pushing Member States to prevent packaging waste generation and promote reuse and recycling, all aimed at fostering the circular economy.

For electronic waste, directives like 2012/19/EU and 2012/65/EU establish extended producer responsibility, requiring producers to ensure separate collection and environmentally sound recycling of WEEE. This helps conserve resources and protect the environment. Complementing these efforts, the RoHS Directive limits hazardous substances in electrical and electronic products, promoting greener manufacturing and reducing risks to health and the environment.

Together, these legislative efforts form a comprehensive framework supporting sustainable waste management, resource efficiency, and the EU's broader goals for environmental protection and sustainable development.

The Circular Economy Action Plan



The Circular Economy Action Plan highlights the significance of WEEE, emphasizing the importance of critical raw materials contained in electronic devices and calling for legislative and non-legislative actions to improve their recovery. Decoupling economic growth from resource consumption and shifting toward circular production and consumption models are central to achieving the EU's climate neutrality target by 2050.

In March 2020, the European Commission introduced an updated Circular Economy Action Plan, with the Council endorsing its conclusions in December 2020, noting how the circular economy is key to a green recovery following the COVID-19 crisis. The plan outlines over 30 initiatives targeting product design, circular production processes, and empowering consumers and public buyers, focusing on sectors like electronics, batteries, packaging, plastics, textiles, construction, and food.



In 2023, the Council also adopted a new negotiating stance on construction products, aiming to make them more durable, repairable, recyclable, and easier to remanufacture.

To support the implementation of the WEEE Directive, the European Commission has launched various initiatives, including compliance promotion and technical studies.

Electronics and ICT have been identified as a key value chain under the second Circular Economy Action Plan. Measures proposed include regulatory changes under the Ecodesign Directive to ensure devices like mobile phones, tablets, and laptops are designed for energy efficiency, durability, reparability, upgradability, maintenance, reuse, and recycling. The plan also emphasizes the 'right to repair'—including the right to update obsolete software—and aims to regulate chargers to improve durability and encourage decoupling charger purchases from new devices. Additionally, efforts are underway to enhance the collection and treatment of e-waste, possibly through an EU-wide take-back scheme.

Circular Electronics Initiative

Within the European Green Deal, the Commission's Circular Electronics Initiative, announced in 2020, focuses on extending product lifetimes, right to repair, common chargers, improved e-waste treatment, and reviewing hazardous substance restrictions. The European Parliament backed this initiative, calling for mandatory certification schemes for recyclers and addressing issues like planned obsolescence and recycling infrastructure.





In June 2023, the Commission adopted measures to ensure mobile phones and tablets are energy efficient, durable, and easier for consumers to repair, upgrade, reuse, and recycle.

The proposal for a common charger, introduced in September 2021 and finalized in November 2022 as Directive (EU) 2022/2380, is part of this push for standardization and sustainability.

Looking ahead, the Commission also put forward a directive proposal in March 2023 promoting the 'right to repair' to further enhance product longevity and reduce waste.

10.2. NATIONAL, REGIONAL AND LOCAL POLICIES

Each of Member States has an obligation to implement the EU legislation into a national legislation. The European Commission may initiate infringement proceedings under Article 258 against a Member State that fails to implement the Directive in time. The Court of Justice may then decide to impose a substantial financial penalty on the basis of the action.

The Commission launched 28 infringement proceedings against Member States in relation to the implementation of the WEEE Directive. It referred three cases to the European Court of Justice for failure to notify national transposition and withdrew from these proceedings after the three Member States concerned had transposed the Directive. As of December 2020, three cases of incorrect transposition of the Directive remained pending.

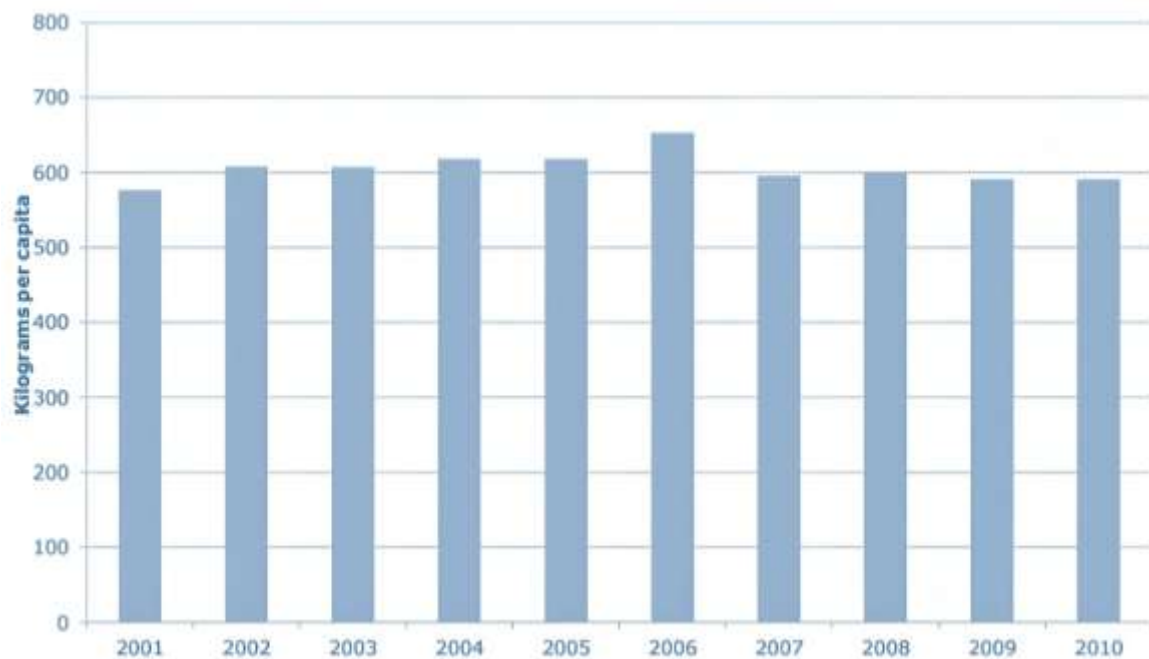
AUSTRIA

The Austrian Regulations on Waste Prevention, Collection, and Treatment of WEEE and Batteries impose several obligations on producers/importers, retailers, and municipalities.

Producers/importers must register online with the Environment Agency Austria, report EEE and portable battery quantities, operate collection points nationwide, arrange agreements with municipalities for waste collection, ensure reuse of WEEE, and provide financial guarantees for collection and recycling. They must also mark new appliances, inform consumers, and comply with hazardous substance restrictions.



Retailers are required to accept household WEEE free of charge on a 1:1 basis, while municipalities must also accept household WEEE at no cost.



MSW generation in Austria for the period 2001-2010

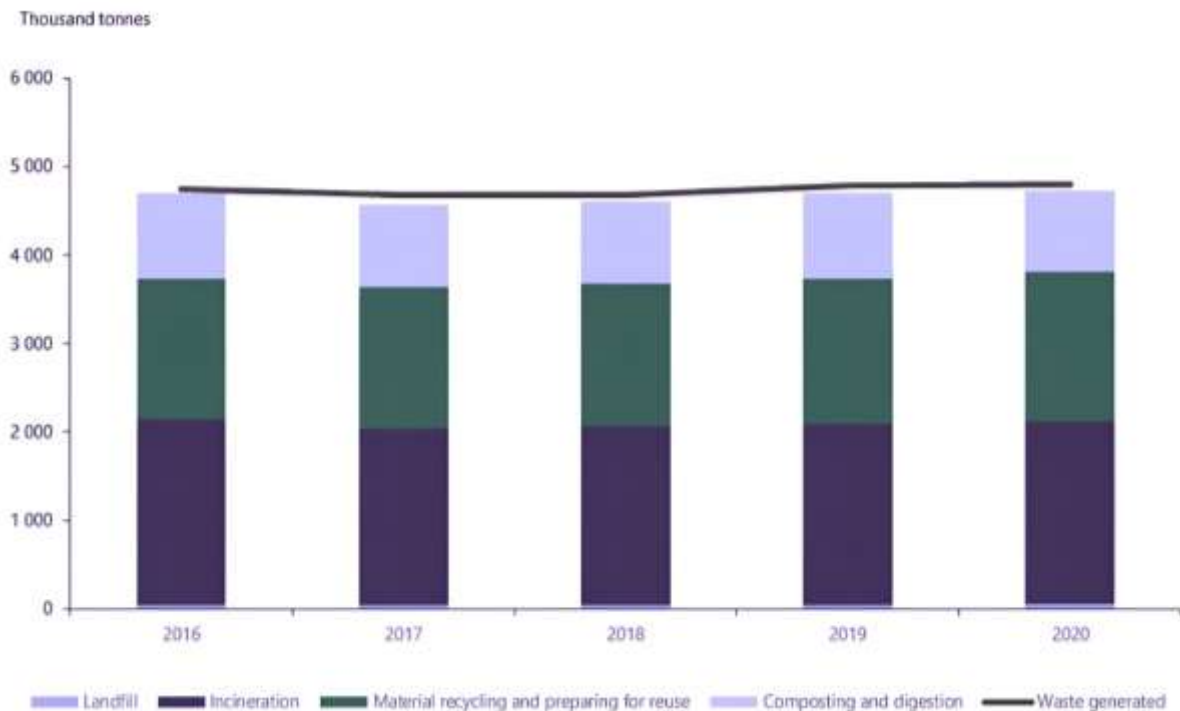
BELGIUM

Flemish Decree on Waste Prevention and Management and the Environmental Policy Agreement (MBO) - an agreement between the 3 regional governments of Belgium and the industry sectors. Decrees regarding the collection and treatment of WEEE for the Walloon Region and the Brussels Capital Region followed in 2002. Based on the legal background and the 'MBO' there is the obligation:

- To organize separate collection of WEEE (for municipalities or municipalities working together)
- To include social economy undertakings in the collection of WEEE,
- To take back a similar product when a new product is purchased (for retailers), and
- To arrange an environmentally sound treatment of WEEE.

Each manufacturer or importer has to join a system for WEEE collection and treatment. Alternatively, manufacturers or importers may establish an individual waste management plan and have it approved by the authorities.





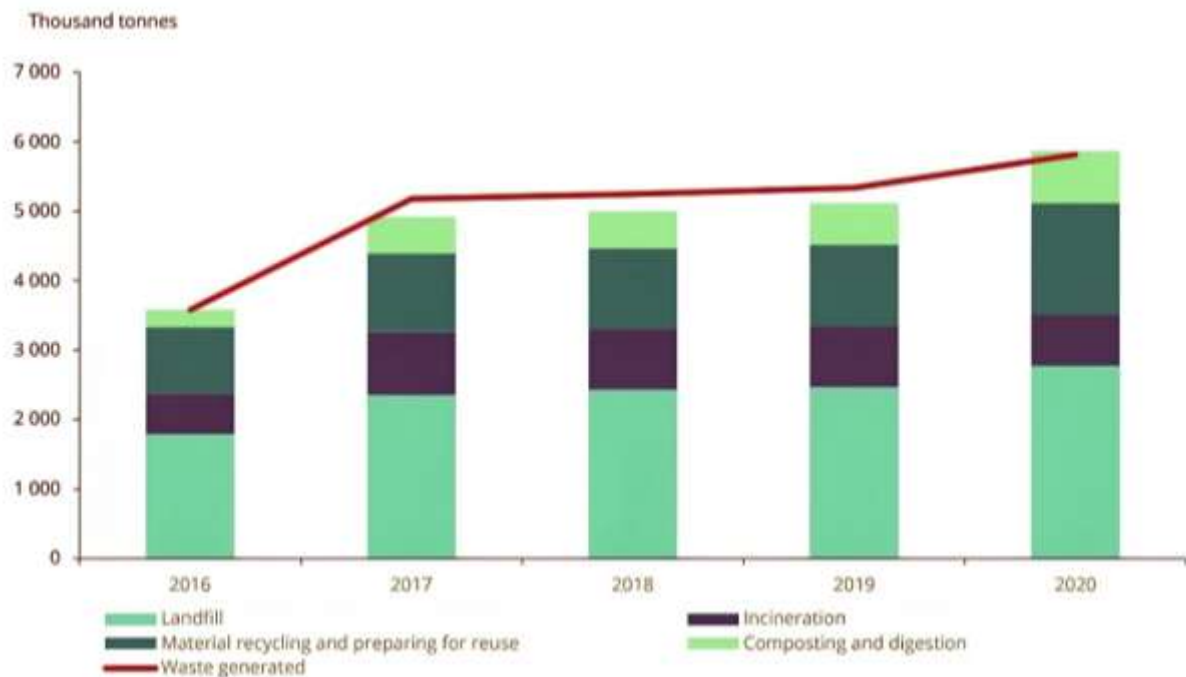
Municipal waste generation and treatment in Belgium between 2016 and 2020, in thousand tonnes. Source: European Environment Agency

CZECHIA

Currently, waste management is regulated by Act No. 541/2020 Coll., on Waste, which is effective from 1 January 2021 and its implementing legislation Decree No. 8/2021 Coll. called as Waste Catalogue, where each waste type has a specific handling method.

Generally, the Waste Act establishes the rights and obligations of persons in the field of waste management and regulates the obligations of waste generators (citizens, municipalities, towns and companies), the obligations of persons who collect, transport, treat, use and dispose of waste (landfills, incinerators, waste collection centres, sorting lines, etc.), the obligations of the public administration and local government and, last but not least, regulates penalties and fees. The Waste Act also promotes the basic principles of circular economy, environmental protection, and human health in waste management.

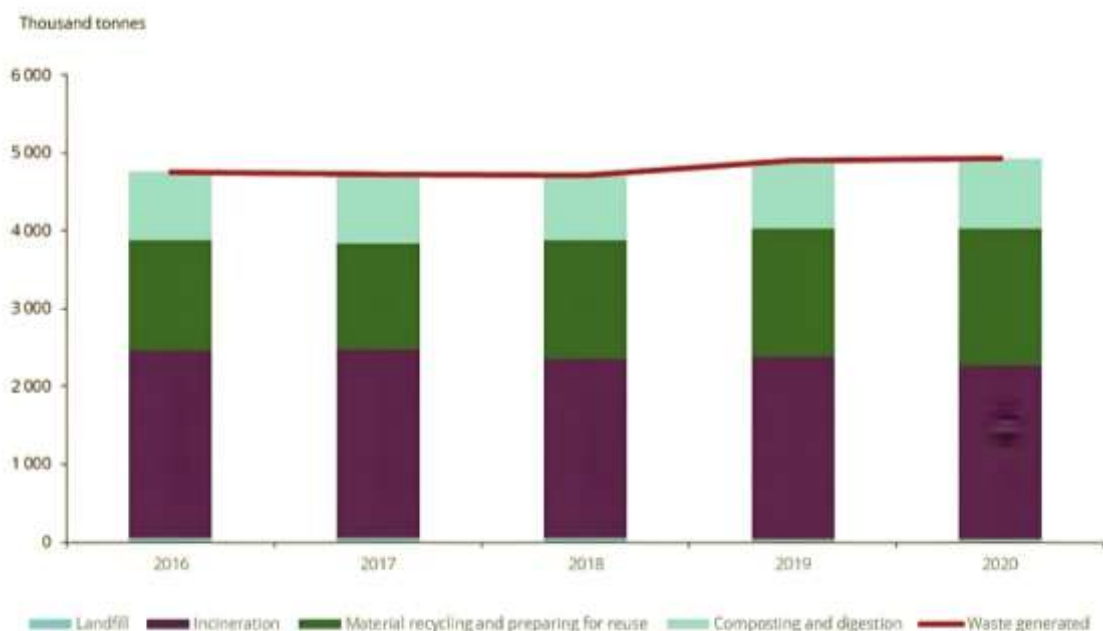




Municipal waste generation and treatment in Czechia between 2016 and 2020, in thousand tonnes. Source: European Environment Agency

DENMARK

The WEEE-directive was transposed into Danish legislation by the below regulations Act no. 385 of 25th May 2005 amending the Environmental Protection Act (Producer liability for electronic waste, etc.) Statutory Order no. 664 of 27th June 2005 on management of waste electrical and electronic equipment (the WEEE Order).





Municipal waste generation and treatment in Denmark between 2016 and 2020, in thousand tonnes. Source: European Environment Agency

FRANCE

The 2012/19/UE Directive published on the 24 July 2012 have been transposed into French law through a decree on the 19 August 2014. It includes obligations for:

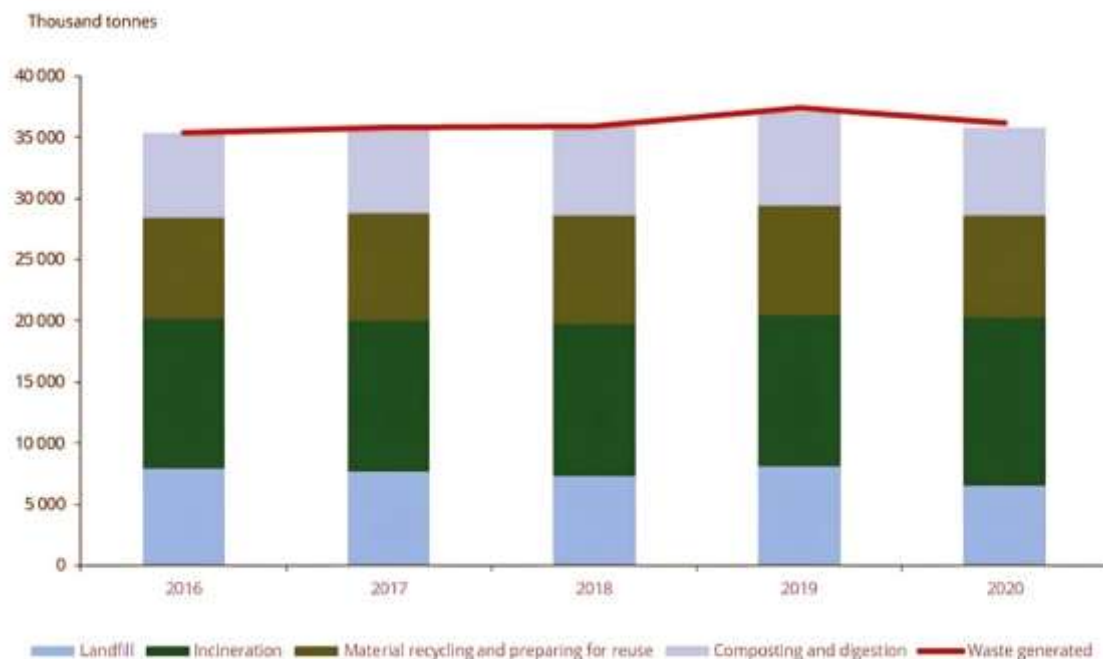
Producers:

- To finance the take-back and the ecological treatment of WEEE according to their current market share for historical WEEE,
- To guarantee the financing of the take-back and treatment of products put on the market.

Retailers:

- To take back household WEEE free of charge on a one-to-one basis,
- For stores with an EEE sale space superior to 400sqm, to take back very small household WEEE free of charge on a one-to-zero basis.

On a voluntary basis, local authorities and municipalities can organize a selective collection of households WEEE, lighting equipment and small fire extinguishers.



Municipal waste generation and treatment in France between 2016 and 2020, in thousand tonnes. Source: European Environment Agency

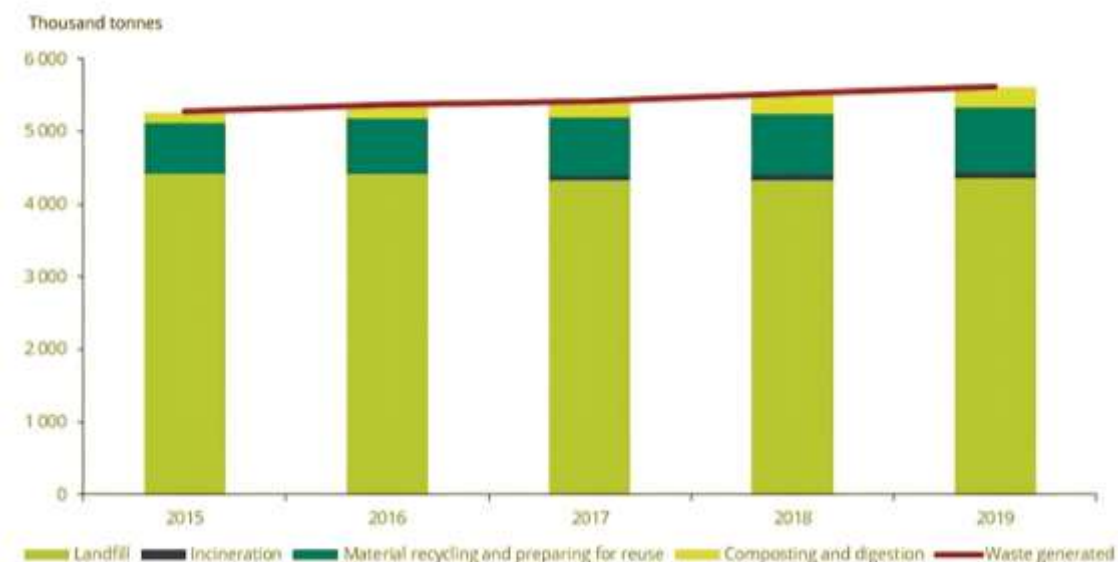
GREECE



Directive 2008/98/EC and Directive 2008/99/EC have been implemented in Greece through Law 4042/2012, which focuses on criminal-law protection of the environment and waste management. The law, consisting of 72 articles divided into four parts, aims to harmonize Greek legislation with EU directives:

- Part I incorporates provisions from EU Directive 2008/99/EC, establishing penalties for activities causing substantial environmental damage.
- Part II aligns Greek legislation with EU Directive 2008/98/EC, aiming to protect the environment and human health through waste prevention, recycling, and control of hazardous waste.
- Parts III and IV introduce amendments to existing legislation and address matters under the jurisdiction of the Ministry of Environment, Energy, and Climate Change.

Overall, Law 4042/2012 seeks to ensure effective environmental protection and sustainable waste management practices in Greece in line with EU directives.



Municipal waste generation and treatment in Greece between 2015 and 2019, in thousand tonnes. Source: European Environment Agency

IRELAND

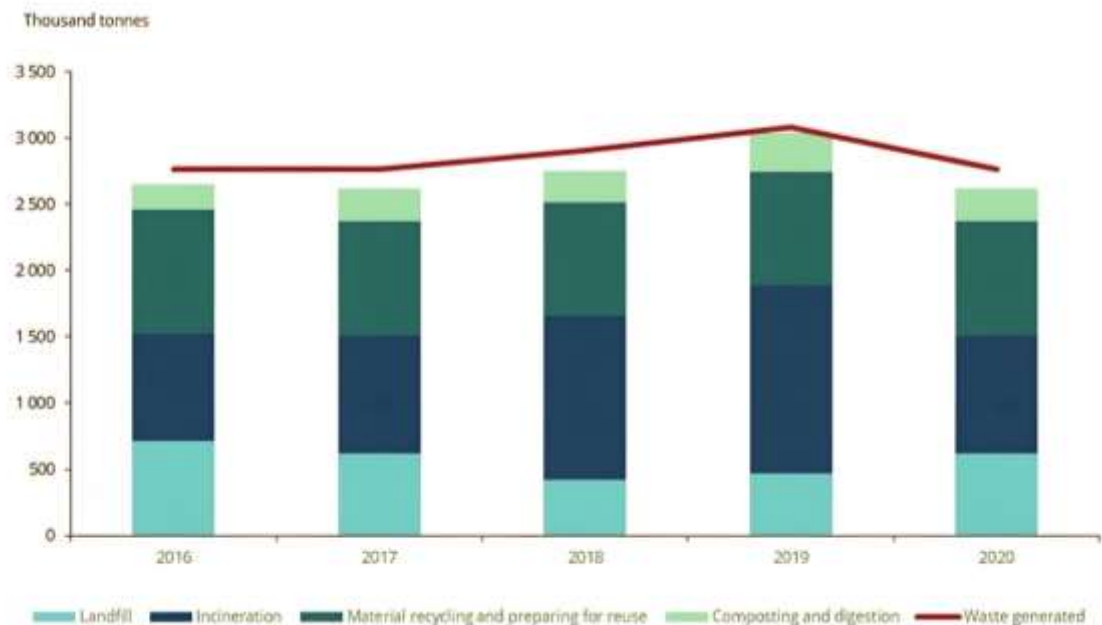
Producer responsibility under WEEE Directive 2012/19/EU & EU Battery Directive 2006/66/EC is transposed in Ireland under WEEE Regulations 2014 S.I. No. 149 of 2014 (as recently amended under S.I. No. 233 of 2019) and Battery Regulations 2014 S.I. No. 283 of 2014 (as amended).

The WEEE Regulations 2014 - S.I. No. 149 of 2014 govern the sustainable production, reuse, recycling and appropriate disposal of WEEE. The WEEE Regulations are in place since 29th March 2014 and replace the 2005 and 2011 WEEE Regulations. As of the 31st of May 2019, the Iris Oifigiúil published the amended S.I. No. 233 of 2019 of the 2014 WEEE Regulations 2014 for the purposes of giving full effect to Directive 2012/19/EU on waste electrical and electronic equipment.





The European Union (Bateries and Accumulators) Regulations 2014 (S.I. No. 283 of 2014), as amended came into effect on 30th July 2014 in Ireland and promote the recycling of waste batteries. In particular, they also facilitate the achievement of targets for the collection, treatment, recycling and disposal of waste batteries in an environmentally sound manner.



Municipal waste generation and treatment in Ireland between 2016 and 2020, in thousand tonnes. Source: European Environment Agency

ITALY

The Legislative Decree 49/2014 in Italy transposes Directive 2012/19/EU, aiming to protect the environment and human health by regulating the production of Electrical and Electronic Equipment (EEE) and associated waste from households and businesses. Several Ministerial Decrees complement the legislative framework, focusing on aspects relevant to producers:

Financial Guarantees Decree (Ministerial Decree No. 68 of March 9, 2017): This decree specifies the requirements for EEE producers to provide financial guarantees, particularly for WEEE from private households, excluding professional WEEE.

Rates Decree (Ministerial Decree of June 17, 2016): This decree establishes charges and payment methods to cover the operating costs of various committees and activities related to WEEE management, including supervision, control, monitoring, and inspections.

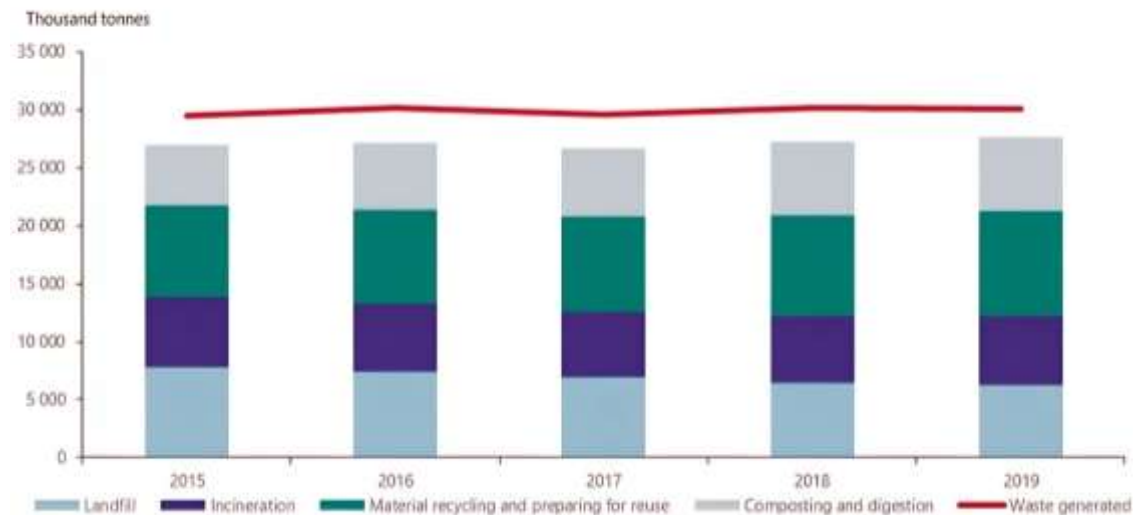
'One-for-Zero' Decree (Ministerial Decree No. 121 of May 31, 2016): This decree outlines simplified procedures for distributors to take back small-sized WEEE from households free of charge, without requiring the purchase of an equivalent product.

'One-for-One' Decree (Ministerial Decree 65/2010): This decree provides guidelines for the free take-back of WEEE from private households by distributors, EEE installers, and assistance



center operators when purchasing an equivalent product, ensuring the proper disposal of old equipment.

These ministerial decrees complement Legislative Decree 49/2014 by establishing specific measures and procedures to ensure effective implementation and compliance with EU directives, contributing to the reduction of negative environmental impacts associated with EEE



production and waste management.

Municipal waste generation and treatment in Italy between 2015 and 2019, in thousand tonnes. Source: European Environment Agency

LITHUANIA

The Law on Waste Management (No. VIII-787) establishes fundamental guidelines for the prevention, handling, and disposal of waste to mitigate its negative impact on the environment and human health. It outlines the roles and responsibilities of public authorities and other entities involved in waste management, setting forth regulations for waste prevention, organization of waste management systems, and economic measures related to waste management.

The law covers various types of waste, including oils, electrical and electronic equipment, vehicles, disposable plastic products, and packaging. Its primary objective is to ensure compliance with relevant European Union regulations and standards. Additionally, the law mandates the prohibition of products made of aerobically degradable plastic and requires waste facilities to safely treat hazardous waste to protect public health and the environment.

LUXEMBOURG

Pursuant to the Law of 21 March 2012 on waste, as amended, and the Law of 9 June 2022 on waste electrical and electronic equipment, waste electrical and electronic equipment (WEEE) is subject to the principle of extended producer responsibility. The modified Luxembourgish regulation initially transposing the directives 2002/95/CE and 2002/96/CE and now the directive 2012/19/EU forces:

Producers and importers:

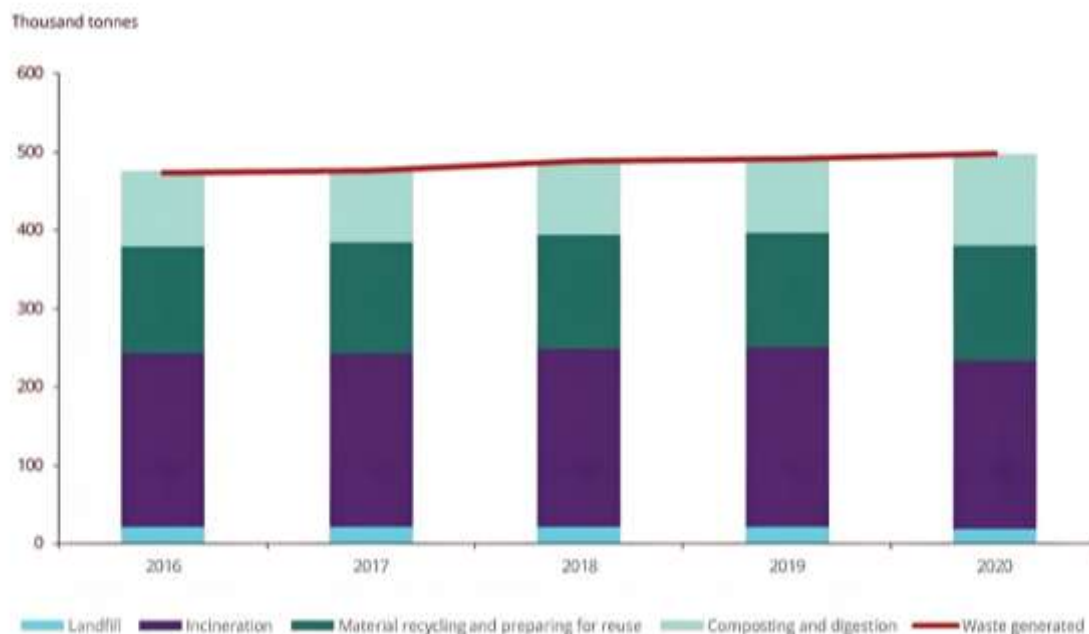


- To finance the take-back and treatment of WEEE from the exit of the selective collection points according to their current market share for the historical WEEE
- To provide a guarantee for the take-back and treatment of appliances placed on the market after the 13th of August 2005

Retailers to take back free of charge WEEE from household on a one-for-one basis and all WEEE smaller than 25 cm even if there is no purchase of a new appliance.

Municipalities to take back free of charge all WEEE from households and to sort and store them.

A voluntary agreement has been signed between the ministry of environment, the municipalities and the private sector. This agreement specifies the rights and obligations of



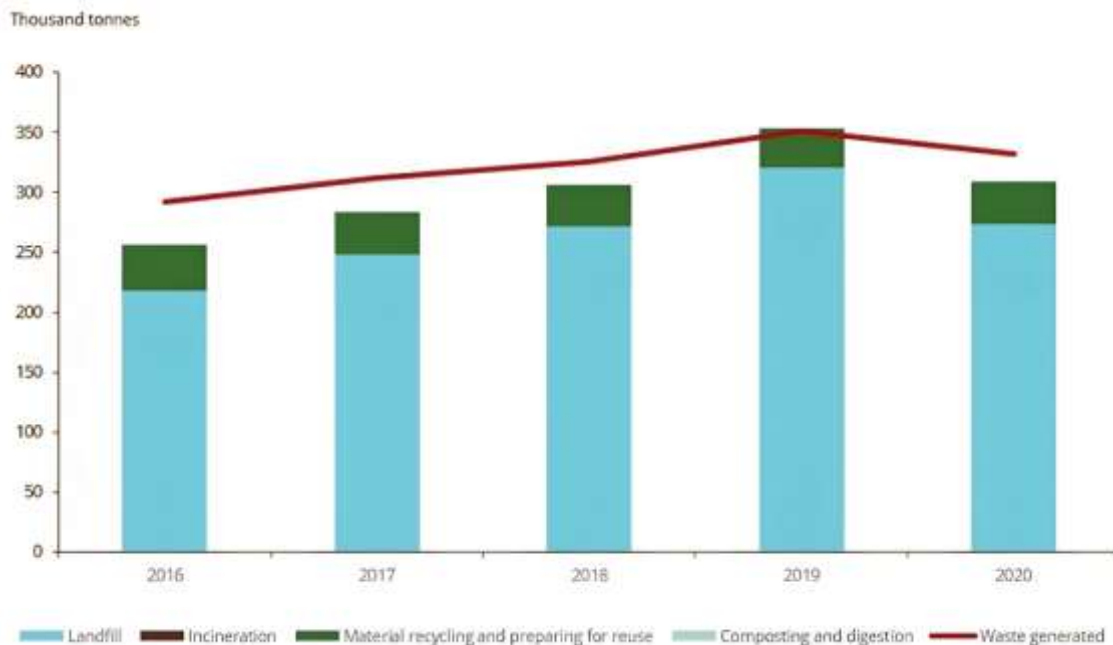
each stakeholder.

Municipal waste generation and treatment in Luxembourg between 2016 and 2020, in thousand tonnes. Source: European Environment Agency

MALTA

The WEEE Directive (Recast) was transposed into Maltese Law through Legal Notice 204 of 2014 updating the Subsidiary Legislation 549.89. The legislation came into force as of 14th February 2014 and subsequently also repealed Legal Notice 63 of 2007. Additional regulations to the Subsidiary Legislation 549.89 were through Legal Notice 532 of 15 bringing into effect the provisions of Directive 2012/19/EC of the European Parliament and of the Council of 4 July 2012 on waste electrical and electronic equipment and repealing Directive 2002/96/EC of the European Parliament and of the Council of 27 January 2003. S.L. 549.63(2). Producers' obligations came into force on 1st September 2015.





Municipal waste generation and treatment in Malta between 2016 and 2020, in thousand tonnes. Source: European Environment Agency

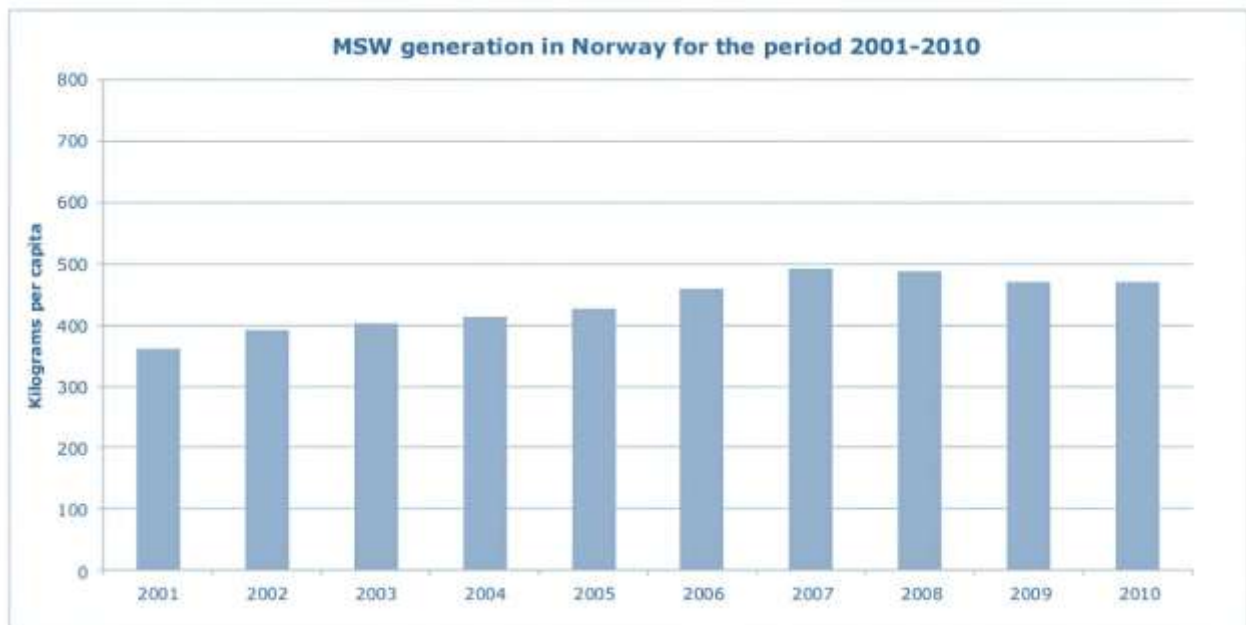
NORWAY

WEEE take-back has been part of Norwegian regulations since 1998 and is now subject to the national Waste Regulations FOR-2004-06-01-930, Chapter 1. Waste electrical and electronic equipment (WEEE directive 2012/19/EU).

- Producers are to finance the take-back, sorting, and correct treatment of put on market for WEEE.



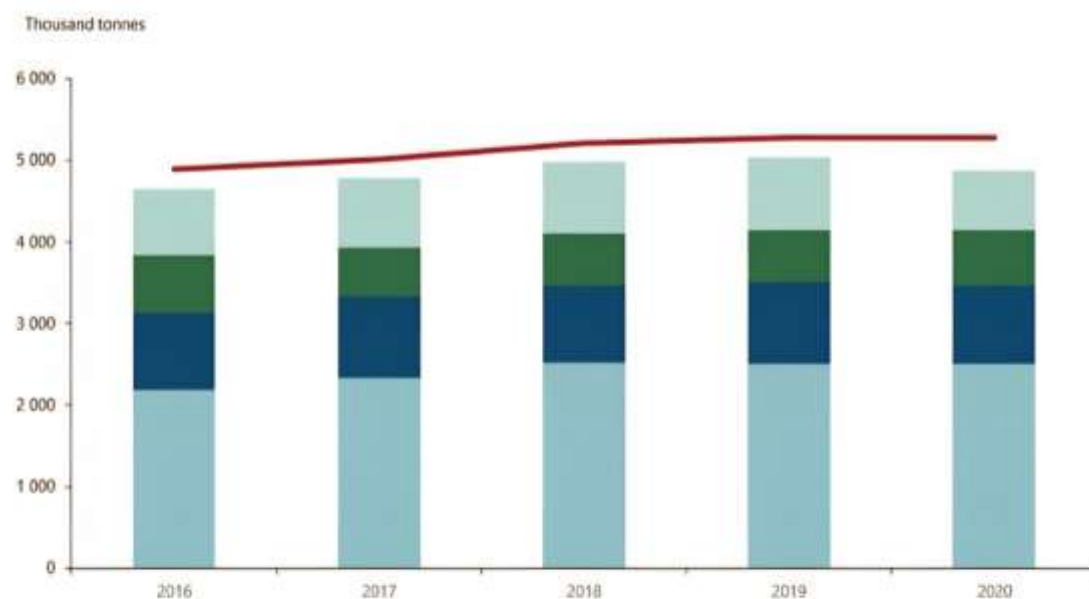
- Retailers and municipalities to free of charge take back WEEE from households



PORTUGAL

The WEEE European legal frame, defined by Directive (2012/19/CE), where transposed into law in Portugal on December 2017 by Law Decree n° 152-D/2017, 11 December. This diploma established the conditions for the organization and management of an Integrated Waste Electric and Electronic Equipment Management System (SIGREEE).

This legislation is the fifth update to Decree-Law No 152-D/2017 of December 11, 2017, introducing the requirement to mark reusable packaging and packaging managed under the



Municipal waste generation and treatment in Portugal between 2016 and 2020, in thousand tonnes. Source: European Environment Agency





deposit system, as well as the requirement to mark recyclable packaging with the indication of its appropriate destination. The draft Decree-Law also provides for the obligation for waste treatment operators to prove annually to the licensing entity that they have complied with the qualification requirements and applicable standards by means of a document issued by qualified verifiers.

ROMANIA

EU Directive 2012/19/EU has been transposed into Romanian legislation through Emergency Ordinance no. 5, which was published on April 16, 2015. This ordinance introduces measures aimed at protecting the environment and public health by mitigating the negative impacts of waste electrical and electronic equipment (WEEE) generation and management.

Among its provisions, Emergency Ordinance no. 5 places specific obligations on producers of electrical and electronic equipment, including:

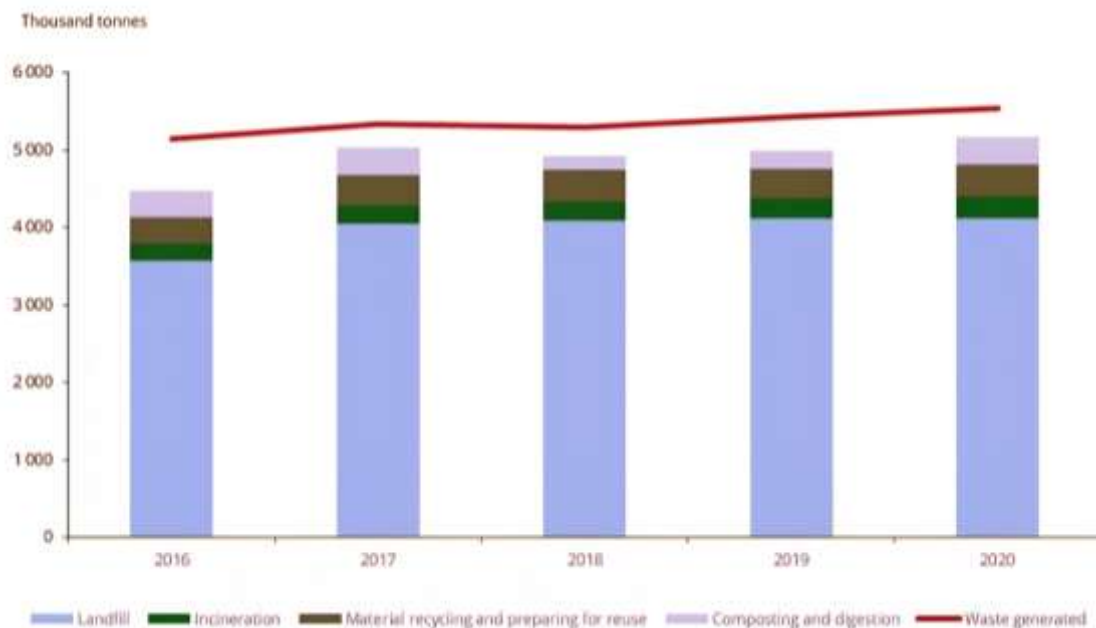
- Meeting ecological protection requirements to facilitate the reuse and treatment of WEEE.
- Avoiding design features or manufacturing procedures that hinder the reuse of WEEE, except where such features or procedures offer clear advantages, such as safety requirements.
- Implementing waste collection from private households to achieve a minimum average annual rate of separate waste collection at the national level.

Furthermore, retailers are mandated to accept WEEE on a "one-for-one" basis from customers, free of charge, provided the equipment is of an equivalent type and serves the same function as the newly purchased product. Retailers with retail spaces exceeding 400 square meters must also offer collection services for small WEEE from end-users, without any obligation to make a purchase.

Additionally, all economic operators involved in the collection and transport of separately collected WEEE must ensure optimal conditions for preparing the equipment for reuse or recycling, including the proper isolation of hazardous substances.



Overall, Emergency Ordinance no. 5 seeks to align Romanian legislation with EU directives, promoting responsible waste management practices and environmental protection.

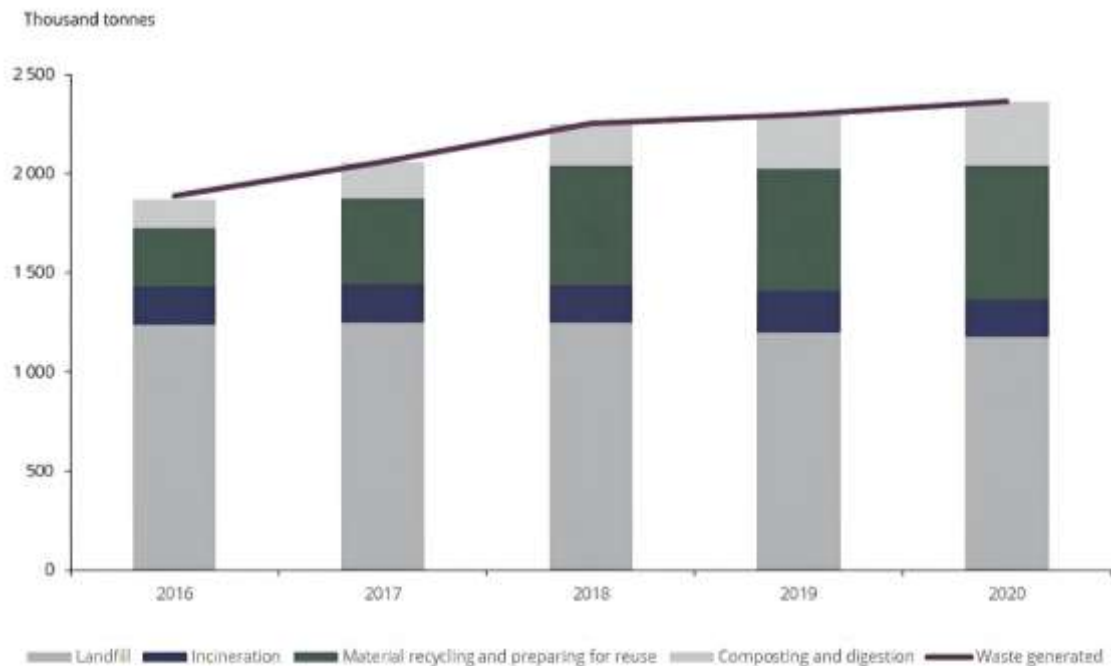


Municipal waste generation and treatment in Romania between 2016 and 2020, in thousand tonnes. Source: European Environment Agency

SLOVAKIA

The Slovak government established the Act on Waste No. 223/2001 in 2001 to regulate waste management. The WEEE Directive was incorporated into Slovak law through an amendment to this act in 2004. Subsequently, in 2015, the new Act on Waste No. 79/2015 was introduced, accompanied by several decrees issued by the Ministry of Environment. These decrees cover various aspects related to WEEE, such as applications and permits for waste handling, waste cataloging, waste evidence and reporting, and extended producer responsibility. The legislation outlines the obligations of producers and importers to ensure the proper handling, collection, recycling, and disposal of WEEE, as well as the responsibility of consumers to return end-of-life appliances. Producers' obligations are determined by their market share, and permits and authorizations are required for producer responsibility organizations. However, municipalities are not obligated to provide separate collection of WEEE, although they must offer their collection capacities to producers/importers and may request compensation. Similarly, retailers are not mandated to accept returned appliances.

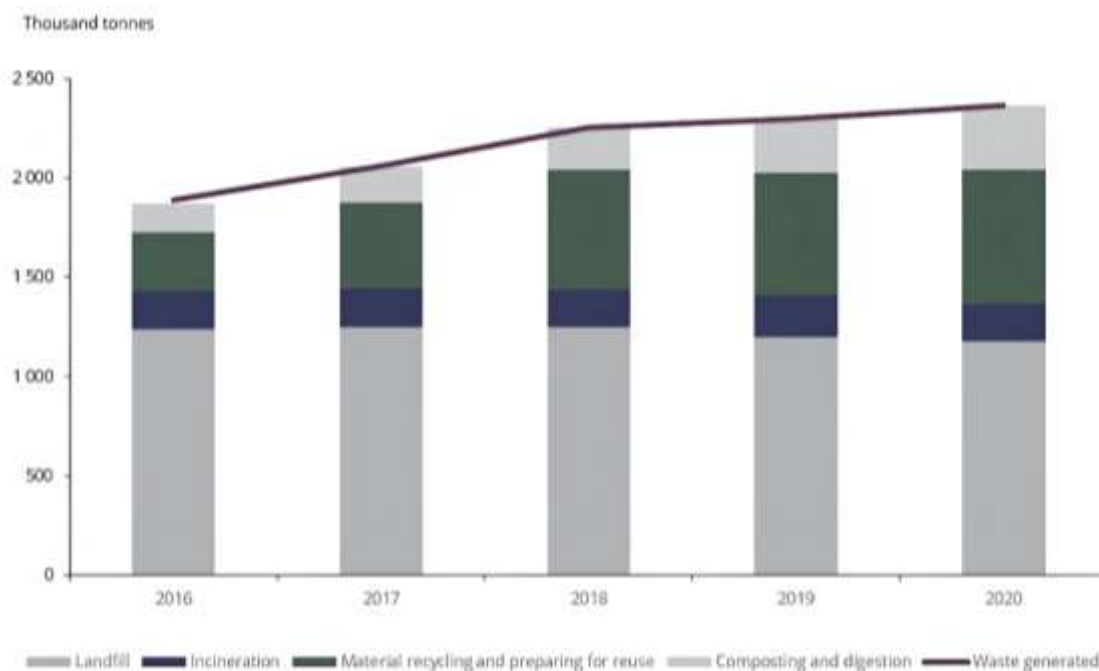




Municipal waste generation and treatment in Slovakia between 2016 and 2020, in thousand tonnes. Source: European Environment Agency

SLOVENIA

The WEEE directive has been transposed into Slovenian law on November 4th 2004 through "THE DECREE on treatment of Waste Electrical and Electronic Equipment" (the decree is applicable from November 2nd 2006 onwards) and Decree of environmental tax for Waste Electrical and Electronic Equipment. Transposition of new Directive 2012/19/EU is not finished yet. Decree on treatment of waste batteries and accumulators is applicable from 15.8.2008.





Municipal waste generation and treatment in Slovenia between 2016 and 2020, in thousand tonnes. Source: European Environment Agency

SPAIN

The Spanish law transposed the WEEE Directive 2002/96/CE through Royal Decree 208/2005 on February 25, 2005. Subsequently, the update of the WEEE Directive in February 2012 was transposed into Spanish law through RD 110/2015.

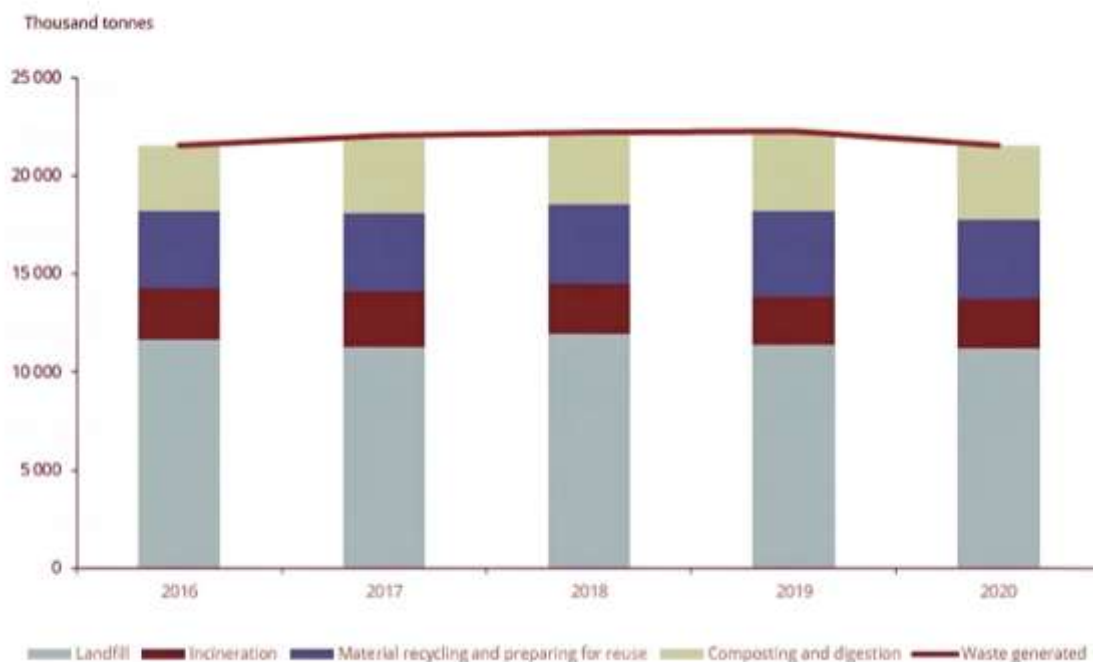
The Royal Decree aims to achieve several immediate objectives:

- Clarify regulations to increase legal certainty and define obligations for various stakeholders.
- Integrate a single control instrument for regional and national WEEE data to ensure compliance and traceability.
- Promote re-use and preparation for re-use, fostering the establishment of re-use centers and job creation.
- Systematize reporting obligations for EEE producers and WEEE managers on collection and recovery throughout the country.
- Optimize and efficiently manage WEEE under extended producer responsibility, ensuring competitiveness while meeting EU objectives.

These objectives will be accomplished through the establishment of a WEEE management model that updates existing practices, ensuring environmental protection and compliance with EU standards. Key changes include the creation of a working group under the coordination commission on waste, the implementation of an electronic platform for waste information and traceability, and the possibility for local authorities to entrust waste management to EEE producers or WEEE managers directly.



The Royal Decree aims to enhance WEEE management in Spain, aligning with EU directives and optimizing resources provided by EEE producers, while fostering sustainable waste management practices.



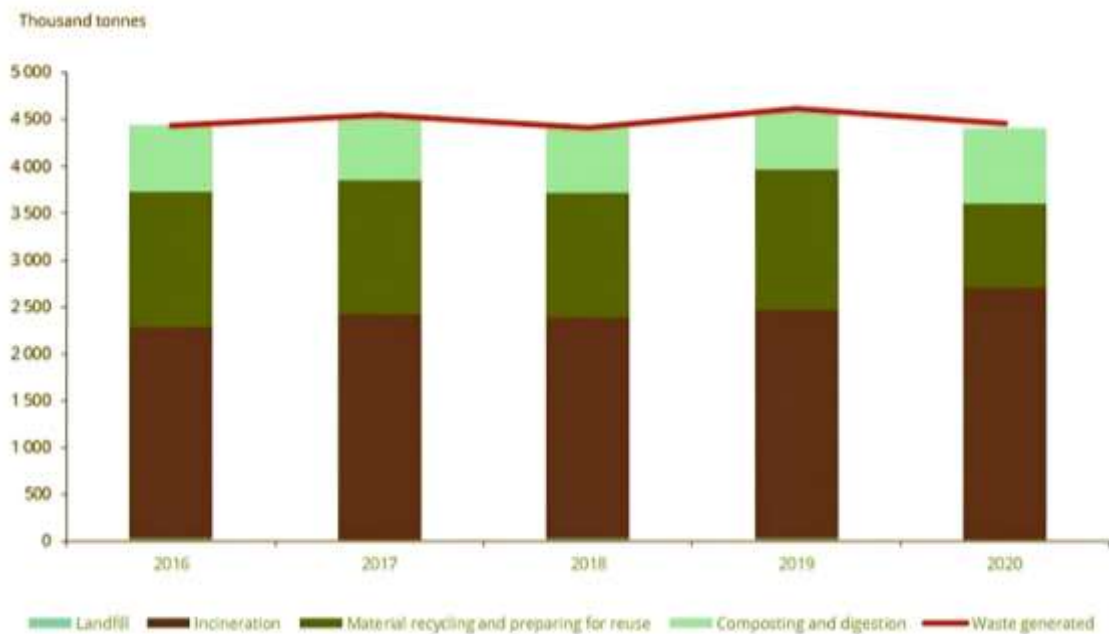
Municipal waste generation and treatment in Spain between 2016 and 2020, in thousand tonnes. Source: European Environment Agency

SWEDEN

The Swedish Ordinance on Producers Responsibility 2005:209 transposes the EU Directive on WEEE into national legislation. The Ordinance strictly follows the EU Directive.

Producers of household electrical and electronic equipment (EEE) in Sweden bear financial responsibility for the waste generated by their products, whether sold before or after August 13, 2005. They must participate in an approved WEEE collection system, provide product content information to waste management operators within a year of sales commencement, label their products, and design them for easy recycling and reuse. The Swedish EPA oversees this responsibility and charges inspection fees. Electrical and electronic equipment not intended for household use falls under different regulations, with the Swedish EPA also supervising collection responsibilities and inspection fees. Additionally, products with integrated batteries are subject to both EEE and battery producer responsibility regulations.





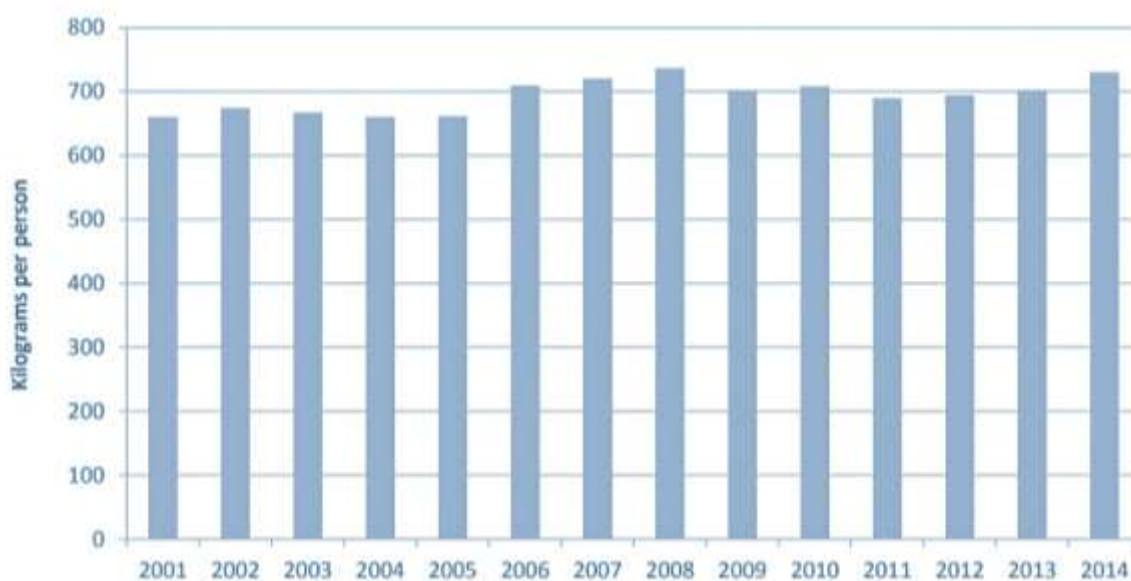
Municipal waste generation and treatment in Sweden between 2016 and 2020, in thousand tonnes. Source: European Environment Agency

SWITZERLAND

On 1 July 1998 the ORDEE came into force (Ordinance on the return, the taking back and the disposal of electrical and electronic equipment). It has been amended to incorporate tighter regulations with effect as of 1 January 2005, and pursues the same objectives as the European WEEE Directive.

The ORDEE is made up of responsibilities at five different levels: 1. Consumers must hand in used equipment to the trade. 2. Distributors, retailers and manufacturers must take back used equipment free of charge (even if no new equipment is purchased). 3. Distributors, retailers and manufactures must professionally dispose of equipment that is taken back. 4. Recycling companies must be in possession of a cantonal license. 5. Exporters must be in possession of a license issued by the federal authorities.





Switzerland, municipal solid waste generation per person, 2001–2014

10.3. IMPLEMENTATION LEVEL OF POLICIES

10.3.1. Collection rates (EU)

The WEEE Directive sets out two different ways for EU Member States to calculate their WEEE collection rates. The first one, called the “WEEE Generated method,” looks at the mass of WEEE collected divided by the mass of WEEE generated in the same year. Using this method, the collection rate has improved significantly—from 40% in 2014 up to 54% in 2021—mainly because the amount of WEEE collected grew faster than the amount generated.

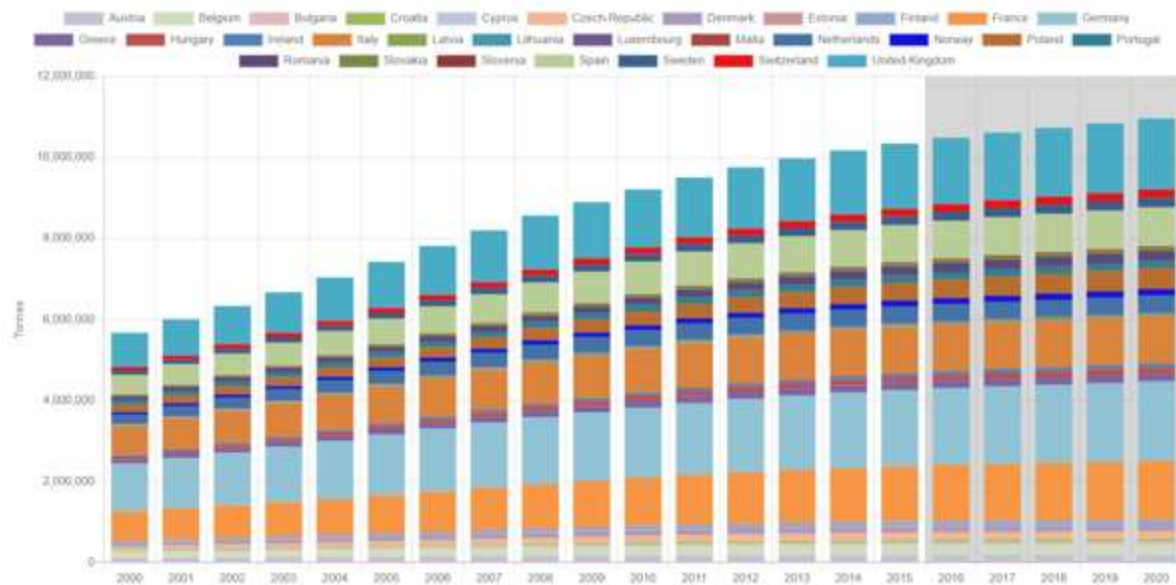
The second approach, known as the “EEE POM method,” calculates the collection rate as the mass of WEEE collected divided by the average amount of electrical and electronic equipment (EEE) placed on the market in the previous three years. With this method, the collection rate rose from 39% in 2013 to 50% in 2016, but then dropped back to 44% by 2020. This drop happened despite increases in WEEE collection, simply because the volume of EEE placed on the market grew even faster, which lowered the ratio.

Member States can choose which method to use each year when reporting their collection rates. The targets differ: for the WEEE Generated method, the goal is 85%, while for the EEE POM method, it’s 65% since 2019.

Looking at individual countries, only three of the 27 EU Member States—Croatia, Bulgaria, and Poland—have met the WEEE Directive’s collection targets based on the most recent data. Interestingly, Switzerland, which doesn’t have such targets, would meet the EU goals if assessed. The countries that hit their targets don’t always follow the general trends seen across Europe, suggesting some inconsistencies in how WEEE is managed or reported.



One major challenge in reaching collection targets is that a significant amount of WEEE never enters the formal collection systems. Instead, it ends up mixed in with metal scrap or other flows that are not well documented. It's estimated that about 1.4 million tonnes of WEEE—equivalent to 2.7 kilograms per inhabitant—are collected with metal scrap but recycled without meeting the environmental and material efficiency standards required for formally managed WEEE.



Weight of EEE - Waste Generated. Source: <http://www.urbanmineplatform.eu/urbanmine/eee/weightpercountry>

Moreover, roughly 0.8 million tonnes (about 1.5 kg per person) of WEEE likely ends up in residual waste streams, meaning it is sent to incinerators or landfills. Illegal exports also represent a big unknown, with estimates of around 0.5 million tonnes (1 kg per inhabitant) leaving the EU unlawfully. Another 0.6 million tonnes (1.1 kg per person) of electrical and electronic equipment is exported legally for reuse, but tracking these exports remains difficult since most countries lack specific trade codes for used EEE.

Improved monitoring of used-EEE exports is crucial. It would help distinguish between legal exports of used equipment—which should not count as waste in the country where it was sold initially—and illegal WEEE exports, which often end up dumped in countries without proper waste management systems.

In a previous study from 2019, about 2.7 million tonnes of WEEE had an unknown fate. That figure has now dropped to 1.5 million tonnes (around 1.9 kg per inhabitant) for 2021. This remaining unknown could be a mix of undocumented flows like illegal exports, scrap recycling, or uncertainties in data reporting.

10.3.2. Problems, barriers, achievements (EU)

Consumer relationships with electronics

Just like fast fashion and fast food, electronics go through rapid cycles of new styles and models. Companies rely heavily on constantly selling the newest, trendiest products, which are becoming more affordable all the time.

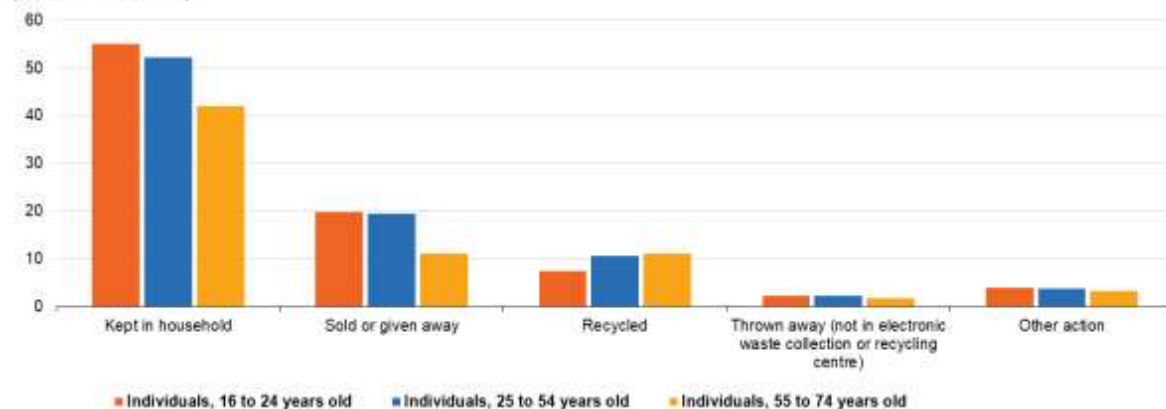


Affordability has especially opened doors in developing countries. For example, mobile money has boosted financial inclusion and created new opportunities. In many places, secondhand markets for devices like laptops and smartphones thrive, giving these gadgets second or even third lives.

But no matter what, eventually all these smartphones, tablets, cameras, and home appliances will turn into waste.

One report estimated the global consumer electronics market was around \$1.1 trillion in 2017, growing at about 6% per year and expected to hit \$1.7 trillion by 2024. The increasing use of smartphones is driving much of this demand. There's also a big shift towards flat-screen TVs in developed countries, and expanding use of 3G and 4G networks in developing ones. On top of that, electric vehicles are becoming more common, and many everyday items—clothes, furniture, toys, sports gear, even toothbrushes—now include complex electronic components.

Methods of disposing of a mobile/smartphone no longer in use, by age group, 2022
(% of individuals)



Source: Eurostat (online data code: isoc_eco_dd)

Lack of recycling

Recycling rates for e-waste worldwide are pretty low. Even in the EU, which is a global leader in e-waste recycling, only about 35% of e-waste is officially collected and recycled properly. Around the world, the average is just 20%, with the rest—80%—basically disappearing into the unknown, often ending up buried in landfills where it can stay for centuries.

E-waste doesn't break down naturally. As devices multiply, get smaller, and more complex, the problem only gets bigger. Recycling some types of e-waste and recovering valuable metals is expensive and challenging.

Then there's the leftover stuff—the plastics mixed with metals and chemicals—which is even trickier. E-waste is a complex mix, containing up to 60 different elements from the periodic table. Sometimes it includes hazardous chemicals, like flame retardants, some of which are Persistent Organic Pollutants regulated under the Stockholm Convention.

On top of all that, many people worldwide are confused about how to properly handle e-waste. The system can be complicated, so a lot of e-waste ends up treated like regular household trash,



even though it needs to be separated. Different types of e-waste—batteries, light bulbs, smartphones, cables, computers—all have to be handled differently.

Plus, concerns about data security and simply not knowing how to recycle electronics means tons of gadgets are just sitting unused in drawers, garages, bedrooms, and offices everywhere. It's a huge pile of potential waiting to be tapped.

Labour, environmental and health issues

E-waste contains a variety of hazardous substances that can be harmful to human health if not handled properly. From lead-lined cathode ray tubes in old TVs to lead and chromium in circuit boards, as well as mercury and cadmium, these materials pose serious risks.



One major concern is how e-waste can pollute water sources and food chains, especially with older electronics that make up much of today's e-waste. While regulations and voluntary targets are helping phase out some of the worst offenders in new products, recycling valuable elements like copper and gold still mainly happens in the informal sector, especially in developing countries.

Unfortunately, many informal recycling methods are crude and dangerous—burning plastics to extract metals, melting lead in open pots, or using acid to dissolve circuit boards. This exposes workers—and their families—to toxic substances. Women and children, who can make up to 30% of the informal e-waste workforce in some places, are especially vulnerable.

Some of the toxic compounds in e-waste are even carcinogenic. Informal workers at dumpsites, where metals are recovered through open burning, often have toxic elements like lead and cadmium in their blood. These dumpsites become economic hubs, attracting food vendors and being located near informal settlements, which increases exposure to toxic fumes for entire communities.

E-waste doesn't just harm people—it contaminates groundwater, soil, and air. We don't know exactly how many people work informally in this sector globally, but estimates give an idea: around 100,000 in Nigeria and 690,000 in China, according to the ILO.

Formalizing and upgrading the industry, creating safe recycling plants that provide decent jobs, is a big opportunity. It's also important to remember the climate impact of electronic goods. Every device ever made has a carbon footprint contributing to global warming. For example, producing just one tonne of laptops can emit about 10 tonnes of CO₂. Most of the carbon emissions happen





during production, long before consumers even buy the product. So, using recycled materials and designing products to last longer are key to reducing environmental impact.

Legislation on e-waste

Around 67 countries have laws to manage the e-waste they produce, often using what's called Extended Producer Responsibility. This means a small fee on new electronic devices helps cover the cost of collecting and recycling old ones. These laws cover roughly two-thirds of the world's population.

But many countries still don't have national e-waste legislation. When it comes to shipping e-waste to developing countries, this is supposed to be controlled by the Basel Convention, which regulates the cross-border movement and disposal of hazardous waste. The Convention has been ratified by 188 countries, and there are also similar regional agreements.

Despite these rules, large amounts of e-waste still get shipped illegally. Enforcement varies widely from place to place, and the patchwork of different laws and regulations makes the whole system quite complex and fragmented.

Illegal WEEE exports

The European Union has established regulations to ensure the proper handling and disposal of Waste Electrical and Electronic Equipment (WEEE) to protect the environment. Despite this, illegal exports of WEEE from Europe to developing countries remain a serious issue, posing significant environmental and health risks.

Several factors drive this illegal trade. In some European countries, weak legal frameworks make it easier for illegal exports to occur. Economic incentives also play a role—companies sometimes find it cheaper to export their waste to developing countries where disposal costs are lower. Additionally, many consumers and producers are unaware of the environmental and health dangers linked to improper electronic waste disposal. Corruption can further enable illegal exports, with some officials vulnerable to bribery or misconduct.

The consequences of these illegal exports are severe. Environmentally, improper disposal contaminates soil and water, harming ecosystems and endangering local food and water supplies. These effects pose serious health risks for communities near illegal dumping sites. Economically, affected communities often bear the cleanup costs, which can hinder local development. Moreover, the illegal trade fosters corruption and undermines efforts to enforce sound waste management policies.

Tackling these challenges requires coordinated action from policymakers, producers, consumers, and law enforcement. By promoting responsible WEEE management, ensuring safe disposal, and protecting workers and communities, the harmful impacts of illegal WEEE exports can be significantly reduced.





Mapping out e-waste. Source: "A New Circular Vision for Electronics – Time for a Global Reboot"
<https://www.weforum.org/publications/a-new-circular-vision-for-electronics-time-for-a-global-reboot/>





11. POLICY BEST SAMPLES ON WEEE MANAGEMENT

11.1. Policy samples for increasing collection

In the era of rapid technological advancement, electronic waste, or Waste Electrical and Electronic Equipment (WEEE), has become a growing concern worldwide. WEEE management is crucial not only for environmental sustainability but also for human health and economic growth.

One of the best practices in WEEE management is increasing public awareness. It is essential to educate individuals about the importance of proper disposal and recycling of electronic waste, the potential hazards associated with improper handling, and the benefits of participating in WEEE management programs. This awareness can drive responsible consumer behaviour, promote recycling, and ultimately contribute to a more sustainable and healthier planet.

There are many small and big companies all around the world that participate actively in extending the awareness about the proper treatment of WEEE. But in this section, it will be treated only the ones that are startup that has significantly grown this last year until becoming a unicorn, where a couple of examples can be found.

Best practice 1: WEEE Ireland Public Collection Day Events. IRELAND

Introduction

WEEE Ireland is a not-for-profit organisation, committed to delivering cost effective compliance on behalf of our Producer Members.

WEEE Ireland represents 96% of the Irish battery industry and 74% of the household electrical and electronic industry who have a Producer responsibility under EU Battery Directive 2006/66/EC & WEEE Directive 2012/19/EU to organise and finance the environmental management of their products at their end of life.

WEEE Ireland has been operational since 2005 and has been the Scheme of choice in Ireland maintaining majority market share across all sectors. WEEE Ireland operates under the approval of the Minister for the Environment, Climate and Communications.

Working closely with their partners in Local Authority and Community Recycling Groups in each location, WEEE Ireland collected 835 tonnes of WEEE in 2019. Public local collection events were promoted locally through press, radio, PR, social media and local community networks. This targeted promotion of WEEE Ireland Public Collection Day Events supported annual increase efficiencies of operations to yield clear and positive results – increase 17% compared to 2018.

Local Authority civic amenity centres, a network of participating electrical retailers and WEEE Ireland free e-waste collection days across 2022 offered a golden opportunity to end the scourge of binning and the terrible loss of valuable materials in our end-of-life electrical goods.

This year one of these events was held in Galway. Galway householders are being urged to bring their batteries, electrical, and electronic waste to a free collection day to help the county meet national e-waste recycling targets for 2023.





The event, hosted by WEEE Ireland in partnership with University of Galway, kicks off on Thursday September 21 at University of Galway. All household items with a plug, battery or cable will be accepted free of charge, including old washing machines, TVs, toasters and kettles, electronic tools and toys, cables, IT equipment, mobile phones, remote controls, batteries, including farm fence batteries, and even watches.



WEEE Free Public Recycling Events in Offaly

Key factors

WEEE Ireland presented their Scheme as a best-in-class Case Study at the European Commission's Compliance Promotion exercises in Dublin and Brussels. In addition, during this time they have:

- Grown the Membership numbers by another 30% to more than 1300 Producers
- Continued to increase and maintain dominant market share
- Provided EPR support for new technologies across WEEE and Battery Sectors
- Delivered additional collection programmes to meet additional takeback challenges
- Diverted over 225,000 tonnes of waste for recycling and recovery during this time
- Partnered with indigenous Irish treatment operators to support national recycling and recovery infrastructure to EN 50625 standard.
- Supported the development of new circular economy, WEEE and Battery policy and regulatory frameworks in Ireland and Europe through engagement, submissions, and expert opinion.
- Extended their compliance services through links with the pan European WEEE Europe platform and the EUCOBAT and WEEE Forum Centres of Excellence





- Led the WEEE and Battery EPR sectors in Ireland in new R&D and CE innovation programmes through co-funding and partnership with EPA Strive and CIRCULÉIRE
- Contributed over €250,000 in corporate sponsorship (over €500,000 in the last decade), to LauraLynn Children's Charity, encouraging more people to collect batteries and small WEEE for recycling.
- Promoted the WEEE and Battery takeback and environmental management messages through a comprehensive Communications Programme with far-reaching campaigns
- Launched their new Circular Vision strategy in anticipation of the Whole of Government CE Strategic focus and the next phase of Scheme Approval from 2022.

Best practice 2: Emmaüs events. FRANCE

Introduction

Emmaüs was born 73 years ago to find, with people who are victims of exclusion, solutions that allow them to once again become active participants in their lives. Faithful to the wishes of Abbé Pierre, Emmaüs has become both a factory of social innovations and solidarity to help people in very precarious situations, and a committed and militant front in favor of a more humane and more just.

The PRO ecosystem and Emmaüs jointly organize regular neighbourhood solidarity collection events on the street to facilitate donation of old appliances. Emmaüs trucks are also present to welcome donors during the PROs solidarity collections. Emmaüs collects donations from individuals made during these events. WEEE appliances are sorted, cleaned, repaired and resold at solidarity prices by Emmaüs or, failing that, decontaminated and recycled in strict compliance with environmental standards.

Even when the donated devices cannot be repaired, Emmaüs receives financial compensation from ecosystem for its participation in the collection of used devices. The money collected by Emmaüs from the resale of old devices promotes employment and professional integration, accommodation and the fight against poor housing, as well as the fight against over-indebtedness. Ecosystem organised around 450 events every year.



Key factors

Emmaus started off in France in 1949 and the movement now has 220 member groups in the country. There are many different types of structures in France, providing a response tailored to the local situation (communities, social action and housing structures, SOS Families, friends committees and reintegration structures). The groups in the country benefit from the support of the national organisation, Emmaus France. Main activities:

- Welcome, providing accommodation, reintegration
- Collecting, reusing, recycling and selling on objects
- Political campaigning and awareness raising
- Social action and housing (emergency accommodation, social housing, fighting against excessive debt, etc.)
- Local, european and international solidarity initiatives

Key numbers

- 30,000 stakeholders involved with Emmaus (including companions, volunteers and employees)
- 480 sales areas
- 270,000 tons of merchandise collected every year



Map of places to donate high tech and small objects

Best practice 3: The Wecycle Premium Pick-up Partners. NETHERLANDS

Introduction

The Wecycle Premium Pick-up Partners provide a pick-up service for small appliances in the Netherlands. When a new large electrical appliance is delivered, users can also return old small appliances to the delivery person. This service has been set up between Wecycle, the main PRO, and EEE sellers and their logistic service providers.





At Wecycle Premium Pick-up drop-off points, consumers can bring not only the old appliance, such as a washing machine or refrigerator, but also smaller electrical appliances, such as a hair dryer, drill, laptop, mobile phone, desk lamp or TV.

With the Jekko, the practical collection box for the home, consumers can store used electrical appliances (and also batteries and light bulbs) neatly in a central location and then hand them in.

Key factors

The OPEN Foundation fulfills the legal producer responsibility for e-waste. Under the name Wecycle they run campaigns to stimulate the collection and recycling of e-waste. They do this by increasing knowledge of the Dutch and strengthening "recycling" self-confidence.

In 2022, the OPEN Foundation has collected a total of 159 million kilos of e-waste in collaboration with our chain partners. In addition, more than 11 million kilos were offered to certified processors via metal recyclers: 2% more than last year; a good start to our effort to minimize the most important 'leakage flow' of e-waste. In addition, they continue to focus on extending the lifespan of equipment, parts and materials: the longer they stay on the R-ladder, the more electrical waste we keep out of leakage currents.

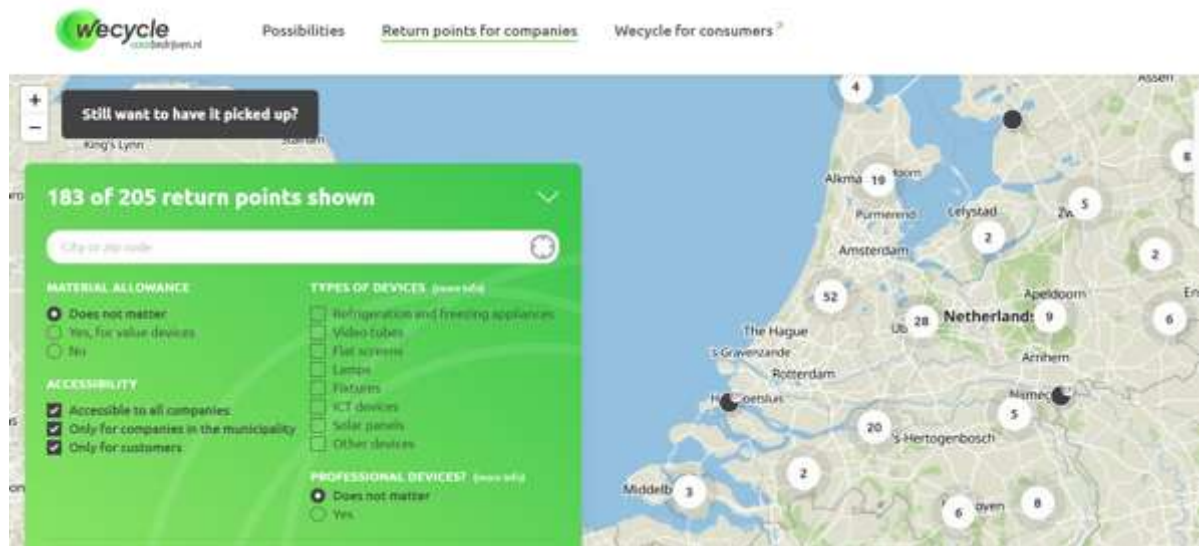
They collect waste electrical and electronic equipment together with their partners at more than 15,000 service points, including almost 8,000 Wecycle return points. Think of recycling centers at municipalities, petting zoos, retailers and technical wholesalers. Consumers already know where to find the Wecycle points in Netherlands.

The percentage of e-waste that ends up in the wheelie bin is decreasing. Nevertheless, they continue to focus on higher collection, more repairs, reuse and sales (other rungs on the R ladder) and responsible processing of discarded equipment, materials and raw materials. Every device counts.

To encourage collection from the municipality as well, they developed a benchmark for recycling centers in 2022 in which they map out how much e-waste is collected per municipality and how much CO2 they have saved as a result.

Moreover, in 2022 they laid the foundation for Wecycle for companies, an online platform that was officially launched in early 2023. As a company, club or foundation, it can be seen here where you can dispose of all kinds of electrical waste: from lamps and flat screens to solar panels and ICT equipment. You will also find indications on wecyclevoorbedrijven.nl whether you can expect compensation for your electrical waste. In this way we contribute to a responsible way of collecting and processing equipment from the business community.





wecyclevoorbedrijven.nl

Best practice 4: Ecolight Consortium. ITALY

Introduction

Ecolight is a qualified partner of companies, institutions, independent contractors and Organised Large-scale Distributions for the integrated management of a company's waste. This Italian company has launched new smart bins dedicated to the collection of small WEEE that meet the requirements of Italian Decree Uno contro Zero (Italian for "one against zero").

Ecolight has made environmental protection and compliance with the regulations its cornerstones: it operates with an authorised logistics network and certified facilities for waste treatment that guarantee high-level standards of recovery.





IL 2023 IN BREVE

**2.402** Aziende coinvolte**46.783** Tonnellate rifiuti gestiti**18.605** Tonnellate RAEE gestiti**45.997** Missioni erogate**94,6%** Tasso medio recupero RAEE*Data from Social Report 2023*

Key factors

The Ecolight Consortium in Italy has launched new smart bins designed for distribution and commercial spaces. RAEE Ecolsoles (Italian for “WEEE Eco-islands”) are smart bins dedicated to the collection of small WEEE that meet the requirements of Italian Decree Uno contro Zero (Italian for “one against zero”).

The small size of the container (1.5 x 1.2 x 1.5 metres) and its complete automation have made it an innovative tool for the collection of small electronic waste (e.g. mobile phones, small household appliances, light bulbs and energy saving lamps). The WEEE eco-islands are located in urban environments close to large shopping centres to easily reach the citizens.

The operation of the eco-islands involves the registration of the consumer (through the regional health card), the identification of the type of waste to be thrown away and the separate disposal according to the same type. At the end of the operations, the machine will issue a receipt confirming that the waste has been delivered. Through a monitoring system, when the internal containers are full, the machine alerts the technicians by text message to come and empty them. The waste delivered is then tracked from the point of delivery until treatment and recovery. To date, there are still 30 functioning WEEE eco-islands located in the regions of Emilia Romagna, Veneto, Lazio, Lombardia and Toscana.

Best practice 5: Helsinki Metropolitan Area Recycling Centre (Kierratyskeskus). FINLAND

Introduction





The Helsinki Metropolitan Area Recycling Centre (Kierratyskeskus) is a non-profit company founded in 1990 with the purpose of reducing resource consumption, increasing environmental awareness and creating opportunities for civic participation and employment.

Citizens, companies and institutions can hand in small EEE (including laptops and chargers) in any of Kierratyskeskus' recycling centres. Kierratyskeskus also has a pick-up service for a small fee. Once or twice a year, the organisation plans a collection tour with 30 stops around the metropolitan area to make it easy for citizens to hand over their EEE.

Key factors

The EEE is transferred to a pre-sorting centre where resale potential is assessed. If it is economically reasonable, the EEE is repaired in one of the Centre's four repair shops. Not all of the recycling centres have a repair shop, so EEE collected at centres without a repair shop are transferred to another centre for assessment. The repair shops differ in size. The Re-use Centre is planning on cutting the number of repair shops to two for better efficiency. The EEE that cannot be resold is sent to the SERTY EPR scheme for recycling.



Pick-up service and household company pick-up

Order an affordable pick-up service at a time that suits you online or by phone. Don't forget the convenient house company pick-up as well!

[Read more about the pickup service](#)



Donating in stores

You can bring intact, clean and reusable donations of goods to all Recycling Centers within the opening hours. You can also bring electrical equipment and bicycles with accessories in broken condition.

[Find your nearest store](#)



Collector cars

There are many types of collector cars; some are on duty in Toölö and Hagissa, some are probably just around your corner of the house.

[Read more about collector cars](#)

The recycling center's donation points 1



**Box donation points**

The boxes can be used to donate extra household items in good condition.

[Find the nearest Box](#)
**Cello donation point**

You can find the recycling center's donation points at Sello's parking level, near the bottle return connection.

[Read more about Sello's donation points](#)
**MyFetch service**

With MyFetch, you can recycle clean and undamaged household items, clothes and textiles that are suitable as they are.

[Read more](#)

The recycling center's donation points 2

Best practice 6: Ö3-Wundertüte. AUSTRIA

Introduction

Ö3 Wundertüte (AT) is a yearly campaign implemented by the NGO Caritas and the Ö3 radio²⁹ in 2005 to mail mobile phones to a charity for re-use or recycling. Paper bags are sent to households throughout Austria and consumers can send back used mobile phones with accessories free of charge at the post office.

The campaign achieves high collection (up to 31% of mobile phones put on the market in Austria) and re-use rates (60% of collected devices). The campaign is conducted through a partnership between a charity, a re-use organisation, a national radio and postal services.



Key factors





Around November every year, the Austrian system “Ö3-Wundertüte” sends red paper bags to households throughout Austria.

Used mobile phones can be placed with or without accessories in the Ö3-Wundertüte and handed in postage free of charge at the post office. The system cooperates with Austrian post, which is responsible for the logistics, the hit radio Ö319 which leads the communication and the social recycling business “magdas” which organises treatment.

The revenues from the sale of each donated mobile phone goes to the emergency aid fund "Licht ins Dunkel" and the emergency aid of Caritas.

Ö3-Wundertüte collects 400,000 – 500,000 mobile phones (including some chargers and other phone equipment) annually. This amount corresponds to 40 to 70 tonnes/per year. This shows a considerable potential for collection systems based on charity incentives.

Best practice 7: Jedonnemontelephone. FRANCE

Introduction

Jedonnemontelephone is a year-round mobile phone collection initiative implemented by the French PRO for WEEE.

Consumers can send their devices for free either by printing out a label to stick on an envelope or by ordering a prepaid envelope. Devices are received as products (EEE) and can therefore be assessed for re-use.



jedonnemontelephone.fr

Ecosystem, the NGO behind the project, said people could order a pre-paid envelope from its website jedonnemontelephone.fr (I give my phone) or simply print out a pre-paid address label.

Key factors

The phones are sent to a processing centre where all data is erased before the phone is either refurbished for sale at Emmaus charity shops, or in the majority of cases (83 percent) broken down for recycling and the removal of the most polluting components.

The project is an expansion of the nonprofit's main electronics recycling programmes that aim to keep appliances and other devices from incinerators or landfill sites.

Best practice 8: Aiven. FINLAND

Introduction



One not so well known startup that has become a unicorn in this last year is Aiven. This company offers a cloud data platform that provides fully managed open-source databases, streaming, and search applications, among other services. Founded in 2015, Aiven has become a key player in the tech industry by simplifying the process of setting up and managing cloud databases. This allows developers to focus on building applications rather than managing infrastructure.

Aiven's services are available on all major cloud platforms, including AWS, Google Cloud, and Azure. This wide availability, combined with their commitment to using open-source technologies, has made Aiven an attractive option for many organizations looking to innovate and scale their data-intensive applications.

As a tech company, Aiven also directly contributes to Waste Electrical and Electronic Equipment (WEEE) management. The way they contribute to this matter is by promoting the importance to treat electrical and electronic devices in a special way when they reach its end of life, increasing this way the awareness of their clients. One of the activities that Aiven carry out to promote this, is through awareness campaigns for their customers and the wider public about the importance of proper e-waste management.



Moreover, by providing cloud-based services, Aiven helps reduce the demand for physical hardware, which in turn can lead to a reduction in electronic waste. Cloud-based services allow for better utilization of hardware resources, which can reduce the need for new devices and prolong the lifespan of existing ones.

Key factors

Aiven offers data infrastructure elements as a service. They don't sell licenses, and they don't own servers - they manage people's data infrastructure for them.

Data infrastructure refers to all the pieces in a company's IT system dealing with data. It can include:

- Databases for storing information
- Data brokers for passing data to and from other systems





- Visualization solutions
- Analysis solutions
- Monitoring and metrics solutions
- Search engines
- Cache
- Connectors for integrating into other systems

By using open-source software (OSS), they and their customers make sure that they never get locked up in a vendor relationship.

Open source has many other benefits, too. The development happens out in the open, which means the bar of access is low, and the tools themselves are available for anyone who needs them.

The developer base is huge and global, and there are always many eyes on any piece of code. As a result, security and reliability is better in the open-source world than for proprietary software.

11.2. Policy samples for recycling, up-cycling, repairing and second life

Best practice 1: Refurb. DENMARK

Introduction

Refurb is a Danish company that acquires used functional IT (including laptops and tablets) from large companies (more than 200 employees) and public institutions. Refurb refurbishes, upgrades and cleans the EEE as required, and sells it again on the same terms of guarantee as new products.

Refurb's collection methods differ depending on the quality and condition of the used EEE or the need of the company/institution. In some cases, the company/institution has a permanent container where the used EEE can be placed. In other cases, the used EEE is packed in boxes.



Some companies/institutions transport their used EEE to Refurb and in other cases Refurb packs the used EEE at the company/institution. Refurb also sends cages out to companies in order to transport their IT in. Defective EEE is always collected in cages. When the used EEE arrives at Refurb the first step is to delete data from all data-bearing devices. Then they then assess the need for repairs. If it is profitable, they repair the device - if not, they take out useful spare parts and shred the rest.





Refurb has their own shredder, and materials from the shredder are sorted into 17 different fractions. The metal is then sold to a recycling company for recovery. If some products are still functional but not new enough to have any market value in Denmark, they are sold in other countries. Approximately 80% of the used laptops are sold in Denmark and 20% are sold to foreign markets.

Key factors

A Refurb product has gone through a series of specialized and certified processes before it lands in the hands of a new owner.

The processes involve thorough inspection, certified data erasure, testing and upgrading software to ensure the highest quality.

- 1) Certified data erasure. Data erasure requires professional skills. All previous data is deleted according to strict international standards and only with proven algorithms and recognized deletion software. You will experience the first start-up of your Refurb product exactly like a new purchase. Without it being one.
- 2) Test and grading. A Refurb product has been thoroughly tested by experts. All products are refurbished, upgraded, and installed with the latest software to work exactly like new products. The condition of the product is assessed and thoroughly cleaned inside and out.
- 3) Quality. The Refurb product is a quality product whose lifespan can and must be extended. It must meet strict quality requirements. This means that the Refurb product, with proper maintenance, has an expected lifespan of at least 2-4 more years with you as the new owner.
- 4) Warranty. Even if a Refurb product has been used before, the warranty is renewed after going through the refurbishment process. It's guaranteed with a 2-year warranty.
- 5) Result. A Refurb purchase is a better alternative to a new purchase. It is saved money on quality products that are also better for the environment.

A Refurb product uses an average of 300 kg less CO₂, 1.5 tonnes less water and 21 kg less chemicals compared to new models.

Best practice 2: RefugeePhones. SWEDEN

Introduction

Refugee Phones is an initiative that encourages people and organisations to donate their old smartphones to refugees and migrants.

It has delivered more than 6,000 smartphones since its launch in Sweden a year ago - and is in the middle of a big push ahead of the planned demolition of the "Jungle" refugee camp in Calais.

RefugeePhones distributed thousands of pre-paid cards and mobile phones to refugees between 2015 and 2017. Their business was based on donations from mobile phone manufacturers and private individuals and on extensive collaboration with telecom operators.



Sony Mobile, for example, has directly donated handsets to the initiative in Sweden, while telecoms companies Telia and 3 have both donated SIM cards.

Coordinated from the UK, another group, Phone Credit for Refugees, enables individual donors to pay directly for credit for refugees who need it.



Key factors

After checking the functionality of devices, data contained on the phones was deleted and the donated phones were reconfigured. The charity had an order system online, where refugees could fill out an application form. Only high-quality phones were donated for re-use; lesser-quality phones were sold to an EPR scheme for recycling.

Best practice 3: Apple. EEUU

Introduction

Apple is running a trade-in system for their devices (iPhone, iPad, Apple Watch, Mac, accessories, non-brand devices etc.). Apple offers product take-back and allows customers to hand in used devices online or in Apple stores.

Key factors

To ensure data privacy, the latest owner must delete the data on the device before trade-in. To estimate the remaining value of a device, the customers must answer a set of questions online, whereas the devices handed in in Apple stores are evaluated by retail specialists.

Depending on the condition and the model type, a monetary value is calculated and paid out to the customer as a gift card or amount towards the purchase of a new device. Apple's trade-in process is part of the buy-flow process, but customers can also simply return an old device without a new purchase. Devices with a remaining value are transferred to re-use/refurbishment activities whereas those without value are sent to recycling.

Apple has partnerships with trade-in vendors which organise the refurbishment and reselling process through existing channels. In select countries, iPhones directed to recycling can be dismantled by Apple's robot "Daisy". The materials obtained may be sold to specialised recycling companies.





All devices are tracked until the end of the recovery process. In 2019, 11.1 million devices were taken-back by Apple in the USA, with the number of devices sent to re-use/refurbishment greatly exceeding the number of devices directed to recycling. In 2018, for example, more than 7.8 million Apple devices got refurbished.

Good for the planet.

If your device is in good shape, we'll help get it to a new owner. Or, if it's seen better days, we can recycle it for free.

[Recycle your device](#)

[More ways to recycle](#)



Doing more, using less. We're using more recycled content in our products than ever before. And we're recovering crucial materials from end-of-life devices to use again in new ones.

[Learn more](#)



For a better future. Our plan is to have a net zero carbon impact by 2030. We're investing in low-carbon design, energy efficiency, renewable power, and more.

[See just how far we go >](#)

Best practice 4: Fairphone. NETHERLANDS

Introduction

Fairphone is a social enterprise that develops and produces smartphones (so called Fairphones) in a way that contributes to a fairer production and a more transparent supply chain. Thanks to the modular design of their phones, Fairphone's aim is to allow easy exchange and repair of phone parts to increase the lifetime of the whole device. Several materials in different parts of the phone originate from recycled sources.

FAIRPHONE

Since 2017, Fairphone takes back all types of smartphones (not only Fairphones) in France and Germany. In 2020, Fairphone collected around 17,000 phones from the European market which represents 18% of Fairphone's sales. Phones and batteries from African countries were also shipped back to Europe through a recycling initiative Fairphone supports.

Apart from increasing the collection awareness in the field relative to WEEE management, another technique with an equally impacting result is the second-life solution. This technique consists of recycle and reuse electrical and electronic waste through reconditioning.

Key factors





In March 2021, Fairphone launched a new Recycling Service to increase its collection rate. With this new service, customers sending in an old phone are offered a discount on a new Fairphone or a direct cash back.

Phones without remaining value are not refunded but can be sent in free of charge for recycling purposes. Customers can download a shipment label from the Fairphone website for free.

All phones are directly sent to Fairphone's French repair and recycling partner. The partner checks if any of the phones is black-listed (e.g. was stolen) and assigns a value to every phone. The value of the phone is calculated on the basis of its actual price on the second-hand market.

Customers receive their refund as soon as the phone has been reviewed. Phones in good condition are refurbished and resold on the (online) second-hand market whereas others are directed to a recycling company. In 2020, 40% of all phones collected could be re-used and 60% were recycled. Spare parts are also sourced from phones and are used internally by the repair and recycling partner.

Since 2020, Fairphone also offers a service to trade-in single parts (e.g. when a consumer upgrades a Fairphone 3 to a Fairphone 3+ with new parts). The parts are also repaired or recycled. Fairphone's overall goal is to implement a collection and re-use/recycling system that is scalable. Fairphone would like other (phone) companies to take over their concept and to take-back all types of phones irrespectively of their market value. Fairphone is also thinking about taking back other small EEE (e.g. tablets). The company aims to offer its Recycling Service in all European countries.

Best practice 5: Back Market. FRANCE

Introduction

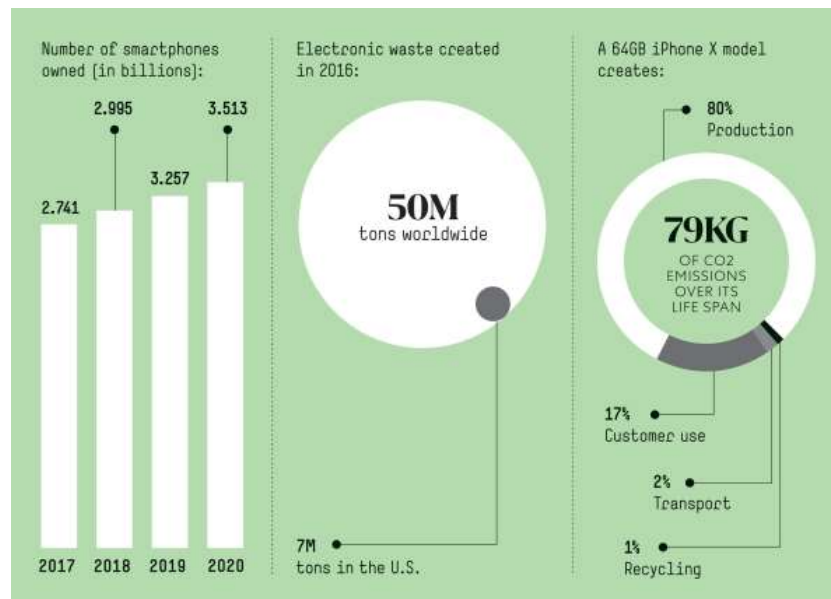
This startup was founded on August 2014, and is an online marketplace that sells refurbished electronic devices.

Back Market has become world changing example due to its innovative approach to the electronics market, providing consumers with an alternative to buying new devices, which can be expensive.

Key factors

By offering refurbished devices, Back Market allows consumers to purchase high-quality electronics at a lower cost. This approach not only benefits consumers but also helps to reduce electronic waste and the demand for new devices, contributing to environmental sustainability. This approach aligns with the principles of the WEEE directive, which encourages the proper disposal of electronic waste and the reduction of wasteful consumption of natural resources.





By offering refurbished devices, this unicorn company extends the life cycle of electronic products, thereby reducing the amount of electronic waste that ends up in landfills. This not only helps to conserve natural resources but also reduces the demand for new devices, which in turn decreases the amount of waste generated.

Furthermore, Back Market's rigorous vetting process for sellers ensures that all refurbished devices sold on their platform have been properly restored and tested. This guarantees that these devices are of high quality and can continue to be used for a long time, further contributing to the reduction of electronic waste.

In addition to the practices mentioned above, one of the most significant ways Back Market contributes to WEEE management is through increasing awareness among its clients. By educating consumers about the benefits of buying refurbished devices, Back Market not only promotes its own business but also raises awareness about the importance of reducing electronic waste.

Through their platform, they inform customers about the environmental impact of electronic waste and how purchasing refurbished devices can help mitigate this. They also provide information on how refurbished devices are a cost-effective and environmentally friendly alternative to buying new.

Back Market has also an extensive guide on how people can properly dispose of their electronic devices once they've reached the end of their life cycle, further promoting responsible e-waste management.

This educational approach empowers consumers to make informed decisions that benefit both their wallets and the environment.





In essence, Back Market is not just selling refurbished electronics; they're also selling the idea of a more sustainable and responsible way of consuming electronics. This approach has a ripple effect, as every informed customer can influence others, leading to a broader societal shift towards more sustainable consumption habits.

Best practice 6: Revolut. ENGLAND

Introduction

This corporation is a British financial technology company that was founded on July 1, 2015, and offers a range of digital banking services.

The services provided by Revolut include easy money management, all in one app. Revolut has become important due to its innovative approach to banking, and thanks to that it has grown significantly until becoming the most profitable unicorn in Europe this last year.

As of 2023, Revolut has attracted more than 18 million customers worldwide. It has been referred to as a "tech superstar" and is considered one of the fastest-growing digital banks with the widest range of features.

Revolut

But Revolut is not only a profitable startup but has also developed a program where it invests part of the budget in WEEE management through promoting the reuse of electronic and electrical devices.

The way that this is promoted is possible thanks to the donations and refurbishment of any redundant electronic equipment when it reaches its end-of-life, and if it cannot be refurbished or reused, Revolut rely on the services of a trusted global partner to recycle e-waste and ensure none of it is directed to landfill.

Key factors

Revolut has taken a number of steps to reduce our carbon footprint:





- Clear waste management procedures allowing for sorting and recycling of general waste across locations.
- Strict e-waste management (meaning discarded electrical and electronic technologies)
- They've introduced a sustainable business travel policy to reduce and compensate emissions linked to such travel.
- Energy used at our London and Vilnius offices is from 100% renewable sources. They expect our policy to expand to other areas as they grow.
- They closed one floor of their London head office to reduce energy consumption.
- All United Kingdom employees also have access to the Cycle to Work scheme to encourage the use of environmentally friendly transport.

Best practice 7: Bolt. ESTONIA

Introduction

Another recent unicorn that has contributed greatly to the cause of WEEE management is Bolt. This Estonian mobility company was founded in August 2013 and offers a variety of services including ride-hailing, micro mobility rental, food, and grocery delivery, and car-sharing.

Bolt operates in over 500 cities in more than 45 countries in Europe, Africa, Western Asia, and Latin America. The company has more than 150 million customers and more than 3 million driver and courier partners.



Bolt has become important due to its innovative approach to mobility. It is the first European mobility super-app offering better alternatives for every purpose a private car. This has made it a top choice for those who prefer to access most services through their smartphones.

Furthermore, this enterprise is also committed to sustainability and compensates for the CO2 emissions its transport and delivery solutions create, minimizing its impact on the local environment. Bolt is one of the few mobility companies that offsets the carbon emissions of all its rides globally. They do this by investing in projects that reduce the amount of carbon dioxide in the atmosphere, making all Bolt rides 100% carbon-neutral.

Key factors

One of the projects where a certain percentage of the budget goes is to Bolt's e-scooters. This program consists in recycling the electric scooters that are at the end of the life cycle thus managing to reduce waste from hardware, thereby embedding circular economy principles across the scooter operations. That is the main reason why they're using, reusing, maintaining,



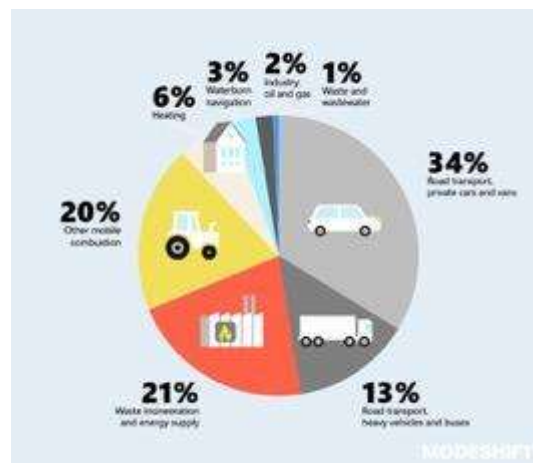


and repairing resources wherever possible to reduce waste and the need for new raw materials through a robust recycling system.

Bolt has also embedded circular economy principles across the entire lifecycle of their products and services. Wherever possible, they use, reuse, maintain, and repair resources to reduce waste and the need for new raw materials.

Thanks to these policies, this startup has managed to achieve 92% reuse of electronic and electrical components in its fleet of electric scooters. The other 8% consists of the batteries of these electric vehicles, which are recycled safely through robust partnerships with local providers.

Bolt is also doing its part to help the city of Oslo reach its sustainability goals being an active member of Næring for Klima, a climate collaboration between Oslo municipality and businesses. One of these goals is to reduce greenhouse gas emissions in the city by 95% by 2030. To enable responsible waste management, Bolt partnered with the company RENAS, which has a network of its partners to handle various aspects of the process. Battkomp (formerly known as Yedlik) inspects and repairs scooter batteries within this network. And Norsk Gjenvinning recycles many remaining scooters waste materials, including wood, metals, plastics, rubber, and others.



Best practice 8: Voi. SWEDEN

This mobility company was founded in 2018 and offers electric scooter sharing service. The company operates in several cities across Europe, providing an eco-friendly transportation alternative to traditional vehicles. Users can rent Voi's electric scooters through a mobile app, making it a convenient option for short distance travel.

Voi has become important due to its innovative approach to urban mobility.

voi.

It provides a solution to the "last mile" problem in transportation, which refers to the challenge of traveling the final stretch from a transportation hub to a final destination. By offering a convenient and eco-friendly transportation option, Voi helps to reduce traffic congestion and





carbon emissions in cities, gaining great popularity among those people who want to contribute to reducing pollution.



Key factors

Voi, as a provider of electric scooters, falls under the category of producers of electrical and electronic equipment. As such, it has responsibilities under the Waste Electrical and Electronic Equipment (WEEE) regulations. These responsibilities include ensuring the correct disposal and treatment of their products when consumers dispose of them.

Voi contributes to this matter in several ways. Firstly, they have built a hierarchy of waste to consider its importance at every stage of our supply chain. From predicting potential for waste during the design stage, to managing waste in the warehouses as well at the point of disposal. There are four main steps that are taken at Voi to ensure best-in-class recycling processes:

- Optimise the use of recycled and recyclable materials in the vehicles.
- Repair and reuse spare parts.
- Implement industry-leading recycling processes.
- Establish zero-waste warehouses in all markets.

However, for the fraction of materials that cannot be reused, Voi strives to divert all waste from landfill and recycle and recirculate all materials elsewhere, by collaborating with local recycling experts.

Voi has also developed an eco e-scooter with a design where 91% of the materials that are used to build it can be recycled. With this, Voi has managed to carry out a circular approach where each scooter in their fleet can be used to build another one when it reaches the end of life.





Furthermore, in addition to all the supply chain recycling and circularity practices, Voi is also focusing on the eradication of all electronic and electrical waste at warehouses, and they aim to have zero-waste warehouses by 2024.





12. INDICATORS BENCHMARKING AND CONVERGING MEDITERRANEAN POLICY

12.1. KPIs to be achieved

According to the aim of the eWAsTER project it is important to set the KPIs, measuring success of the project and impact on the market and its regulation. Among the KPIs possible to watch can be:

1. Increased WEEE collection rates measured as a percentage increase in the amount of e-waste collected within participating regions over a set period.
2. Enhanced WEEE reuse and refurbishment rates by measuring the percentage of collected e-waste that is successfully reused or refurbished instead of being directly recycled.
3. Improved WEEE recycling efficiency through monitoring the percentage of collected e-waste that undergoes proper and efficient recycling processes, minimizing waste and maximizing resource recovery.
4. Policy alignment with the EU Circular Economy Action Plan using qualitative assessment of how well the policies developed or refined through the project align with the principles and goals outlined in the Action Plan.
5. Knowledge sharing and collaboration among participating regions measured by tracking the number of knowledge exchange events, best practice documents shared, or collaborative policy development initiatives undertaken by the regions.
6. Public awareness and participation, bringing the changes in public awareness of ewaste issues, monitor participation in e-waste collection programs, or engagement in initiatives promoting responsible e-waste management.

Measuring the Key Performance Indicators (KPIs) within the eWAsTER project will require a clearly defined methodology for data collection and analysis. Below is the proposed methodology for measuring each KPI.

In detail, within work package 2 of the project, PACT will be in charge of carrying out the pilot called WEEE REUSE, which promotes the creation of new business models for reuse of plastic and e-waste, with a focus on creating jobs for vulnerable individuals.

The KPIs that have been agreed upon to reach the objective are the following:

Job Creation & Impact on Vulnerable Individuals:

- Number of Jobs Created: Track the total number of jobs created within the pilot program related to plastic and e-waste reuse. Target: Create X number of jobs.
- Number of Vulnerable Individuals Employed: Specifically track the number of jobs filled by individuals from vulnerable groups (e.g., long-term unemployed, people with disabilities, refugees, etc.). Target: Y% of jobs created are filled by vulnerable individuals.





- **Job Retention Rate:** Measure how long vulnerable individuals retain their employment within the program. Target: Achieve a job retention rate of Z% after a certain period (e.g., 6 months, 1 year).
- **Income Generated by Vulnerable Individuals:** Track the average income earned by vulnerable individuals employed in the program. Target: Ensure income meets or exceeds a living wage standard.
- **Skills Development & Training:** Measure the number of vulnerable individuals who receive training and develop new skills related to plastic and e-waste reuse, recycling, and business operations. Target: Provide training to X% of participating vulnerable individuals.
- **Improved Quality of Life (Qualitative):** Gather qualitative data (e.g., through surveys, interviews) to assess the impact of employment on the quality of life of vulnerable individuals (e.g., improved financial stability, social inclusion, self-esteem). Target: Demonstrate positive impact on quality of life through qualitative data.

Business Model Viability & Impact:

- **Number of Businesses Created:** Track the number of new businesses established as part of the pilot program focused on plastic and e-waste reuse. Target: Create A number of viable businesses.
- **Revenue Generated by Businesses:** Measure the total revenue generated by the businesses involved in the pilot. Target: Achieve a total revenue of \$B.
- **Profitability of Businesses:** Track the profitability of the participating businesses. Target: Achieve a profit margin of C% for participating businesses.
- **Volume of Plastic and E-waste Reused:** Measure the amount (in weight or units) of plastic and e-waste collected, processed, and reused through the program. Target: Reuse D tons/kg of plastic and E tons/kg of e-waste.
- **Types of Products/Services Developed:** Track the variety and innovativeness of products and services created using reused plastic and e-waste. Target: Develop F number of new and innovative products/services.
- **Market Demand for Reused Products/Services:** Assess the market demand for products and services made from recycled plastic and e-waste. Target: Achieve G% market penetration for recycled products.
- **Cost-Effectiveness of Reuse Processes:** Analyze the cost of collecting, processing, and reusing plastic and e-waste compared to traditional waste management methods. Target: Demonstrate cost-effectiveness of reuse processes.

Environmental Impact:

- **Reduction in Landfill Waste:** Estimate the amount of plastic and e-waste diverted from landfills due to the program. Target: Divert H tons/kg of waste from landfills.
- **Reduction in Greenhouse Gas Emissions:** Estimate the reduction in greenhouse gas emissions due to recycling and reuse activities. Target: Achieve I tons/kg of CO2 equivalent emission reduction.





- Resource Conservation: Quantify the amount of virgin materials conserved due to the reuse of plastic and e-waste. Target: Conserve J units of virgin materials.

12.2. Proposals of improvements at local and regional level

Building upon the eWAsTER project's foundation, here are some potential proposals for improvements at local and regional levels to further enhance e-waste management.

Local level

- ✓ Public awareness campaigns by organizing educational workshops, community events, and targeted social media campaigns to raise awareness about responsible e-waste disposal and the availability of local collection points.
- ✓ Incentivize e-waste reuse and refurbishment through partnership with local repair shops to offer discounts or vouchers for e-waste repairs and refurbishments, thereby extending the lifespan of devices.
- ✓ Organize community collection events, hosting regular e-waste collection drives in convenient locations, making it easier for residents to responsibly dispose of their unwanted electronics.
- ✓ Implement convenient e-waste drop-off points by establishing easily accessible and clearly marked drop-off locations, such as supermarkets, recycling centres, or public buildings, to encourage regular e-waste disposal.
- ✓ Partner with local schools and businesses to establish dedicated e-waste collection points and educational programs for staff and students on responsible e-waste management.

Regional level

- ✓ Develop regional comprehensive e-waste management plans that outline specific targets, strategies, and resource allocation for improving e-waste collection, reuse, and recycling across the region.
- ✓ Invest in e-waste processing infrastructure by supporting the development or upgrade of regional e-waste processing facilities to ensure efficient and responsible recycling, minimizing environmental impact.
- ✓ Standardize e-waste collection and recycling practices, establish consistent regional guidelines for e-waste collection, sorting, and recycling processes, ensuring efficient and high-quality recycling throughout the region.
- ✓ Foster collaboration among municipalities and stakeholders, encourage collaboration between local municipalities, waste management companies, and other stakeholders to share best practices, resources, and expertise for efficient e-waste management.
- ✓ Advocate for extended producer responsibility (EPR) schemes by lobbying national or regional governments to implement or strengthen EPR policies, holding producers financially responsible for the collection and recycling of their products at end-of-life.





13. WP3 eWAsTER Solutions Endorsement and Transfer Framework

13.1. Purpose of the WP3 Consolidation

The WP3 consolidation process updates PACT's Local Action Plan to reflect the transition from territorial analysis (WP1) and pilot testing (WP2) to policy-level commitment. The Alentejo's LAP responds to a clear challenge: Portugal ranks among the weakest WEEE collectors in the EU, with regional studies confirming low citizen awareness despite a dense collection infrastructure.

PACT's initial pilot focus on WEEE reuse was blocked by Portuguese legal constraints, as no unlicensed organisation may collect, dismantle, or handle WEEE, and by the risk of diverting equipment towards grey markets.

In response, PACT developed a VR-based application for WEEE education and capacity building. This WP3 update consolidates that pivot into a long-term commitment: endorsing the educational solution as a durable, transferable instrument to be actively deployed through PACT's institutional offers for citizen awareness.

This section does not constitute an implementation plan or formal regional strategy; rather, it expresses PACT's institutional commitment to integrating and disseminating the solution across the Alentejo through its established networks and partnerships.

13.2. Evidence from WP2 Pilot Solutions

PACT initially planned to implement a WEEE reuse pilot in partnership with APPACDM Évora, a local social solidarity institution working with individuals with mental disabilities, alongside a regional waste management entity. The partnership demonstrated the willingness and cooperative spirit of the regional stakeholder network. However, implementation was blocked by Portuguese legal requirements: Decree-Laws 102-D/2020 and 152-D/2017 restrict all WEEE handling — including collection, dismantling, and reuse — to certified and licensed entities. Neither PACT nor APPACDM held the necessary certification, and the pilot as designed was not legally valid.

Beyond the legal barrier, regional consultations confirmed that WEEE reuse in the Alentejo would face financial unsustainability, limited availability of safe-component equipment, and the risk of feeding parallel grey markets. A key lesson was that reuse addresses a downstream problem, while the primary challenge lies upstream: incentivising conscious purchasing, personal reuse, repair, and proper disposal. Replication of WEEE REUSE in other territories requires prior legal validation and a careful cost-benefit assessment against alternative approaches such as innovative awareness campaigns.

Following consultation with Gesamb and two stakeholder group sessions involving all five intermunicipal waste management entities and national-level organisations, PACT pivoted to the development of a VR-based application offering several immersive experiences: WEEE sorting by typology, desktop PC dismantling, and education on WEEE handling and circularity.

Stakeholders confirmed that school-focused, innovative awareness campaigns produce the strongest and most lasting behavioural outcomes in the Portuguese context. The VR solution was





well-received in prototype demonstrations. Its key strength lies in reusability and transferability: it can be deployed repeatedly across different municipalities, audiences, and settings, and will remain available to other entities after the project ends. Its main limitation is the absence of direct WEEE collection, requiring coordination with a licensed entity for any integrated collection component after application of the educational modules.

PACT tested the VR-based educational experience over a period of two weeks, targeting both children, young adults, and their legal guardians. Responses were overwhelmingly positive over the 55 collected survey answers, averaging a 3.81/4 score, where 45 responses detailed a 4/4 score.

Of all, 43 participants stated the experience was easy to use, while 21 evaluated there were some challenges, of which the main ones were controls and movement (17 respondents), clarity and instructions (8), and user experience in navigating menus (2).

Out of 55 respondents, 89.1% considered they had learned at least “some things” during the experience, while the remaining presented no learning opportunities, though half of these claimed to already consistently recycle WEEE. The main requests for improvements were the addition of further interactive experiences for hands-on learning, with a smaller portion requesting further information concerning WEEE.

The overwhelming majority of respondents claimed that they would recommend the experience for WEEE education (94.5%), that it would be useful in a school setting or training environment (96.4%), and that they would start to recycle WEEE (50.9%) or strengthen their practice (43.6%) after the experience.

Considering recycling profiles, over half the respondents (54.5%) claim to recycle WEEE, though only 34.5% recycle consistently. The main motives for not recycling were not knowing where to deliver WEEE (34.5%), while a smaller percentage stated they did not know the importance of recycling WEEE (14.5%) or the inconvenience of directly depositing in purpose-made places (5.5%).

Overall, the experience was overwhelmingly seen as positive, with a majority of respondents emphasising the benefits a VR-based experience can bring to WEEE and environmental education and awareness-raising.

13.3. Selection of Solutions for Endorsement

PACT endorses the adapted WEEE BEHAVE solution, specifically the VR-based educational application developed as a context-appropriate response to the legal and operational barriers encountered during WP2.

The endorsement is grounded in three rationales. Strategically, the solution aligns, despite not foreseeing integration into, with Specific Objective 3 of Portugal's National Plan for Waste Management (PNGR 2030), reducing the negative environmental impacts of waste through integrated management, and with the weaknesses identified in Alentejo's intermunicipal Strategic Action Plans for Urban Waste (PAPERSU 2030). Institutionally, it falls within PACT's established citizen science and circular economy offer, enabling deployment through existing channels without requiring new regulatory frameworks. Operationally, it delivers a durable, reusable asset capable of reaching diverse audiences across the region.





It should be noted that PACT's solution, while informed by WEEE BEHAVE principles, has a distinct operational basis and non-comparable KPIs relative to partners who implemented the standard WEEE BEHAVE pilot. The solution is classified within PACT's Industry 4.0 strategic area while simultaneously responding to regional dissemination needs.

WEEE REUSE is not endorsed at this stage. It is considered operationally unfeasible and financially unviable in the Alentejo context, as confirmed by legal analysis and regional stakeholder consultation.

13.4. Conditions for Future Adoption

The VR application is designed for integration into PACT's public institutional offer, specifically within its citizen science and circular economy pillar. PACT has regional scope across the Alentejo and maintains established cooperative relationships with all five intermunicipal waste management entities (Ambilital, AMCAL, Gesamb, Resialentejo, Valnor) and the region's higher education institutions, providing natural deployment channels through study visits, open days, fairs, and hosted sessions at PACT's premises and partner locations.

The most appropriate governance level for broader adoption is regional, with the CCDR-A as a potential anchor for intermunicipal coordination of joint awareness actions. Relevant instruments that could host future adoption include intermunicipal Strategic Action Plans for Urban Waste (PAPERSU 2030) and CCDR-A's environmental monitoring and licensing framework.

Enabling conditions for wider institutional adoption include: formal engagement of intermunicipal communities in awareness activities through waste management entities; administrative coordination for school involvement; and, where direct WEEE collection is pursued alongside educational sessions, logistical partnership with a licensed waste management operator.

No budgets, timelines, or formal implementation responsibilities within official environmental education are committed through this endorsement. PACT is not a competent authority for waste management and does not assume formal functions for waste management or local dissemination under the national Agency for Environmental Protection (APA). However, PACT does have authority to implement citizen education actions, and plans to start deploying VR-based learning activities at the end of 2026, with potential coordination with educational actors and stakeholders starting in early 2027.

13.5. Stakeholder Alignment and Governance Pathway

PACT conducted one focus group and one discussion forum during WP3, involving ten organisations across two governance levels. At regional level: five intermunicipal waste management entities (Ambilital, AMCAL, Gesamb, Resialentejo, Valnor) and the Alentejo Coordination and Regional Development Commission (CCDR-A). At national level: two producer responsibility organisations (Electrão and ERP).

Alignment was strong across all participants. Stakeholders converged on one priority: innovative, school-focused awareness campaigns that generate lasting behavioural change and indirectly reach family units. The VR-based solution was considered well-suited to this objective. Two persistent barriers were acknowledged: a widespread expectation of material reward for recycling,





which undermines consistent behaviour; and theft and diversion of WEEE at collection points, which erodes citizen trust.

The governance pathway envisaged is institutional rather than regulatory: PACT integrates the solution into its own operational offer, with the CCDR-A positioned as a potential future coordinator for broader intermunicipal uptake.

13.6. Endorsement Statement

Through this Local Action Plan, PACT acknowledges the relevance of the VR-based WEEE educational solution identified through the eWAsTER project and expresses its institutional commitment to its continued deployment and future adoption as part of its citizen science and circular economy offer, in line with its organisational competences, established regional partnerships, and applicable policy frameworks.

PACT hopes to begin deployment and make such VR solutions officially available through its Laboratory in late 2026.





14. CONCLUSIONS

The project has proven to be a pivotal initiative in addressing the escalating challenge of electronic waste (e-waste) across Europe. By fostering collaboration and encouraging knowledge exchange among participating regions, it effectively bridged the gap between existing local and regional policies and the ambitious targets set by the EU's Circular Economy Action Plan. This success was achieved through a comprehensive, lifecycle-based strategy that addressed e-waste management from collection to final treatment.

Key focus areas included increasing collection rates, promoting the reuse and refurbishment of electronics, and ensuring environmentally responsible and efficient recycling practices. This holistic approach empowered each region to develop and implement tailored policies, while also promoting a culture of collaboration and shared learning. The ripple effect of this cooperation holds the potential to influence e-waste management practices well beyond the original eight participating regions, benefiting the broader EU landscape.

Moreover, the project laid a practical foundation for enhancing e-waste management at the local and regional levels. By adopting targeted improvements—such as public awareness campaigns, incentivized reuse and refurbishment schemes, more accessible e-waste collection infrastructure, and detailed regional management plans—authorities can make meaningful progress toward circular economy goals. Advocating for Extended Producer Responsibility (EPR) schemes can further support sustainable e-waste management by assigning producers financial responsibility for their products at end-of-life.

Building on these achievements, project partners will now develop a Methodology for Designing Strategies and Action Plans (APs) for e-waste prevention and management in the Mediterranean. These strategies will be implemented through eight Action Plans and tested via three innovative pilot actions:

- WEEE REUSE: Fostering social enterprises and community initiatives to manage WEEE and create employment opportunities.
- WEEE PROCURE: Promoting a new eco-innovative business models based on the eco-renting of EEE, in cooperation between the demand side and the offer side, which allows the creation of a new eco-business
- WEEE BEHAVE: Increasing public awareness and engagement in e-waste management practices.





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