



LOCAL ACTION PLAN. BOSNIA AND HERZEGOVINA

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Name	Role	Action	Date
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LOCAL ACTION PLAN BOSNIA AND HERZEGOVINA

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polluting MED waster by turning waste
into a resource.

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1. EXECUTIVE SUMMARY

The increasing presence of electronic devices in our daily lives has brought about a significant challenge: electronic waste, or e-waste. As these devices reach the end of their usability, the need for responsible and sustainable management becomes more critical than ever. The eWasTER project, a collaborative initiative funded by the Interreg Euro-Med program, is actively addressing this issue.

Operating across eight European regions, eWasTER aims to bridge the gap between existing regional and local policies and the objectives set out in the EU's Circular Economy Action Plan. This initiative promotes a shift from the traditional "take, make, dispose" model to a circular system where resources are utilized more efficiently for extended periods. By improving e-waste management processes, eWasTER contributes directly to this transition.

Beyond legal compliance, eWasTER fosters cooperation between participating regions by encouraging the exchange of best practices and collective learning. Through knowledge sharing, joint policy development, and tailored regional solutions, the project strengthens local capacities while ensuring broad geographical impact. This collaborative approach accelerates progress toward circular e-waste management throughout the EU.

By engaging partners like LINK, which actively supports WEEE management business in the country, eWasTER not only addresses policy gaps and promotes best practices but also takes tangible steps toward achieving circular economy goals. In Bosnia and Herzegovina, the project's implementation, guided by key stakeholders such as LINK's partners and Municipality of Neum, will be instrumental in aligning with regulations, advancing sustainability, and contributing to environmental protection.

In addition, this consolidated LAP serves as a localized implementation guide, adopting the general principles of the national BiH LAP (including the LINK's information) while focusing on the specific needs of Neum as the country's only coastal municipality. The primary vision for the 2026–2030 period is to establish a recognizable and measurable local system that prevents e-waste from polluting the marine ecosystem and ending up at the Klepovica landfill. By involving all actors, from public utility companies to the tourism sector, the plan aims to maximize resource recovery and protect public health.



2. ABBREVIATIONS

AP	Action Plan
BP	Best Practices
CPU	Central Processing Unit
CWC	Chemical Weapons Convention
EC	European Commission
EEE	Electrical and Electronic Equipment
EP	European Parliament
EPR	Extended Producer Responsibility
ERDF	European Regional Development Fund
EU	European Union
E-waste	Electronic waste
GIZ	Deutsche Gesellschaft für Internationale Zusammenarbeit
HS	Harmonized System
JKP	Javno Komunalno Preduzeće (Public Utility Company)
KPI	Key Performance Indicator
LAP	Local Action Plan
LGU	Local Government Groups
LoW	European List of Wastes
OECD	Organization for Economic Co-operation and Development
OECD	Organization for Economic Co-operation and Development
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
SWOT	Strengths, Weaknesses, Opportunities, and Threats
WCO	World Customs Organization
WEEE	Waste Electrical and Electronic Equipment



3. PURPOSE AND METHODOLOGY

This Local Action Plan (LAP) for Waste Electrical and Electronic Equipment (WEEE) aims to provide a framework for managing e-waste effectively at a local level. The primary purpose of such a plan is to promote sustainable waste management practices by ensuring the environmentally sound collection, treatment, and disposal of WEEE. It focuses on reducing environmental and health hazards linked to improper e-waste handling while maximizing the recovery and recycling of valuable materials like metals and plastics. By reintegrating these materials into production cycles, the LAP supports the transition to a circular economy.

Another important objective of the plan is to raise awareness among citizens and stakeholders about the importance of proper e-waste disposal. This enhances public participation in collection programs and encourages sustainable practices. Furthermore, the plan helps align local efforts with national and international regulations, such as the WEEE Directive and Basel Convention, ensuring regulatory compliance. By fostering collaboration between local governments, producers, recyclers, and the community, the LAP strengthens partnerships and facilitates the implementation of Extended Producer Responsibility (EPR) schemes. It also contributes to economic and technological development by creating green jobs and fostering innovation in recycling technologies.



The development of a Local Action Plan begins with an assessment and baseline analysis. This includes identifying the sources, types, and volumes of WEEE generated locally and mapping existing collection, recycling, and disposal systems. A review of current practices highlights gaps in infrastructure, regulations, and public awareness. Stakeholders are then engaged through consultation workshops and public participation to identify challenges and co-develop solutions.

The methodology for developing this plan involves a combination of baseline analysis from the national BiH LAP (including LINK's information) and a review of Neum-specific documents, including the Waste Management Plan 2021–2025 and the Development Strategy of the Municipality of Neum 2023–2030. This approach ensures that local challenges, such as seasonal waste spikes and coastal environmental risks, are addressed within the broader regulatory framework of the eWasteTER project.

The strategic framework of the plan is built around well-defined objectives, policies, and financial mechanisms. These include setting measurable goals, enhancing regulations, and identifying funding sources such as municipal budgets, EPR schemes, or external grants. The plan also includes detailed actions, such as improving infrastructure for e-waste collection and treatment, launching targeted awareness campaigns, and introducing systems to monitor WEEE flows.

Implementation is phased, with short-term, medium-term, and long-term actions clearly outlined. Responsibilities are assigned to stakeholders, and capacity-building initiatives are incorporated to train workers in e-waste management. To ensure success, the plan establishes key performance indicators (KPIs) to measure progress, along with mechanisms for periodic reviews and transparent reporting.

Overall, this comprehensive approach ensures that WEEE is managed efficiently, benefiting the environment, the economy, and public health. It is tailored to address the specific needs and resources of the local area while fostering sustainable development.



4. INTRODUCTION TO THE TOPIC

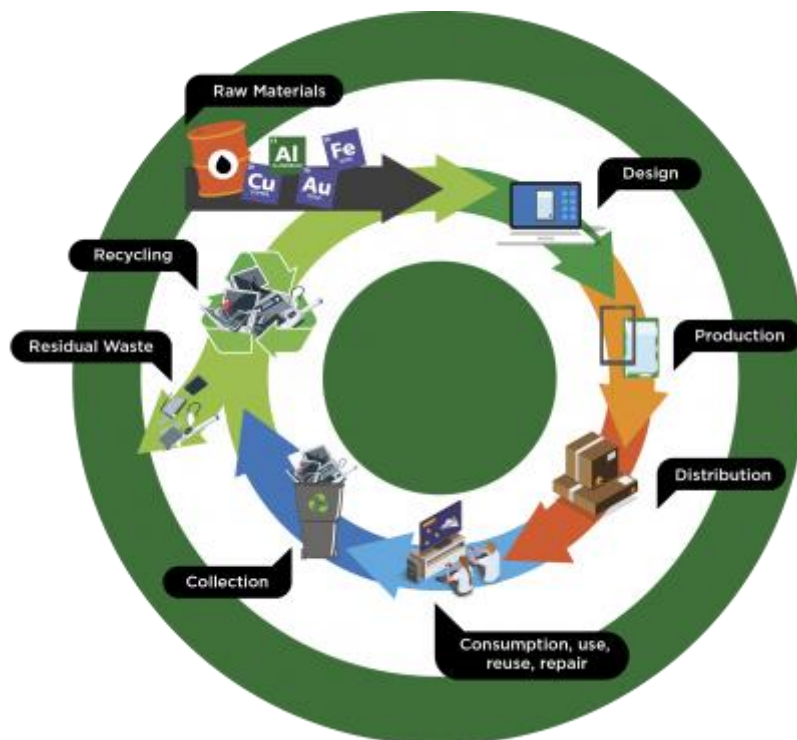
4.1. Introduction to WEEE challenge

Electrical and electronic equipment - from washing machines and vacuum cleaners to smartphones and computers – these products can define the modern world and it is hard to imagine life without them today.

The term WEEE, also referred to as 'e-waste', is an abbreviation of waste electrical and electronic equipment. A key component of the definition is the word 'waste' and what it logically implies – that the item has no further use and the owner is obliged to dispose of it in its current state. WEEE includes nearly any household or business item containing circuitry or electrical components with either power or battery supply.

The management of WEEE in Europe is a pressing issue, as the growing volume of electronic waste poses significant challenges for sustainable waste management. WEEE consists of a complex mixture of materials, including hazardous substances (e.g., brominated flame retardants (BFRs) and polychlorinated biphenyls), risk elements, plastics, and on the other hand valuable resources like rare earth elements. Safely handling and disposing of WEEE is crucial to mitigate environmental and health risks while also promoting resource recovery.

Below you can see the main materials and their percentages in selected products that are used every day. In the EEE, metals such as iron, copper or aluminium, plastic and glass are the most common. It is therefore appropriate that waste management for these products is set up well and, above all, efficiently with the potential for reuse.





In Europe, the management of WEEE is governed by a comprehensive set of directives and policies aimed at minimizing its adverse effects and fostering the principles of the circular economy. These regulations provide guidelines for the collection, treatment, and recycling of WEEE to ensure the proper handling of hazardous components and the recovery of valuable materials.

However, the implementation of WEEE management regulations across European countries and regions exhibits variations and challenges. Different approaches and practices can impact the effectiveness and efficiency of WEEE management systems. For instance, the availability and accessibility of collection points, the effectiveness of recovery networks, and the involvement of various stakeholders can vary.



Only 3 member states have reached the collection target of the WEEE Directive (source: <https://www.scycle.info/new-study-update-of-weee-collection-rates-targets-flows-and-hoarding/>)

In response to the ever-growing volume of discarded electrical and electronic appliances, the European Parliament put into effect the Waste Electrical and Electronic Equipment (WEEE) Directive in February 2003. The purposes of the WEEE Directive 2002/96/EC were:

- to prevent and reduce the amount of WEEE,
- to improve the reuse, recycling, and recovery of WEEE,
- and to ensure discarded appliances are treated using environmentally sound processes.

The recast of the WEEE Directive 2012/19/EU was enacted on 13 August 2012. The purpose of the Directive and the recast is to contribute to sustainable production and consumption by, as a first priority, the prevention of WEEE, as well as by the reuse, recycling, and other forms of recovery of such wastes so as to reduce the disposal of waste and to contribute to the efficient use of resources and the retrieval of valuable secondary raw materials. The Directive also seeks to improve the environmental performance of all operators involved in the life cycle of electronic and electrical equipment, e.g., producers, distributors, and consumers, especially those operators directly involved in the collection and treatment of WEEE.

4.2. eWAsTER project

The “Preventing e-waste from polluting MED water by turning waste into a resource (eWAsTER)” project is co-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:

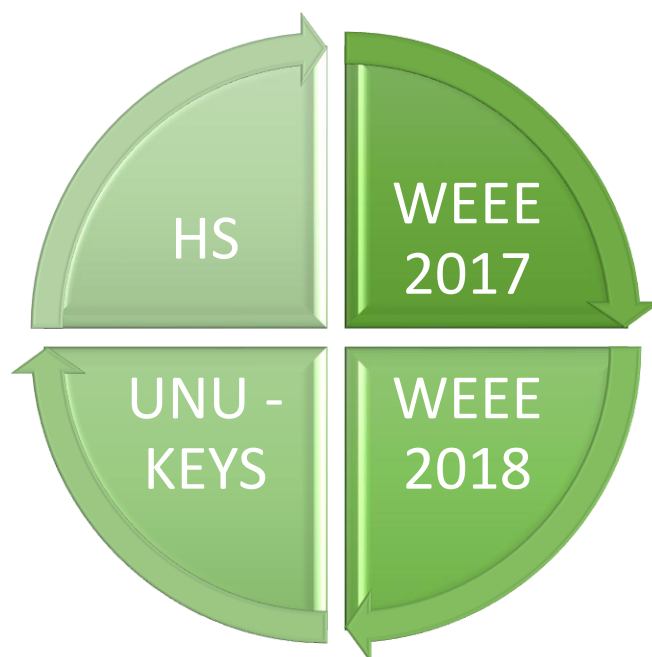
- WP1: To create local and regional Action Plans for e-waste prevention and management, based on the project self-assessment tools and the project “Methodology for designing Strategies for Mediterranean e-waste prevention and management”
- WP2: To demonstrate and test the feasibility and effectiveness 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.

4.3. Introduction to main WEEE Waste key concept

Before launching the explanations of the different factors affecting the national and local policies in WEEE management, it is necessary to underline some definitions that will be of importance for the Action Plan.

WEEE classification

There are main classifications launched by the EU and international organisms that will be of common use in the document.



- WEEE 2017 and 2018 are classifications provided by the European Union in their WEEE Directives.
- UNU-KEYS is a classification system launched from the UNU which categorises products by similar function, comparable material composition and related end-of-life attributes UNU.
- HS 2022 codes, harmonised statistical coding of the international trade codes, includes specific provisions for its classification to assist countries in their work under the Basel Convention. The HS codes link to the CPC product classification

WEEE monitoring systems and concepts

When defining the data sources for calculation and monitoring, many potential options are currently used in different world locations. Some of the most necessary to understand the EU system are: EEE Put on Market, Life-time of EEE products, stocks, Formal collection of e-waste, Extended Producer Responsibility (EPR), Other recycling (Wother).

Concepts on WEEE monitoring

EEE Put on Market,
Life-time of EEE products, stocks,
Formal collection of e-waste.
Extended Producer Responsibility (EPR)
Other recycling (Wother)

Key actors



Key actors in waste management
(Source: <https://weee-forum.org/>)

Through this part, references will be done to the different actors involved in the flow of e-waste, which goes from producer to users and authorities.

Currently there is a clear discrepancy between the competences and the responsibilities allocated to the actors involved in the WEEE value chain. In practice, many Member States have appointed PROs and producers as the only actors that can effectively contribute to the attainment of the targets.

This situation did not take into account who is best placed to act or influence. It did not account for the fact that PROs and producers do not have the levers to access all WEEE and actors outside of the formal WEEE system do, whilst access is needed to meet the targets. Moreover, some Member States have imposed penalties on PROs for not attaining the targets.

On behalf of over 31,000 brand owners and producers of electrical appliances, and through contracts with logistics and recycling operators, the system, since their start-up, collected, de-polluted, recycled, and recovered to the highest treatment standards almost 26 million tonnes of waste electrical and electronic equipment.

According to Eurostat, the total collected WEEE increased from 3.0 million tonnes in 2012 to 4.9 million tonnes in 2021.

Just the main association of PROs, the WEEE Forum, operate more than 114,000 collection points.

The actors in the All-Actors Approach (AAA)

National competent authorities include: Member State governments; National waste authorities

Control and enforcement bodies: Inspection and customs

Coordination body.

EEE Producers and PROs

Retail. Including household and non-household WEEE.

Local authorities.

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

Preparing for reuse.

WEEE treatment companies. Including: WEEE recyclers and licensed (for treating/accepting WEEE) scrap and car shredders.



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

Citizens/Business/Public sector-WEEE generators



5. BACKGROUND TO THE LOCAL ACTION PLAN

5.1. Introduction to Local Action Plan

The objective of Managing Authorities is to implement better national, regional and local policies for management of WEEE, covering the main recommendations of the “Circular Electronics Initiative” from the EU Circular Economy AP.

The first step in this process is to identify the current WEEE situation and policies on the geographic area to be influenced, comparing them with the surrounding areas (seeking for divergences which can create illegal shipments), and producing a SWOT analysis.

The current situation analysis is called in many ways in the Interreg Europe community, such as regional assessment, state of art, regional analysis, etc. and the name provided in eWasteR is Action Plan.



The Action Plan includes an analysis of the WEEE sector in the project regions, evaluating the main actors and main policies. This Action Plan is the phase 1 of the project.

The management of WEEE is a complex and multi-faceted issue. From organization to implementation, selective collection, sorting and treatment systems, local authorities face tricky technical, legal, economic and educational questions. These national and regional peculiarities will influence the AP results and the defined Key Performance Indicators (KPI).

The Conclusions of the AP will describe all this data, trying to be the departing point for the Pilot Action structure, thus Pilot Action will directly feed in the AP. The Action Plan will use the information of the sectorial analysis to define new policy tools and design the actions to be implemented in phase 2.

5.2. Methodology to be implemented in eWasteR

The Action Plan has followed a methodology structured in several phases where the data was gathered, processed, verified, agreed and delivered. The objective of the Methodology was to assure that the final product (AP) achieved the requirements defined in the Policy Instruments. The final data, in addition to being technically reliable, will have to count with the review of the experts and the stakeholders in order to be integrated in the final Action Plan.

Desk analysis

The Analysis was carried out at macro data, using statistical sources, mainly national statistic agencies, European statistic bodies or sectorial reports both at national and EU level.

These reports can provide most of the information related to the economic, education and industry sectors, their trends and SWOT, while in some cases they also provided energy data about consumption profiles, aggregated consumptions or energy market composition.



In terms of policies, they were also gathered in this stage, identifying the current targets and level of achievements for EU, National and regional policies.

WEEE data gathering

When necessary, deeper detailed information was analyzed from sectorial researches, or even on-site data gathering. For the detailed data gathering, specific tools were used for data collection. This information has allowed working on the details of the key performance indicators, together with additional information which was collected in the following stages.

Key performance indicators practice structure definition.

Following the desk research, and based on some data gathering, the AP identified preliminary KPI to be analyzed in depth in the following stages. These socio-economic indicators were an initial measurement tool for the adequacy of the WEEE to be evaluated in the best practices.

Validation process

The initial KPI were evaluated in base to the best practices results, and modification applied when required. The final KPI were integrated in the Draft AP, together with the preliminary conclusions. The draft local action was presented to key stakeholders in a meeting, together with a SWOT analysis, where the KPI and rest of information were validated.

Results

The results and conclusions from the Action Plan will be the base for the definition of the Pilot Action structure, which will be based on the sectorial necessities of the industry in the region. Thus, the conclusions of this document will be aimed to the final integration in the Action Plan structure.

The expected results will be the identification of the:

- Challenge
- Existing Tools and actors
- New path and solutions



6. WEEE CONCEPTUAL FRAMEWORK

6.1. E-WASTE / WEEE CLASSIFICATION

Before going into detail about the measurement framework, the issue of e-waste classification will be discussed.

Electronic waste, or e-waste, refers to all electrical and electronic equipment (EEE) and its parts that have been discarded by its owner as waste without the intent of re-use. There are many types of EEE products on the market, which makes it important to group them into sensible and practically useful categories.

There are many classifications that can be used to describe e-waste, and each of them is potentially valuable to form the basis of e-waste statistics in the proposed measurement framework. However, there are several criteria to which the classification should comply in order to effectively harmonise e-waste measurement, and thus lead to sensible and internationally comparable indicators.

In general, the categories should not be defined too specifically around products that do not pose a threat to the environment, or that do not contain valuable materials, nor have a large market share, as this leads to too many irrelevant codes and consequently imposes an unnecessary administrative burden on respondents. Moreover, there will be very few databases available from which data can be collected in the desired classification. The classification system should also not be too aggregated, as differences between countries will be difficult to interpret.

Consequently, those inconsistencies in reporting will affect data quality and should be avoided, as they hamper the usability of the results for international benchmarking and effective policymaking.

2 main classifications have been used in the recent years:

- Classifications defined in the EU Directives until 2017 and from 2018
- UNU classification

6.2. EU classifications

European List of Wastes

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

The LoW defines 839 waste types, which are structured into 20 chapters mainly according to the source of the waste (i.e., the economic sector or process of origin). Each waste type is characterised by a six-digit code. The allocation of wastes to the defined waste types is laid out in the introduction of Decision 2000/532/EC and explained in a separate section. There are 13 LoW codes that refer to e-waste. They are subdivided into hazardous and non-hazardous waste, and listed in Table 2 below. Fractions or components that can be generated during treatment of e-waste, such as metal scrap, plastics, and lead glass, are not listed in this table.

Those codes describe e-waste very generally and are merely useful to measure e-waste that is registered as separately collected e-waste. For compiling e-waste



statistics however, these codes lack the ability to distinguish between different types of e-waste, thus ignoring differences in environmental relevance and materials' potential when recycled. Also, in practice, e-waste is collected and registered under other LoW codes, such as non-separately-collected domestic waste or metal scrap.

Currently, the WEEE Directive is enforced in the EU Member States. The WEEE Directive lists 10 categories for which data is collected. Those were:

1. 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

2. 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

3. 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

4. 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

5. 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

6. 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

7. 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

8. 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

9. 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)

10. 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

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

The recast of the WEEE Directive lists six categories that should be reported from 15 August 2018, which are representative of the e-waste collection streams in practice. These categories are:

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 cm ² 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.

The EU Member States either have a collection target based on a percentage of the amounts Put on Market (POM, in other words, EEE sales) in the three preceding years, or as a percentage of e-waste generated. The change from a flat target towards to a relative target requires improving e-waste statistics.

EEE CATEGORY UNDER EU-6 (2018)	EEE CATEGORY UNDER EU-10 (2017)
Lamps	Lighting equipment

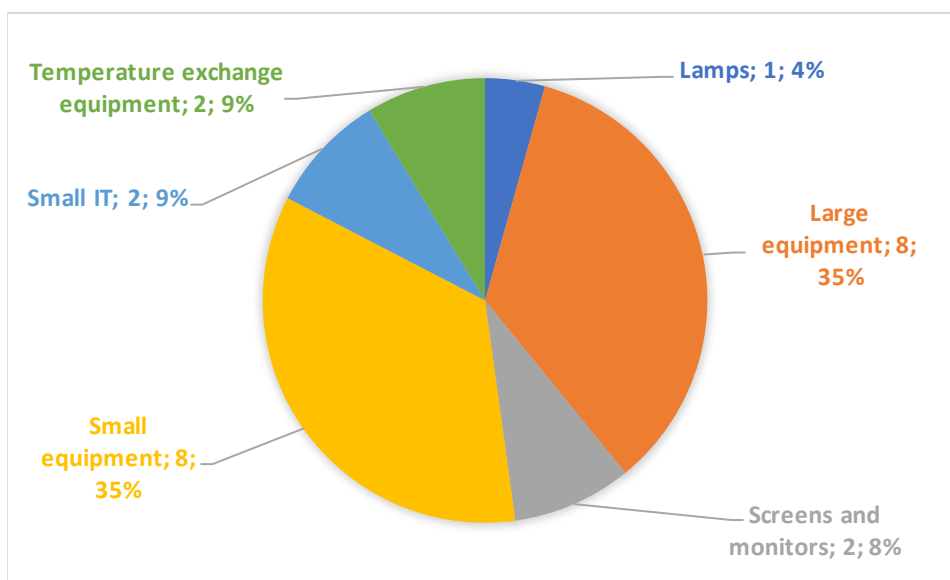


Large equipment	Large household appliances
Large equipment	Consumer equipment
Large equipment	IT and telecommunications equipment
Large equipment	Electrical and electronic tools
Large equipment	Toys
Large equipment	Medical devices
Large equipment	Monitoring and control instruments
Large equipment	Automatic 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%

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

EEE CATEGORY UNDER EU-6	Account EEE CATEGORY UNDER EU-10
Lamps	1
Large equipment	8
Screens and monitors	2
Small equipment	8
Small IT	2
Temperature exchange equipment	2



EEE Category under EU-10. Source: Own

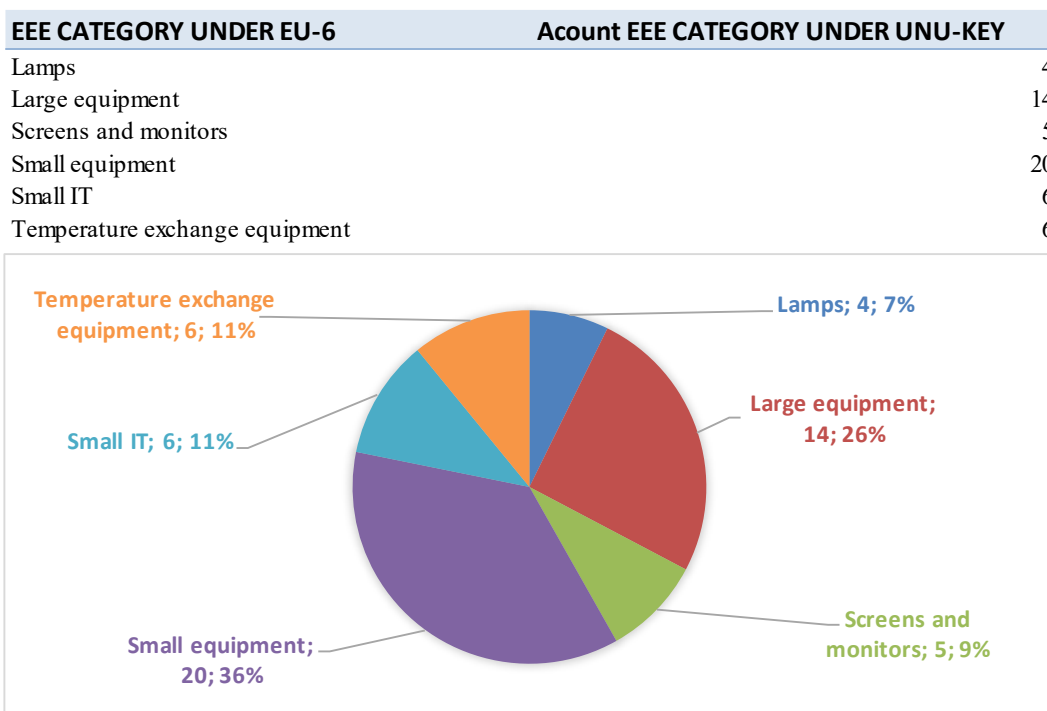
6.3. Other classification system outside the EU

Classification of e-waste under the Basel Convention

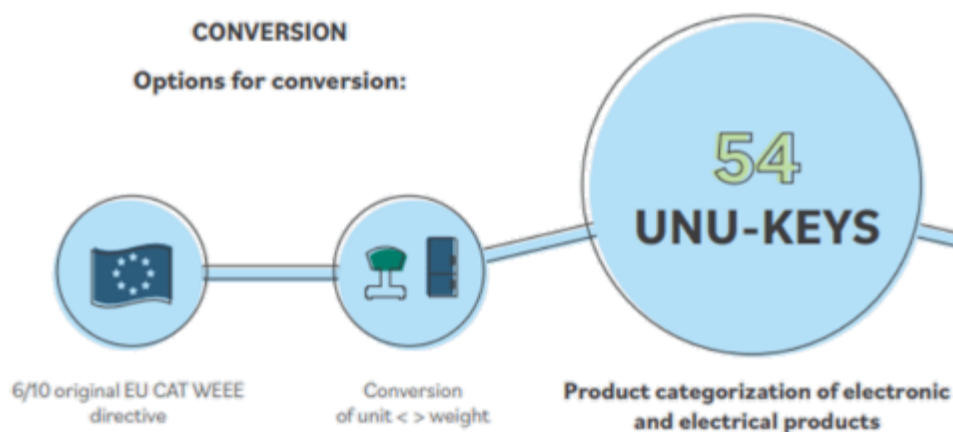
Article 2 (“Definitions”) of the Basel Convention defines waste as “substances or objects, which are disposed of or are intended to be disposed of or are required to be disposed of by the provisions of national law.” In paragraph four of that article, it defines disposal as “any operation specified in Annex IV” to the Convention 1.

UNU-KEYS

UNU-KEYS are designed so that product groups share comparable average weights, material composition, end-of-life characteristics and lifetime distributions. This makes the system very useful for compiling e-waste statistics. The full list of UNU-KEYS is given in Table 1. The 54 categories can be grouped into 10 primary categories according to the original EU Waste Electrical and Electronic Equipment (WEEE) Directive (see fourth column in Table 1). The classification can also be linked to the new reporting categories for the WEEE Directive recast (see third column in Table 1), which will come into force in the EU in August 2018. The UNU-KEYS classification is ideal as a link between the EU categories and the existing classifications. UNU-KEYS is used in the implementing law to describe the common methodology for calculating WEEE collection targets for Article 7 (European Commission, 2017/2018).



EEE category under EU-6. Source: Own



Monitoring global transboundary E-waste flows. Source: https://www.unodc.org/res/environment-climate/asia-pacific/unwaste_html/Unwaste_Webinar_14.09.22_SCYCLE_ppt.pdf

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

6.4. HS 2022 codes

The World Customs Organisation (WCO) has amended and revised HS 2022, the seventh edition of the Harmonised System (HS) nomenclature that came into force on 1 January 2022.

The new HS2022 edition makes some major changes to the Harmonised System with a total of 351 sets of amendments covering a wide range of goods moving across borders.

Increased visibility of a number of high-profile product streams feature in the 2022 Edition, recognising the changing trade patterns. Electrical and electronic waste, commonly referred to as e-waste, is one example of a product class which presents significant policy concerns as well as a high value of trade, hence HS 2022 includes specific provisions for its classification to assist countries in their work under the Basel Convention.

Other changes include new provisions for novel tobacco and nicotine-based products, specific provisions for unmanned aerial vehicles (UAVs), commonly referred to as drones, and smartphones will gain their own subheading.

Major reconfigurations have been undertaken for the subheadings of heading 70.19 for glass fibres and articles thereof and for heading 84.62 for metal forming machinery. These changes recognise that the current subheadings do not adequately represent the technological advances in these sectors, leaving a lack of trade statistics important to the industries and potential classification difficulties.

Protection of society and the fight against terrorism are increasingly important roles for Customs and goods specifically controlled under various Conventions have also been updated. The HS 2022 Edition introduces new subheadings for for certain persistent organic pollutants (POPs) controlled under the Stockholm Convention, specific chemicals controlled under the Chemical Weapons Convention (CWC) and for certain hazardous chemicals controlled under the Rotterdam Convention.

The WCO, established in 1952, is an independent intergovernmental body whose mission is to enhance the effectiveness and efficiency of Customs administrations and represents 183 Customs administrations across the globe that collectively process approximately 98% of world trade.

6.5. Correlations between the classifications

The correlations between the previously mentioned classifications are summarized in below table. The HS codes describe the products in the most detail. The UNU-KEYS are constructed from the HS codes, and this link is displayed in Annex 1. The UNU-KEYS, in turn, can be related to the 6 or 10 categories in the WEEE Directives, as indicated in the next Table.



The Basel Codes and LoW codes, however, are difficult to relate to the HS codes. This mainly is due to the fact that the HS nomenclature defines waste as the residual streams. This is in conflict with the definition of waste in Article 1 of the Basel convention, which states that wastes are substances or objects that are disposed of or are intended to be disposed of, or are required to be disposed of by the provisions of national law.

	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)

Objects that are “intended to be disposed of” include a larger variety of commodities that the HS would categorize as “products” in Chapters 84 and 85, as opposed to waste, which is their legal status according to the Basel convention. A preliminary correlation table between customs nomenclature codes and waste codes was published by the European Commission in the Commission Implementing Regulation (EU) 2016/1245. The LoW and Basel codes are currently not correlated to each other.



7. ACTORS INVOLVED IN THE SYSTEM

The 'all actors' approach is a policy model which includes all natural and legal persons that have legal responsibilities in WEEE management, are handling WEEE (collection, logistics, preparation for reuse, refurbishment, treatment of WEEE), monitor WEEE, legislate and enforce WEEE legislation. All actors are obligated to abide by the WEEE Directive (such as on compliance, monitoring, and reporting), work towards the common goal of responsible WEEE operations and transparent monitoring.

According to the principle of mandatory handover, all the WEEE management is, by law, carried out exclusively by certified WEEE collectors and recyclers, and all WEEE that is collected outside the certified actors has to be handed over to certified ones. Mandatory handover can also be accompanied with financial compensation. The mandatory handover is expected to be a mechanism under which more WEEE is collected and registered, and thus will increase the collection rate.

List of actors in the model of All-Actors Approach (AAA)

National competent authorities include:

- Member State governments
- National waste authorities

Enforcement bodies:

- Inspection and customs

Coordination body.

EEE Producers and PROs

Retail. Including household and non-household WEEE.

Local authorities.

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

Preparing for reuse.

WEEE treatment companies. Including: WEEE recyclers and licensed (for treating/accepting WEEE) scrap and car shredders.

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

Citizens/Business/Public sector-WEEE generators

7.1. Producers and producer responsibility organizations (PRO)

The Producer Responsibility Organisation is a collective body operating at national level to ensure compliance with the legislative requirements of producers on their behalf and with their financial contribution. Thus, once a producer joins a PRO (usually by paying a fee corresponding to the type/quantity and characteristics of the products it places on the market), the PRO becomes the entity which is legally responsible and thus needs to ensure that the legislative targets and requirements are fulfilled.



The producer obligations under the EPR system for WEEE in Europe are outlined in the WEEE Directive of the European Union. These obligations include:

- Financing the management of WEEE: Producers are responsible for financing the collection, transportation, and environmentally sound treatment of WEEE. They must ensure that the costs of WEEE management are covered, either individually or through a collective scheme.
- Registration with a national WEEE management organisation: In some European countries, producers are required to register with a national WEEE management organisation, which manages the collection and treatment of WEEE on behalf of producers.
- Designing products for easy recycling: Producers are encouraged to design products that are easy to recycle and to reduce the use of hazardous materials. This can help to increase the recovery of valuable materials and reduce the environmental impact of WEEE.
- Meeting collection and recycling targets: Each member state of the European Union is required to set collection targets for WEEE. Producers must ensure that they meet these targets.
- Reporting on their WEEE management activities: Producers must report on their WEEE management activities, including the amount of WEEE collected and treated, and the costs associated with this.
- Providing information to consumers: Producers must provide information to consumers on the environmentally sound disposal of WEEE, including the availability of collection points and the procedures for returning WEEE.

Overall, the producer obligations under the EPR system for WEEE in Europe are designed to hold producers responsible for the entire life cycle of their products, from production to disposal. By requiring producers to finance the collection, transportation, and treatment of WEEE, and to design products that are easy to recycle, the EPR system promotes the sustainable management of WEEE and the circular economy.



Producer responsibilities according to WEEE Directive



7.2. Extended Producer Responsibility (EPR)

Extended Producer Responsibility (EPR) is a key policy instrument for the management of WEEE in Europe. The WEEE Directive of the EU introduced the concept of EPR, making producers of electronic equipment responsible for the entire lifecycle of their products. This includes financing the collection, transportation, and environmentally sound treatment of WEEE. EPR has proven to be an effective mechanism for promoting the sustainable management of WEEE, encouraging producers to design products that are easy to recycle and reducing the environmental impact of electronic waste. As a result, many countries in Europe have adopted EPR policies and regulations, recognizing the significant role that producers can play in promoting the circular economy and reducing the environmental impact of WEEE.

The OECD defines EPR as an approach to environmental policy that extends producer responsibility for a product to the post-consumer phase of the product life cycle. In practice, EPR involves the responsibility of producers to collect products at the end of their life and to sort them before final treatment, ideally by recycling. EPR schemes can enable producers to exercise their responsibility either by providing the necessary funding or by taking over the operational and organisational aspects of the process from municipalities, e.g., in the case of packaging.

In Europe, there are two main types of EPR systems for WEEE: individual and collective. The key differences between the two systems are outlined below:

- Individual EPR systems: under an individual EPR system, each producer is responsible for financing the collection, transportation, and treatment of the WEEE generated by their products. This means that the producer must ensure that the WEEE generated by their products is collected, transported, and treated in an environmentally sound manner, either directly or through a contracted service provider. The producer is also responsible for reporting on their WEEE management activities to the relevant authorities.
- Collective EPR systems: In a collective EPR system, multiple producers of WEEE products join together to form a collective scheme. This scheme is responsible for financing the collection, transportation, and treatment of WEEE generated

by the products of its members. This system allows producers to pool their resources and share the costs of WEEE management. The collective scheme is responsible for ensuring that the WEEE generated by its members is collected, transported, and treated in an environmentally sound manner. The collective scheme is also responsible for reporting on the WEEE management activities of its members to the relevant authorities.



The implementation of WEEE EPR in Europe varies by country, and each country has adopted its own specific system. The steps involved in implementing a WEEE EPR system in Europe can be broadly outlined as follows:

- Develop legislation: A country must develop national legislation to implement the EU WEEE Directive. This legislation outlines the obligations of producers, the requirements for the management of WEEE, and the penalties for non-compliance.
- Choose an EPR system: The country must decide which type of EPR system to adopt - individual or collective. This decision will depend on factors such as the size of the market, the number of producers, and the available resources.
- Establish a producer responsibility organisation (PRO): If the country chooses to adopt a collective EPR system, a PRO must be established. This is an organisation that is responsible for managing the collection, transportation, and treatment of WEEE on behalf of producers.
- Develop collection and recycling infrastructure: The country must develop infrastructure for the collection and recycling of WEEE. This may involve the establishment of collection points and recycling facilities, as well as the development of transportation networks.



- Establish a monitoring and reporting system: The country must establish a system for monitoring and reporting on the collection, transportation, and treatment of WEEE. This system is used to ensure that producers are meeting their obligations under the legislation.

Each country in Europe has its own specific implementation of WEEE EPR. For example, Germany has adopted a collective EPR system, where producers are required to join a PRO that is responsible for managing the collection and recycling of WEEE. France has also adopted a collective system, while Italy has adopted an individual EPR system, where producers are responsible for managing the collection and recycling of their own products.

Spain has adopted a hybrid system, where larger producers are required to manage their own WEEE, while smaller producers are allowed to join a collective scheme.

Overall, the implementation of WEEE EPR in Europe involves a combination of legislative, organisational, and infrastructural measures. The specific implementation of EPR systems varies by country, depending on the national context and resources available.

7.3. Retailers

Retailers constitute one of the pillars of the WEEE Collection network. It is suggested that each Member States explores the possibility of extending the 1x0 obligation to other retailers in addition to the ones cited in the WEEE Directive (selling surface > 400 m²), provided collection is economically and environmentally sustainable.

Retailers, in addition to the legal requirements applicable, are suggested to:

- Participate in a coordination body.
- Collect small WEEE (incl. non-household retailers), in store and at delivery.
- Report WEEE received, preferably using tools that will lower this administrative burden.
- Promote the use of reverse logistics.
- Contribute finances to a central body for consumer campaigns.
- Provide any support required for tackling practices leading to irregular flows and treatment of WEEE (especially during delivery take back).



Extend retail in Netherlands that provides a pick-up service for small appliances.

Only in a fully implemented AAA, retailers should have the choice of arranging and paying for treatment of the WEEE collected at their facilities if they wish, and reporting it, provided they reach a proper treatment or handing it over to PROs with the right of free uplift and PROs pay for treatment. Retail associations and representatives of the retail sector are encouraged to proactively involve their members in awareness raising campaigns partnering with PROs and preferably through a coordination body. It is proposed that retail associations participate in R&D and initiatives promoting the use of reverse logistics for WEEE collection.



7.4. National competent authorities and Enforcement bodies

The role of national competent authorities in this AAA is about providing an appropriate legislative frame that will ensure all actors influencing collection will contribute to reaching national collection targets matching their competences.

Some of the actions that are envisaged for national (waste) competent authorities in this AAA are:

- Set up a coordination body.
- Ensure appropriate coordination amongst all actors is carried out through a coordination body, and including regular interaction and synergy building between policy makers and enforcement bodies, such as customs and inspection.
- Legislative support providing means for increasing collection, such as: » Setting up policies requiring all actors to report.
 - Regulating and enforcing reporting including reporting of UEEE/WEEE exported and imported.
 - Defining a legal frame promoting the use of reverse logistics in WEEE collection.
 - Regulate and enforce mandatory handover of WEEE to PROs.
 - Making CENELEC standards mandatory.
- Contribute to monitoring / measurement campaigns of Complementary flows (e.g., MSW).
- Support targeted awareness raising campaigns at national level.
- Provide clear and harmonized collection and sorting guidance to local authorities.

Enforcement bodies, and in particular inspection, have a relevant role for ensuring the success of an AAA. Besides incentives and legislative endorsement, inspection campaigns are key to guarantee a level playing field for all actors.

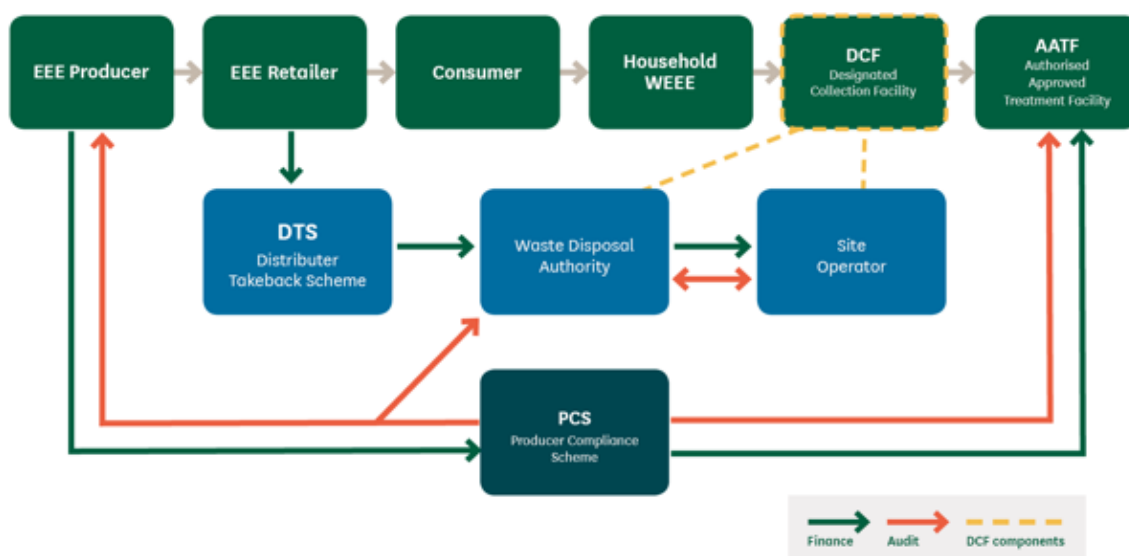
Enforcement bodies are to set up national targeted inspections and measures for:

- All actors reporting WEEE received and UEEE exported/imported.
- Proper WEEE treatment, and
- Reporting of producers (addressing the issue of freeriding).

Customs ensure reporting of import and export of UEEE/WEEE. A critical assessment of the current practices should be done to set up an appropriate improvement plan that will:

- Allow an unequivocal traceability of UEEE and WEEE trans frontier shipments.
- Ensure appropriate treatment of WEEE is carried out outside Europe.
- Increase reporting of UEEE/WEEE from shipment companies.

International multi-stakeholder groups are encouraged for addressing trans-frontier movement, adequate knowledge and training.

Flow of E-Waste:

7.5. Coordination body

In an AAA, all stakeholders that may influence WEEE collection rates should contribute to the attainment of the national collection targets. A coordinated response for ensuring an efficient use of resources and adequate monitoring requires coordination between parties and fluid communication. Ideally, a coordination body should be composed of representatives of all actors that may influence collection rates. PROs must play a critical role in the governance of the coordination body, for example to ensure that any initiatives are cost-effective, proportionate and fair.

It is proposed that a coordination body:

- Coordinates and monitors the allocation of collection responsibilities.
- Monitors compliance of collection responsibilities and national collection in general.
- Sets a reporting framework / tool and coordinates reporting from all actors.
- Facilitates and channels agreements between PROs and local authorities to support efficient collection of households WEEE.
- Designs strategies for expanding and improving the collection network, such as improving existing collection or creating incentives for new collectors to be part of the national collection network.
- Coordinates with other sectors for monitoring and traceability (building, car...).
- Funds R&D e.g., running studies on WEEE flows, technical best practice development etc.
- Coordinates national and local communications campaigns for efficient use of resources and consistent and well researched messages and campaigns.
- Is involved in enforcement planning and supports enforcement.

The coordination body may be financially supported by public and/or private funding. The responsibilities allocated to producers (e.g., art. 14 and 15 of the WEEE Directive), though managed by the coordination body for an efficient use of resources and consensus, will remain financed by producers.



7.6. Local authorities

Local authorities should be considered the main pillar of the WEEE Collection network. A proactive and active role in promoting WEEE collection among their citizens is suggested for municipalities in this AAA.

In particular local authorities, in addition to the legal requirements applicable, should:

- Participate in a coordination body.
- Set agreements with PROs for handing over WEEE received at their facilities, when this is not required by law, and municipalities are entitled to hand over the WEEE to a downstream acceptor, additional control and evidence-based traceability and proper treatment should be ensured by for example laws setting up tendering conditions.
- Carry out targeted, harmonized and clear awareness raising campaigns.
- Implement measures for fighting theft and scavenging.
- Monitor and benchmark WEEE collection, scavenging and theft rates.
- Collaborate with enforcement for tackling thefts and scavenging issues by reporting such practices, training of staff working at collection points and implementing measures for reducing scavenging rates and thefts.
- When competence allows, local entities to run enforcement campaigns against illegal treatment and misreporting of WEEE.

Activities marked with an should preferably be facilitated by a coordination body.

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

The AAA promotes the expansion of the collection network by the addition of all actors that have access to WEEE. This includes businesses, installers of equipment such as PV panels or A/C, demolition and construction companies, social economy entities, repair services, public institutions etc.

Contributions of such collectors to the WEEE collection rates should be traceable and follow official flows. For achieving all of the above, it is suggested that they:

- Become registered WEEE collectors upon requirement / take back and collection obligations. It is encouraged that the procedure for authorizing or registering such activities is free of charge and simple, otherwise, it may be a deterrent for these activities to become part of the collection network.
- Report any WEEE received and its fate to an official database.
- Ensure traceability and treatment of the WEEE collected in officially recognized facilities.
- Provide any support required for tackling practices leading to irregular flows and treatment of WEEE.

These collection channels are encouraged to set agreements with the national PROs and benefit from the resources PROs can tap into for an adequate handling of the WEEE.

7.8. Preparing for reuse organizations

Preparing for reuse organisations are becoming more and more relevant and supported by the WEEE sector. Their role as contributors to the circular economy is undeniable. In certain Member States, they offer an efficient collection network that



should be used for collecting WEEE whenever it is possible. Alliances between preparing for reuse organisations and PROs have shown good results in some Member States. PROs and preparing for reuse organisations in other MS are encouraged to learn from successful experiences and try to replicate them. It is important to ensure proper traceability of the WEEE that is handed over to preparing for reuse organisations.

Exploring efficient and safe ways for ensuring access to WEEE to preparation for reuse is also encouraged. In this AAA approach, it is suggested that preparing for reuse organisations:

- Participate in a coordination body.
- Become authorised WEEE collectors.
- Report any WEEE received and its fate to an official database.
- Set up alliances with PROs for ensuring reporting of WEEE and proper management of it.
- Comply with preparation for reuse standards such as EN50614.
- Provide any support required for tackling practices leading to irregular flows and treatment of WEEE.

7.9. WEEE treatment companies

In many Member States, recyclers are not only dealing with treatment. They may act as logistics and collection companies as well and can be a relevant part of the WEEE collection network. Having access to WEEE, they become a contributor to the attainment of the national WEEE collection targets in this AAA. Some Member States do not entitle companies treating scrap for the specialist treatment of WEEE but are receiving WEEE mixed with scrap and treating it as the latter. In this case, and for a full implementation of this AAA, such companies should either become authorised companies for treating WEEE or separate WEEE from scrap and send the WEEE to an authorised facility.

It is suggested that metal recycling companies:

- Comply with standards that will include traceability protocols.
- Report on the amounts of WEEE received, categories, activity undertaken and fate of the WEEE and/or resultant fractions, either via agreements set with PROs, authorities or to a national database.
- Scrap facilities collecting or receiving WEEE mixed with scrap under a licence or registered exemption, must report on WEEE received and treated, or send to an authorised WEEE treatment facility.
- Provide reports on treatment quality to a coordination body.
- Contribute to law enforcement by supporting audits/inspection programs.

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

Some types of WEEE can follow the path of a valuable commodity. Brokers, dealers, traders and alike are part of the value cycle of WEEE, and as actors having access to WEEE they must be obliged to contribute to the attainment of national collection targets aligned with their competences and bearing in mind their limitations.

It is suggested that they:

- Report any WEEE received and its fate to a national database.



- Report any UEEE exported/ imported either via agreements set with PROs, authorities or to a national database.
- Provide evidence of proper treatment of WEEE traded.
- Provide any support required for tackling practices leading to irregular flows and treatment of WEEE.

7.10. Citizens/Business/Public sector-WEEE generators

The levels of hoarding and the rates of wrong disposal may be significant in some Member States, and are practices occurring in all of them. Citizens, and WEEE generators in general, are the first holders of WEEE and decide disposal paths, hence, they are key players for ensuring correct disposal and increasing collection rates.

Citizens should be encouraged to:

- Reduce hoarding.
- Stop disposing of WEEE through the wrong channels.



8. STANDARD MONITORING SYSTEMS

One of the key objectives of these previously mentioned policies is to promote the collection and recycling of WEEE, with specific objectives set for each member state. Methods for collecting and recycling WEEE vary by country and type of waste, but generally involve a mix of government- led programs, producer responsibility schemes, and private sector initiatives.



Standard monitoring systems in the context of e-waste management typically refer to established frameworks or protocols for tracking, recording, and managing electronic waste throughout its lifecycle. These systems are designed to ensure compliance with regulations, assess performance, and monitor the effectiveness of e-waste management practices. Here are key components and features of standard monitoring systems in e-waste management:

Tracking and Tracing: Systems are in place to track the movement of e-waste from collection points to recycling facilities or treatment centers. Barcoding, tagging, or digital tracking methods may be used to monitor the flow of e-waste and verify proper handling.

Data Management: Robust data management systems collect and store information about the types and quantities of e-waste received, processed, recycled, or disposed of by different entities involved in the management chain.

Compliance Monitoring: These systems ensure compliance with regulations and standards governing e-waste management. They track adherence to recycling targets, proper disposal practices, and environmental regulations.

Performance Assessment: Monitoring systems assess the performance of e-waste management initiatives. This includes evaluating recycling rates, recovery of valuable materials, reduction in hazardous substances, and overall environmental impact.

Reporting and Transparency: Standard monitoring systems facilitate reporting to regulatory authorities, stakeholders, and the public. They provide transparency regarding the handling, recycling rates, and environmental impact of e-waste management activities.

Auditing and Verification: Audits are conducted to verify compliance with regulations and standards. These audits ensure that e-waste is handled in accordance with prescribed protocols and environmental best practices.

Continuous Improvement: Monitoring systems enable the identification of areas for improvement in e-waste management practices. By analyzing data and performance metrics, adjustments can be made to enhance efficiency and sustainability.

Integration with Policy Frameworks: Standard monitoring systems are often integrated into broader policy frameworks, such as Extended Producer Responsibility (EPR) programs, to ensure alignment with regulatory requirements.

These monitoring systems are crucial for effective governance and oversight of e-waste management. They enable authorities, stakeholders, and organizations



involved in the e-waste lifecycle to track, manage, and improve the environmental impact of electronic waste handling and disposal practices.

8.1. POM

The 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 Market (POM) in the three preceding years. From 2013 to 2016, the collection rate using this method increased from 39% to 50%. However, from 2016 to 2020, the collection rate using the POM method dropped to 44%. Despite the significant increase in the WEEE collection, the decrease in the collection rate is caused by even larger increases in POM, causing the collection rate to decrease using this method.

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



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

Governments typically rely on information reported by producers and importers to determine how much weight of appliances are placed on the market. Producers and importers are required to report the quantities of electrical and electronic equipment that they place on the market to national authorities in accordance with the WEEE Directive. The authorities then use this information to determine whether the collection targets for different types of WEEE have been met.

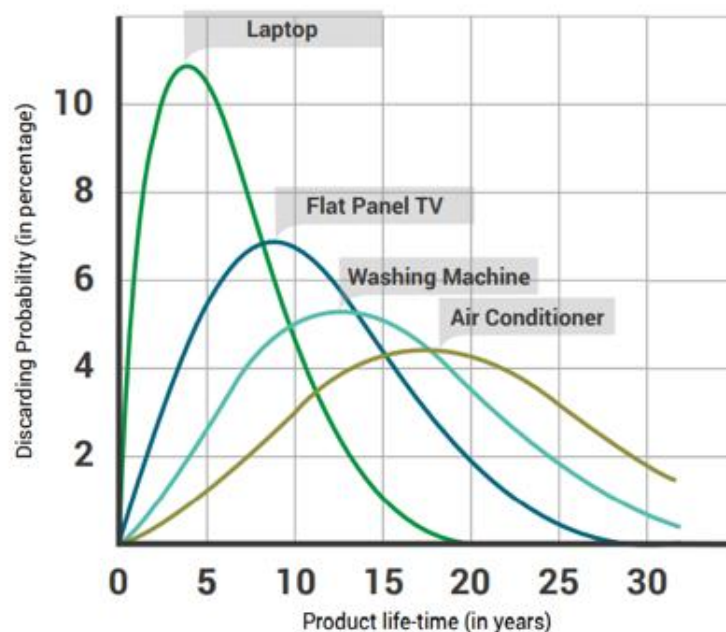
The initial approach to calculate the collection rate involved dividing the mass of WEEE collected by the average amount of EEE POM in the preceding three years, which was implemented in 2016. Since then, the collection target has been determined as the ratio between the collected amount and the average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

Regulations and directives often govern the responsibilities of manufacturers, distributors, and consumers regarding e-waste management from the point of "putting on the market" to the eventual disposal or recycling of these devices. This includes obligations for proper disposal, recycling, and handling of electronic waste by the entities involved in the product lifecycle, ensuring environmentally responsible practices.

8.2. 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.

The life-time of EEE products could vary per product and country. The next figure shows an example of different life-time profiles expressed as Weibull functions per type of product in the European Union. There is generally no official data collection for life-times by governments. However, several countries may have this information available through scientific literature or other studies performed in their country.



Recycling Computation: Navigating the World of E-Waste Recycling.
Source: <https://medium.com/greenbyte-labs/recycling-computation-navigating-the-world-of-e-waste-recycling-6612ce12c838>

As mentioned before, the life-time of EEE products could vary by product and country. For other EU countries a sensitivity analysis was carried out, and it is calculated that the margin of error for the e-waste generated related to the potential variation in life-time is approximately 10% per country. Therefore, countries may wish to determine life-time empirically per product and country. The variation for the life-times between the countries in EU has been small for most products.

When defining the lifetime of EEE, it's essential to consider these factors to ensure realistic expectations regarding the duration for which the equipment will function optimally. It's also important in the context of sustainability and responsible consumption, as it impacts the generation of electronic waste and the overall environmental footprint of the product.



8.3. System of Environmental-Economic Accounting (SEEA)

The System of Environmental-Economic Accounting (SEEA) contains the internationally-adopted standard concepts, definitions, classifications, accounting rules, and tables for producing internationally-comparable statistics on the environmental-economic accounts and their relationship with the economy. The SEEA framework follows a similar accounting structure as the System of National Accounts (SNA) and uses concepts, definitions and classifications consistent with the SNA's in order to facilitate the integration of environmental and economic statistics. In the SEEA, e-waste would fall under Chapter 3.6.5 on Waste Accounting. Following the concepts of SEEA, e-waste statistics is a subset of the aggregates on waste from EEE and vehicles. The e-waste guidelines lack the origin of the waste generated (ISIC/NACE 18 or household), which is essential for SEEA. This requires additional modelling, which could be done on the UNU-KEY level. SEEA also reports on import and export data, which is also part of those guidelines. However, at this moment, a good measurement of transboundary flows of e-waste is very difficult to ascertain. The generation of secondary materials from e-waste (plastics, scrap metal, residues) is included in the concepts of SEEA, and these materials are excluded from e-waste statistics, but they could be modelled.

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

The Framework for the Development of Environment Statistics (FDES) is a flexible, multipurpose conceptual and statistical framework that is comprehensive and integrative in nature. It marks out the scope of environmental statistics and provides an organizing structure to guide their collection and compilation and to synthesize data from various subject areas and sources, covering the issues and aspects of the environment that are relevant for analysis, policy, and decision-making. Subcomponent 3.3: Generation and Management of Waste includes statistics on the amount and characteristics of waste (including e-waste), defined as discarded material for which the owner or user has no further use, generated by human activities in the course of production and consumption processes. The FDES provides the structure for identifying and collecting waste statistics, including e-waste statistics. The FDES structure links waste statistics to the International Standard Industrial Classification (ISIC), which facilitates the integration with economic statistics.

8.5. Stock (S)

The Stock (S) refers to the equipment in households, businesses and the public sector. Stock levels of appliances in households and businesses are generally unavailable for all 54 UNU-KEYS, especially levels measured in a harmonised manner. There may be stock data available in some countries for some products; sometimes, national statistical institutes survey households about their household possessions or penetration rate of several types of households EEE. This data can feed into the measurement framework. It should be noted that with this methodology, both functioning and non-functioning appliances have to be counted. Another, but less reliable data source, could be the number of subscriptions. In that case, one subscription would mean a stock level of at least one appliance. But there might be appliances with two subscriptions, or appliances in stock without a subscription. Sometimes, penetration rates of ICT use is measured by countries. In that case, one



can calculate the minimum stock level, as the surveys do not monitor whether a household has more than one appliance.

8.6. Formal collection of e-waste (Wformal)

Data on formal collection of e-waste are not modelled. Data must be gathered by countries using the most appropriate data-gathering methods. The data that is reported under “formal collected e-waste” are the amounts of collected and recycled e-waste compliant with a specific e-waste management law, thus meeting the national environmental standards for recycling e-waste.

This is ideally a national e-waste legislation that regulates the e-waste management system in the country, sets collection and recycling targets, and sets minimum recycling requirements or has a certification ²¹ to recycle e-waste in an environmentally sound manner.

All the actors involved in the formal e-waste management system are potential sources for data. If the e-waste is collected through official take-back systems, it can be assumed that e-waste collected equals e-waste recycled, though in practice there might be losses taking place during the treatment phase. Data on e-waste formally collected and recycled can be gathered either by tracing the e-waste that is collected for recycling after its generation, and determining whether the collected e-waste is actually recycled in a treatment facility domestically or in another country. It is also possible to gather data on the amounts of e-waste that enter the treatment facility operating in an environmentally sound manner. In that case, imported e-waste for recycling should be subtracted from these amounts.

On the basis of legal provisions, data could be collected or recorded by competent authorities for licensing, monitoring and law enforcement scope. Such recording systems can also function as registers for e-waste statistics on formal collection of e-waste. This is mostly the case for countries that have adopted the Extended Producer Responsibility (EPR) principle for e-waste. In an EPR scheme, e-waste along with e-waste data should be collected by designated organizations, producers, and/or by the government (formal collection). The e-waste collected via retailers, municipal collection points, and/or pick-up services should be then sent to e-waste treatment facilities. A distinction can be made between data collected or recorded by competent authorities on the basis of legal provisions and other data collected on a voluntary, economic, or other basis by the private or public sector; this includes, in particular, data collected by associations for their own purposes.

If there is no EPR scheme, or register, for e-waste in the country, the e-waste can still be recycled in the country in an environmentally sound manner. For instance, it can be sent to treatment facilities that are certified to recycle e-waste.



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

Household statistics: The collection of household statistics might also be a method to compile statistics on the collection and recycling of e-waste. In this case, a representative sample of the households in a country are sent a questionnaire in which they are asked details of the household (size, income levels, etc.), and information about e-waste. This should include which e-waste has been discarded (e-waste generated), how long the discarded product has been in use at the time of disposal (life-time “L”), and also how the product has been disposed of (Wofficial, Wbin or Wother). The information about the type of e-waste is usually reported in pieces (number of units). This will have to be converted to weight.

Survey collection points: E-waste can be collected at collection points established by municipalities or by private companies. Obsolete electric or electronic appliances can either be brought to a collection point by the previous owner, or it can be collected as bulky waste door to door (e.g. fridges or washing machines). It might be that municipalities and private companies register the collected e-waste separately from other wastes. If this separately collected e-waste is recycled, it may be reported here.

Collection points established from stores can also be a possible source of data because the possibility of returning broken or obsolete appliances to electronic stores is increasingly spreading worldwide. However, it should be ensured that the e-waste collected through these collection points are managed correctly in certified treatment facilities.

Questionnaire to e-waste treatment facility: E-waste statistics can also focus on tracing the quantities of e-waste entering the treatment facilities. Comprehensive registers are a prerequisite for the collection of facility-related information and for data on treated quantities, irrespective of the method of data collection used. For this reason, e-waste facility registers are likely to form the core of an e-waste information system. A disadvantage of focusing on waste treatment is that the constitution of the e-waste is different from the origin (it might have been dismantled into components). Also, it might be less clear which of the treated e-waste was imported, and which of the domestically generated e-waste was exported for treatment. Since the aim is to get the e-waste management data on the domestically produced e-waste, imports have to be deducted from this.



Other data sources: Other possible data sources are registers from waste companies, reports from NGOs, or other environmental surveys in the country. A number of public and industrial associations at the national level compile statistics for their own use on the management of e-waste streams. Sectoral data of this kind may be used by countries in their national statistics on e-waste treatment. Where such data are used, it is advisable to take steps to ensure that they meet the requirements and quality criteria defined by national e-waste legislations. Scientific literature may also be an interesting source for statistics on the collection and recycling of e-waste, as research in this field is making significant progresses worldwide.



9. THE AREA UNDER ANALYSIS

9.1. WEEE CONTEXT IN THE AREA UNDER ANALYSIS

In Bosnia and Herzegovina, the management of WEEE is primarily regulated by the Law on Waste Management and the Rulebook on Management of Waste Electrical and Electronic Products. These regulations outline the procedures for placing electrical and electronic products on the market and establish a unified system for the collection and treatment of waste derived from such products.



ZEOS eko-sistem d.o.o., based in Sarajevo, is the first authorized system operator for WEEE management in the Federation of Bosnia and Herzegovina. Authorized by the Federal Ministry of Environment and Tourism, ZEOS eko-sistem collaborates with over 200 system participants, including importers, distributors, and manufacturers, to ensure compliance with WEEE regulations. The organization offers legal support, a streamlined electronic reporting system for sold electrical and electronic products, and cost-effective management solutions. Legally, this plan is governed by the Law on Waste Management in FBiH and is strategically aligned with Neum's 2023–2030 strategy, which prioritizes modernizing communal infrastructure and protecting the Mediterranean coastal landscape.

Since its inception in 2013, ZEOS eko-sistem has collected approximately 18,200 tons of e-waste. The organization has established around 400 e-waste disposal locations across the Federation of Bosnia and Herzegovina, all of which are accessible via an interactive map on their website. Additionally, ZEOS eko-sistem provides a free service for collecting e-waste directly from companies and households, further facilitating proper disposal practices.



Public awareness and education are integral components of ZEOS eko-sistem's mission. The organization has implemented numerous projects targeting various demographics, including educational initiatives in elementary schools. For instance, the "Green Revolution 2" project engages students from 140 elementary schools in the Federation of Bosnia and Herzegovina to foster eco-friendly habits related to e-waste disposal.

Despite these advancements, challenges remain in achieving uniform WEEE management across the entire country. The Federation of Bosnia and Herzegovina has made significant progress with established regulations and authorized system operators. However, the adoption and implementation of similar frameworks in other regions, such as the Republika Srpska entity, are still pending. This disparity leads to inconsistencies in compliance and enforcement, affecting the overall effectiveness of e-waste management nationwide.

To enhance the WEEE management system, it is crucial to harmonize regulations across all regions of Bosnia and Herzegovina, strengthen enforcement mechanisms, and continue public education initiatives to raise awareness about the importance of proper e-waste disposal.

9.2. SITUATION OF THE WEEE POLICY

9.2.1. Legal Framework in Bosnia and Herzegovina

The Ministry of Foreign Trade and Economic Relations of Bosnia and Herzegovina is in charge of the ratification and access procedures of international treaties and guidelines, while the three territorial units of Bosnia and Herzegovina are responsible for drafting and adopting their own waste legislation.

The Ministry of Foreign Trade and Economic Relations of Bosnia and Herzegovina is the national institution in charge of the ratification and access procedures of international conventions in the field of environmental protection, as well as for all operational matters within Bosnia and Herzegovina on the subject. The Ministry's competencies include defining policies, basic principles, coordinating activities, and harmonising plans of the government and institutions of the three territories in accordance with international obligations in the areas of agriculture, energy, environmental protection, development, and use of natural resources. The most significant policy-making activities in Bosnia and Herzegovina, in terms of environmental protection, belong to Bosnia and Herzegovina's territorial units.

The Bosnia and Herzegovina entity FBiH adopted a regulation for the management of e-waste in 2012, and the Bosnia and Herzegovina entity Republic of Srpska adopted one in 2020; the Brčko District BiH does not yet have one, and there is currently no special Agency or regulatory body in charge of enforcing e-waste laws.



The responsibilities for waste management in Bosnia and Herzegovina (BiH) is complicated, due to the country's two major administrative regions – the Federation of Bosnia and Herzegovina (FBiH) and the Republic of Srpska – which operate two almost entirely separate regulatory and infrastructural systems for waste management. Bosnia and Herzegovina's third administrative region, the Brčko District, also bears responsibility for its own waste system. The three territorial unit governments are responsible for drafting and adopting their own waste legislation, so



there is no overarching waste legislation nationally, and each authority has developed their own laws and accompanying strategies and policies for implementation.

As such, the waste management is regulated by three main entity laws for the three different territorial units (with the respective bylaws):

- The Law on Waste Management in FBiH (Official Gazette of FBiH, No. 33/03, 72/09, 92/17, 65/21).
- The Law on Waste Management in the Republic of Srpska (Official Gazette of Republic of Srpska, No. 113/13, 106/15, 16/18, 70/20, 63/21, 65/21).
- The Law on Waste Management in the Brčko District (Official Gazette of Brčko District, No. 72/09, 25/04, 1/05, 19/07, 2/08 and 9/09).

A regulation for the management of e-waste was adopted in 2012 in the Bosnia and Herzegovina entity FBiH and in 2020 in the Bosnia and Herzegovina entity Republic of Srpska, but no such regulations have yet been adopted in the Brčko District BiH.

The most relevant secondary e-waste legislations in the Bosnia and Herzegovina entity FBiH are:

- Regulation on Management of Waste from EEE, also referred to as the Rulebook on WEEE Management (Official Gazette of FBiH, No. 23/23)
- Regulation on Necessary Conditions for Transfer of Obligations from Producers and Sellers on Operators of Systems for Collection of Waste (Official Gazette of FBiH, No. 9/05) [40]
- Regulation on Criteria for Calculation and Method of Payment of Compensation for Products that Become Packaging and Electrical and Electronic Waste After Use (Official Gazette of FBiH, No. 104/22)
- Regulation on the Method of distribution and Investment of Collected Fees for Packaging and Electrical and Electronic Products (Official Gazette of FBiH, No. 104/22)

In February 2016, the earlier Regulation on WEEE Management (Official Gazette of FBiH, No. 87/12) was suspended and out of force for several months, creating a legal vacuum. It was reinstated in October 2016 in the same form and content by the decision of the competent ministry. The system continued to function in the same way, with the system operators (EPR) collecting fees and organising the e-waste management system through authorised collectors and recyclers.

EPR laws for e-waste are in place in both Bosnia and Herzegovina entities (FBiH and Republic of Srpska) and are under preparation in the Brčko District BiH.

Extended Producer Responsibility laws specific for e-waste are in place in both Bosnia and Herzegovina entities, FBiH (2013) and Republic of Srpska, but not in the Brčko District. In the Bosnia and Herzegovina entity FBiH, e-waste management fees are collected and managed by system operators (the 2 PROs), whereas in the Bosnia and Herzegovina entity Republic of Srpska, the fees are collected by the Environment Fund, which then organises the waste management system. Manufacturers and importers are also obligated to submit, alongside the fee, a report on the quantity, weight, and type of EEE. Funds gathered in this way are used to improve the collection options available for e-waste. In the Bosnia and Herzegovina entity Republic of Srpska, the EPR law went into force in 2020, but the application started only in 2022, and producers/importers are obligated to pay a fee on EEE POM directly to Environmental Protection and Energy Efficiency Fund of the Republic of Srpska. The implementation of a separate EPR system in the Brčko District is not considered an efficient solution because of the small population and the small quantities of e-waste generated. As such, available options include (i) the Brčko District BiH developing a legislation on



EPR based on a shared responsibility model, with such a system working efficiently only if existing operators in both Bosnia and Herzegovina entities FBiH and Republic of Srpska apply and obtain a license to operate in the Brčko District BiH, or (ii) allowing producers/importers to sign contracts with the PROs licensed in FBiH and the Republic of Srpska.

E-waste management standards are provided for in the legislation of FBiH, with supervision carried out by inspectors, while the recycling/recovery goals are monitored through the Waste Management Information System of 2021.

In summary, the list of legal framework which manages the management of WEEE is as follows:

- Law on Waste Management (Official Gazette of the Federation of Bosnia and Herzegovina, no. 33/03, 72/09, 92/17)
- LAW ON ENVIRONMENTAL PROTECTION (Official Gazette of the Federation of Bosnia and Herzegovina, number 15/21)
- Rulebook on the management of waste from electrical and electronic products (Official Gazette of the Federation of Bosnia and Herzegovina, number: 23/23)
- Regulation on criteria for calculation and method of payment of compensation for products that become packaging waste and electrical and electronic waste after use (Official Gazette of the Federation of Bosnia and Herzegovina, number: 104/22)
- Regulation on the information system of waste management (Official Gazette of the Federation of Bosnia and Herzegovina, number 12/18) Directive of the European Parliament and the Council of the EU on the management of waste electrical and electronic equipment, DIRECTIVE 2012/19/EU OF THE EUROPEAN PARLIAMENT AND OF THE COUNCIL, 4 July 2012, on waste electrical and electronic equipment (WEEE), 04/07/2012, L197 p. 37-71/
- Rulebook on categories of waste with lists (Official Gazette of the Federation of Bosnia and Herzegovina, number 09/05)
- Rulebook on the issuance of a permit for the performance of small activities in waste management (Official Gazette of the Federation of Bosnia and Herzegovina, number 09/05)
- Rulebook on the Necessary conditions for the transfer of obligations from the producer and seller to the operator of the waste collection system (Official Gazette of the Federation of Bosnia and Herzegovina, number 09/05)
- Rulebook determining the handling of hazardous waste that is not on the waste list or whose content is unknown (Official Gazette of the Federation of Bosnia and Herzegovina, number 09/05)
- Rulebook on the content of the waste adjustment plan for existing waste treatment or disposal facilities and activities undertaken by the competent authority (Official Gazette of the Federation of Bosnia and Herzegovina, number 9/05)
- Regulation on types of financial guarantees that ensure cross-border transportation of hazardous waste (Official Gazette of the Federation of Bosnia and Herzegovina, number 41/05)
- Decree on financial and other guarantees to cover the costs of the risk of possible cleaning and procedures after closing the landfill (Official Gazette of the Federation of Bosnia and Herzegovina, number 39/06)
- Regulation on selective collection, packaging and labelling of waste (Official Gazette of the Federation of Bosnia and Herzegovina, number 38/06)



- Decree regulating the obligation of operators and waste producers to report on the implementation of the program of supervision, monitoring and record keeping according to the conditions of the license (Official Gazette of the Federation of Bosnia and Herzegovina, number 31/06)
- Rulebook on the form, content and procedure of notification of essential characteristics of products and packaging by the manufacturer (Official Gazette of the Federation of Bosnia and Herzegovina, number 6/08)
- Rulebook on waste of animal origin and other non-hazardous substances of natural origin that can be used for agricultural purposes Official Gazette of the Federation of Bosnia and Herzegovina, number 8/08
- Rulebook on medical waste management (Official Gazette of the Federation of Bosnia and Herzegovina, number 77/08)
- Rulebook on packaging and packaging waste management (Official Gazette of the Federation of Bosnia and Herzegovina, number: 27/23)

9.2.2. Waste Management Plan(s)

Relevant Government policies and plans are in place to ensure environmental protection and sound waste management practices.

Strategic documents pertaining to environmental protection and waste management are developed at the territorial unit level. The main strategic and planning documents related to waste management in Bosnia and Herzegovina are:

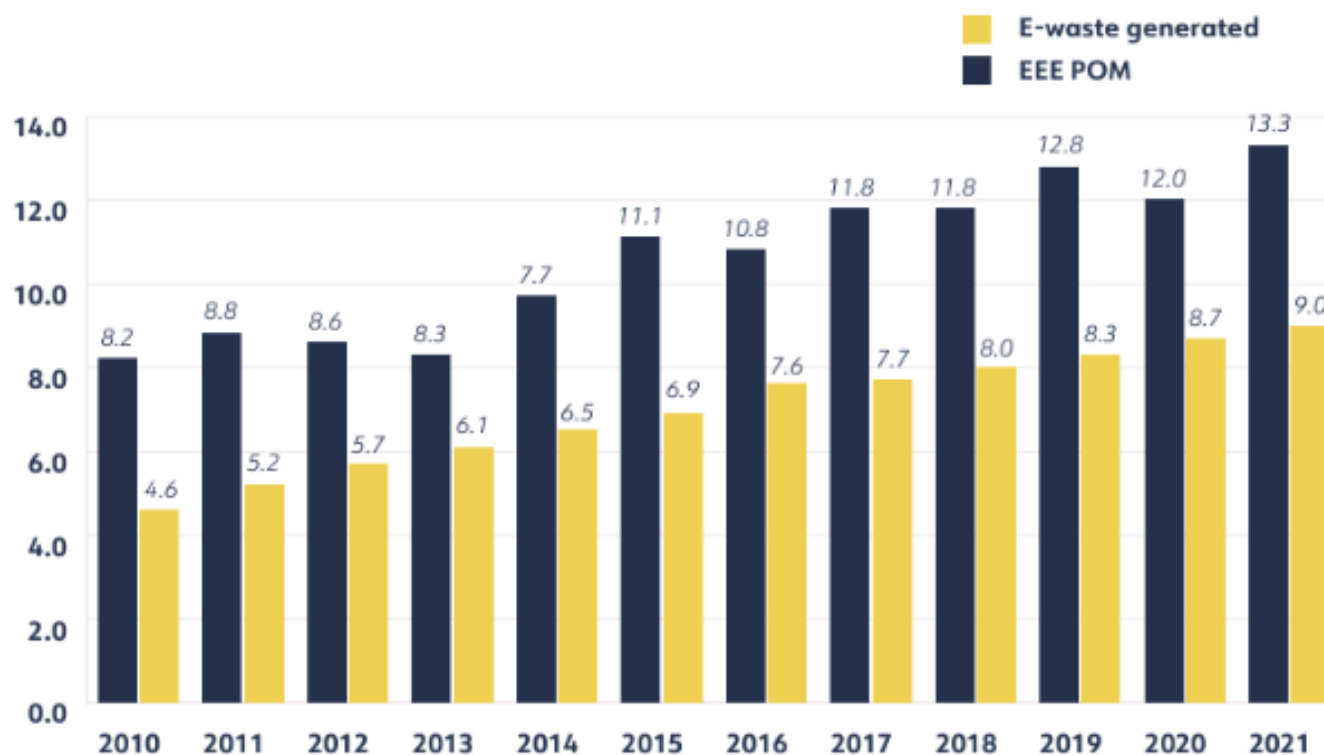
- Environmental Strategy and Action Plan 2030+ of FBiH, which addresses waste management in its integral part
- The Waste Management Strategy of FBiH
- Federal Waste Management Plan 2012–2017 of FBiH
- Waste Management Strategy (2017–2026) of Republic of Srpska, adopted in 2017
- Waste Management Strategy 2016–2026 of Brčko District, adopted in 2017

There is currently no specific policy on e-waste.



9.2.3. Rates and figures related to the country and region

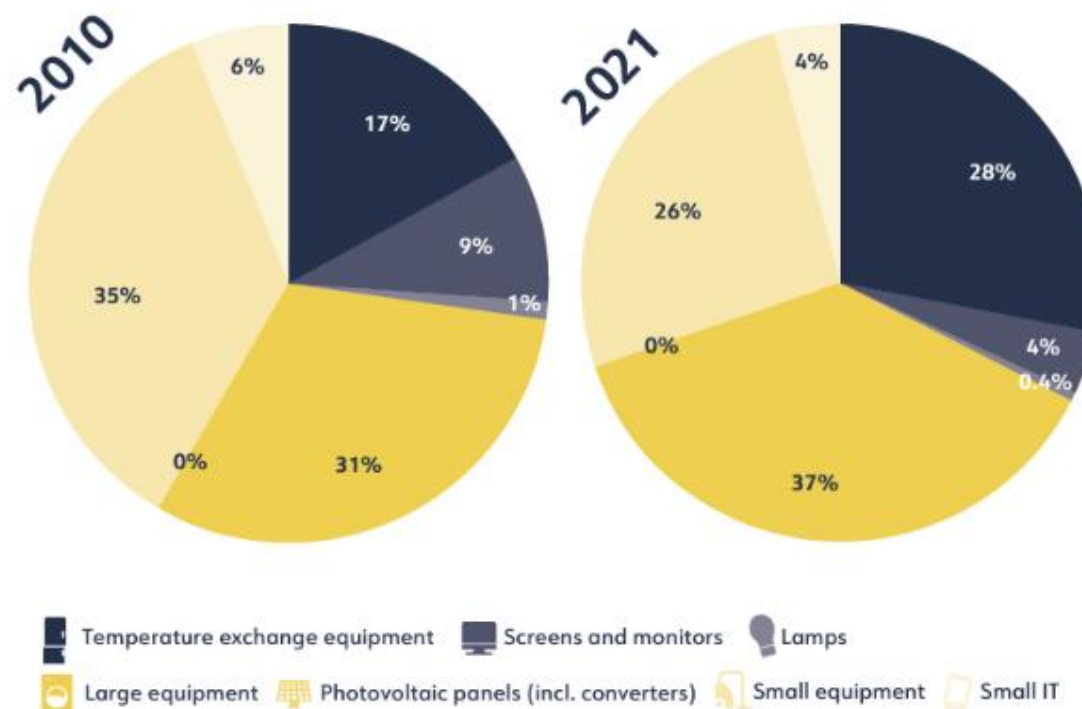
EEE POM and waste generated per kg/inh of Bosnia and Herzegovina. Source: Regional E-waste Monitor for the Western Balkans – 2023



The EEE POM increased slightly from 2010 to 2011, from 8.2 kg/inh to 8.8 kg/inh, and then decreased to 8.3 kg/inh in 2013. An increase then followed until 2015, amounting to 11.1 kg/inh in 2015, before stabilising at approximately 11 kg/inh in 2016. The EEE POM increased in 2017 and stabilised at 11.8 in 2018, and then increased again to 12.8 kg/inh in 2019. The EEE POM then decreased in 2020 to 12.0 kg/inh and increased to 13.3 kg/inh. By contrast, a gradually increasing trend developed for the e-waste generated from 4.6 kg/inh in 2010 to 9.0 kg/inh in 2021 with a brief stagnation in 2017 at 7.7 kg/inh.



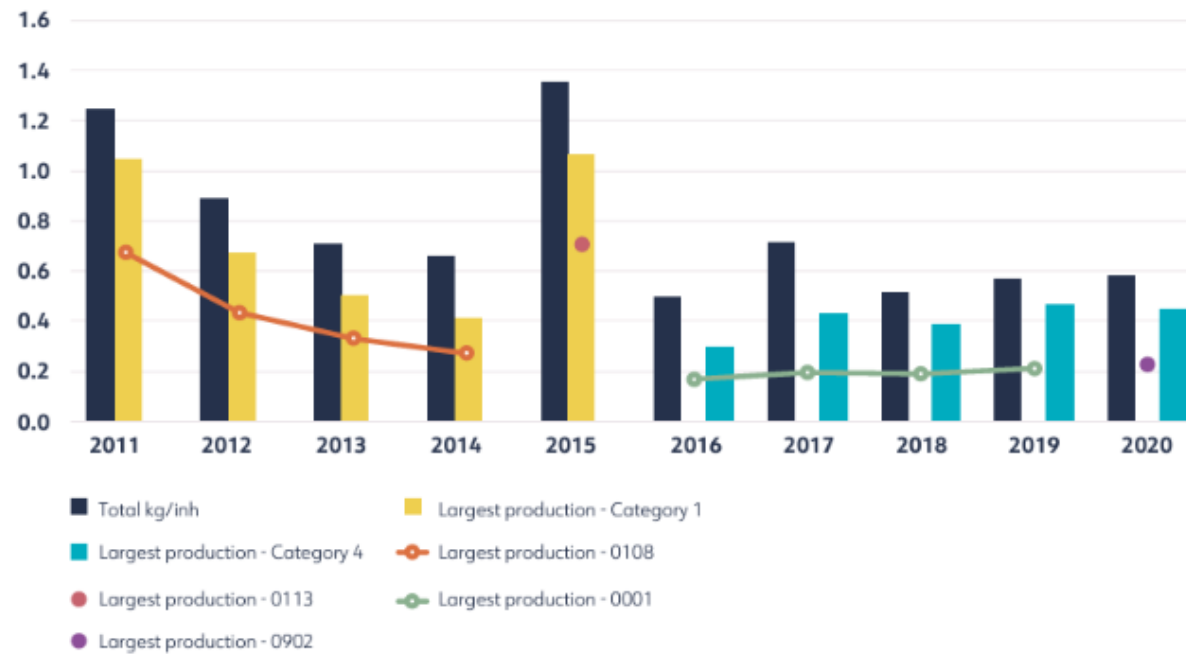
Shares of the EEE POM in Bosnia and Herzegovina. Source: Regional E-waste Monitor for the Western Balkans – 2023



The greatest share for 2021 is Large Equipment (Cat. IV) with 37% (5.0 kg/inh). Temperature Exchange Equipment (Cat I) was the second largest with 28% (3.8 kg/ inh), which has increased from 17% in 2010. Small Equipment (Cat V) is the third-largest category with 26% (3.4 kg/ inh), which was initially at 35% in 2010. The smallest categories consist of Screens and Monitors (cat II) with 4% (0.5 kg/ inh), Small IT (Cat VI) with 4% (0.5 kg/inh), and Lamps (Cat III) with 0.4% (0.1 kg/inh). No shares were available for PV panels (Cat IV B) in 2010 or 2021, though in 2017, 2019, and 2020, the PV share was approximately 2% of the EEE POM. Weight of EEE



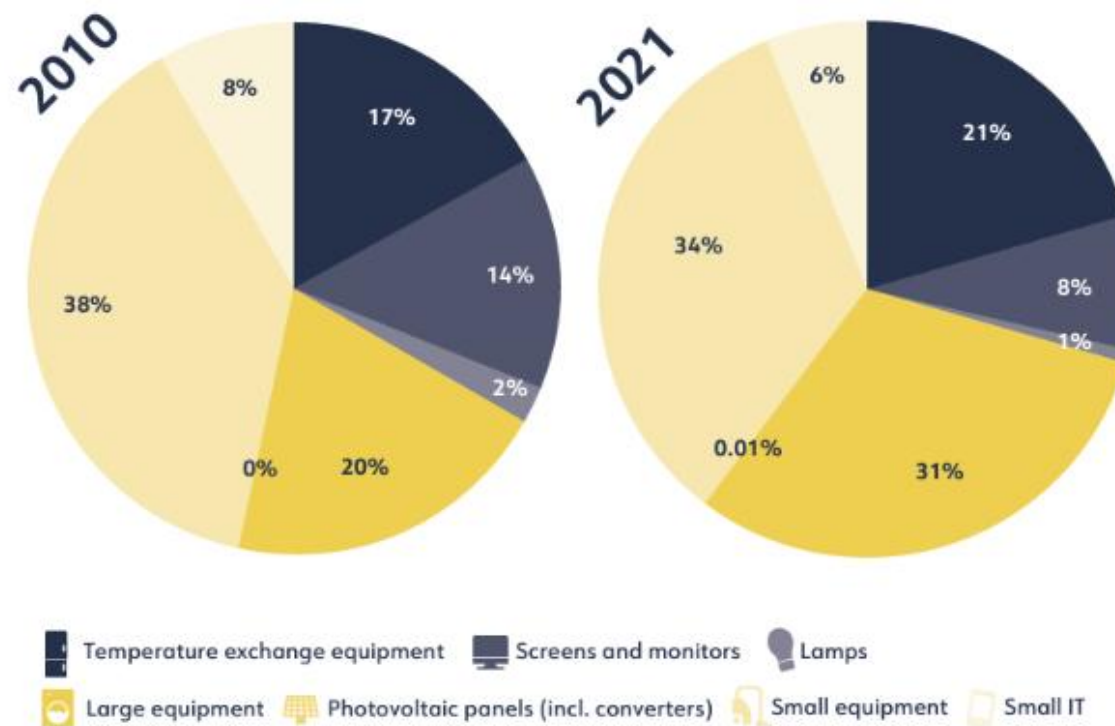
Domestic production of Bosnia and Herzegovina in kg/inh, including the largest UNU-KEY produced per year, largest category per year, and total. Source: Regional E-waste Monitor for the Western Balkans – 2023



The amount decreased from 1.3 kg/inh (4.7 kt) in 2011 to 0.6 kg/inh (2.0 kt) in 2020. In 2020, the domestic production of EEE equated to 16% of the entire amount of EEE POM in the country.



Shares of E-waste generated in Bosnia and Herzegovina. Source: Regional E-waste Monitor for the Western Balkans – 2023



The greatest share of e-waste generated is Small Equipment; in 2021, specifically, its share for was 34% (3.0 kg/inh). This is followed by Large Equipment at second largest, with 31% (2.8 kg/inh). The third largest share is for Temperature Exchange Equipment, with 21% (1.9 kg/inh) of e-waste generated. The fourth largest category is Screens and Monitors, with 8% (0.7 kg/inh). Small IT follows with 6% (0.5 kg/ inh) of generated e-waste. Lamps (Cat III) and PV (Cat VI B) are the smallest categories with 1% (0.1 kg/inh) and 0.01% (0.001 kg/inh) in 2021.



E-waste collected and collection rate in Bosnia and Herzegovina for 2014–2021. Source: Regional E-waste Monitor for the Western Balkans – 2023

	2014	2015	2016	2017	2018	2019	2020	2021
E-waste collected (kt)	1.4	1.9	0.9	2.8	3.5	4.0	4.0	4.7
E-waste collected (kg/inh)	0.4	0.5	0.3	0.8	1.0	1.2	1.2	1.4
E-waste collection rate EEE POM (%)	4	6	3	8	9	10	10	11
E-waste collection rate WG (%)	6	8	4	11	13	14	14	16



9.2.4. Regional status: Improvements and challenges

Officially collected data on e-waste in the Bosnia and Herzegovina entity FBiH is available from PROs, and statistics on the Waste Management Information System of the FBiH entity are expected starting in 2023, while official data collection and reporting for the Bosnia and Herzegovina entity Republic of Srpska are still in process.

Starting in 2021, specific data is kept in part through the Waste Management Information System of FBiH (expected to also be established in the Bosnia and Herzegovina entity Republic of Srpska by the end of 2022). Data is entered electronically, and a control system is in place that allows consistency in POM as well as the import and production through a data gap-filling process. The first data from the Waste Management Information System of the entity FBiH is expected to be available in early 2023. In the FBiH, all legal entities that manage waste are monitored through the Waste Management Information System, regardless of whether they are involved through PROs or independently. The Agency for Statistics of Bosnia and Herzegovina collects, processes, and distributes statistical data of Bosnia and Herzegovina in accordance with internationally accepted standards. Based on the tools and methodology developed by UNITAR, the Agency for Statistics of Bosnia and Herzegovina (BHAS) managed to compile the e-waste statistics indicators from 2010 to 2021 in compliance with the UNU-KEYs and the EU-6 classification system.

The EEE POM fluctuated between 8.2 and 13.3 kg/inh from 2010 to 2021, and the waste generated increased gradually from 4.6 kg/inh to 9.0 kg/inh from 2010 to 2021.

The largest production from 2011 to 2020 were for the following products:

- Central Heating (household-installed) (0001) (Cat IV)
- Fridges (incl. combi-fridges) (0108) (Cat I)
- Professional Cooling (e.g. large air conditioners, cooling displays) (0113) (Cat I)
- Professional Monitoring & Control (e.g. laboratory, control panels, and invertors) (0902) (Cat IV)

From 2011 to 2014, the largest production was for Fridges, with 0.3 kg/inh in 2014. In 2015, the largest production was for Professional Cooling Equipment, with 0.7 kg/inh. From 2016 to 2019, central heating was the largest, with a steady production of 0.2 kg/inh. Finally, the largest production in 2020 was found for Professional Monitoring & Control, with 0.2 kg/inh. The largest EEE production was in line with the greatest production of Temperature Exchange Equipment (Cat I), with approx. 0.7 kg/inh from 2010 to 2015. And the largest from 2016 to 2020 was for Large Equipment (Cat IV) with 0.45 kg/inh in 2020.

In 2021, 4.7 kt of e-waste was collected in FBiH, while the total amount of e-waste collected over the period 2014–2021 is 23.2 kt, partly from the two system operators and partly from public utility companies.

In Neum, this challenge is compounded by its tourist character; with 5,684 recorded beds in 2022, the municipality faces pronounced seasonal pressure that significantly increases municipal waste volumes during summer months. Currently, e-waste is not systematically separated and often ends up at the local landfill, though a positive step was taken with the installation of the first e-container in Ruđer Bošković Street. Key stakeholders for improvement include JP Komunalno Neum d.o.o., the local tourism board, and authorized system operators.



Data on e-waste formally collected for Bosnia and Herzegovina is incomplete and was provided by the Agency for Statistics of Bosnia and Herzegovina (BHAS), the Environmental Protection Fund of FBiH, and the two PROs active in the administrative region Federation, namely Zeos and Kim Tec. Zeos, the first PRO in FBiH and now an authorised e-waste management operator, reported collecting 1.1 kt of e-waste in 2014. Since Zeos started operations in 2013, it exceeded the collection milestone of 10 kt collection, with 10.02 kt of e-waste collected and disposed of until 2019. As of August 2022, the total amount of e-waste collected by Zeos since 2013 is 18.9 kt. Kim Tec, the other PRO of FBiH, started operations in 2014 and collected over 8 kt of e-waste over the period 2014–2021, with 2 additional kt in 2022. Based on reporting from BHAS, the total amount of e-waste collected by public utility companies, which collect municipal waste in the whole of Bosnia and Herzegovina, equals 0.24 kt from 2014 to 2021. In total, over the period 2014–2021, the amount of e-waste collected equals 23.2 kt, with 15.0 kt from Zeos, 8 kt from Kim Tec, and 0.2 kt from the public utility companies. It is important to point out that the operators' activity is expanded in relation to public utility companies, which collect municipal waste (competences and scope of work are defined for them by the Rulebook on Waste Management of Electrical and Electronic Products). This includes, for example, direct collection of e-waste from legal entities/companies. For this reason, the amount of e-waste collected as reported by the operators is higher than the ones related to public utility companies. The data on formally collected e-waste must be viewed as partial because data on formally collected e-waste from the other Bosnia and Herzegovina entity (the Republic of Srpska) and the Brčko District is unknown.

9.3. ACTORS INVOLVED IN THE POLICY INSTRUMENT

9.3.1. Main actors in the policy

BiH entity FBiH has two PROs that are responsible for e-waste management. There is a functional formal e-waste management system in place, and producer/importers are primarily responsible for e-waste management through two licensed PROs (in FBiH): Zeos Eko-sistem Ltd and Kim Tec Eco Ltd. The PROs provide collection facilities, while two small e-waste treatment companies process parts of e-waste before exporting recovered parts. Recently, the two e-waste PROs and the two PROs licensed to manage waste package materials in FBiH (Ekopak Sarajevo and Eko život Tuzla) formed an Association of System Operators in Bosnia and Herzegovina, whose aim is the improvement and development of a recycling system in FBiH.

Consumers can dispose of e-waste in containers installed at collection points provided by the two PROs, hand it over to retail shops that have taken-back obligations, or ask PROs for home pick-up collection for larger quantities of e-waste.



Source: <https://furaj.ba/zeos-eko-sistem-sarajevo-ten-years-of-caring-for-the-environment-in-bosnia-and-herzegovina/>

Citizens discard e-waste in installed e-waste containers at designated collection points, though there are relatively few such points and they are located only in urban areas. Individuals also hand e-waste over to the PROs. In 2019, Zeos received about 150 kg of individual handover of e-waste. A project named 'Door-to-door collection' provides citizens with a new free home e-waste collection service and is aimed at redirecting as much e-waste as possible to the recycling sector through the PROs. Organisations and businesses can contact the PROs and request for collection of larger quantities of e-waste; Zeos has had over 3,330 such requests in FBiH. The PROs are also very active in creating awareness. The Environmental Fund is obliged to calculate the fees to be paid by producers/importers who did not join either of the 2 PROs (System Operators) on time for any given year. The Fund functions like a corrective measure, and the fees prescribed by the Fund are many times (even 10 times) higher than those charged by the System Operators. The two System Operators also work with some authorised collectors and recyclers (their clients) to treat the collected e-waste. For example, Zeos clients became part of the recycling network and possess waste management licenses issued by authorised ministries for handling e-waste pursuant to legal provisions.

Nine companies are licensed to treat e-waste in Bosnia and Herzegovina, and they take on manual dismantling, removal of hazardous parts, and valuable material recovery, with most recovered parts being exported.

In the territory of FBiH, the management of e-waste was reported through WMIS for 2021 by 17 companies, of which nine companies reported processing/recycling procedures and managing hazardous components, while the other nine companies performed collection. The two System Operators (PRO companies) do not manage e-waste directly and did report waste management through WMIS in 2021. However, Zeos and Kim Tec Eko, for instance, supervise and monitor the statistical data of e-waste inputs and outputs at authorised recyclers.

Some of the companies that treat e-waste in Bosnia and Herzegovina include Aida Commerce, Lucius d.o.o, Kemeko BH d.o.o., C.I.B.O.S. d.o.o., Harex d.o.o and SirovinePezić d.o.o. The e-waste types mainly treated are large and small household appliances (e.g. refrigeration appliances), IT equipment, and TV monitors. However, reliable data is not yet available on the recycling capacity of e-waste in the country. In the FBiH, there are some other smaller facilities that can process some e-waste parts. E-waste is managed primarily by manual dismantling (to varying degrees), hazardous part removal, and material recovery of valuable/profitable materials (metals, some



types of plastics) and other actions necessary to complete the process. Such operations are steered by the manual effort of single dismantling operations and the material value of certain parts. Some parts, because they have little value and exporting smaller quantities would be too expensive, are stored and accumulated before being exported. Hazardous components are exported mostly to EU countries, and there are several companies in Bosnia and Herzegovina that deal with the collection, treatment, and exporting of hazardous waste. Cooling appliances, bulbs, and CRTs from monitors are mostly exported for treatment after the first processing stage, due to the absence of appropriate treatment plants in Bosnia and Herzegovina. E-waste not collected by the PROs is either managed by the informal sector, treated with other waste streams, or landfilled.



Many producers and importers are registered with the PROs, but the existence of two PROs in Bosnia and Herzegovina with a small market is not an optimal solution, as it leads to high administrative costs for the PROs.

There is an obligation to pay a Waste Management Fee for EEE POM in Bosnia and Herzegovina territorial units on a semi-annual basis by producer/ importers through the PROs. In addition to the stated fee, all importers, distributors, and producers are obliged to pay a general fee per kilogram of EEE POM (0.0016 KM/kg) to the Environmental Protection Fund of the FBiH for the administrative costs of implementing the e-waste regulations. The Fund has prepared the database of potential subjects to the rules (which contains approximately 4,500 companies) and receives the biannual reports submitted by the companies on the fulfilment of their obligation. In 2017, more than 350 companies were registered as subject to the fee. Noncompliant entities pay a (punitive) levy to the Environmental Protection Fund of the Federation, which is more than 10 times higher in the case of e-waste. The existence of two independent PROs in a relatively small market in the country is not an optimal solution, as it leads to high administrative costs for the PROs. The non-availability of a clear framework for defining the responsibilities of different actors and how to finance the costs of separate collection, sorting, and treatment of e-waste is part of the challenges of EPR.

The informal sector exists in Bosnia and Herzegovina, and they sometimes dismantle e-waste and select valuable parts, which are then sold to dealers, while items of no value are disposed of at landfills.

Stakeholder	Responsibility
Ministry of Foreign Trade and Economic Relationships	Defines policy and coordinates activities and harmonisation of plans in the fields of environmental protection, use of natural resources, and waste management.
Ministry of Environment and Tourism FBiH	Responsible for ecological protection and monitoring and control of air, water, and land; develops environmental strategies and policies and waste management standards.
Ministry of Spatial Planning, Construction and Ecology	The Ministry manages integrated protection of environmental quality and



	its enhancement through research, management, and safeguards planning; protection of public interest assets, natural resources, natural and cultural heritage.
Environmental Protection and Energy Efficiency Fund of the Republic of Srpska	Responsible for fundraising and financing the preparation, implementation, and development of programs, projects, and similar activities in the field of conservation, sustainable use, protection, and improvement of the environment, as well as in the field of energy efficiency and use of renewable energy sources.
Agency for Statistics of Bosnia and Herzegovina	Performs tasks of collecting, processing, analysing, and disseminating statistical data for the country. The agency provides reliable, high-quality, understandable, timely, and internationally comparable statistical data that meet needs of decision-makers, researchers, etc.
Environmental Protection Fund	Established to ensure additional funds for financing programs and projects relating to protection and improvement of the environment. They are responsible for collecting data on the placement of EEE on market, as well as data on the movement of e-waste. The Fund is also responsible for the establishment and management of the WMIS of FBiH. The same task is given to the Environmental Fund of the Republic of Srpska.
ZEOSEko-sistem	The first e-waste PRO in Bosnia and Herzegovina. It has 256 system payers, 27 collectors, 225 storage locations, and 218,829 awareness programme participants. Zeos is now an authorised operator for e-waste management
Kim Tec Eko d.o.o.	Kim Tec is a PRO that works with about 59 importers and distributors, about 20 collectors, and processors, including a specific 'Cathode Pipe Separator' for treatment of CRTs, and with several licensed exporters. The project is supported by the Federal Environmental Fund as well as E Recycling (E Reciklaža) from neighboring Serbia (with expertise in the area).



Aida Commerce	Collects and recycles e-waste and secondary raw materials (aluminum, copper, batteries, plastics, etc.). Aida has a modern recycling yard, 'Eco world-Eco World', within which recycling of e-waste is carried out through institutional incentives. They also handle disposal of hazardous waste (incl. medical waste).
LUCIUS d.o.o.	Provides dismantling and recycling services, with emphasis on e-waste. The company owns recycling machines and facilities for motherboards, cables, electric motors, etc.
KEMEKO-BH d.o.o.	The company deals with the collection, storage, and disposal of hazardous waste, including used tires, electronic and electrical waste, waste freon, and other hazardous gases, PCB capacitors and transformers, batteries, etc.
C.I.B.O.S. d.o.o.	C.I.B.O.S. is the largest company in the field of metal waste recycling in Bosnia and Herzegovina. The company purchases all secondary raw materials, including e-waste, and also sets up street containers for e-waste.
RREUSE	A network of social enterprises active in reuse, repair, and recycling. They collect and redistribute 24 material streams, including textiles, electronics, and furniture, and operate second-hand retail outlets, etc.
Municipality of Neum	In particular the Department for Housing and Communal Affairs, Construction and Development.
JP Komunalno Neum d.o.o.	

Visual schematic model of actors involve in BiH:

Ecosystem tier	Key actors	Core responsibilities and operational mandate	Financial mechanism and flow
Policy and oversight	Ministry of Foreign Trade; Entity Ministries (FBiH/RS); Environmental Protection Funds	Defines national policy, coordinates international treaties, and sets waste management standards. Manages the Waste	Collects the General Fee (0.02 KM/kg) for administration. Collects Punitive Levies (10x higher) from non-



		Management Information System (WMIS).	compliant producers.
System coordination (operational core)	Producer Responsibility Organizations (PROs): ZEOS Eko-sistem; Kim Tec Eco	Authorized operators responsible for the formal collection network. They provide infrastructure (containers), logistics (home pick-ups), and monitoring of treatment data.	Funded via Management Fees paid by producers based on EEE class (e.g., 7.50 KM for fridges vs 0.20 KM for small IT).
Market entry	Producers, Importers, and Distributors	Legally responsible for the entire lifecycle of products placed on the market. Must report quarterly on EEE volumes sold.	Must pay the General Fee to the Fund and either a Management Fee to a PRO or a punitive levy to the Fund.
Local collection	Public Utility Companies (JKP); Retailers; Citizens/Businesses	JKP manages local municipal sites. Retailers provide 1-for-1 take-back. Citizens discard waste at PRO points or via "Door-to-door" express post.	Operations are supported by PRO funding derived from producer management fees.
Recovery and export	Licensed Treatment Companies (e.g., Aida Commerce, Lucius d.o.o.); Exporters	Perform manual dismantling and hazardous part removal. Valuable materials are recovered domestically, while hazardous components (CFCs, CRTs) are exported to the EU.	Revenue is generated from the sale of secondary raw materials and service contracts with PROs.

Management fees by EEE category:

Category	Device Type (Class of EEO)	Management Fee (KM/piece)	General Fee (KM/kg)
R1	Large household appliances	1.80	0.02
R1a	Refrigerators and freezers	7.50	0.02
R1ac	Air-conditioners	6.00	0.02



R2	Small household appliances	0.20	0.02
R3	IT and telecommunication equipment	0.20	0.02
R3a	Monitors (CRT and LCD)	3.00	0.02
R4a	Television sets	4.20	0.02
R5	Lighting equipment: illuminations	0.10	0.02
R5 fluo	Stick fluorescent bulbs	0.04	0.02
R8 / R9	Medical / Monitoring instruments	1.50	0.02
S-panels	Solar panels	2.00	0.02
SO	Small equipment (below 1kg)	0.10	0.02

9.3.2. Priority operational measures for local authorities in Bosnia and Herzegovina

To ensure the Local Action Plan functions as a practical policy tool rather than a background study, municipalities must adopt immediate, low-cost measures that leverage existing resources. A foundational step is the formal appointment of a Local e-Waste Coordinator from within the existing municipal staff. This designated individual serves as the primary focal point for all external cooperation, particularly with authorized Producer Responsibility Organizations (PROs) such as ZEOS and KimTec Eco. By centralizing this role, the municipality ensures consistent communication between communal utility companies (JKP), educational institutions, and non-governmental organizations, facilitating the organized flow of technical information and reporting.

The physical infrastructure for collection must also be prioritized through the establishment of two to three permanent collection points located in highly accessible areas such as JKP yards, municipal buildings, or school premises. For citizens residing in remote neighborhoods or rural villages, the municipality should coordinate monthly mobile collection drives in direct partnership with PROs. Under this collaborative model, the PRO provides the specialized containers and ensures the logistics for transport and final treatment, while the municipality manages the administrative permits, site signage, and public information dissemination. This ensures a comprehensive collection network that leaves no area underserved while keeping municipal infrastructure costs at a minimum.

Furthermore, the municipality must engage the local business community and retail sector to expand the reach of the take-back system. Electronics stores and specialized service workshops should be encouraged to act as voluntary take-back points for small equipment in partnership with authorized PROs. To drive consumer participation, local authorities can facilitate "discount-for-return" models or promotional campaigns where residents who return old devices receive small benefits or public recognition. Working alongside the local Chamber of Commerce, these measures can be formally integrated into corporate social responsibility programs, aligning local business interests with environmental sustainability goals.



9.4. THE WEE INDUSTRIAL AND ENVIRONMENTAL IMPACT ON THE POLICY AREA

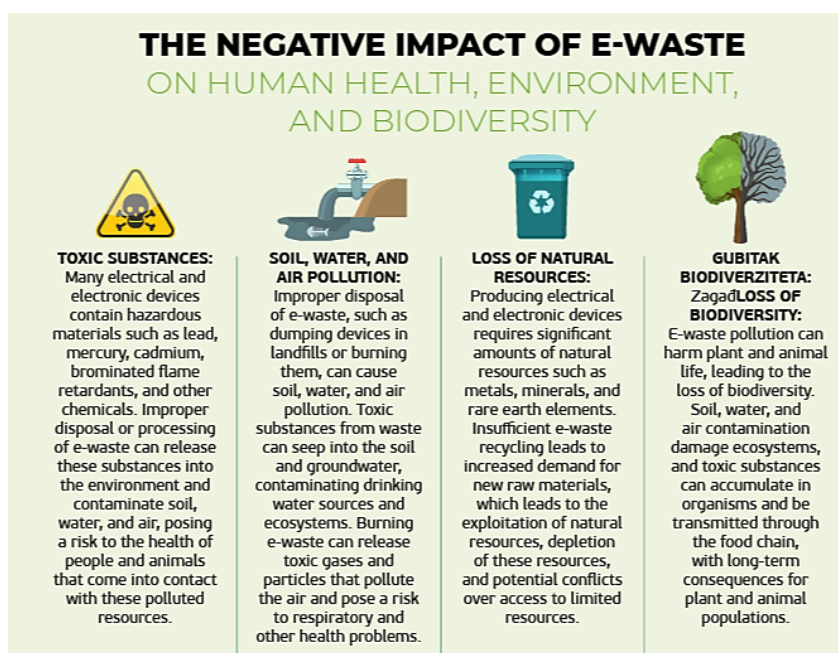
In Bosnia and Herzegovina, the management of Waste Electrical and Electronic Equipment presents significant industrial and environmental challenges. The country has experienced a notable increase in e-waste generation, driven by technological advancements, shorter product lifespans, and a growing middle class. Between 2010 and 2021, the amount of Electrical and Electronic Equipment (EEE) placed on the market rose from 0.16 million tonnes to 0.21 million tonnes, while e-waste generation nearly doubled from 0.09 million tonnes to 0.15 million tonnes during the same period. [\[cite\turn0search0\]](#)

Despite the establishment of specific legislation and Extended Producer Responsibility (EPR) schemes, challenges persist in the effective management of e-waste. The country faces hurdles such as a lack of reliable data and reporting systems, hindering proper enforcement and monitoring, and a limited collection and recycling infrastructure. In 2021, Bosnia and Herzegovina collected and managed 38.4 kilotonnes of e-waste, achieving a total collection rate of 27%. Environmentally sound e-waste management could recover 4.2 kilotonnes of secondary raw materials from e-waste in 2021, equivalent to \$34 million USD, while avoiding 76.4 kilotonnes of CO₂-equivalent emissions. However, this is not practiced in all Western Balkans countries and could be improved. [\[cite\turn0search0\]](#)

The environmental impact of improper e-waste disposal is significant. Hazardous substances such as lead, mercury, and cadmium can leach into soil and water, posing risks to ecosystems and human health. Additionally, the informal handling of e-waste can lead to the release of toxic emissions, further contributing to environmental degradation.

To mitigate these impacts, it is crucial to enhance the country's e-waste management infrastructure, improve data collection and reporting systems, and strengthen enforcement mechanisms. Public education initiatives are also essential to raise awareness about the importance of proper e-waste disposal and the environmental consequences of neglecting this issue.

Addressing the industrial and environmental impacts of WEEE in Bosnia and Herzegovina requires a comprehensive approach that includes policy refinement, infrastructure investment, and public engagement to promote sustainable e-waste management practices.



In the coastal area, The Municipality of Neum faces significant environmental risks associated with improper e-waste management. Electrical and electronic waste contains hazardous substances such as mercury, lead, cadmium, chromium and brominated flame retardants, which can contaminate soil and groundwater if disposed of in landfills or illegal dumping sites. Given Neum's coastal and karst environment, inadequate e-waste management also threatens marine ecosystems, the local landscape, public health and the municipality's tourism image.

Improper handling of e-waste also poses risks to public health and safety. Informal dismantling of equipment without appropriate protective measures can expose people to hazardous chemicals, while damaged appliances may cause injuries, fires or refrigerant leaks. In addition, informal collection practices often recover only valuable materials, leaving hazardous components to be discarded improperly and reducing the quantities entering the formal recycling system.

Tourism further increases these challenges. During the summer season, hotels, restaurants and other tourism businesses generate larger volumes of obsolete electrical and electronic equipment, including televisions, refrigerators, air conditioners and IT devices. Without dedicated collection procedures, these items may remain in storage, be mixed with bulky or municipal waste, or enter informal waste streams, increasing environmental and operational risks.

The municipality also faces institutional and logistical constraints, including limited infrastructure for separate e-waste collection and storage, insufficient monitoring and record-keeping systems, limited financial resources, and the absence of formal coordination mechanisms with authorized recycling operators. These limitations increase transport and treatment costs, reduce recycling rates and make long-term planning more difficult. Strengthening the local collection system, improving coordination among stakeholders and enhancing data management would reduce environmental risks, increase resource recovery and support more sustainable waste management in the municipality.



Simple overview of the main e-waste risks and recommended system responses





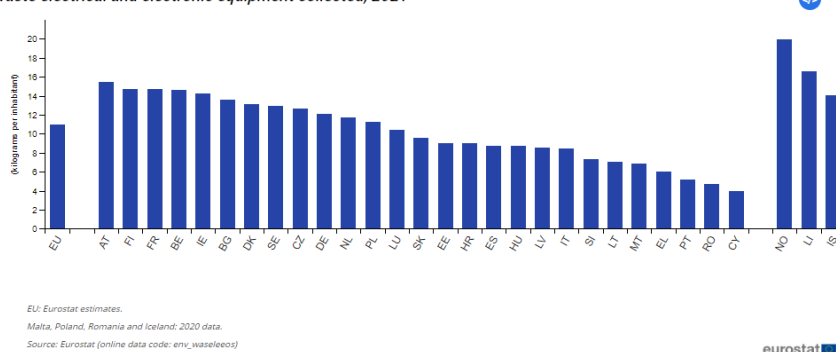
10. THE EEE/WEEE ECONOMIC CONTEXT

The Annex V of WEEE Directive describes the minimum recovery targets to in article 11. Regarding all WEEE separately collected in accordance with Article 5 and sent for treatment in accordance with Articles 8, 9 and 10, Member States shall ensure that producers meet the minimum targets set out in Annex V. This Annex is divided into 3-time parts. First two parts are no longer relevant. The third part is valid from 15 August 2018 with minimum targets applicable by categorie with reference to the categories listed in Annex III.

- for WEEE falling within category 1 or 4 of Annex III,
- 85 % shall be recovered, and
- 80 % shall be prepared for re-use and recycled;
- for WEEE falling within category 2 of Annex III,
- 80 % shall be recovered, and
- 70 % shall be prepared for re-use and recycled;
- for WEEE falling within category 5 or 6 of Annex III,
- 75 % shall be recovered, and
- 55 % shall be prepared for re-use and recycled;
- For WEEE falling within category 3 of Annex III, 80 % shall be recycled.

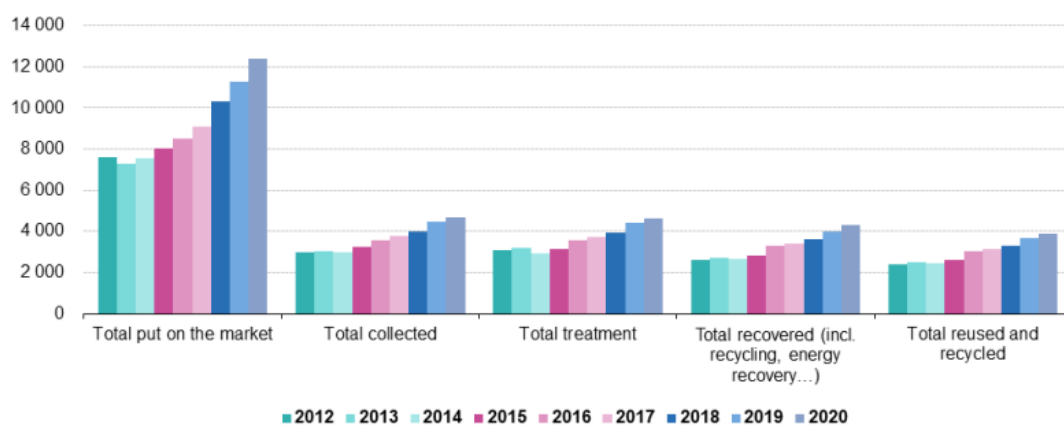
The amount of EEE put on the market in the EU evolved from 7.6 million tonnes in 2012 to a currently maximum peak of 12.4 million tonnes in 2020. Within this period, the lowest level was in 2013, with 7.3 million tonnes. Over the period 2012-2020 as a whole, the amount of EEE put on the market grew by 62.2 %. The total collected WEEE increased from 3.0 to 4.7 million tonnes (+57.8 %), while the total treated WEEE grew from 3.1 to 4.6 million tonnes (+49.1 %). Recovered WEEE developed from 2.6 to 4.3 million tonnes (+65.2 %), and WEEE recycled and prepared for reuse grew from 2.4 to 3.9 million tonnes (+61.7 %) from 2012 to 2020. Generally during this period was increasing trend of the EEE put on the market, on the other hand the similar trend was observed with collected, treatment, recovered and recycled/reuse of EEE, resp. WEEE.

Waste electrical and electronic equipment collected, 2021



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

Electrical and electronic equipment (EEE) put on the market and waste EEE collected, treated, recovered, recycled and prepared for reuse, EU, 2012–2020
(thousand tonnes)



Note: 2019 and 2020: Eurostat estimates

Source: Eurostat (online data code: env_waselees and env_waselee)

eurostat

EEE put on the market and WEEE processed in the EU in years 2012-2020

([https://ec.europa.eu/eurostat/statistics-](https://ec.europa.eu/eurostat/statistics-explained/index.php?title=Waste_statistics_electrical_and_electronic_equipment#Electrical_and_electronic_equipment_28EEE.29_put_on_the_market_and_WEEE_processed_in_the_EU)

explained/index.php?title=Waste_statistics_electrical_and_electronic_equipment#Electrical_and_electronic_equipment_28EEE.29_put_on_the_market_and_WEEE_processed_in_the_EU)

10.1. NATIONAL AND REGIONAL ECONOMIC TRENDS

10.1.1. Recycling fees in 2024

Waste management fees apply to current and future clients. The said fee refers to the management fee paid by the client through the ZEOS eco-system d.o.o. System Operator for each placed/sold piece of electrical and electronic equipment in the territory of the Federation of Bosnia and Herzegovina. After the System Participant completes the report in the application, an automatic calculation and invoice are made according to the specified price list, on a quarterly basis.

In addition to the said fee, all importers, distributors and manufacturers are to pay the general fee (0.02 KM/kg) to the Environmental Protection Fund, based on the Decision the Fund issues to them semi-annually.

Applicable management fees as of 2024.



Class of EE Equip	Name of class of EEO (E-waste management fee)	ZEOS eko-sistem d.o.o. management fee for period from 2024. year
		KM/pcs
R1	Large household appliances	1,80
R1a	Refrigerators and freezers	7,50
R1ac	Air-conditioners	6,00
R2	Small household appliances	0,20
R3	Information technology (IT) and telecommunication equipment	0,20
R3a	Monitors	3,00
R4	Consumer goods for entertainment	0,20
R4a	Television sets	4,20
R5	Lighting equipment: illuminations	0,10
R5a	Lighting equipment: other bulbs	0,10
R5 fluo	Lighting equipment: stick fluorescent bulbs	0,04
R6	Electrical and electronic tools (other than large-scale stationary industrial tools)	0,20
R7	Toys, equipment for leisure (entertainment) and sports	0,06
R8	Medical devices (other than implanted and infectious products)	1,50
R9	Instruments for monitoring and control	1,50
R10	Automated machines	3,60
S0	Class small equipment (all below 1kg except bulbs)	0,10
E-cigarettes	Electric cigars weighing up to 0.050 kg	0,04
S-panels	Solar panels	2,00

Fees 2024. Source: <https://www.zeos.ba/en/24/pages/15/management-fees>

10.2. EEE/WEEE BUSINESS ENVIRONMENT AND EMPLOYMENT

10.2.1. EU

The business environment surrounding Electrical and Electronic Equipment (EEE) and Waste Electrical and Electronic Equipment (WEEE) is influenced by various factors, including regulatory frameworks, technological advancements, consumer behaviour, and sustainability initiatives.

In the European Union (EU), the business environment surrounding Electrical and Electronic Equipment (EEE) and Waste Electrical and Electronic Equipment (WEEE) is heavily influenced by stringent regulations, sustainability initiatives, and evolving consumer behaviour. Here are key aspects shaping the EEE/WEEE business environment in the EU:

WEEE Directive

The WEEE Directive sets the framework for the collection, recycling, and proper disposal of electrical and electronic waste in the EU. It mandates extended producer responsibility (EPR), obligating manufacturers to manage the end-of-life disposal of their products.

Circular Economy Action Plan



The EU's Circular Economy Action Plan aims to promote a more circular approach to product lifecycles, emphasizing waste reduction, resource efficiency, and recycling. This initiative influences product design, waste management strategies, and business practices.

Extended Producer Responsibility (EPR)

EPR programs in the EU require manufacturers to take responsibility for the collection, recycling, and disposal of their products at the end of their life cycle. This affects product design, material choices, and recycling infrastructure. Strict Waste

Management Regulations

The EU has stringent regulations governing the handling, recycling, and disposal of electronic waste, ensuring compliance with environmental standards and encouraging sustainable practices.

Consumer Awareness and Preferences

EU consumers are increasingly conscious of environmental issues. Their preferences for sustainable products, responsible disposal, and support for eco-friendly brands influence business strategies and product offerings.

Green Public Procurement

EU policies promote green public procurement, encouraging public authorities to choose environmentally friendly products and services. This incentivizes businesses to develop sustainable EEE products.

Innovation and Research

The EU invests in research and innovation for sustainable technologies and recycling methods, supporting businesses in developing eco-friendly products and waste management solutions.

Cross-Border Compliance

EEE/WEEE businesses in the EU must adhere to cross-border regulations and standards, ensuring consistency in waste management practices across member states. In legislation, this issue is defined in Regulation (EC) No 1013/2006 of the European Parliament and of the Council of 14 June 2006 on shipments of waste. In order to protect the environment, the above-mentioned Directive prohibits the export of waste intended for disposal to third countries which are not EFTA (European Free Trade Association) countries, or which are not parties to the Basel Convention.

The EU's EEE/WEEE business environment is characterized by a strong regulatory framework, sustainability commitments, and a push for circular economy principles. Businesses operating in this sector navigate these regulations and consumer expectations while innovating to develop environmentally responsible products and sustainable waste management practices. And last but not least consumer awareness and preferences- EU consumers are increasingly conscious of environmental issues. Their preferences for sustainable products, responsible disposal, and support for eco-friendly brands influence business strategies and product offerings.

10.2.2. NATIONAL AND REGIONAL

The EEE/WEEE business environment and employment in Bosnia and Herzegovina is an evolving sector influenced by EU policies and regional waste management initiatives. In the European Union, the environmental goods and services sector, which includes WEEE management, has seen a steady increase in employment. Between 2010 and 2020, employment in this sector grew from 2.1% to 2.5% of total employment,



reaching approximately 5.1 million full-time workers. This trend highlights the growing importance of waste management and energy resource efficiency in generating new job opportunities. While the situation in Bosnia and Herzegovina is not directly comparable to the EU due to differences in economic structures and policy implementation, the country is gradually integrating circular economy principles and improving its e-waste management framework.

One of the key partners in Bosnia and Herzegovina is the Association LINK Entrepreneurial Center, which plays a significant role in supporting business development, entrepreneurship, and sustainability programs. Through this collaboration, Bosnia and Herzegovina is working to bridge the gap between existing waste management practices and the goals of the circular economy.



A major challenge in Bosnia and Herzegovina's WEEE business environment is the need to strengthen Extended Producer Responsibility (EPR) schemes. Currently, waste collection and recycling efforts rely heavily on municipal initiatives and informal networks, but the introduction of stricter EPR policies would ensure that producers contribute financially and logistically to the proper disposal and recycling of electrical and electronic equipment. Without strong enforcement of EPR principles, e-waste management remains fragmented, leading to inefficiencies in collection systems and recycling processes.

In response to these challenges, Bosnia and Herzegovina has been investing in capacity-building initiatives aimed at improving the skills of workers in the WEEE sector. These initiatives focus on training professionals in areas such as life cycle assessment, resource recovery, and sustainable product design. The goal is to equip businesses and waste management operators with the knowledge needed to implement more efficient recycling processes, minimize environmental impact, and create employment opportunities in the circular economy.

Although Bosnia and Herzegovina still faces obstacles in fully integrating into the EU's waste management framework, the country is making progress in developing business models that support WEEE collection and treatment. By increasing collaboration between public and private stakeholders, enhancing recycling infrastructure, and enforcing regulations that align with EU standards, Bosnia and Herzegovina has the potential to expand its WEEE business sector, generate new employment opportunities, and contribute to a more sustainable and resource-efficient economy.

10.3. EEE/WEEE EDUCATION, SKILLS AND CAPACITY BUILDING

10.3.1. NATIONAL AND REGIONAL

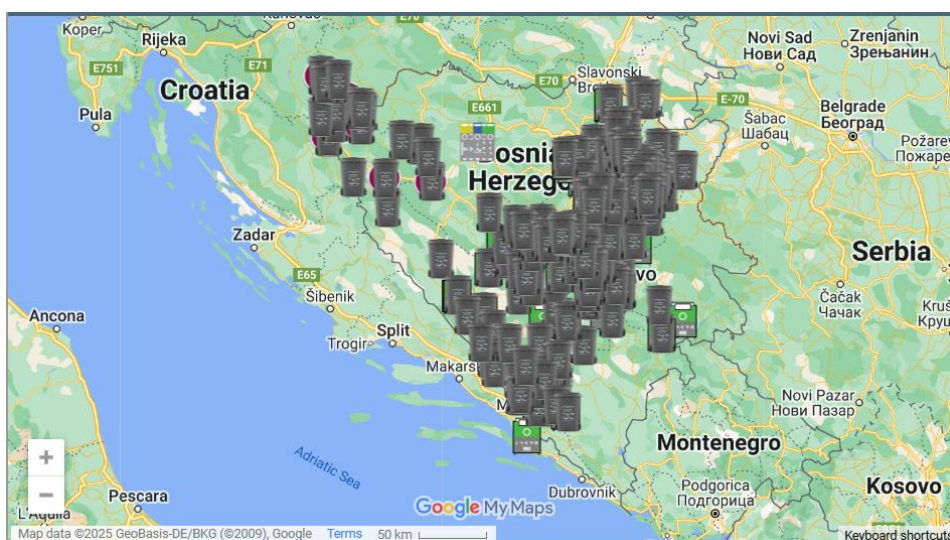
There are projects and initiatives for creating awareness on e-waste by NGOs and the PROs. Zeos have several awareness projects, including:

- 'Green E-volution'. This project was valued at 47,960.00 KM, with 52.13% financed by the Environmental Protection Fund of FBiH. The project was



implemented in Mostar and Tuzla, with each city receiving eight e-waste containers, for a total of 16 containers.

These containers can hold up to 300 kg of e-waste, equivalent to about 150 small appliances. E-waste encompasses all items that operate on electricity or batteries, including small appliances, tools, large devices, electric toys, laptops, mobile phones, chargers, recreational equipment, various instruments, TV monitors, and similar items. Citizens can dispose of e-waste up to 45 cm in size in these containers. The addresses of all containers, with exact locations and pictures, can be found on the map at www.zeos.ba. E-waste contains harmful substances like brominated flame retardants, chromium, selenium, beryllium, and arsenic, which can negatively impact public health. Therefore, we urge all citizens to responsibly and properly dispose of e-waste.



Map with containers. Source: <https://www.zeos.ba/en/43/pages/21/map-with-containers>

- 'Collecting e-waste door to door' for consumers to send e-waste over by Express post. In 2022, ZEOS eko-sistem d.o.o. continued implementing the Door-to-Door Collection project, which provides citizens with a new, free service for disposing of electrical and electronic waste from their addresses. This service accepts washing machines, stoves, dryers, small household appliances, refrigerators, air conditioning units, IT equipment, electric toys, lighting equipment, gas bulbs, tools, and various electrical instruments. As an authorized operator, ZEOS eko-sistem d.o.o. collects all devices and redirects them to the recycling sector. Citizens are also reminded that electronic and electrical waste is dangerous and that it is important to dispose of and manage it properly.
- 'Old for New'. As a socially responsible company, we are aware that a lot of electrical and electronic equipment ends up in places not designated for this type of waste. In cooperation with our partner Gorenje Commerce Ltd., we have designed an ecological campaign in which we offer customers in Gorenje STUDIJA retail stores the opportunity to purchase new appliances at a discount of 5% for trading in an old appliance on a "one for one" basis. This ecological discount can be combined with other current discounts. The campaign applies to pre-determined categories of appliances, and all details can be found at www.zeos.ba. In addition to large appliances, people can also dispose of small



ones at the “Zeleni namještaj” (Green Furniture) in every Gorenje Studio store as part of this campaign.



Kim Tec has similar projects, including a partnership to launch the action ‘Taking care of the environment starts from us!’ to raise awareness on the dangers of e-waste and its proper disposal. Though the Fund does not collect fees for e-waste management, its co-finances, through its activities, the construction of infrastructure for the management of special categories of waste, including e-waste (e.g. the 'Cathode Pipe Separator' for treatment of CRTs).

FBiH recognises a lack of knowledge (e.g. on waste codes, R or D procedures, etc.) as a challenge in the e-waste sector, especially among collectors and recyclers. As such, the Fund is putting an emphasis on educating all those obliged to report on e-waste collection and recycling in 2023. The training is planned for the more than 400 persons obliged to report and make the necessary adjustments on reports based on the needs of the Agency for Statistics, which is then required to report to Eurostat.

Other initiatives that aimed at enhancing education, skills, and capacity building are emerging, though specific programs targeting WEEE are still developing. Efforts to improve overall waste management and environmental education indirectly contribute to building capacity in this area.

Higher Education and Capacity Building:

The "Capacity Building in Higher Education" projects, selected in 2019, aim to improve the competencies of higher education graduates in Bosnia and Herzegovina. These projects focus on developing dual education models and legal frameworks to support the diverse needs of students, companies, and higher education institutions across various regions. While not exclusively centered on WEEE, these initiatives enhance the overall educational infrastructure, potentially benefiting environmental sectors, including e-waste management.

Quality Education for All:

The "Quality Education for All – Bosnia and Herzegovina" action proposes measures at policy and grassroots levels to improve education quality by fostering a culture of democracy and inclusion and combating discrimination. Although not directly linked to WEEE, promoting inclusive and quality education can lead to a more informed populace capable of engaging in effective waste management practices.

Municipal Solid Waste Management:

The "Municipal Solid Waste Management Sector Review" highlights the need for capacity building at all levels to improve waste management in Bosnia and



Herzegovina. Recommendations include enhancing data collection, public awareness, and infrastructure development, which are crucial for effective WEEE management.



11. 11. THE STRATEGIC AND POLICY CONTEXT

11.1. EU POLICY CONTEXT

11.1.1. WEEE EU Policy

The European Community policy in the environment sectors aims at a high level of protection, taking into account the diversity of situations in the various regions of the Community.

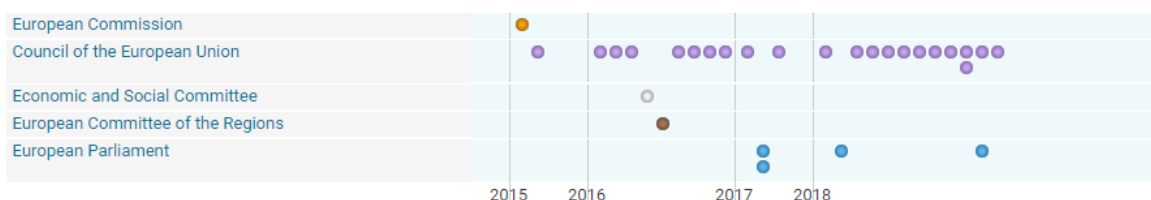
These ideas were included in original Directive 2008/98/EC on waste, respectively amending Directive (EU) 2018/851, as part of a package of measures on the circular economy. It sets out the legal framework for waste management in the European Union (EU). It aims to protect the environment and human health by emphasizing the importance of proper waste management, recovery and recycling techniques to reduce pressures on resources and improve their use. The key point of the directive is an establishment of a waste hierarchy with the following principles:

- prevention,
- preparing for reuse,
- recycling,
- other recovery (e.g., energy recovery),
- and disposal.

The Directive also reaffirms the "polluter pays principle", according to which the costs of waste management must be paid by the original producer of the waste. The amending Directive in the connection to the circular economy has a more ambitious target for recycling and strengthens rules on waste prevention. The Directive on waste can be seen as a starting point for waste management, from which other individual areas, such as e-waste, packaging, limiting the impact of plastic products, are specified by other directives and Commission decisions.

Packaging is a significant part of the waste and subsequently waste management. This part is addressed not only at the EU level by separate legislation - the Directive 2018/852/ES on packaging and packaging waste. The Directive applies to all packaging placed on the European market and to all packaging waste, whether used or released at industrial, wholesale, retail, office, service, household or any other level, regardless of the material used.

Directive (EU) 2018/852 is the latest amendment to the original Directive 94/62/EC and contains updated measures to prevent the generation of packaging waste and promote the reuse, recycling and other forms of recovery of packaging waste instead of its final disposal, with a view to contributing to the transition to a circular economy.



Procedure 2015/0276/COD- procedure of Directive (EU) 2018/852 (<https://eur-lex.europa.eu/legal-content/EN/HIS/?uri=CELEX:32018L0852&qid=1700574371612>)

EU countries should encourage an increase in the proportion of reusable packaging* placed on the market and in the proportion of packaging reuse schemes in an



environmentally friendly way, without compromising food safety or consumer safety. This may include:

- returnable back-up packaging systems,
- objectives,
- economic incentives,
- minimum percentage of reusable packaging placed on the market for each type of packaging, etc.

EU countries must also take the necessary measures to meet waste recycling targets, which vary depending on the packaging material. To this end, they have to apply the new calculation rules concerning reporting in relation to the new recycling targets to be met by 2025 and 2030.

Objectives- by 31 December 2025, at least 65% by weight of all packaging waste must be recycled. The recycling targets for each material are set out: 50 % of plastics, 25 % of wood, 70 % ferrous metals, 50 % aluminum, 70 % glass and 75 % paper and cardboard.

At least 70 % by weight of all packaging waste must be recycled by 31 December 2030. These include: 55 % of plastics, 30 % of wood, 80 % of ferrous metals, 60 % aluminum, 75 % glass and 85 % paper and cardboard.

European legislation covers the treatment of end-of-life electrical equipment for the whole of the European Union. The first WEEE Directive (Directive 2002/96/EC) entered into force in February 2003. This Directive provided for the establishment of collection schemes under which consumers hand in their WEEE free of charge. The aim of these schemes is to increase the recycling and/or re-use of WEEE. The key documents are currently Directives 2012/19/EU (WEEE Directive) and 2012/65/EU (RoHS Directive), which arose out of the need to properly regulate the management of the ever-increasing amount of waste electrical equipment in EU countries. The aim of the Directives is to unify the rules for the management of e-waste so that they are consistent with environmental protection in all EU countries.



Based on article 174 of the EC Treaty, the WEEE Directive aims to improve the environmental performance of WEEE management and to close the « waste-resources » loop through notably:

- a selective collection of WEEE by suitable systems, which preserves the integrity of the appliances and their recovery potential and ensure a free service for households
- a collection rate to be achieved by Member States of 4kg WEEE/inhabit. /Year by 31st December 2006
- an individual producer responsibility: reuse, recycling and recovery rates ranging from 50% to 80% according to the category of equipment considered, must be achieved by producers of EEE by 31st December 2006: these shall finance the treatment, recovery and environmentally sound disposal of their waste
- the provision of information to end-users (whose participation is essential for the achievement of high collection and recycling rates), through the marking of packaging notably; and to treatment facilities (regarding the structure and composition of EEE).

The restriction of the use of certain hazardous substances in EEE with the Directive 2002/95/EC of the European Parliament and the Council of 27 January 2003 on the



restriction of the use of certain hazardous substances in electrical and electronic equipment (ROHS). This directive is a "single market directive" based on article 95 of the EC Treaty whose scope of application is quite similar to that of the WEEE directive. It mainly entails that from 1st July 2006, four heavy metals (lead, mercury, cadmium, hexavalent chromium) and flame retardants PBB and PBDE will be banned from the manufacturing of new electrical and electronic appliances, excepted:

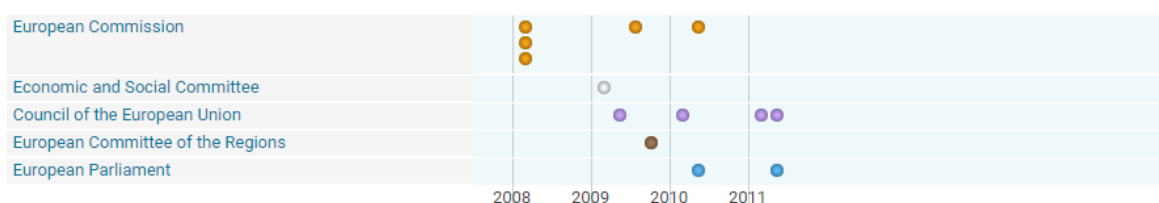
- Some applications defined in a comprehensive way (ex: mercury in fluorescent lamps or tubes, lead in cathode ray tubes, or alloying elements, chromium for anti-corrosion applications...);
- Spare parts for the repair or reuse of EEE put on the market before 1st July 2006. If the market for new components requires the phasing out of certain substances, the availability of old components will be limited in time and the availability of spare parts is important to stimulate the repair of equipment.

This original Directive was replaced by Directive 2011/65/EU.

This version strengthens the existing rules on the use of hazardous substances such as lead, mercury and cadmium in electrical and electronic equipment (EEE). Directive (EU) 2017/2102 amends Directive 2011/65/EU to address a number of issues to avoid unintended consequences of this legislation due to the open scope introduced in 2011.

The Annex to the Directive sets out the categories of EEE covered by this legislation. This includes equipment ranging from household appliances to IT equipment plus an open miscellaneous category (valid from July 2019). The ban now applies to all EEE and to cables and spare parts. A short list of exemptions has been issued for certain special cases. For some products, the ban has been phased in. It starts to apply 22 July 2014 for monitoring and control equipment and medical devices, 22 July 2016 for in vitro medical devices, 22 July 2017 for industrial monitoring and control devices and 22 July 2019 for the remaining product groups.

It also aims to promote the circular economy by lifting the ban on secondary market operations (which include repairs, replacement of spare parts, refurbishment and re-use and retrofitting) for EEE that were not covered by the previous Directive 2002/95/EC but which did not comply with Directive 2011/65/EU.



Procedure 2008/0240/COD- procedure of Directive 2011/65/EU (<https://eur-lex.europa.eu/legal-content/EN/HIS/?uri=CELEX:32011L0065&qid=1700572305344>)

In 2017, the Commission adopted a legislative proposal modifying the scope of the RoHS Directive. Directive 2017/2102/EU amends Directive 2011/65/EU on restrictions on the use of certain hazardous substances in EEE.

The last consolidated version of the RoHS Directive (2011/65/EU) is dated to 1 September 2023.

In the context of hazardous substances found in electrical equipment, the Regulation EC on substances that deplete the ozone layer should also be mentioned. Ozone Depleting Substances (chlorofluorocarbons, etc...) EC regulation N°2037/2000 of the European Parliament and the Council of June 29, 2000 is of direct application in



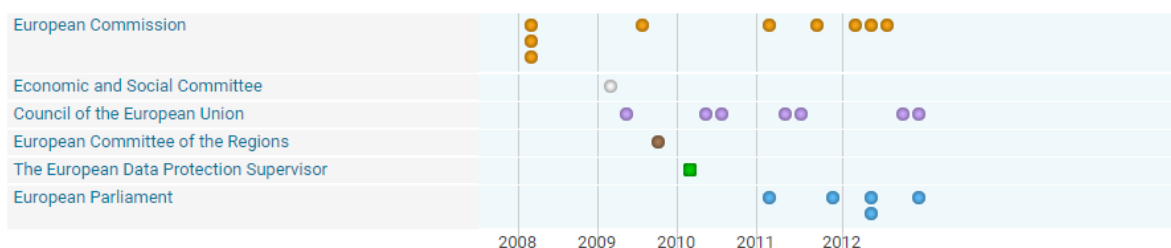
national law, and requires to recover and to treat ozone depleting substances like CFC and HCFC from cooling circuits and insulating foams in refrigeration, air-conditioning and heating pumps equipment, when cleaning or before disassembling or eliminating them.

This regulation was replaced by the Regulation (EC) No 1005/2009. This regulation sets out rules for the manufacture, import, export, sale, use, recovery, recycling, reclamation, and disposal of ozone-depleting substances. It establishes information and action requirements for products and equipment using these substances. One of the key points is that there is a general ban on the manufacture and sale of controlled substances- for EEE, the Regulation applies to hydrochlorofluorocarbons (used in refrigerators and air conditioning systems), the production or use of which is subject to regulation. Another key point is the introduction of a recovery system for the disposal, recycling or reclamation of controlled substances used in refrigeration and air conditioning equipment and heat pumps, fire extinguishers and fire protection systems and equipment containing solvents.

In subsequent years, the first WEEE Directive (2002/96/EC) was replaced by Directive 2012/19/EU, notably to strengthen separate collection and recovery, including providing for more ambitious targets. Most notably, the WEEE Directive lays down, as of 2019, a collection target of 65% of the average weight of EEE placed on the market in the three preceding years in the Member State concerned, or alternatively 85% of WEEE generated on the territory of that Member State. The WEEE Directive also allows a Member State to set a more ambitious level of separate collection target of WEEE, in which case it will notify the Commission.

Minimum rates for separate collection of WEEE	
Until 31 December 2015	At least 4 kg / inhabitant of WEEE from private households; OR the same weight as the average amount of WEEE collected in that Member State in the three preceding years; whichever of the two figures that is highest shall continue to apply.
From 2016 to 2018	45% of EEE put on the market, calculated on the basis of: - the total weight of WEEE collected; and - the average weight of EEE put on the market in the three preceding years.
As of 2019	65% of EEE put on the market, calculated on the basis of: - the total weight of WEEE collected; and - the average weight of EEE put on the market in the three preceding years. OR 85% of WEEE generated on the territory of that Member State. (Member States will be able to choose which one of these two equivalent ways to measure the target they wish to report.)

Bulgaria, the Czech Republic, Latvia, Lithuania, Hungary, Malta, Poland, Romania, Slovenia and Slovakia were allowed to postpone reaching the 2019 collection level until 2021 because they lack the necessary infrastructure and make little use of EEE.



Procedure 2008/0241/COD – procedure of Directive 2012/19/EU (<https://eur-lex.europa.eu/legal-content/EN/HIS/?uri=CELEX:32012L0019&qid=1700570810202>)

In addition, Article 5(1) of the WEEE Directive determines that Member States shall adopt appropriate measures to minimise the disposal of WEEE in the form of unsorted municipal waste, to ensure the correct treatment of all collected WEEE and to achieve a high level of separate collection of WEEE.

Within this context, it should be noted that the take-back obligation under Article 5 on separate collection requires Member States to ensure that:

- a) Systems are set up allowing final holders and distributors to return WEEE free of charge. Member States shall ensure the availability and accessibility of the necessary collection facilities, taking into account, in particular, the population density.
- b) when supplying a new EEE, distributors are responsible for ensuring that WEEE can be returned to the distributor at least free of charge on a one-to-one basis as long as the EEE is of equivalent type and has fulfilled the same functions as the supplied EEE. Member States may derogate from this provision provided that they ensure that returning the WEEE is not thereby made more difficult for the final holder and that it remains free of charge. Member States making use of this derogation shall inform the Commission thereof.
- c) distributors provide for the collection, at retail shops with sales areas relating to EEE of at least 400 m², or in their immediate proximity, of very small WEEE (no external dimension more than 25 cm) free of charge to end-users and with no obligation to buy EEE of an equivalent type, unless an assessment shows that alternative existing collection schemes are likely to be at least as effective.



Such assessments shall be available to the public. WEEE collected shall be properly treated in accordance with Article 8; The Waste Framework Directive (WFD) reflects the polluter-payer principal through the extended producer responsibility (EPR) schemes under Article 8a. Under the EPR mechanism, producers are made administratively and/or financially responsible for waste management.

Finally, the WEEE Directive also constitutes the basis for extended producer responsibility for WEEE generated in the EU. Based on this mechanism, producers of EEE are given the financial and, in some cases, administrative responsibility for the separate collection and sound treatment of WEEE.



It requires the separate collection and proper treatment of WEEE and sets targets for their collection as well as for their recovery. Recovery targets include preparation for re-use and recycling of WEEE.

Circular Economy Action Plan

The resource efficiency potential of WEEE was iterated in the first Circular Economy Action Plan, which underlined the importance of critical raw materials for the EU and in particular those present in electronic devices and also announced legislative and non-legislative actions to increase the low level of recovery of such critical raw materials.

Decoupling economic growth from resource use and shifting to circular systems in production and consumption is key to achieving EU climate neutrality by 2050.

In March 2020, the Commission presented a new circular economy action plan, on which the Council adopted conclusions in December 2020. The conclusions also highlight the role of the circular economy in ensuring a green recovery from COVID-19.



The action plan envisages over 30 action points on designing of sustainable products, circularity in production processes and empowering consumers and public buyers. It targets sectors such as electronics and ICT, batteries, packaging, plastics, textiles, construction and buildings, and food.

In June 2023, the Council adopted its negotiating position on the construction products regulation. The proposed regulation sets new requirements to ensure that the design and production of construction products make these more durable, repairable, recyclable and easier to re-manufacture.

The European Commission furthermore supported the implementation of the WEEE Directive through various initiatives such as reports reviewing some of its aspects including targets and preparation for reuse, a compliance promotion initiative and technical studies.



The electronics sector and ICT have also been identified as a “key product value chain” under Commission’s second Circular Economy Action Plan. The CEAP 2020 in this respect envisages the following measures:

1. Regulatory measures for electronics and ICT including mobile phones, tablets and laptops under the Ecodesign Directive (2009/125/EC), so that devices are designed for energy efficiency, durability, reparability, upgradability, maintenance, re-use and recycling;
2. Focus on electronics and ICT as a priority sector for implementing the ‘right to repair’, including a right to update obsolete software;
3. Regulatory measures on chargers for mobile phones and similar devices, including the potential introduction of a common charger, improving the durability of charging cables and incentives to decouple the purchase of chargers from the purchase of new devices; and
4. Improving the collection and treatment of waste electrical and electronic equipment including by exploring options for an EUwide take back scheme to return or sell back old mobile phones, tablets and chargers

Circular Electronics Initiative

Under the European Green Deal, the European Commission presented in March 2020 a New Circular Economy Action Plan, in which it announced a circular electronics initiative that would promote longer product lifetimes and include, among others, the following actions:

- regulatory measures for electronics and ICT including mobile phones, tablets and laptops under the Ecodesign Directive;
- implementation of the ‘right to repair’, including a right to update obsolete software;
- regulatory measures on chargers for mobile phones and similar devices (including the introduction of a common charger);
- improvement of the collection and treatment of waste electrical and electronic equipment;
- review of EU rules on restrictions of hazardous substances in electrical and electronic equipment.



In the Commission work programme for 2021, published on 19 October 2020, the non-legislative initiative was announced for the fourth quarter of the year.

In its resolution of 10 February 2021 on the New Circular Economy Action Plan, the European Parliament supported the Circular Electronics Initiative, which should address the shortcomings in durability, circular design, presence of hazardous and harmful substances, recycled content, reparability, access to spare parts, upgradability, e-waste prevention, collection, reuse and recycling. It also called for the



integration of issues linked to early obsolescence including product obsolescence caused by software changes, and for the harmonisation and improvement of recycling infrastructure for waste electrical and electronic equipment in the EU. It asked for a mandatory certification scheme for recyclers of electronics waste to guarantee efficient material recovery and environmental protection.

The European Commission adopted on 16 June 2023 measures to ensure that mobile phones and tablets are designed to be energy efficient and durable; consumers can easily repair, upgrade and maintain them; it is possible to reuse and recycle the devices.

The Commission put forward a proposal for a common charger for electronic devices on 23 September 2021. The legislative process is now completed, with the final act signed on 23 November 2022 and published in the EU Official Journal as Directive (EU) 2022/2380. In the Commission work programme for 2022, adopted on 19 October 2021, the revision of EU rules restricting the use of hazardous substances in electronics was announced for the last quarter of 2022.

On 22 March 2023, the Commission tabled a proposal for a directive on common rules promoting the repair of goods ('right to repair').

Preparatory studies

- Several studies pending to assess new eco-design measures for phones, tablets, laptops + IoT/edge and other electronic devices (incl. software)
- Ongoing studies on extending consumer protection legislation on horizontal rights to information/transparency and repair

Legislative actions (through existing or new instruments)

- New minimum design requirements for ICT devices (e.g. phones, tablets and laptops): Implementing measures (current Ecodesign Directive)
- Enable measures beyond design requirements (e.g. right to repair): TBD – possibly via consumer protection legislation
- Common Charger (decoupling, collection)

Non-legislative actions

- Take-back scheme (TBD)
- Capacity building (e.g. after-markets, repair/recycling)
- Improved consumer information (e.g. product passports, ecolabels)

11.1.2. EU initiatives, directives, papers, etc. related to the project

- European Green Deal



The European Green Deal is a package of policy initiatives, which aims to set the EU on the path to a green transition, with the ultimate goal of reaching climate neutrality by 2050.

It supports the transformation of the EU into a fair and prosperous society with a modern and competitive economy.

It underlines the need for a holistic and cross-sectoral approach in which all relevant policy areas contribute to the ultimate climate-related goal. The package includes initiatives covering the climate, the environment, energy, transport, industry, agriculture and sustainable finance – all of which are strongly interlinked.

Some of the initiatives that affect the development of the project are:

European climate law

The European climate law regulation turns the political ambition of reaching climate neutrality by 2050 into a legal obligation for the EU.

By adopting it, the EU and its member states committed to cutting net greenhouse gas emissions in the EU by at least 55% by 2030, compared to 1990 levels. This target is legally binding and based on an impact assessment carried out by the Commission.

The main actions included in the regulation are:

- mapping out the pace of emission reductions until 2050 to give predictability to businesses, stakeholders and citizens
- developing a system to monitor and report on the progress made towards the goal
- ensuring a cost-efficient and socially-fair green transition

Following the provisional agreement reached with the European Parliament in April 2021, the Council approved the agreement in May 2021. The regulation is in force.



European industrial strategy

The EU relies on Europe's industry to lead the transitions towards climate neutrality.

The aim of the EU's industrial strategy is to support the industry in its role as an accelerator and enabler of change, innovation and growth.



Following the publication of the Commission's new industrial strategy published in March 2020, the Council adopted conclusions on the strategy in November 2020. In them, ministers stressed that the principles of sustainability, circularity and environmental protection should support the recovery from the COVID-19 pandemic.

An update to the industrial strategy, published by the Commission in May 2021, is aimed at strengthening resilience and advancing Europe's competitiveness. It strives to enable Europe's industry to lead the green and digital transformation and become the global driving force in the shift towards climate neutrality and digitalisation.

Batteries and waste batteries

Demand for batteries is expected to grow by more than ten-fold by 2030. The EU has adopted a regulation on batteries to create a circular economy for the sector by targeting all stages of the life cycle of batteries, from design to waste treatment. This initiative is of major importance, particularly in view of the massive development of electric mobility.



The new regulation adopted in 2023 replaces the current batteries directive of 2006. It aims to both promote a circular economy and improve the functioning of the internal market for batteries ensuring fairer competition thanks to the safety, sustainability and labelling requirements.

The European Commission presented a proposal for the regulation in December 2020. The Council adopted a general approach on 17 March 2022. Following interinstitutional negotiations, a provisional agreement was reached between the Council presidency and European Parliament negotiators. The Council formally adopted the final text in July 2023, completing the legislative procedure.

A just transition

Achieving climate neutrality by 2050 will be more challenging for some member states and regions than for others. For instance, some are more reliant on fossil fuels, or have carbon-intensive industries, that employ significant numbers of people.

The EU has introduced a just transition mechanism to provide financial and technical support to the regions most affected by the move towards a low-carbon economy. It will help mobilise at least €55 billion over the period 2021-2027 for:

- people and communities – facilitating employment opportunities and reskilling, improving energy-efficient housing and fighting energy poverty
- companies – making the transition to low-carbon technology attractive for investment, providing financial support for and investment in research and innovation
- member states or regions – investing in new green jobs, sustainable public transport, digital connectivity and clean energy infrastructure

With an overall budget of €17.5 billion, the just transition fund is the first pillar of the mechanism. It provides tailored support to alleviate the social and economic costs resulting from the green transition for regions dependent on fossil fuels and high-emission industries. It supports investment in:

- SMEs and new firms
- research and innovation



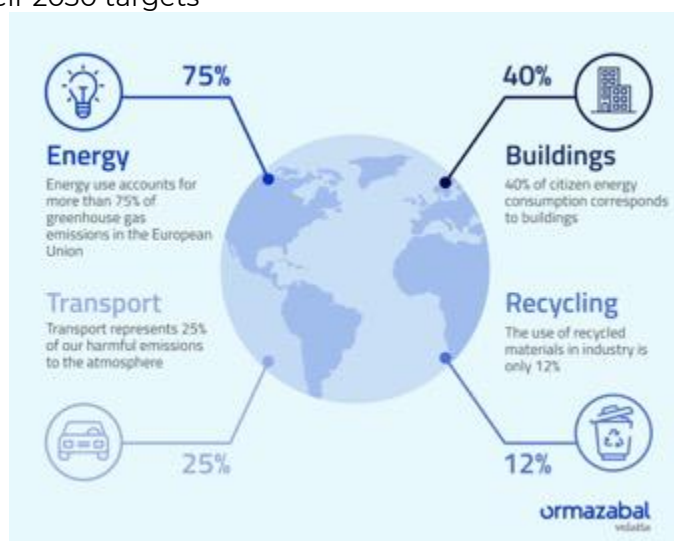
- clean energy technologies and emissions reduction
- reskilling of workers and job-search assistance

Clean, affordable and secure energy

As 75% of EU greenhouse gas emissions come from energy use and production, the decarbonisation of the energy sector is a crucial step towards a climate-neutral EU.

The EU is working at several levels to achieve these objectives:

- supporting the development and uptake of cleaner energy sources, such as renewable offshore energy and hydrogen
- fostering integration of energy systems throughout the EU
- developing interconnected energy infrastructure via EU energy corridors
- revising the current legislation on energy efficiency and renewable energy, including their 2030 targets



The buildings sector is one of the largest energy consumers in Europe and is responsible for more than one third of the EU's greenhouse gas emissions.

In June 2021, EU ministers approved conclusions on the Commission's renovation wave strategy emphasising the aspects of social inclusion, economic recovery and green transition. Ministers endorsed the aim of the strategy to at least double energy-related renovation rates in the EU by 2030.

EU chemicals strategy for sustainability

Chemicals are essential to modern living standards and the economy. However, chemical substances can be harmful to people and the environment. In March 2021, the Council adopted conclusions endorsing the EU chemicals strategy for sustainability, as presented by the Commission.

The strategy sets out a long-term vision for the EU chemicals policy, wherein the EU and member states want to:

- better protect human health
- strengthen the industry's competitiveness
- support a toxic-free environment

The strategy is an essential part of the European Green Deal and its zero-pollution ambition.



In June 2023, the Council adopted its negotiating position on the regulation for classification, labelling and packaging of chemical substances. It will allow consumers to purchase chemical products in a safer, better informed and more sustainable way.

- Territorial Agenda 2030 - A Future for all Places

The Territorial Agenda 2030 is a strategic framework document that underlines the importance of and provides orientation for strategic spatial planning and calls for strengthening the territorial dimension of sector policies at all governance levels. It seeks to promote an inclusive and sustainable future for all places and help achieve Sustainable Development Goals in Europe. The Territorial Agenda contributes to key European objectives, a Just Europe that offers future perspectives for all places and people, and a Green Europe that protects common livelihoods and shapes societal transition.

Pilot actions composed of several countries and partners were launched to accompany the Territorial Agenda. Pilot actions develop, showcase and further inspire stakeholders across Europe to implement the Territorial Agenda priorities. They demonstrate how the territorial dimension of regional, national and European policies can be addressed. Everybody is encouraged to follow these actions, take inspiration and offer proposals for new actions.

- The EU Taxonomy

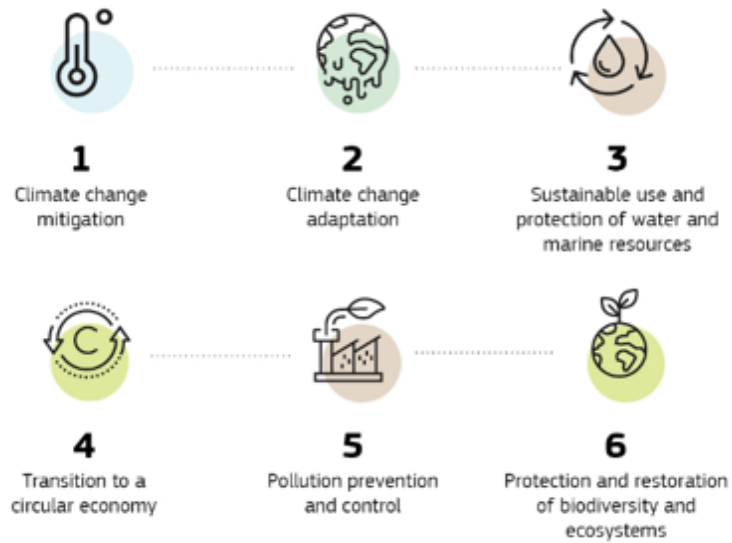
The EU Taxonomy Regulation, for instance, establishes a framework for determining whether an economic activity is environmentally sustainable. It provides criteria for assessing the sustainability of activities in sectors such as energy, transportation, agriculture, and more. This taxonomy aims to direct investments toward green initiatives, aligning with the goals of the Green Deal to achieve climate neutrality and environmental sustainability.



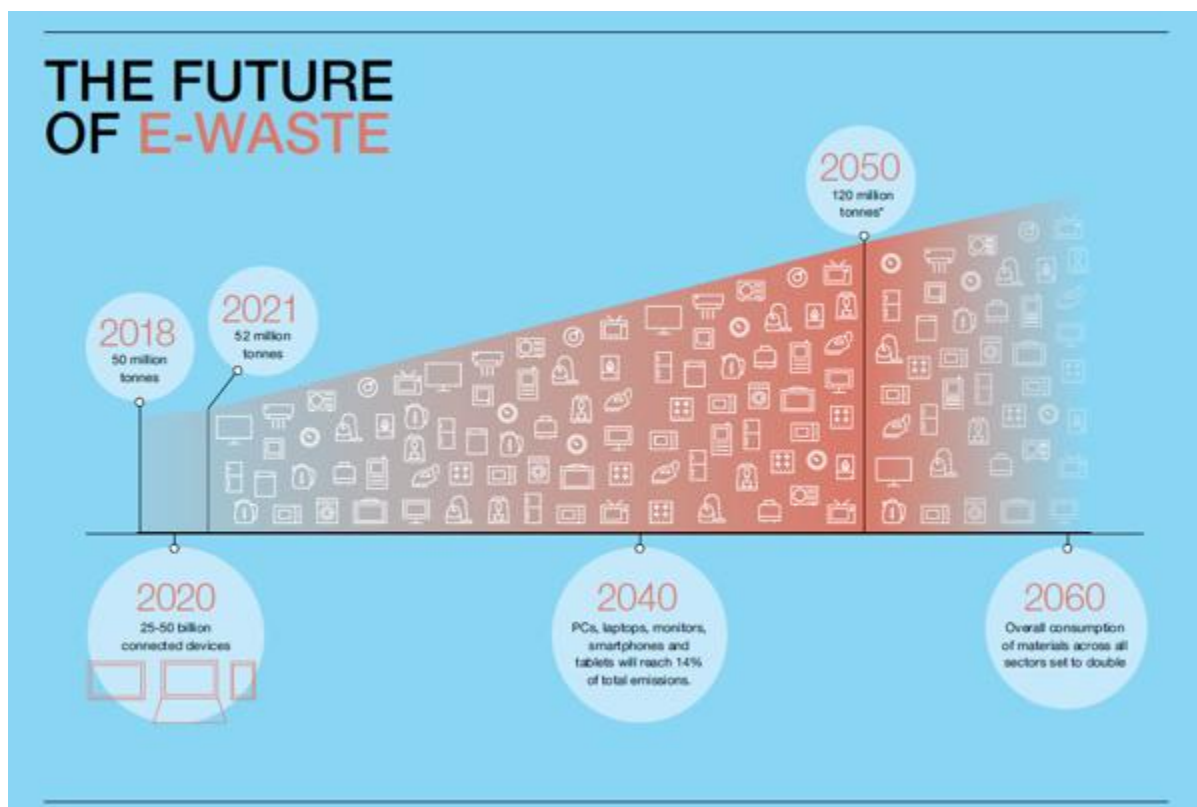
Principles and objectives for the EU Taxonomy (<https://ec.europa.eu/sustainable-finance-taxonomy/>)

The taxonomy helps investors, businesses, and policymakers by providing a common language and standard for what qualifies as environmentally sustainable economic activities. By creating transparency and clarity, it assists in directing funding and resources toward projects that contribute to the transition to a more sustainable economy, a key aspect of the Green Deal.

Regulation (EU) 2020/852 of the European Parliament and of the Council of 18 June 2020 (hereinafter referred to as the "Taxonomy Regulation") can be described as the basic legal implementation of the taxonomy, which "sets out the criteria for determining whether an economic activity qualifies as environmentally sustainable, for the purpose of determining the extent to which an investment is environmentally sustainable."



6 climate and environmental objectives of EU Taxonomy (<https://ec.europa.eu/sustainable-finance-taxonomy/>)



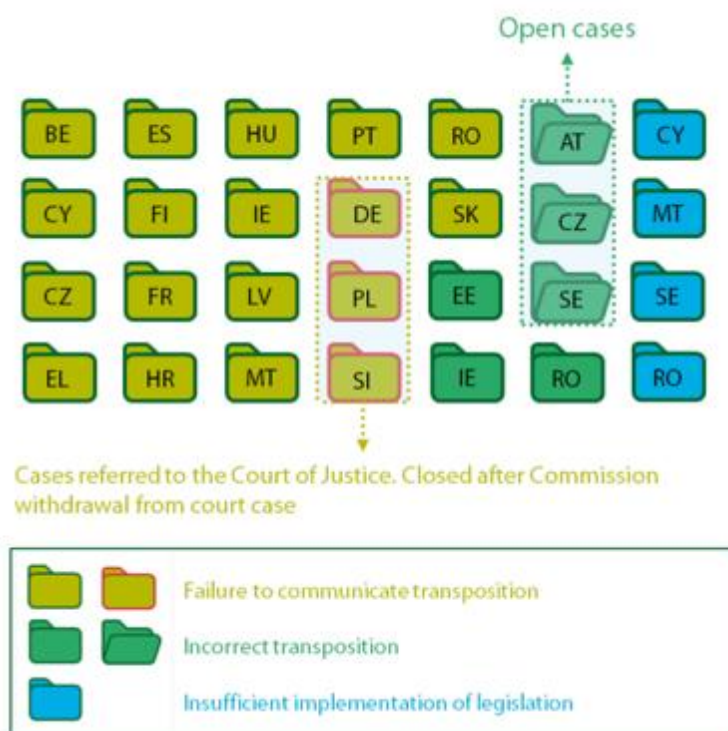
11.2. NATIONAL, REGIONAL AND LOCAL POLICIES

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.



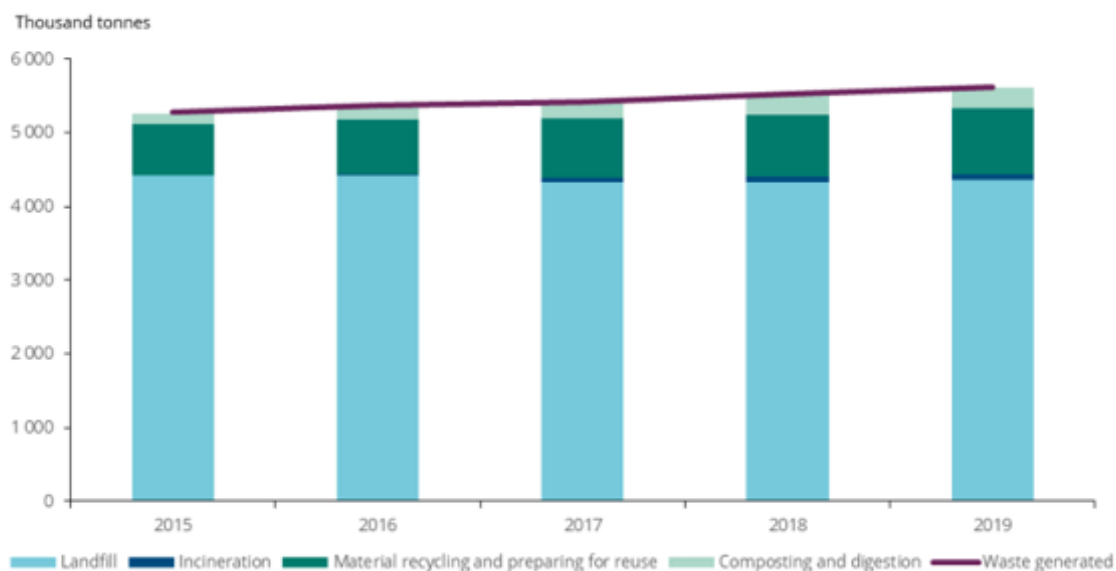
Infringement processes related to the WEEE Directive ([EÚD_přezkum_04.pdf](#))

GREECE

Directive 2008/98/EC and Directive 2008/99/EC were applied in Greece by the law 4042/2012 for criminal-law protection of the environment. The law aims at harmonizing the Greek legislative framework with EU Directives 2008/99/EC and 2008/98/EC as regards the protection of the environment through criminal law and waste management.

The law consists of 72 articles divided in four parts. Part I incorporates into the national legislative framework the provisions made under EU Directive 2008/99/EC. Articles 2 to 9 (Part I) establish penalties for environmentally harmful activities, which typically cause or are likely to cause substantial damage to the air, including the stratosphere, to soil, water, animals or plants, including to the conservation of species. Part II (articles 10 to 48) harmonizes the national legislative framework with the provisions of EU Directive 2008/98/EC by establishing measures to protect the environment and human health by preventing or reducing the adverse impacts of the generation and management of waste and by reducing overall impacts of resource use and improving the efficiency of such use. These measures include recycling, control of hazardous

waste, ban on the mixing of hazardous waste and rules on labelling of waste. Parts III (articles 49-56) and IV (articles 57-72) provides for certain amendments in the current legislation and for matters falling under the competence of the ministry of Environment, Energy and Climate Change.



Municipal waste generation and treatment in Greece between 2015 and 2019, in thousand tonnes

ROMANIA

The EU Directive 2012/19/EU was transposed in the Romanian legislation as EMERGENCY ORDINANCE no. 5 regarding electrical and electronic equipment waste, published on April 16, 2015.

This new regulatory act establishes measures for the protection of the environment and public health by reducing the negative effects of the generation and management of waste electrical and electronic equipment.

Inter alia, geo no. 5/2015 places the following obligations on producers of electrical and electronic equipment:

- To satisfy the ecological protection requirements that serve to facilitate the reuse and treatment of waste electrical and electronic equipment (as stipulated in government decision no. 55/2011);
- Not to impede the reuse of waste electrical and electronic equipment through the use of specific design features or specific manufacturing procedures, with the exception of where these specific design characteristics or specific manufacturing procedures offer clear advantages (e.g. In terms of safety requirements);
- To implement, by 31 December 2015, the collection of waste electrical and electronic equipment from private households in order to achieve an average annual rate of separate waste collection at national level of at least 4 kg per inhabitant.

At the request of the customer, retailers are obliged to take in waste electrical and electronic equipment on a “one-for-one” basis, free of charge, while respecting the same delivery conditions as for the product newly purchased by the customer, provided the equipment is of an equivalent type and serves the same function as the



new equipment. Retailers are obliged to inform the customer of this possibility before the latter purchases the new product.

In addition, retailers of electrical and electronic equipment with over 400 square meters of retail space are obliged to provide collection, free of charge, from the end user of waste electrical and electronic equipment of up to 25 cm in size for any one of its external dimensions. This facility must be offered either within the store or in the immediate vicinity thereof, and with no obligation on the end user to purchase electrical and electronic equipment of an equivalent type.

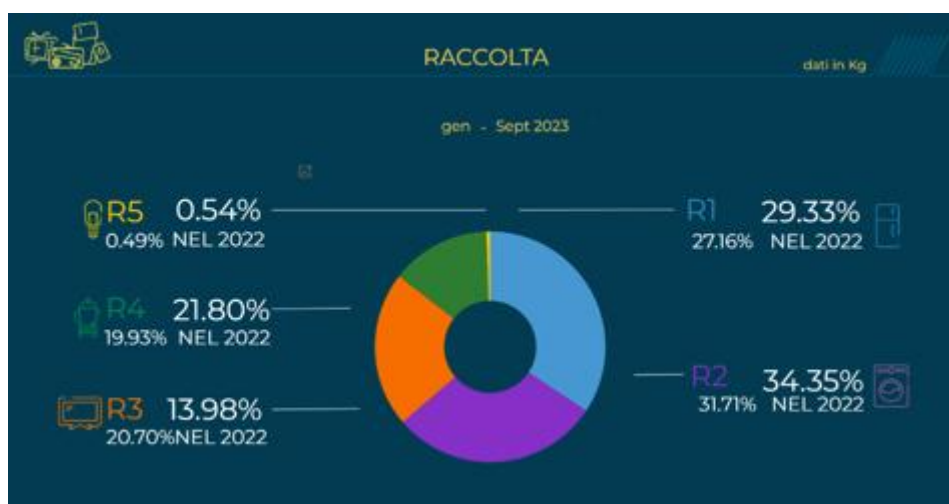
All economic operators performing collection and transport activities for separately collected waste electrical and electronic equipment must ensure optimum conditions are met such that the equipment collected can be prepared for reuse or recycling, including the isolation of dangerous substances in the latter case.

ITALY

The Legislative Decree 49/2014 arises from the transposition of directive 2012/19/EU which, in order to protect the environment and human health, defines the measures and procedures necessary for the improvement, prevention and reduction of the negative impacts deriving from the production of Electrical and Electronic Equipment and associated waste, both from households and businesses.

Related to the decree there are some Ministerial Decrees which define its implementation aspects. Below are listed the most significant ones for producers:

- Financial guarantees decree – Ministerial Decree NO. 68 of 9 march 2017
The Decree on financial guarantees regulates the ways in which EEE producers must provide the financial guarantees, applicable only for WEEE from private households, while professional WEEE is not subject to this provision;
- Rates Decree – Ministerial Decree of 17 june 2016
The Ministerial Decree “Rates for covering the charges deriving from the waste management system for electrical and electronic equipment” establishes the charges and payment methods for covering the operating costs of the Supervisory and Control Committee, of the WEEE Steering Committee, of the activities performed by ISPRA for monitoring the WEEE collection rates and recovery targets, as well as for the keeping of the WEEE register and the inspections activities by the Guardia di Finanza (Financial Police);
- ‘One-for-Zero’ Decree – Ministerial Decree NO. 121 of 31 may 2016
This Decree regulates the simplified procedures for the take-back by Distributors of small sized WEEE from households, free of charge and without the obligation to purchase an equivalent product;
- ‘One-for-One’ Decree – Ministerial Decree 65/2010
This Decree provides guidelines for the free ‘One-for-One’ take-back of WEEE coming from private households by distributors, EEE installers and operators of assistance centres for such equipment. This Decree ensures the free take-back of the old equipment when purchasing an equivalent product.



SPAIN

The WEEE Directive 2002/96/CE was transposed to the Spanish law by the Royal Decree 208/2005 (25th February 2005). The update of the WEEE Directive in February 2012 has been transposed to the Spanish law into the RD 110/2015.

The Royal Decree has the following immediate objectives: the establishment of a clearer regulation to increase the level of legal certainty and to establish a detailed description of the obligations of users, manufacturers, authorized representatives, importers, distributors and managers; integrate a single control instrument on regional and national WEEE data to identify compliance with the objectives in this field and ensure the traceability and appropriate management of waste; promote re-use and preparation for re-use, encourage the creation of preparation for re-use centers and job creation in this sector; provide reliability and systematize reporting obligations of EEE producers and WEEE managers on the collection and recovery of WEEE throughout the country, ensuring uniformity of WEEE management criteria and market unity; and economically optimize and efficiently manage WEEE under the extended producer responsibility in a framework that ensures competitiveness of EEE manufacturers and WEEE managers.

These challenging goals will be achieved through the definition of a WEEE management model that updates the existing one and guarantees environmental protection while preserving successful elements and avoiding past errors, in order for Spain to efficiently comply with the EU objectives and requirements in this field, optimizing the resources provided by the EEE producers under the extended producer responsibility framework, in the light of sector developments and the type of waste generated.

The most important changes can be summarized under a dual perspective, involving both substantial and institutional changes. From an institutional perspective, the establishment of a working group reliant on the coordination commission on waste, which performs under two instruments: an electronic platform (that structures waste information and calculates and ensures its traceability, allowing participation of WEEE-related operators) and an allocation office directly managed by EEE producers. It also lays out the possibility of local authorities directly entrusting waste management to EEE producers or WEEE managers.



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.



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.

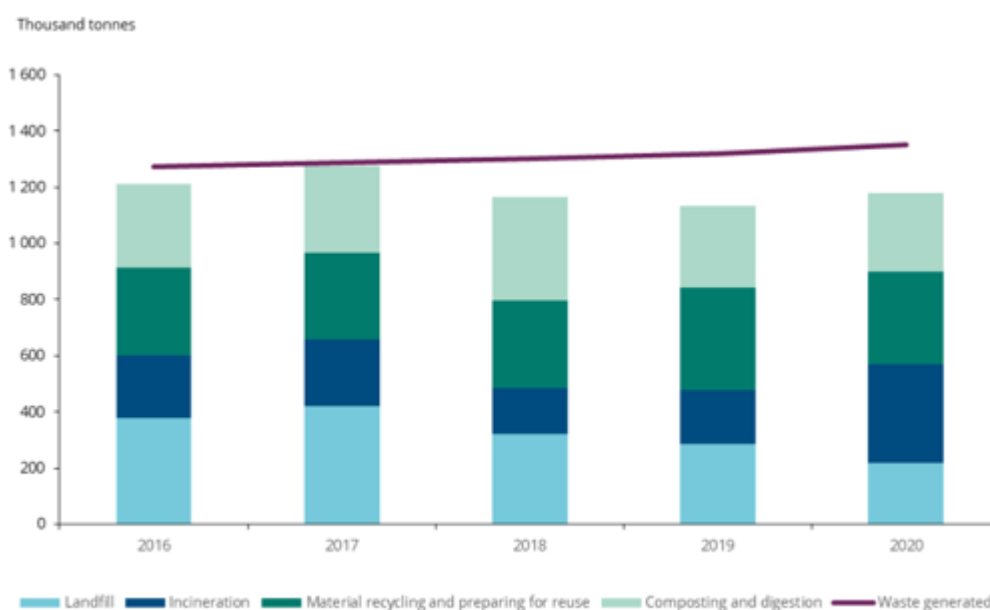
LITHUANIA

Law on Waste Management (No. VIII-787).

This Law shall establish the basic requirements for the prevention, record keeping, collection, sorting, storage, transportation, utilization and disposal of waste with a view to prevent its negative effects on the environment and human health.

The Law shall stipulate the functions of public authorities and other legal and natural persons in the sphere of waste management. This Law establishes general requirements for the prevention and management of waste in order to prevent the adverse effects of waste on public health and the environment, the conditions under which the substance or object may be considered as waste, state regulation of waste management, basic principles of organization and planning of waste management systems, requirements for waste holders and waste managers; economic and financial measures for waste management, the rights and obligations of manufacturers, importers and distributors of oils, electrical and electronic equipment, vehicles, taxable products, products made of aerobically degradable plastic, disposable plastic products, fishing gear containing plastic and packaging.

The purpose of this Law is to ensure the application of the legal acts of the European Union specified in Annex 5 to this Law. The placing on the market of all products made of aerobic plastic shall be prohibited. The waste facility must ensure that hazardous substances, compounds and components are compressed or separated from the hazardous waste during its treatment in order to treat the waste in a way that is safe for public health and the environment.



Circular Economy Action Plan (<https://data.europa.eu/doi/10.2775/660415>)



It is prohibited to import into Lithuania from other countries municipal and hazardous waste intended for disposal and/or use for energy production, and residues from the municipal waste incineration process (ash and slag).

Enterprises which during the discharge of their economic-commercial activities generate waste and which utilize, dispose or handle waste must take every appropriate and economically feasible measure to minimize its quantity and the harmful effect on human health and the environment (art. 3).

There are provisions regarding the regulation of waste management by the Government involving regulation of the manufacturing, import, sale and utilization of substances and products, including containers and packaging (art. 7). Article 8 refers to the procedure of waste record keeping whereas article 14 regards technical regulations of a waste utilization or disposal facility. Facilities involved with hazardous waste must obtain a license from the relevant authority (art. 16). There are extensive provisions regarding the administration of waste management and economic and financial measures for waste management.

This law was updated in 2018 (Law No. XIII-1571 amending Law on Waste Management (No. VIII-787))

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 EEE

Products that are normally used in households can become household waste when discarded, so they are referred to as household EEE.

A producer who sells household EEE has responsibility for:

- assuming financial responsibility for waste electrical and electronic equipment (WEEE) from equipment sold in Sweden from 13 August 2005.
- assuming financial responsibility for WEEE from equipment sold in Sweden before 13 August 2005.

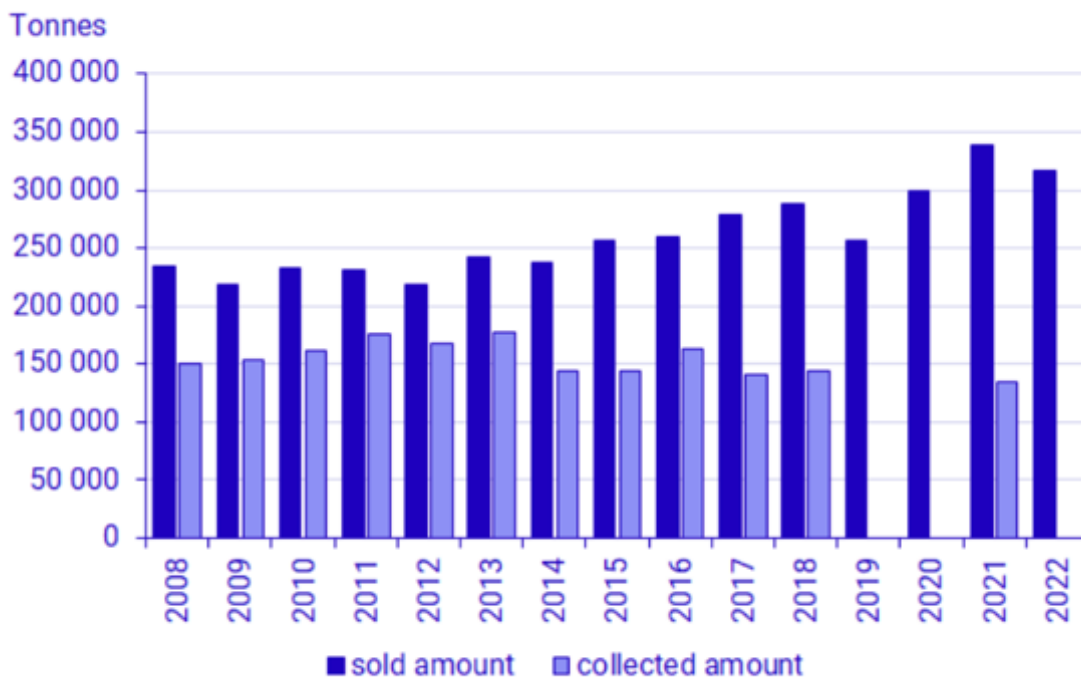
A producer also is to:

- join an approved WEEE collection system;
- within a year after sales begin, provide information about the product's contents to waste management operators;
- be able to describe how the above information requirements are fulfilled to the Swedish EPA upon request;
- label the products and
- design the products to promote recycling and reuse.

Producers of other EEE

Electrical and electronic equipment that is not household EEE (professional EEE) is defined as other electronic equipment.

Sold and collected amount of electrical and electronic equipment, tonnes



Confidentiality on collected amount of electrical and electronic equipment for 2019 and 2020 in Sweden.

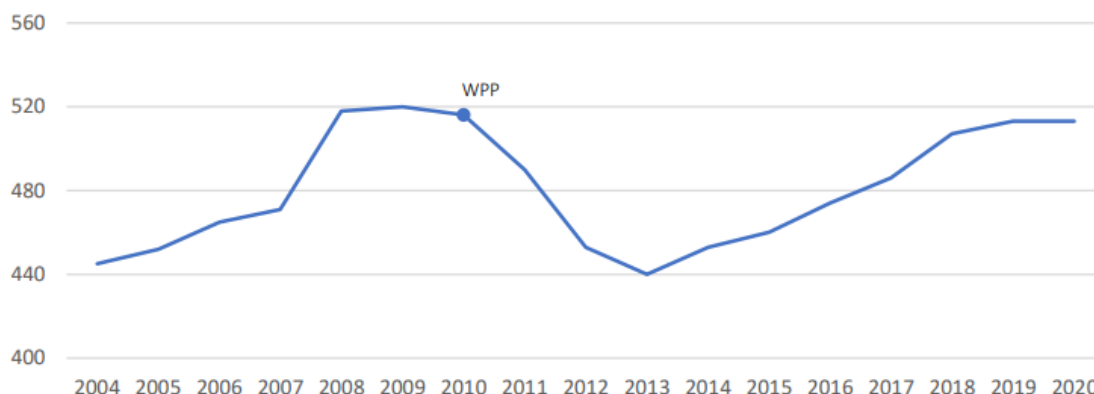
The Swedish EPA supervises the collection responsibility and charges an inspection fee for it.

Products with integrated batteries are covered by two regulations. All electrical and electronic equipment (EEE) with built-in batteries is subject to two regulations: the ordinance (2014:1075) on producer responsibility for electrical and electronic equipment and the ordinance on producer responsibility for batteries (SFS 2008:834).

PORTUGAL

The WEEE European legal frame, defined by Directive (2012/19/CE), where transposed into law in Portugal on December 2017 by Law Decree nº 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 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.



Municipal waste generation and treatment in Lithuania between 2004 and 2020, in thousand tonnes.

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).

SLOVAKIA

In 2001 the Slovak government issued the Act on Waste No. 223/2001 as a legal base ruling the handling with waste. WEEE Directive was transposed to Slovak legal system through the Amendment of the Act on Waste No. 733/2004 from December 2, 2004. In 17.3. 2015 was adopted new Act on waste No. 79/2015 and several decrees related to WEEE issued by Ministry of Environment:

- Decree No. 371/2015 Z. z., applications and permits for handling with waste
- Decree No. 365/2015 Z. z., waste catalog
- Decree No. 366/2015 Z. z. Waste evidence and reporting
- Decree No. 373/2015 Z. z. Extended producers' responsibility and management with specific waste

The legislation sets down:

- the obligation of producers/importers to ensure take-back, separate collection, collection targets, transport, recycling, recovery and environmentally sounded disposal of WEEE
- the obligation of consumers to hand in an end-of-life appliance to the takeback or separate collection system
- the obligation of producers/importers to ensure the collection of each kilogram of WEEE on the whole territory of Slovakia. Producers' obligation is set down by their market share
- Permits and authorization for Producers responsibility organization
- Establishment and operation of the Coordination body for handling with WEEE

The legislation does not set down an obligation to municipalities to ensure the separate collection of WEEE. Municipalities are only obliged to provide producers/importers with their collection capacities and are allowed to ask for cost compensation. Nor retailers are obliged to realize the take back of any appliances.

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).

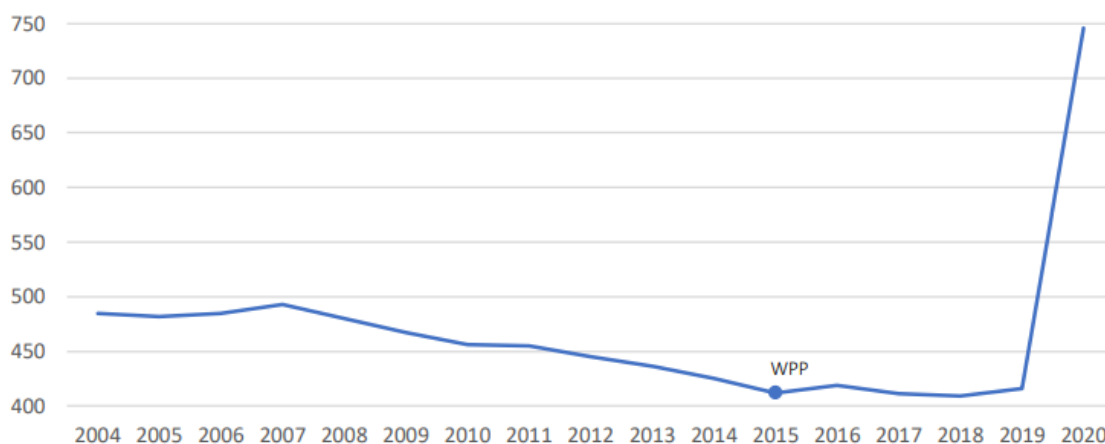
- Producers are to finance the take-back, sorting, and correct treatment of put on market for WEEE.
- Retailers and municipalities to free of charge take back WEEE from households.

BELGIUM

Flemish Decree on Waste Prevention and Management (VLAREA, 1997) 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 in Belgium (kg per capita), 2004-2020. Eurostat.

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.

AUSTRIA

The Austrian Regulations on Waste Prevention, Collection and Treatment of WEEE (WEEE Ordinance) and Batteries (Batteries Ordinance) includes obligations for:

Producers / Importers:

- Online registration at UBA (Umweltbundesamt – Environment Agency Austria)
- Regular reporting of EEE-quantities and portable batteries-quantities put on the market in Austria (to UBA)
- Operation of 1 collection point in each district all over Austria (100)
- Concluding an agreement on collecting WEEE and portable batteries with municipalities or otherwise to execute pick up orders by the Clearing House (Elektroaltgeräte Koordinierungsstelle) appointed by the ministry
- Re-use of WEEE
- Collection and recycling of WEEE and portable batteries incl. all reporting responsibilities
- Financial guarantee for collection and recycling of new appliances
- Obligatory system participation for historical waste
- Information for consumers
- Individual marking of each new appliance
- Compliance with restrictions on hazardous substances

Retailers:

- Taking back WEEE from households free of charge on a 1:1 take back basis

Municipalities:

- Taking back WEEE from households free of charge

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 (Batteries 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.

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.

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.

Legislation in the field of electronic waste (e-waste) is a complex system of rules and regulations that extends from the local to the national and even international levels. The purpose of these regulations is to reduce the impact of e-waste on the environment and human health, and to promote recycling and reuse of electronic devices. Below is a general overview of legislation at various levels:

LEGISLATION: Waste Electrical and Electronic Equipment

- Regulation on Waste Electrical and Electronic Equipment (Official Gazette of the Republic of Slovenia, No. 55/15, 47/16, 72/18, 84/18 – ZIURKOE, 108/20, and 44/22 - ZVO-2)
- Regulation on the Environmental Charge for Pollution Caused by the Generation of Waste Electrical and Electronic Equipment and Waste Portable Batteries and Accumulators (Official Gazette of the Republic of Slovenia, No. 84/18 and 44/22 - ZVO-2)
- Directive 2012/19/EU of the European Parliament and of the Council on waste electrical and electronic equipment

LEGISLATION: Waste Portable Batteries, Industrial Batteries, and Accumulators

- Regulation on the Management of Batteries and Accumulators and Waste Batteries and Accumulators (Official Gazette of the Republic of Slovenia, No. 3/10, 64/12, 93/12, 103/15, 84/18 – ZIURKOE, 101/20, and 44/22 - ZVO-2)
- Regulation on the Environmental Charge for Pollution Caused by the Generation of Waste Electrical and Electronic Equipment and Waste Portable



Batteries and Accumulators (Official Gazette of the Republic of Slovenia, No. 84/18 and 44/22 - ZVO-2)

- Regulation of the European Parliament and of the Council on batteries and waste batteries, or Regulation (EU) 2023/1542 (amending Directive 2008/98/EC and Regulation (EU) 2019/1020 and repealing Directive 2006/66/EC)

LEGISLATION: Waste Grave Candles

- Regulation on Waste Grave Candles (Official Gazette of the Republic of Slovenia, No. 25/19 and 44/22 - ZVO-2)
- Regulation on the Environmental Charge for Pollution Caused by the Generation of Waste Packaging (Official Gazette of the Republic of Slovenia, No. 32/06, 65/06, 78/08, 19/10, 68/17, and 82/18 and 44/22 - ZVO-2)

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.

11.3. IMPLEMENTATION LEVEL OF POLICIES

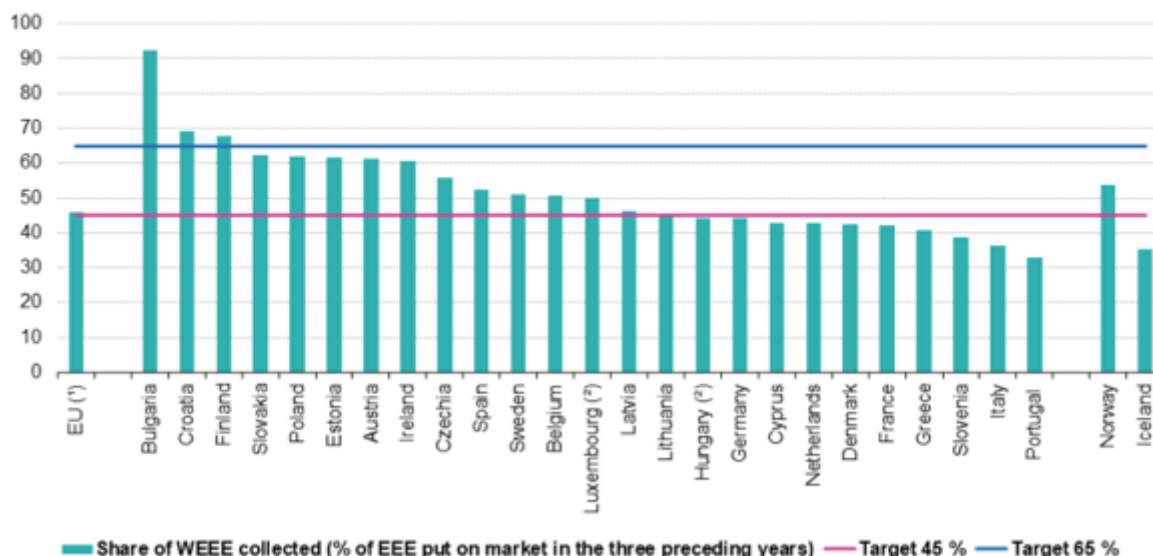
11.3.1. Collection rates (EU)

WEEE Directive describes two methods for calculating the collection rate in the EU Member States. The “WEEE Generated method” is calculated by mass of WEEE collected divided by the mass of WEEE Generated in the same year. The collection rate increased from 40% in 2014 to 54% in 2021 using this method. The increases are mainly driven by the significant increases of the WEEE collection compared to the WEEE Generation.

The second method is the ‘EEE POM method’, which is calculated as the mass of WEEE collected divided by the average amount of EEE POM in the three preceding years. The collection rate using the EEE POM method increased from 39% to 50% from 2013 to 2016. From 2016 to 2020, the collection rate dropped to 44%.

Total collection rate for waste electrical and electronic equipment (WEEE), 2020

(% of the average weight of EEE put on the market in the three preceding years (2017-2019))



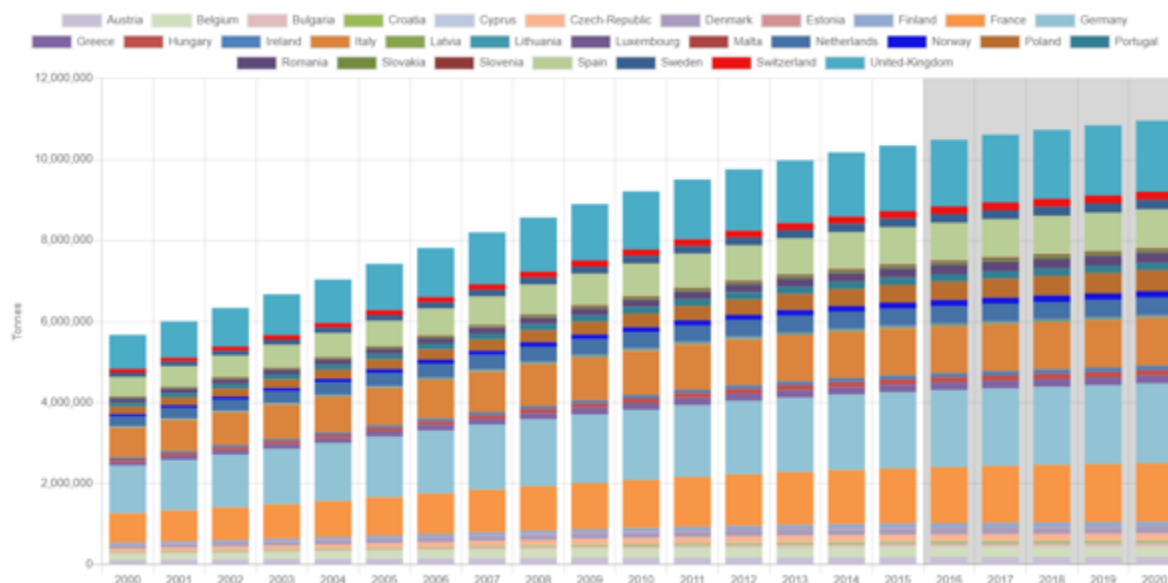
Source: Eurostat (online data code: env_waseleees and env_waselee)

Despite the significant increases of WEEE collection, the decrease in the collection rate is caused by even larger increases of the EEE POM, causing the collection rate to decrease, using this method. The Member States of the EU can annually choose either method for the calculation of the WEEE collection targets. For the WEEE Generated method, the target is 85%, and for EEE POM, the target has been 65% since 2019.

In considering all individual countries, only three of the 27 EU Member States (Croatia, Bulgaria, and Poland) have reached the collection target of the WEEE Directive, according to the latest set of data available in this study. Switzerland does not have such targets in place, but would meet the EU target. The countries that reach the targets seem to contradict both the overall trend and the underlying factors observed across the rest of the EU.

Besides official government statistics, there are no additional public reports or underlying information available that allow for a better understanding of the collection rates.

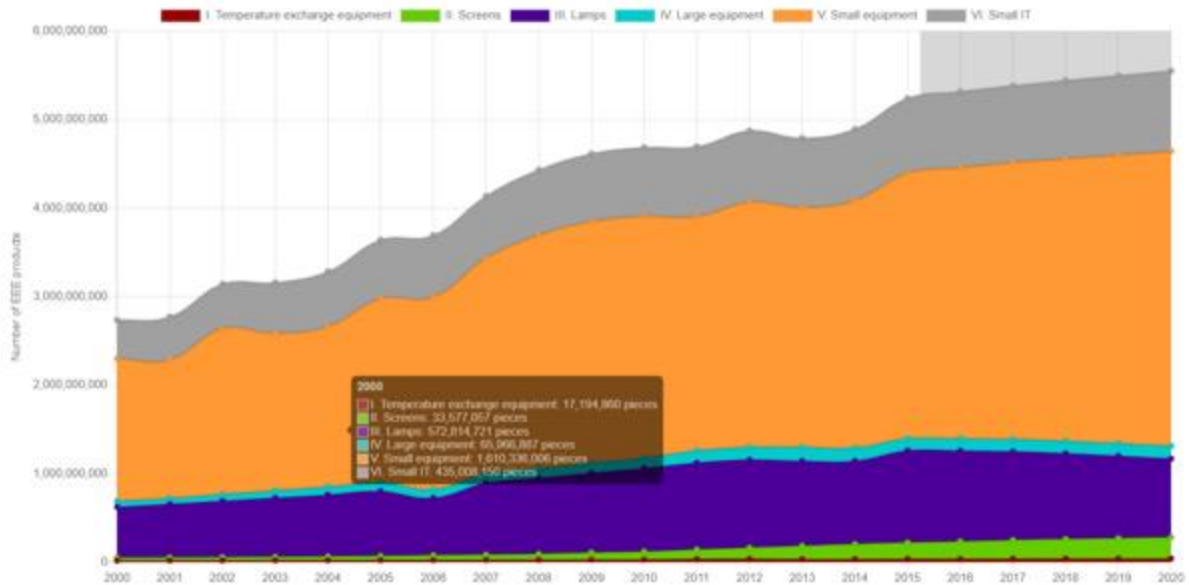
One of the obstacles in reaching collection targets is that considerable amounts of WEEE are diverted to other, undocumented WEEE flows. Unwanted WEEE flows need to be reduced and steered into the formal WEEE management regime. It is estimated that 1.4 Mt (2.7 kg/inhabitant) was collected with metal scrap to be recycled, but not with the same environmental and material efficiency standards as the formally managed WEEE.



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

Approximately 0.8 Mt – 1.5 kg/inhabitant – of WEEE is estimated as being disposed of with mixed residual waste and ends up in incinerators and landfills. It is estimated that 0.5 Mt – 1 kg/inhabitant – is illegally exported outside the EU27. As well, 0.6 Mt – 1.1 kg/inhabitant – of EEE is estimated to be exported for reuse. The exports for reuse and illegal exports are hardly monitored in most countries, also due to the lack of trade codes for used EEE.

Better monitoring of used-EEE exports is essential in order to distinguish legal used EEE exports from exports of illegal WEEE. WEEE illegally exported often ends up illegally dumped in countries with no formal management systems. The legal exports of used-EEE could be corrected in the collection target, as they do not typically become waste in the country where they have been placed on the market initially. In the previous study over reference year 2019, the whereabouts of 2.7 Mt of WEEE were unknown. In this study, the unknown has reduced to 1.5 Mt of WEEE – 1.9 kg/inhabitant – over 2021. The unknown WEEE can still be part of the previous mentioned flows or could be uncertainties in the calculations.



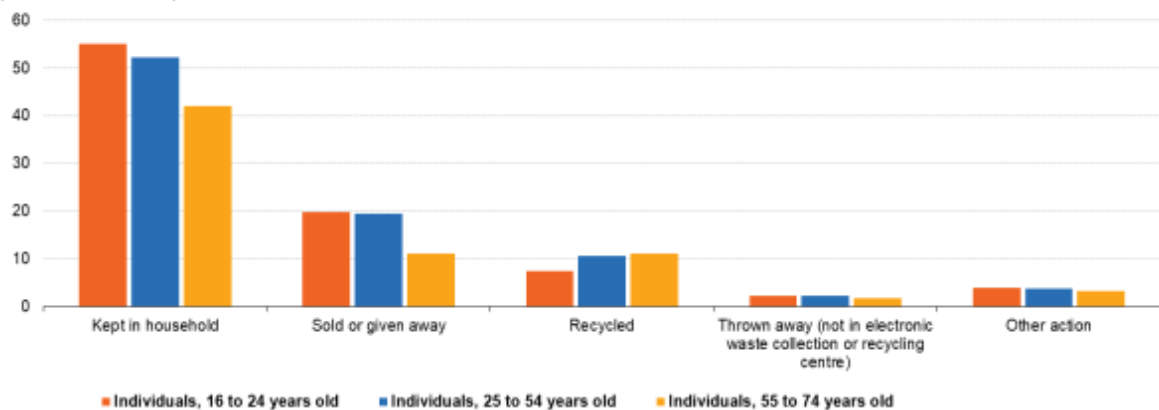
Number of EEE products - Waste Generated in EU28 + Norway and Switzerland.

11.3.2. Problems, barriers, achievements (EU)

Consumer relationships with electronics

Like fast fashion and fast food, electronics can involve a rapid turnover in style trends, with revenues dependent on selling the latest products, which are increasingly affordable.

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)

In particular, affordability has opened up opportunities in developing countries, for instance mobile money has dramatically increased financial inclusion and given rise to other developmental opportunities. In many cases, secondhand device markets flourish in these countries with products such as laptops and smartphones having second or third lives.

Yet eventually all these smartphones, tablets, cameras and home gadgets or appliances will become waste.



One report puts the global consumer electronics market at around \$1.1 trillion in 2017, growing at a rate of 6% until 2024, when it will be worth \$1.7 trillion. Rising smartphone adoption rates are fuelling global demand. There is also a major trend towards flat panel TV screens in developed markets and adoption of 3G and 4G in developing economies; electric vehicles are also on the rise. More clothes, furniture, toys, sports equipment and toothbrushes have complex electronic components.

Lack of recycling

Recycling rates globally are low. Even in the EU, which leads the world in e-waste recycling, just 35% of e-waste is officially reported as properly collected and recycled. Globally, the average is 20%; the remaining 80% is undocumented, with much ending up buried under the ground for centuries as landfill.

E-waste is not biodegradable. The lack of recycling weighs heavily on the global electronic industry and as devices become more numerous, smaller and more complex, the issue escalates. Currently, recycling some types of e-waste and recovering materials and metals is an expensive process.

The remaining mass of e-waste – mainly plastics laced with metals and chemicals – poses a more intractable problem. The waste stream is complex, containing up to 60 elements from the periodic table. In some cases, it contains hazardous chemicals, such as flame retardants, of which some are Persistent Organic Pollutants listed under the Stockholm Convention.

There is also confusion in global consumers' minds in terms of how they handle e-waste because the system is often complex. In many cases, it is treated as normal household waste, but it must be separated. Different streams of e-waste must also be dealt with separately, including batteries, light bulbs, smartphones, cables or computers. This lack of awareness about how to recycle and worries about data security mean there are vast tranches of residual electronics sitting in drawers, garages, bedrooms and offices across the globe waiting to be dealt with. An opportunity is waiting.

Labour, environmental and health issues

From lead-lined, cathode ray tubes from old TVs, to lead and chromium in circuit boards, e-waste can contain substances that are hazardous to human health if not dealt with properly, including mercury, cadmium and lead.



E-waste can pollute water sources and food supply chains. This is particularly true of older products making up today's e-waste. Regulation and some voluntary targets are driving the phase out of some of the worst offenders in new products. Recycling of valuable elements contained in e-waste, such as copper and gold, has become a source of income, mostly in the informal sector of developing countries.

However, basic recycling techniques to burn the plastic from electronic goods leaving the valuable metals (melting down lead in open pots, or dissolving circuit boards in acid) lead to adult and child workers, as well as their families, exposed to many toxic substances. In many countries, women and children make up to 30% of the workforce in informal, crude e-waste processing and are therefore particularly vulnerable.

E-waste compounds are also carcinogenic. Toxic elements are found in the blood streams of informal workers at dumping grounds for e-waste where open burning is used to harvest metals. These dumps have become economic hubs in their own right, attracting food vendors, and are often adjacent to informal settlements, leading to further contamination from the toxic fumes.

E-waste can contaminate groundwater, soil and air. Today, the total number of people working informally in the global e-waste sector is unknown. However, as an indication, according to the ILO in Nigeria up to 100,000 people are thought to be working in the informal e-waste sector, while in China that number is thought to be 690,000.⁴⁷

The upgrade and formalization of the industry to one where formal recycling plants provide safe, decent work for thousands of workers is a major opportunity. It is also worth considering the effects electronic goods have on climate change. Every device ever produced has a carbon footprint and is contributing to human-made global warming.

Manufacturing a tonne of laptops and potentially 10 tonnes of CO₂ are emitted. When the carbon dioxide released over a device's lifetime is considered, it predominantly occurs during production, before consumers buy a product. This makes lower carbon processes and inputs at the manufacturing stage (such as use recycled raw materials) and product lifetime key determinants of overall environmental impact.

Legislation on e-waste



A total of 67 countries have legislation in place to deal with the e-waste they generate. This normally takes the form of Extended Producer Responsibility, when a small charge on new electronic devices subsidizes end-of-life collection and recycling.

The legislation covers about two-thirds of the global population. However, many countries do not have national legislation on e-waste. When it comes to the export of e-waste to developing countries, it is regulated under the Basel Convention on the Control of Transboundary Movements of Hazardous Wastes and Their Disposal, which has been ratified by 188 countries, other similar conventions exist at a regional level.

Even with the convention in place, however, large amounts of e-waste continue to be shipped illegally. The difference in enforcement of conventions and transposing e-waste legislation globally means the regulatory environment can be complex and fragmented.



Illegal WEEE exports

The European Union has implemented regulations to control the proper handling and disposal of WEEE to ensure environmental sustainability. However, the illegal export of WEEE from Europe to developing countries continues to pose significant environmental and health risks.

The illegal exportation of waste electrical and electronic equipment from Europe to developing countries is caused by several factors. These include the lack of adequate regulatory frameworks, economic incentives, a lack of awareness, and corruption.

One factor contributing to the illegal export of WEEE is the lack of sufficient legal frameworks to enforce WEEE management policies in some European countries. This makes it easier for illegal exports to take place. Additionally, economic incentives have been established in some European countries to increase the cost of WEEE management, leading to companies exporting their waste to developing countries where disposal costs are lower.

Furthermore, many consumers and producers in Europe are not aware of the potential environmental and health hazards associated with improper disposal of electronic waste, which has contributed to the growth of the illegal WEEE trade. Finally, corruption may be a factor in illegal WEEE exports from Europe, with some officials susceptible to bribery or other forms of corruption.

The effects of illegal WEEE exportations from Europe to developing nations are carefully examined. One of the primary consequences of these exports is environmental damage. Improper disposal of electronic waste can lead to soil and water pollution, which can have long-term impacts on the environment and surrounding ecosystems. This pollution can also contaminate food and water sources, which poses a significant health risk to local communities.

Illegal WEEE exports can also have economic impacts, as local communities may bear the costs of waste disposal and cleanup efforts. These costs can be significant, and may ultimately limit economic development in affected areas. In addition, the illegal WEEE trade can contribute to corruption and undermine regulatory efforts to promote sound waste management practices.

Addressing these consequences requires a concerted effort from all stakeholders, including policymakers, producers, consumers, and law enforcement agencies. By



promoting sound WEEE management practices, ensuring that electronic waste is disposed of in an environmentally responsible manner, and providing adequate protection for workers and local communities, the negative consequences of illegal WEEE exports can be minimized.





12. POLICY BEST SAMPLES ON WEEE MANAGEMENT

12.1. 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.



Citybin welcome everyone to the event in Galway

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.

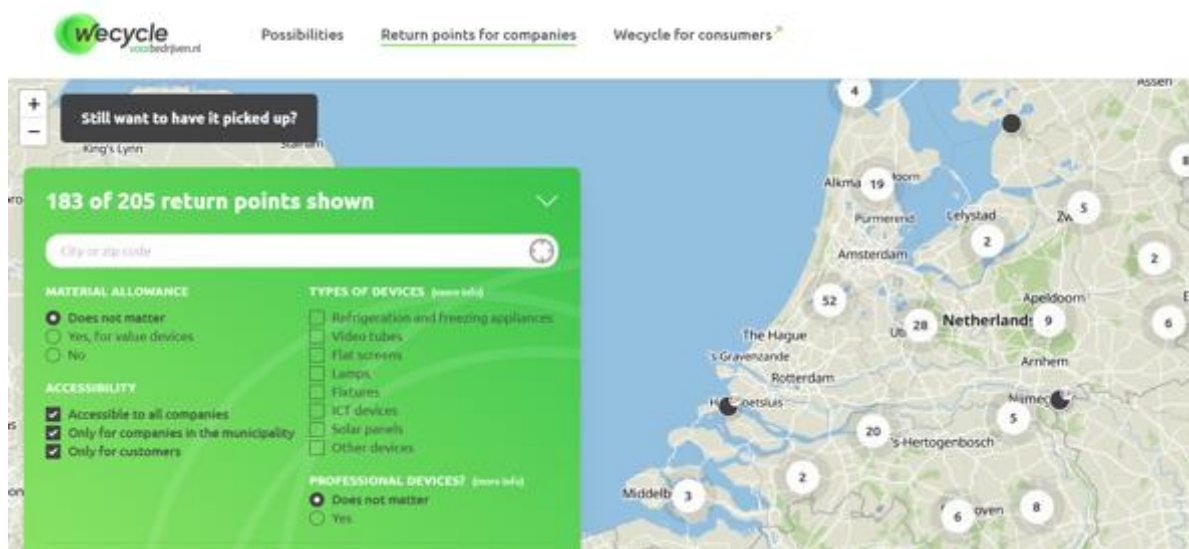
In 2022, the OPEN Foundation has collected a total of 159 million kilos of e-waste in collaboration with our chain partners. In addition, more than 11 million kilos were offered to certified processors via metal recyclers: 2% more than last year; a good start to our effort to minimize the most important '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



Period January 1 – December 31, 2022

Collection channel	Service points (number)	Collection (ton)
Municipal	755	84,574
Retail	8,785	63,183
Social	1,011	62
Business-wise	5,121	10,830
Market parties	57	11,620
Grand total	15,729	170,268

The collect grades

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.



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 Töölö and Hagisse, 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](#)



Sello 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.

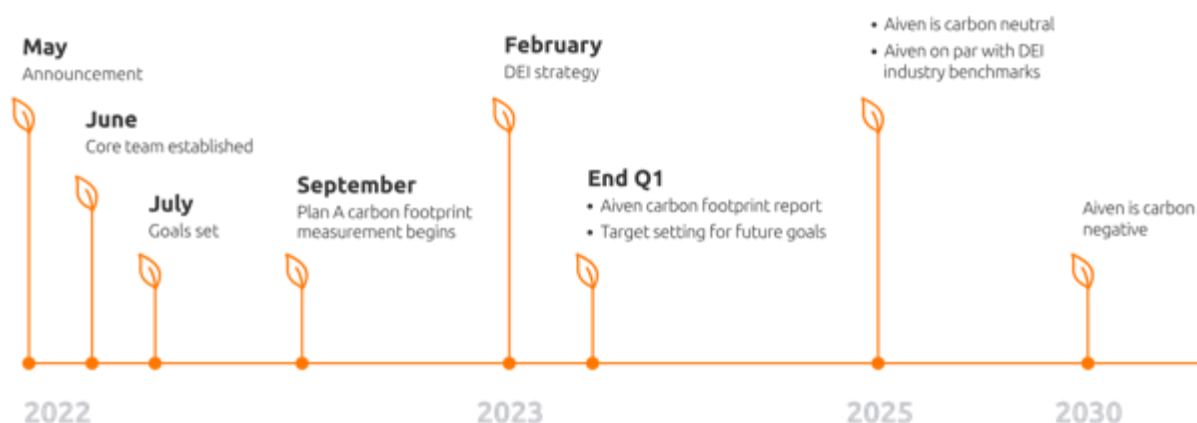
Best practice 8: Aiven. FINLAND

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.

12.2. 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

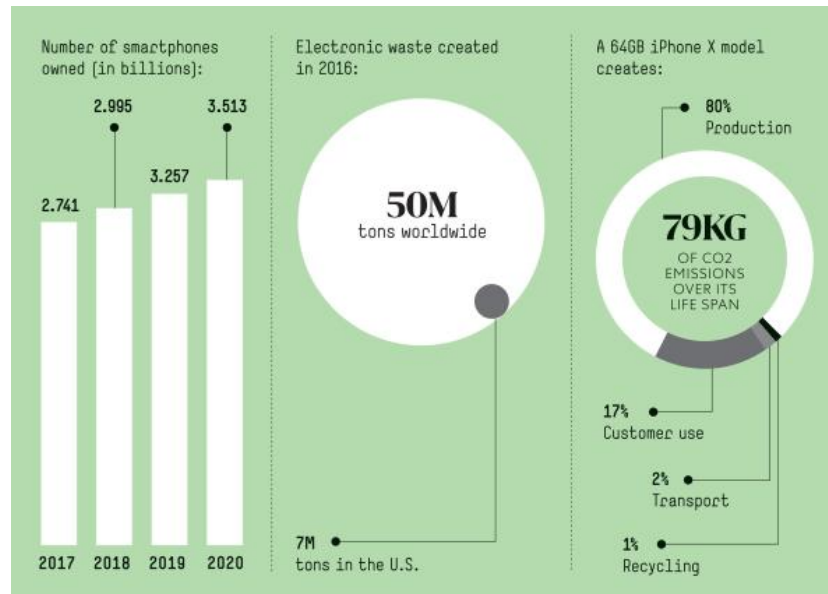
Introduction

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.

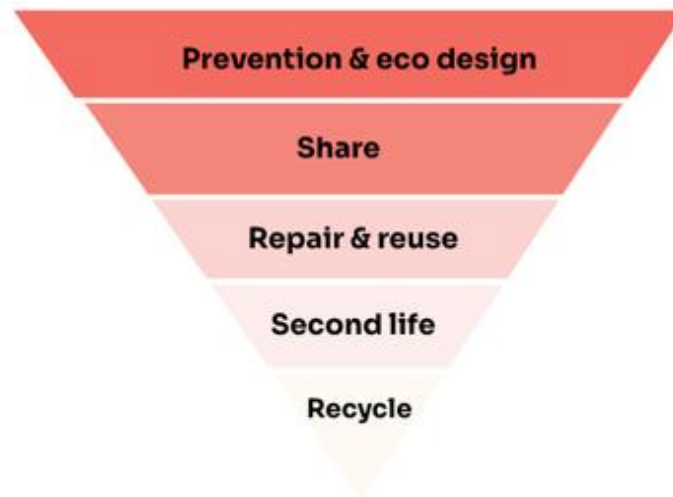


Bolt has become important due to its innovative approach to mobility. It is the first European mobility super-app offering better alternatives for every purpose a private car. This has made it a top choice for those who prefer to access most services through their smartphones.

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

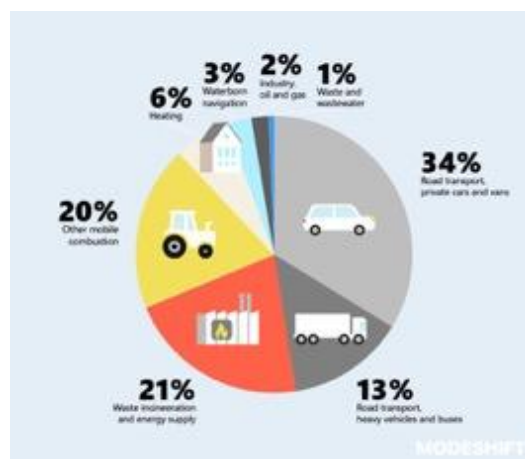
One of the projects where a certain percentage of the budget goes is to Bolt's e-scooters. This program consists in recycling the electric scooters that are at the end of the life cycle thus managing to reduce waste from hardware, thereby embedding circular economy principles across the scooter operations.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

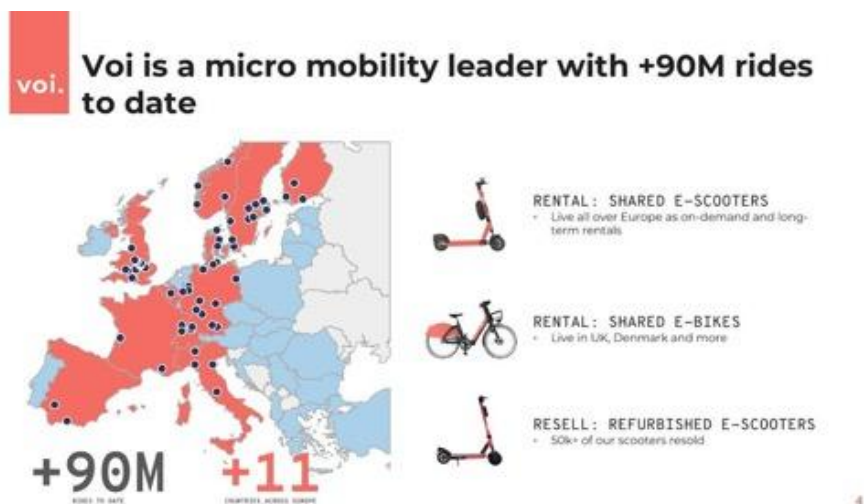
This mobility company was founded in 2018 and offers electric scooter sharing service. The company operates in several cities across Europe, providing an eco-friendly transportation alternative to traditional vehicles. Users can rent Voi's electric scooters through a mobile app, making it a convenient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

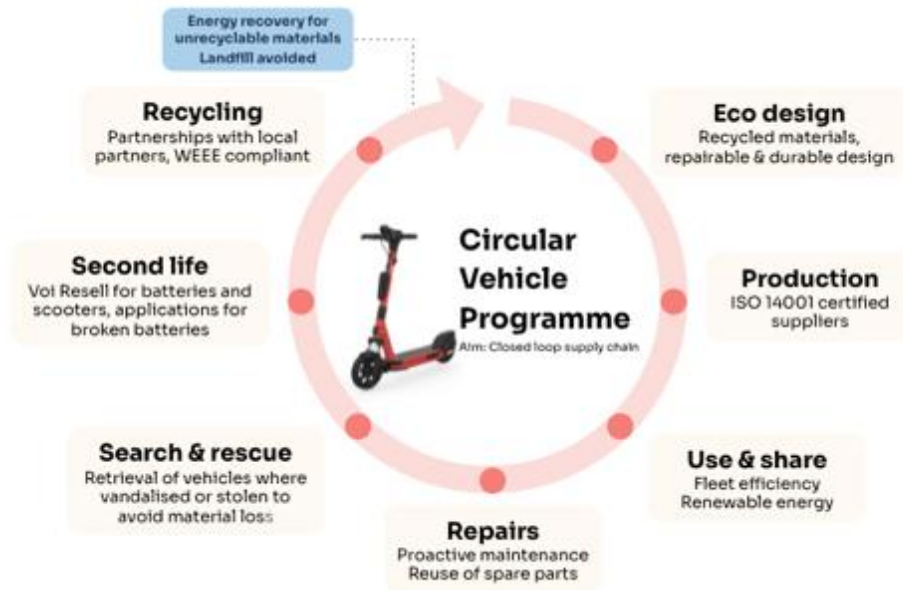
Voi, as a provider of electric scooters, falls under the category of producers of electrical and electronic equipment. As such, it has responsibilities under the Waste Electrical and Electronic Equipment (WEEE) regulations. These responsibilities include ensuring the correct disposal and treatment of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



13. INDICATORS BENCHMARKING AND CONVERGING MEDITERRANEAN POLICY

13.1. 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, LINK 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.

In addition, within work package 2 of the project, Neum will be in charge of the WEEE PROCURE pilot. The KPIs that have been agreed upon to reach the objective are the following.



Impact on Tenderers (Demand Side):

- **Technology Refresh Rate:** Measure how frequently tenderers receive updated equipment compared to traditional purchase models. Target: Increase in refresh rate by X% (e.g., 20%) within the test period.
- **Cost Savings:** Track the total cost of ownership (TCO) for EEE under the eco-renting model compared to traditional purchase. Include rental fees, maintenance costs, and potential disposal costs avoided. Target: Reduction in TCO by Y% (e.g., 15%) over the test period.
- **Satisfaction with Equipment Performance:** Measure user satisfaction with the rented equipment's performance, features, and reliability. Use surveys or feedback forms. Target: Achieve a satisfaction rating of Z (e.g., 4 out of 5) or higher.
- **Reduction in E-waste Generation (Indirect):** While the tenderer doesn't directly handle the e-waste, track the potential e-waste avoided based on the extended lifespan of the equipment through resale and reuse. This can be calculated based on estimated lifespans of equipment under traditional ownership. Target: Quantify the potential e-waste reduction in kg or tons.
- **Access to Latest Technology:** Measure the percentage of tenderers who have access to the latest EEE technology through the eco-renting model that they might not have been able to afford under a traditional purchase model. Target: X% increase in access to latest technology.

Impact on Sellers (Offer Side):

- **New Revenue Stream:** Measure the revenue generated from the eco-renting business line, including rental fees, maintenance contracts, and resale of refurbished equipment. Target: Achieve a specific revenue target (e.g., \$X) within the test period.
- **Equipment Utilization Rate:** Track the percentage of time that the rented equipment is in use. A higher utilization rate indicates a more efficient and profitable business model. Target: Achieve an average equipment utilization rate of Y% (e.g., 80%).
- **Resale Value of Refurbished Equipment:** Measure the average resale price of refurbished equipment after the initial rental period. This demonstrates the viability of the second-life market. Target: Achieve a resale value of Z% (e.g., 50%) of the original purchase price.
- **Customer Acquisition Rate for Eco-Renting:** Track the number of new customers acquired specifically for the eco-renting service. Target: Acquire X number of eco-renting customers.
- **Profitability of Eco-Renting Business Line:** Calculate the profit margin specifically for the eco-renting business line, considering all costs (maintenance, logistics, refurbishment, etc.). Target: Achieve a profit margin of Y% (e.g., 10%) for the eco-renting business line.
- **Extension of Equipment Lifespan:** Quantify the average extension of the EEE lifespan due to the eco-renting model and subsequent resale/reuse. Target: Extend equipment lifespan by Z years on average.

Overall Impact:



- **Environmental Impact (Indirect):** Estimate the overall environmental impact reduction (e.g., CO₂ emissions, resource consumption) due to the extended lifespan of equipment and reduced e-waste. This can be based on lifecycle assessments and industry data. Target: Quantify the reduction in environmental impact.
- **Market Adoption Rate:** Track the overall adoption rate of the eco-renting model within the target market. Target: Achieve X% market penetration within Y years.
- **Stakeholder Satisfaction (Overall):** Measure the overall satisfaction of both tenderers and sellers with the eco-renting model. Target: Achieve a high overall satisfaction rating.

13.2. 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.

13.3. Strategic policy integration

The long-term sustainability of e-waste initiatives depends on their formal integration into the LGU's broader strategic framework. Every municipality should adopt a dedicated sub-measure within its local development or environmental strategy specifically focused on establishing a local system for the separate collection and re-use of waste electrical and electronic equipment in partnership with PROs and communal utilities. This formal policy integration transforms e-waste management from an isolated project into a core municipal service with permanent administrative oversight. It provides the necessary legal and political foundation to ensure that activities continue across different budget cycles and administrative changes.

By embedding these actions into local strategies, municipalities create a coherent pathway to bridge the gap between national-level policy objectives and on-the-ground municipal action. This strategic alignment makes the overall e-waste management system in Bosnia and Herzegovina more coherent and effective. It also allows local government units to systematically track progress and report comparable results to higher-level institutions or international donors, which is essential for securing future investment. Formalizing these goals ensures that e-waste management becomes a standard, measurable component of local environmental governance rather than an ad-hoc activity.



14. LOCAL IMPLEMENTATION AND OPERATION FRAMEWORK (from LINK's information)

The operational success of e-waste management in Bosnia and Herzegovina requires a transition from high-level strategic alignment to concrete, ground-level execution. Local Government Units (LGUs) often operate under significant constraints, including limited municipal budgets and specialized human resources. To address these challenges, this framework leverages existing institutional structures, primarily the cooperation between municipal administrations, public utility companies (JKP) and Producer Responsibility Organizations (PROs). By following this structured roadmap, municipalities can establish functional collection and reporting systems within a single 12-month budget cycle.

14.1. Institutional roles and coordination mechanisms

Effective implementation starts with a clear division of mandates to avoid administrative overlap and ensure accountability. The municipal administration acts as the primary coordinator, responsible for appointing a Local e-Waste Coordinator from existing staff to serve as the focal point for all stakeholders, including schools and NGOs. The municipality's role is primarily regulatory and administrative, involving the issuance of location permits for collection points, the provision of public signage, and the formal integration of e-waste targets into local development strategies.

Complementing this, the public utility companies (JKP) manage the daily logistical operations of permanent collection sites, often located within their existing yards. Meanwhile, authorized PROs (such as ZEOS or KimTec Eco) assume the technical and financial burden of the system. They are responsible for providing specialized collection containers and managing the complex logistics of transport, specialized treatment, and recycling. Regular quarterly meetings between these three entities are essential to synchronize collection schedules and ensure accurate reporting.

14.2. Sustainable financing through the EPR Model

Financial sustainability is anchored in the Extended Producer Responsibility (EPR) mechanism, which ensures that the primary costs of e-waste management are borne by the producers who place equipment on the market. Under this model, the PROs cover the costs of containers, logistics, and final treatment, significantly reducing the financial burden on local government budgets. This makes e-waste management a financially viable priority for municipalities with constrained resources.

Municipal financial contributions are limited to supporting communication materials, minor site adjustments, and the administrative time required for coordination. To supplement these efforts, municipalities are encouraged to actively seek external support through international donor projects, such as those funded by the EU, UNDP, or GIZ. These funds should be targeted toward digitalizing reporting systems and conducting high-impact public awareness campaigns that would otherwise be beyond current local capacities.

14.3. Establishing the collection network and mobile coverage

Operationally, the municipality must prioritize accessibility by identifying two to three permanent collection points in high-traffic locations, such as utility yards, municipal buildings, or school premises. These points must be clearly marked and integrated into the interactive maps maintained by system operators like ZEOS to ensure citizens can easily locate them. To ensure comprehensive coverage, the municipality must also coordinate monthly mobile collection drives in partnership with PROs to serve remote neighborhoods and rural villages that lack permanent infrastructure.



Local authorities should further extend the network by engaging electronics retailers and service workshops to act as voluntary take-back points for small equipment. By introducing "discount-for-return" models or public recognition schemes, municipalities can incentivize businesses to participate in circular economy goals. These efforts should be formalized through cooperation with the local Chamber of Commerce to embed e-waste management into broader corporate social responsibility programs.

14.4. Integration of the RE-USE Principle and circular hubs

A key pillar of this framework is the transition from a "take-make-dispose" model to a circular system that prioritizes product longevity. LGUs should enable the creation of "Local Circular Hubs", community-based spaces hosted within JKP facilities, schools, or NGO premises. These hubs focus on the visual inspection and preparation of functional devices (e.g., computers, printers, small appliances) for donation to local schools, libraries, or social programs.

To ensure safety and regulatory compliance, these initiatives must focus on simple, non-technical actions and avoid complex repairs that require specialized certification. These circular hubs serve as a foundation for future repair-based social enterprises and green job creation. By fostering a culture of reuse at the local level, municipalities can significantly reduce the amount of waste directed to landfills while simultaneously supporting vulnerable groups through the redistribution of functional technology.

14.5. Monitoring through the "e-Waste Progress Card"

To maintain transparency and demonstrate results to citizens and higher-level authorities, municipalities must apply a focused set of measurable indicators. Data should be tracked quarterly and summarized in a one-page "e-Waste Progress Card" published on the municipal website. Key indicators include:

- Infrastructure growth: The number of permanent and mobile collection points established.
- Collection volume: Total kilograms of e-waste collected per inhabitant per year.
- Public engagement: The number of awareness actions and schools involved in collection competitions.
- Circular impact: The percentage of items diverted to re-use initiatives versus those sent for recycling.

This systematic reporting not only validates the effectiveness of the local system but also provides the data necessary to align with national waste management information systems and secure future donor funding. Through this operational framework, small municipalities can become active and measurable contributors to the circular economy transition in Bosnia and Herzegovina.



15. WP3 eWAsTER Solutions Endorsement and Transfer Framework (only from LINK information)

15.1. Purpose of the WP3 Consolidation

Consolidation in WP3 is relevant for our territory given Bosnia and Herzegovina's WEEE and waste management framework. In the Federation of BiH, the Law on Waste Management and the Rulebook on Management of Waste from Electrical and Electronic Products set systems for collection, treatment, recycling, and reuse, promoting circular economy principles. However, these regulations are still being operationalized and aligned with EU accession and extended producer responsibility.

WP2 pilot implementation provided practical insights into WEEE reuse across sectors, highlighting barriers related to operator roles, data requirements, and stakeholder coordination. These findings clarify what policies enable and where legal or procedural guidance is needed.

At this stage, endorsement, not implementation, is the goal. WP3 aims to integrate pilot evidence and legal context into the Local Action Plan to secure institutional support and policy alignment, strengthening decision-making credibility before full operational execution.

15.2. Evidence from WP2 Pilot Solutions¹

Solution: WEE REUSE

The pilot showed that reuse-oriented handling of WEEE is technically feasible within Bosnia and Herzegovina's existing waste management and regulatory framework. Small e-waste items were easier to manage and preferable. Cooperation with certified operators, recycling yards, associations, and other stakeholders proved effective. Including businesses from diverse sectors—agriculture, food production, souvenir and jewelry production, handicrafts, services, and sales—helped assess WEE REUSE across contexts. The best results were observed in creative sectors such as jewelry, souvenirs, and handicrafts.

Initial challenges included a rise in the minimum wage, which pressured small businesses and caused layoffs, and the fact that WEE REUSE is not formally recognized in BiH, with systems primarily designed for collection and treatment. Pilot businesses were pioneers, and initial engagement was difficult. These challenges were overcome through trust built from previous work and expert support during testing.

The pilot highlighted structural limitations: the existing system focuses on collection, compliance, and recycling rather than reuse, offering limited procedural space or incentives for preparation for reuse. WEE REUSE outcomes varied by sector; in agriculture, for example, benefits for sustainability or income generation were limited. Large devices were difficult to manage logistically, and access to e-waste can be a constraint, though targeting companies and NGOs with large stakeholder networks mitigated this issue.

Key lessons for policy: reuse should be formally recognized as a complementary pillar to recycling, especially for small equipment. Expert mentoring and capacity-building

¹ For WEEEPURCURE solution carried out by Municipality of Neum, see Annex 1



support are essential in early phases, and incentive programs are needed to reward businesses implementing reuse practices.

For replicability and scaling, clear policy recognition of reuse, alignment with authorized operators and governance structures, and continued cooperation with private companies are required. Scaling relies on institutional endorsement, improved data clarity, and shared understanding of roles, rather than new infrastructure or financial investment at this stage.

15.3. Selection of Solutions for Endorsement

Selected solution: WEE-REUSE

Motivation for selection: Politically, reuse promotes environmental protection and resource efficiency without requiring immediate regulatory changes, supporting EU and national circular economy goals by prioritizing waste prevention and extending product lifetimes, addressing the gap between EEE placed on the market and collection targets. Institutionally, preparation for reuse is recognized within the waste hierarchy, enabling policy endorsement to build on existing frameworks and competencies. Strategically, WP2 pilot evidence showed that reuse complements current WEEE management, engages private operators and companies, and generates measurable environmental benefits while remaining compatible with compliance-driven governance. LINK will endorse the WEEE BEHAVE solution in the next phase with local and regional partners, independently of the eWAsTER project.

Solutions not selected: LINK will not pursue WEEE PROCURE, as it lacks experience with public procurement models for WEEE, which falls under the expertise of partners such as the Municipality of Neum.

15.4. Conditions for Future Adoption

Adoption of WEEE reuse measures could occur where policy recognition and legal clarity explicitly acknowledge preparation for reuse as a legitimate activity within existing waste management frameworks. Institutional support from competent authorities, including ministries, authorized operators, and local administrations, is needed to provide guidance, reduce perceived risks, and coordinate stakeholders.

Regional or entity-level governance is most suitable to provide regulatory interpretation and policy endorsement, while local authorities facilitate operational alignment and stakeholder engagement. This multi-level approach ensures coherence between strategic policy goals and practical implementation without imposing new obligations locally at this stage.

Adoption could be embedded in instruments such as Local Action Plans on waste management, regional waste management strategies, formal guidance, or regulatory frameworks clarifying preparation-for-reuse activities. Examples include the Environmental Strategy and Action Plan 2030+ (aligning BiH with EU acquis), entity-level Waste Management Strategies and Plans, municipal/cantonal Local Action Plans, and reporting platforms that integrate reuse as an official category. These instruments collectively provide strategic, planning, and regulatory support for policy endorsement of WEEE reuse, which is the focus of WP3 consolidation.

Explicit exclusions: WP3 does not commit to operational implementation, financial allocations, or infrastructure development. No new obligations are imposed on private



operators or municipalities, and scaling or replication depends on further political and institutional support.

15.5. Stakeholder Alignment and Governance Pathway

WP3 consultations engaged a wide range of stakeholders:

Regional institutions: Ministry of Health FBiH, Federal Institute for Programming, Ministry of Trade, Tourism & Environment Protection HN canton, Foreign Trade Chamber, Ministry of Economy HN canton, University of Džemal Bijedić Mostar, Sarajevo School of Science & Technology.

Local institutions: Municipalities and cities including Jablanica, Konjic, Stolac, Mostar, public institutions Los Rosales Mostar and Radimlja, Agency Prvi Korak Konjic, utility companies Jablanica and Standard Konjic.

Business sector: Webstudio Mostar, Most M Jablanica, MM Mostar, CEDES Sarajevo, Pepi Karttis Mostar, Investing & Consulting Jablanica, ZEOS Sarajevo, BAH, MGBAGO, RADIN.

NGO/CSO sector: CRES Mostar, Association of Women Most Jablanica, Wood Cluster Herzegovina, Association Ruzicnjak Mostar, Association of Entrepreneurs Herzegovina, Josip Broz, Gastro Kutak.

Consensus was high on the strategic importance of reuse, its alignment with legislation, and the need for institutional recognition to reduce operational and legal risks. Private operators and pilot participants particularly valued its practical feasibility.

Critical concerns include clarifying legal responsibilities to avoid risk-averse behaviors, ensuring institutional support does not imply immediate operational or financial obligations, and addressing limited awareness among some entrepreneurs and municipalities through targeted communication and capacity-building alongside policy endorsement.

15.6. Endorsement Statement

Through this Local Action Plan, LINK acknowledges the relevance of the solutions identified above and expresses its commitment to consider their future adoption, in line with institutional competences and applicable policy frameworks.



16. CONCLUSIONS

To sum up, the project has proven to be a pivotal initiative in addressing the growing challenge of electronic waste (e-waste) across Europe. By fostering collaboration and facilitating the exchange of knowledge among participating regions, it has successfully bridged the gap between existing local and regional policies and the ambitious targets set by the EU's Circular Economy Action Plan. This achievement was made possible through a comprehensive strategy that tackled the e-waste challenge from a lifecycle perspective.

The project emphasized increasing collection rates, promoting the reuse and refurbishment of e-waste whenever possible, and ensuring responsible and efficient recycling practices. This holistic approach empowered individual regions to craft and implement policies tailored to their unique circumstances while creating an environment conducive to knowledge sharing and the dissemination of best practices. Such collaboration has the potential to extend its impact, influencing e-waste management practices beyond the original eight regions and benefiting the broader European Union.

Moreover, the project's influence goes beyond its initial objectives. It has provided a practical framework for advancing e-waste management at the local and regional levels. By adopting targeted improvements—such as public awareness campaigns, incentivized reuse and refurbishment programs, accessible e-waste collection points, and detailed regional management plans—authorities can significantly enhance e-waste practices and contribute to a more circular economy. Additionally, advocating for extended producer responsibility (EPR) schemes can further encourage sustainable e-waste management by making producers financially responsible for the collection and recycling of their end-of-life products. These measures collectively pave the way for a more sustainable future for e-waste management across Europe.

To build on these achievements, partners will develop a Methodology for designing Strategies/AP for Mediterranean e-waste prevention and management, implementing it in eight Action Plans, which will test 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.



17. REFERENCES

- D. Hogg et al., 'A comprehensive assessment of the current waste management situation in South East Europe and future perspectives for the sector including options for regional co-operation in recycling of electric and electronic waste. Task 1: National waste assessment and roadmap for improving waste management in Bosnia and Herzegovina. 12th January 2017. Eunomia Research and Consulting Ltd,' 2017. Accessed: Aug. 09, 2024. [Online]. Available: https://ec.europa.eu/environment/enlarg/pdf/pilot_waste/BH_NWA_Roadmap_en.pdf
- EEA, 'Overview of national waste prevention programmes in Europe: Country profile, Bosnia Herzegovina. European Environment Agency,' 2021. Accessed: Aug. 09, 20234 [Online]. Available: https://www.eea.europa.eu/themes/waste/waste-prevention/countries/2023-waste-prevention-country-factsheets/bosnia_herzegovina_waste_prevention_2023/view
- G. Iattoni, I.C. Nnorom, D. Toppenberg, R. Kuehr, C.P. Baldé. Regional E-waste Monitor for the Western Balkans – 2023. International Telecommunication Union (ITU), United Nations Environment Programme (UNEP) and United Nations Institute for Training and Research (UNITAR) – SCYCLE Programme. <https://ewastemonitor.info/wp-content/uploads/2023/12/Regional-E-waste-Monitor-Western-Balkans-2023.pdf>
- GEF, 'Circular Economy Regional Programme Initiative (Near Zero Waste). Global Environment Facility. Part I: Project Information GEF ID 10328. 10th May 2020. Regional project (Albania, Bosnia-Herzegovina, Montenegro, North Macedonia, Serbia, Turkey); EBRD,' 2020. Accessed: Nov. 09, 2024. [Online]. Available: https://publicpartnershipdata.azureedge.net/gef/GEFProjectVersions/3566c4da-5bb7-e911-a837-000d3a375590_CEOEndorsement.pdf
- World Bank, 'Bosnia and Herzegovina: municipal solid waste management sector review- Review of the extended producer responsibility in Bosnia and Herzegovina for packaging and packaging waste and WEEE. Final report. March 2018,' 2018. Accessed: Nov. 09, 2024. [Online]. Available: <https://documents1.worldbank.org/curated/zh/834281562138748942/pdf/Municipal-Solid-Waste-Management-Sector-Review-Review-of-the-Extended-Producer-Responsibility-in-Bosnia-and-Herzegovina-for-Packaging-and-Packaging-Waste-and-WEEE.pdf>
- A. Haarman, F. Magalini, J. Courtois (2020), Study on the Impacts of Brominated Flame Retardants on the Recycling of WEEE plastics in Europe. <https://www.bsef.com/wp-content/uploads/2020/11/Study-on-the-impact-of-Brominated-Flame-Retardants-BFRs-on-WEEE-plastics-recycling-by-Sofies-Nov-2020-1.pdf>
- European Commission (2020) Circular Economy Action Plan. <https://circabc.europa.eu/ui/group/6e9b7f79-da96-4a53-956f-e8f62c9d7fed/library/37e8e207-6222-4212-ad7c-e809e64df72c>
- European Commission (2021a): Batteries and accumulators. https://ec.europa.eu/environment/topics/waste-and-recycling/batteries-and-accumulators_en
- European Commission (2021b): Waste and recycling. https://ec.europa.eu/environment/topics/waste-and-recycling_en
- European Commission, Directorate-General for Environment, Romagnoli, V., Bruijne, E., Drapeau, P. (2022). Study on options for return schemes of mobile phones, tablets and other small electrical and electronic equipment in the EU, Publications Office of the European Union. <https://data.europa.eu/doi/10.2779/237189>



- European Commission, Directorate-General for Environment, Weißenbacher, J., Magalini, F., Lecerf, L. (2015). Study on WEEE recovery targets, preparation for re-use targets and on the method for calculation of the recovery targets: final report, Publications Office. <https://data.europa.eu/doi/10.2779/235063>
- European Parliament and Council (11/22/2008): DIRECTIVE 2008.98.EC on Waste (WFD).
- European Parliament and Council (12/20/1994): DIRECTIVE 94.62.EC on packaging and packaging waste.
- European Parliament and Council (7/4/2012): DIRECTIVE 2012/19/EU on waste electrical and electronic equipment (WEEE).
- European Parliament and Council (7/6/2006): DIRECTIVE 2006/66/EC on batteries and accumulators and waste batteries and accumulators.
- F. Magalini, J. Courtois, A. Concheso, C. Heinz (2021), Extended Producer Responsibility schemes and their strategic role for producers. <https://www.consultdss.com/content-hub/extended-producer-responsibility-schemes/>
- Forti, Vanessa, Baldé, Kees and Kuehr, Ruediger (2018), E-waste Statistics: Guidelines on Classifications, Reporting and Indicators, second edition. <https://collections.unu.edu/view/UNU:6477#viewMetadata>
- M. A. Tortarolo (2023), Circular economy: management of waste electrical and electronic equipment (WEEE) in Europe. <https://repositori.uji.es/xmlui/handle/10234/203322?show=full>
- OECD (2016), Extended Producer Responsibility: Updated Guidance for Efficient Waste Management, OECD Publishing, Paris. DOI: <http://dx.doi.org/10.1787/9789264256385-en>
- RREUSE (2002), The Management of Waste Electrical and Electronic Equipment – A Guide for Local Authorities. <https://rreuse.org/wp-content/uploads/00028-Brochure-ACRR-Part-I.pdf>
- RREUSE (2021), Job creation in the re-use sector: Data insights from social enterprises. <https://rreuse.org/job-creation-in-the-re-use-sector-data-insights-from-social-enterprises/>
- S. Šipka (2021), Towards circular e-waste management: How can digitalisation help? https://www.epc.eu/content/PDF/2021/E-waste_DP_v5.pdf
- SCYCLE Programme, United Nations Institute for Training and Research (UNITAR) (2022), C.P. Baldé, G. Iattoni, C. Xu, T. Yamamoto, Update of WEEE Collection Rates, Targets, Flows, and Hoarding – 2021 in the EU-27, United Kingdom, Norway, Switzerland, and Iceland, 2022. <https://www.scycle.info/new-study-update-of-weee-collection-rates-targets-flows-and-hoarding/#:~:text=The%20WEEE%20generated%20also%20shows,kq%2Finhabitant%20in%202021>
- United Nations Environment Programme (2007), E-Waste Vol.1: Inventory Assessment Manual. <https://www.unep.org/ietc/resources/toolkits-manuals-and-guides/e-waste-vol3-weeee-waste-%E2%80%9Ctake-back-system%E2%80%9D>
- United Nations Environment Programme (2007), E-Waste Vol.2: E-waste Management Manual. <https://www.unep.org/ietc/resources/toolkits-manuals-and-guides/e-waste-vol3-weeee-waste-%E2%80%9Ctake-back-system%E2%80%9D>
- United Nations Environment Programme (2012), E-Waste Vol.3: WEEE/E-Waste “Take Back System”. <https://www.unep.org/ietc/resources/toolkits-manuals-and-guides/e-waste-vol3-weeee-waste-%E2%80%9Ctake-back-system%E2%80%9D>
- United Nations Environment Programme (2017), Compendium of Technologies for the Recovery of Materials from WEEE / E-waste. <https://www.unep.org/ietc/resources/report/compendium-technologies-recovery-materials-weee-e-waste>
- United Nations Institute for Training and Research (UNITAR), C.P. Baldé, E. D'Angelo, V. Luda O. Deubzer, and R. Kuehr (2022), Global Transboundary E-waste



Flows Monitor. https://ewastemonitor.info/wp-content/uploads/2022/06/Global-TBM_webversion_june_2_pages.pdf

- United Nations University (UNU) / United Nations Institute for Training and Research (UNITAR) (2020) C.P. Baldé, M. Wagner, G. Iattoni, R. Kuehr, In-depth Review of the WEEE Collection Rates and Targets in the EU-28, Norway, Switzerland, and Iceland. https://www.scycle.info/wp-content/uploads/2020/11/In-depth-review_WEEE-Collection-Targets-and-Rates_UNITAR_2020_Final.pdf
- WEEE Forum (2020), An enhanced definition of EPR and the role of all actors. https://weee-forum.org/wp-content/uploads/2020/11/EPR-and-the-role-of-all-actors_final.pdf
- WEEE Ireland (2022), WEEE annual Environmental report 2022 <https://www.weeeireland.ie/weee-annual-environmental-report-2022/>
- ZEOS Annual Report, 'Annual Report 2019: System operator for managing electrical and electronic waste in the Federation of Bosnia and Herzegovina,' 2019. Accessed: Aug. 09, 2024. [Online]. Available: https://www.zeos.ba/download/doc/ZEOS_en.pdf/d5957d5d1121ab01f91ea4f368070999.pdf
- ZEOS Annual Report, 'Annual Report 2022: Operator of waste electrical and electronic equipment management system in the Federation of Bosnia and Herzegovina,' 2022. <https://www.zeos.ba/en/34/pages/1/about-us>
- ZEOS Annual Report, 'Annual Report 2023: Operator of waste electrical and electronic equipment management system in the Federation of Bosnia and Herzegovina' 2023. <https://www.zeos.ba/en/34/pages/1/about-us>
- ZEOS BA. <https://www.zeos.ba/en/34/pages/1/about-us>



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ANNEX 1. Action Plan Neum



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Action Plan for the Prevention and Management of Electronic Waste in the Municipality of Neum





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List of Abbreviations

AP	Action Plan
BiH	Bosnia and Herzegovina
d.o.o.	Limited Liability Company
EEE	Electrical and Electronic Equipment
EPR	Extended Producer Responsibility
EU	European Union
eWAsTER	Project name: <i>Preventing e-waste from polluting MED water by turning waste into a resource</i>
FBiH	Federation of Bosnia and Herzegovina
HNK	Herzegovina-Neretva Canton (abbreviation used in the source documents)
HNŽ	Herzegovina-Neretva County
Interreg Euro-MED	European Union programme for transnational cooperation in the Mediterranean area
IT	Information Technology
JP	Public Enterprise
KM	Convertible Mark
KPI	Key Performance Indicator
LAP	Local Action Plan
NVO	Non-Governmental Organization
PRO	Producer Responsibility Organization
QR	QR Code (Quick Response)
WEEE	Waste Electrical and Electronic Equipment
ZEOS	ZEOS eco-system d.o.o., authorized system operator for e-waste management in the FBiH



1. Introduction and Purpose of the Document

1.1. Reasons for Developing the Action Plan

The Action Plan for the prevention and management of electronic waste in the Municipality of Neum is being developed as a local addition, or annex, to the Local Action Plan for Bosnia and Herzegovina, which was developed within the eWAsTER project. The document is focused on the specific needs of the Municipality of Neum as the only coastal municipality in Bosnia and Herzegovina, with particular emphasis on protecting the marine ecosystem, the coastal zone, the tourist area and the health of the population. [1, 2]

Electrical and electronic waste represents one of the fastest-growing categories of waste. Devices such as computers, mobile phones, televisions, air conditioners, refrigerators, household appliances, lighting fixtures, cables, tools and small electrical devices contain valuable materials, but also hazardous components. If they are not collected separately and handed over to authorized operators, they can end up in mixed municipal waste, at the landfill, in informal flows or at illegal dumpsites.

The Local Action Plan for BiH within the eWAsTER project emphasizes the need to establish local and regional action plans for the prevention and management of e-waste, relying on the circular economy, better collection, reuse, recycling and the involvement of all stakeholders in the system. [3]

1.2. Connection with the Local Action Plan for BiH and the eWAsTER Project

This document is being developed as a supplement to the Local Action Plan for BiH. The Local Action Plan for BiH provides a broader framework for WEEE/e-waste, including concepts, stakeholders, the regulatory framework, monitoring, examples of good practice and proposed measures at the local and regional level. In this sense, the Action Plan for the Municipality of Neum adopts the general principles of the BiH LAP, but adapts them to the local context of Neum. [4]

The eWAsTER project aims to improve local and regional e-waste management policies, reduce the environmental damage associated with e-waste and encourage the transition from the linear “take–use–discard” model to a circular model in which devices, components and materials are kept in use for as long as possible. [5]

It is particularly significant for Neum that the Municipality of Neum is a project partner in the eWAsTER project, and activities aimed at validating the results and raising awareness have already been held in Neum, including a workshop at the Neum High School and the fourth project validation workshop held in September 2025. [3, 4, 16]

1.3. Spatial, Temporal and Institutional Scope of the Plan

The Action Plan applies to the administrative area of the Municipality of Neum, including the urban settlement of Neum, the coastal zone, tourist zones, public institutions, economic



entities, catering and accommodation facilities, as well as rural settlements in the municipality's hinterland.

A planning period from 2026 to 2030 is proposed in order to align the document chronologically with the Development Strategy of the Municipality of Neum 2023–2030. The Development Strategy recognizes the importance of modernizing communal infrastructure, environmental protection, sustainable tourism and the organization of the waste management system, including the strategic project of remediating and developing the Klepovica landfill and establishing planned waste management. [7]

1.4. Methodological Approach

The methodology for developing the Action Plan is based on a combination of analysis of available documentation, review of planning documents, analysis of the local context, identification of stakeholders, risk assessment and the definition of measures with indicators. The main sources used are the Local Action Plan for BiH, the Waste Management Plan of the Municipality of Neum 2021–2025, the Waste Management Plan of HNŽ 2025–2030, the Development Strategy of the Municipality of Neum 2023–2030, and available information from the Municipality of Neum, ZEOS and the eWAsTER project. [1, 5, 6, 7, 8, 12]

The methodological approach of the BiH LAP comprises an initial situation analysis, a review of existing systems, identification of shortcomings in infrastructure and regulations as well as the level of public awareness, stakeholder involvement and the definition of measurable objectives, deadlines and responsibilities. [9]

2. Conceptual, Legal and Strategic Framework

2.1. Definition of Electrical and Electronic Equipment and E-Waste

Electrical and electronic equipment comprises products that use electrical energy, batteries or electromagnetic fields to function properly. Electrical and electronic waste arises when such equipment becomes unusable, obsolete, broken or when the owner discards it. [8, 9]

For the purposes of this document, the following terms are used: **e-waste**, **electrical and electronic waste** and **WEEE**. In the practice of the Municipality of Neum, this includes small household appliances, computers, monitors, laptops, printers, mobile phones, cables, televisions, air conditioners, refrigerators, power tools, lighting fixtures and other devices that run on electricity or batteries.

2.2. Basic Categories of E-Waste

For the local system in Neum, the use of six practical categories that are understandable to citizens, the communal enterprise and the economy is recommended:

1. temperature exchange equipment: refrigerators, freezers, air conditioners;
2. screens and monitors: televisions, monitors, laptops;
3. lamps and lighting equipment: fluorescent tubes, LED lighting, compact bulbs;



4. large equipment: washing machines, stoves, larger appliances from hotels and households;
5. small equipment: hair dryers, vacuum cleaners, irons, kettles, small appliances;
6. small IT and telecommunications equipment: mobile phones, routers, printers, computers, keyboards, mice.

ZEOS lists a similar division into six classes of e-waste and emphasizes that e-waste does not belong in mixed municipal waste, that it must be collected separately and handed over for disposal, and that it may contain hazardous substances. ^[9]

2.3. Principles of the Circular Economy and Extended Producer Responsibility

The Action Plan is based on the principles of waste prevention, extending the service life of devices, reuse, repair, separate collection, recycling and the responsible disposal of hazardous components.

Extended Producer Responsibility, EPR, means that producers, importers and distributors of electrical and electronic equipment participate in financing and organizing the system for the collection and treatment of e-waste. The BiH LAP cites EPR as a key instrument for the sustainable management of WEEE waste and for connecting producers, operators, local authorities and users. ^[1]

2.4. Relevant Legal and Planning Framework

At the FBiH level, there are regulations governing the management of waste from electrical and electronic products, including the obligations of system operators, producers, importers, distributors and other stakeholders. ZEOS states that the rulebook on the management of waste from electrical and electronic products governs the placing on the market of electrical and electronic products, take-back, collection and treatment, recycling, export, temporary storage and other activities for the application of the circular economy. ^[8, 9]

At the local level, the Waste Management Plan of the Municipality of Neum 2021–2025 establishes that e-waste previously ended up at the local Klepovica landfill together with municipal waste, which represents a key problem that this Action Plan must eliminate. ^[5]

2.5. Alignment with the Development Strategy of the Municipality of Neum 2023–2030.

The Action Plan is aligned with the strategic orientations of the Municipality of Neum relating to the modernization of communal infrastructure, sustainable environmental management, the protection of natural resources and the development of sustainable tourism. The Development Strategy states that, in the area of sustainable management of the environment and infrastructure resources, the emphasis is placed on improving environmental protection, the planned use of natural resources, increasing energy efficiency and modernizing communal infrastructure. ^[7]



The connection with the strategic project of remediating and developing the regional Klepovica landfill and establishing planned waste management is particularly important, because the e-waste management system must be functionally connected with the future development of a recycling yard, a transfer station or another organized system for collecting special categories of waste. ^[7]

3. Analysis of the Current Situation in the Municipality of Neum

3.1. Basic Characteristics of the Municipality of Neum

The Municipality of Neum is the only municipality in Bosnia and Herzegovina with access to the Adriatic Sea. According to the Development Strategy of the Municipality of Neum, the municipality has an area of 225 km², about 24.5 km of indented sea coast and a specific position within the Mali Ston and Neum bays. ^[7, 13]

According to the estimate for 2022, the Municipality of Neum has 4,358 inhabitants and falls among sparsely populated areas, with a pronounced concentration of population in the central settlement of Neum and a considerably lower population in the rural hinterland. ^[7]

3.2. Tourist and Coastal Character of the Municipality

Tourism is one of the most important economic activities in Neum. The Development Strategy states that Neum is a typical Adriatic municipality, that tourism grows every year, and that the municipality has significant accommodation capacities in hotels, motels and private apartments. According to the Strategy, in 2022 a total of 5,684 beds were recorded in accommodation facilities. ^[7]

This fact directly affects the waste system. During the tourist season, the number of service users increases significantly, the quantity of municipal waste increases, and so does the potential generation of e-waste from hotels, apartments, restaurants, shops, public services and households.

3.3. Existing Municipal Waste Management System

The public enterprise JP Komunalno Neum d.o.o. is responsible for the collection and disposal of waste in the Municipality of Neum. The Waste Management Plan of the Municipality of Neum states that this enterprise carries out waste collection and disposal, that waste is collected in containers with a capacity of 1.1 m³, that the municipality has about 230 containers, 35 stone bins and 10 ordinary bins, and that waste is deposited at the local Klepovica landfill. ^[5, 13]

The Plan also states that 1,392 households and legal-entity facilities have been recorded in the municipality as users of the waste collection, removal and disposal services. ^[5]

The dynamics of waste removal in Neum are seasonally intensified. During the summer season, due to the large number of tourists, municipal waste is removed more frequently



than during the rest of the year, which confirms the pronounced seasonal pressure on the communal system. ^[5]

3.4. Current State of E-Waste Management

In the previous period, e-waste was not systematically separated from mixed municipal waste. The Waste Management Plan of the Municipality of Neum explicitly states that electronic and electrical waste ends up at the local Klepovica landfill together with municipal waste. ^[5]

A positive step is the installation of the first e-container for electrical and electronic waste in Neum. According to an announcement by the Municipality of Neum, the e-container was installed in Ruđer Bošković Street, near the new church, and is intended for small appliances, computer equipment, entertainment equipment, toys and other small electrical and electronic equipment. ^[12]

Nevertheless, the existing system cannot yet be considered complete. A single e-container does not cover the needs of the entire municipality, especially taking into account the tourist season, hotels, apartments, public institutions, remote settlements and the need to collect large appliances.

3.5. Key Stakeholders in the System

The key stakeholders for implementing the Action Plan are:

- the Municipality of Neum, in particular the Department for Housing and Communal Affairs, Construction and Development;
- JP Komunalno Neum d.o.o.;
- authorized e-waste system operators, primarily ZEOS eco-system d.o.o. and other authorized operators in the FBiH;
- the Environmental Protection Fund of the FBiH;
- the Ministry of Trade, Tourism and Environmental Protection of HNŽ;
- the tourist board, hotels, apartments, catering and trade entities;
- public institutions, schools, the Health Centre, municipal services;
- citizens, tourists and non-governmental organizations.

The BiH LAP emphasizes an “all-stakeholder involvement approach”, that is, an approach that includes producers, operators, local authorities, recyclers, the public and private sectors, citizens and other stakeholders involved in the generation, collection, treatment and monitoring of WEEE waste. ^[1]

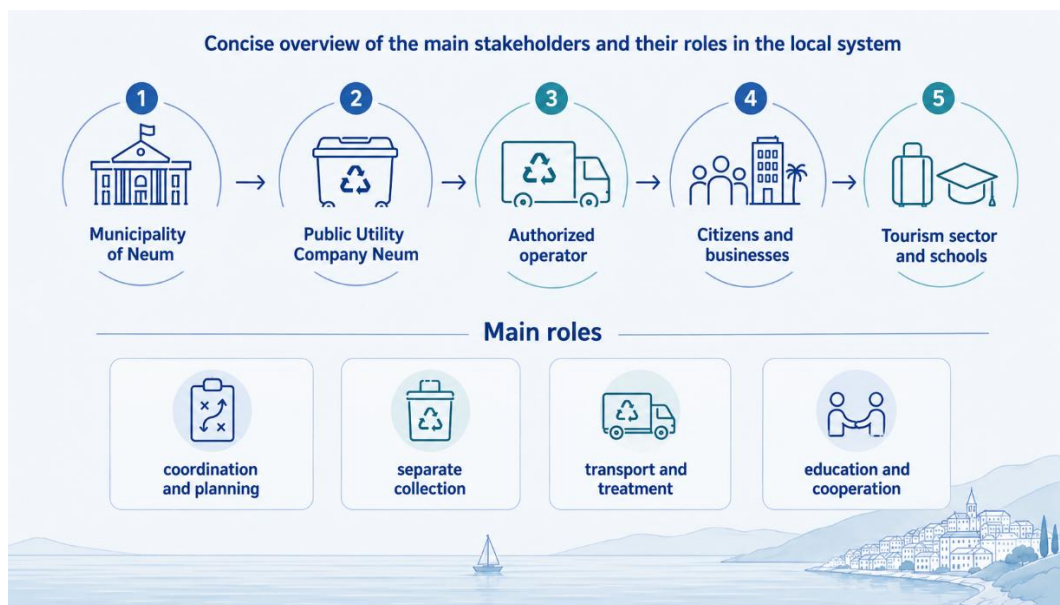


Figure 1. Key stakeholders in the e-waste management system in the Municipality of Neum and their basic roles

3.6. Identified Shortcomings

The key shortcomings of the existing system are:

- the absence of a local database on quantities of e-waste;
- insufficient infrastructure for the separate collection of e-waste;
- the lack of regular campaigns for larger e-waste;
- weak involvement of the tourism sector in the system;
- an insufficiently developed system for informing citizens and tourists;
- insufficiently formalized cooperation between the Municipality, the communal enterprise and the system operators;
- the risk that e-waste continues to end up in mixed municipal waste or at the landfill.

4. Challenges and Risks Related to E-Waste in the Coastal Area

4.1. Environmental Risks

E-waste may contain hazardous substances such as mercury, lead, cadmium, chromium, brominated flame retardants and other substances. If it is deposited at the landfill or at illegal dumpsites, there is a risk of hazardous substances leaching into the soil and water, especially in a karst and coastal area such as Neum. ^[9, 11]



In the coastal context, improper disposal of e-waste is not merely a local communal problem, but also a matter of protecting the sea, the coastal landscape, the tourist image and the health of the population.

4.2. Risks to Public Health and Safety

Improper handling of e-waste can lead to injuries, fires, exposure to hazardous chemicals, leakage of refrigerant fluids from refrigerators and air conditioners, breakage of screens and bulbs, and informal dismantling of devices without protective equipment. ^[9,11]

4.3. Risks Related to Tourism and Seasonality

During the summer season, Neum has a considerably increased number of users of its space. The tourism sector uses significant quantities of electrical and electronic equipment: televisions, refrigerators, air conditioners, lighting, routers, kitchen appliances, security systems and computer equipment. The replacement of this equipment often occurs seasonally, before or after the tourist season. ^[7]

Without a special protocol for the tourism sector, there is a risk that old devices end up in storage rooms, next to containers, with bulky waste or in informal flows.

4.4. Risks Related to Informal Flows and Landfill Disposal

Informal collectors often extract only the valuable components, while the rest of the device may end up at unregulated locations. Such a practice reduces the quantities entering the formal system and makes accurate reporting impossible.

The Waste Management Plan of the Municipality of Neum has already recognized that e-waste ends up at Klepovica with municipal waste, which represents the fundamental risk that this Action Plan must systematically resolve. ^[5]

4.5. Institutional and Financial Challenges

The main institutional challenges are limited capacities for record-keeping and monitoring, the lack of formal protocols with e-waste operators, insufficient financial resources for infrastructure and the need for better coordination between municipal services, the communal enterprise, the tourism sector and the system operators.

The key risks related to e-waste in the coastal area of Neum relate to mixing with municipal waste, possible negative impacts on the sea, soil and coast, seasonal tourist pressure, and informal flows and improper disposal.

4.6. Insufficiently Developed Local Capacities and Logistical Challenges in E-Waste Management

The Municipality of Neum currently does not have developed infrastructure for the separate collection, storage, sorting and treatment of electrical and electronic waste. The existing waste management system is oriented towards mixed municipal waste, while e-waste is dealt with through cooperation with authorized operators outside the local community.



This model creates additional organizational and financial challenges. The lack of local collection points and infrastructure increases the costs of transport and disposal, especially because the authorized operators are located at greater distances, which makes the system less cost-effective for smaller quantities of waste.

At the same time, the absence of a local record-keeping system makes it difficult to monitor the quantities of e-waste and to plan future investments. Organizing regular transport for recycling requires additional resources and coordination.

Although e-waste contains valuable materials such as metals and plastics, their recovery is possible only with an organized system of collection and handover. Otherwise, e-waste is considered a cost, especially when the logistical costs exceed the potential benefit.

An additional problem is that part of the e-waste ends up in households, mixed waste or informal flows, whereby control over hazardous components is lost and the quantities available for recycling are reduced.

By establishing a more efficient system of separate collection and waste management, the Municipality of Neum could reduce existing costs, increase the quantities of waste that are recycled and, in the long term, create a basis for generating additional revenue and more sustainable waste management.



Figure 2. Key risks of e-waste management in the coastal area of Neum and the proposed system response

5. Strategic Framework of the Action Plan

5.1. Vision

The Municipality of Neum establishes a recognizable, accessible and measurable local e-waste management system, which prevents the disposal of electrical and electronic



equipment at the landfill and in the environment, protects the coastal and marine ecosystem, involves the tourism sector and promotes the circular economy.

5.2. General Objective

The general objective of the Action Plan is to establish a functional system for the prevention, separate collection, reuse, handover to authorized operators and monitoring of e-waste flows in the Municipality of Neum.

5.3. Specific Objectives

Specific objective 1: Establish an institutional and organizational framework for e-waste management.

Specific objective 2: Increase the availability of the separate e-waste collection system for citizens, public institutions, the economy and the tourism sector.

Specific objective 3: Prevent the disposal of e-waste at the Klepovica landfill and at improper locations.

Specific objective 4: Develop a local system of record-keeping, monitoring and annual reporting.

Specific objective 5: Encourage the reuse, repair and donation of functional equipment.

Specific objective 6: Raise the awareness of citizens, tourists, students and economic entities about the proper handling of e-waste.

5.4. Implementation Principles

The implementation of the Action Plan is based on the following principles:

- prevention before disposal;
- reuse before recycling;
- separate collection at the source;
- handover exclusively to authorized operators;
- involvement of all stakeholders;
- transparent reporting;
- protection of the sea and the coastal area;
- alignment with the Development Strategy of the Municipality of Neum and the BiH LAP

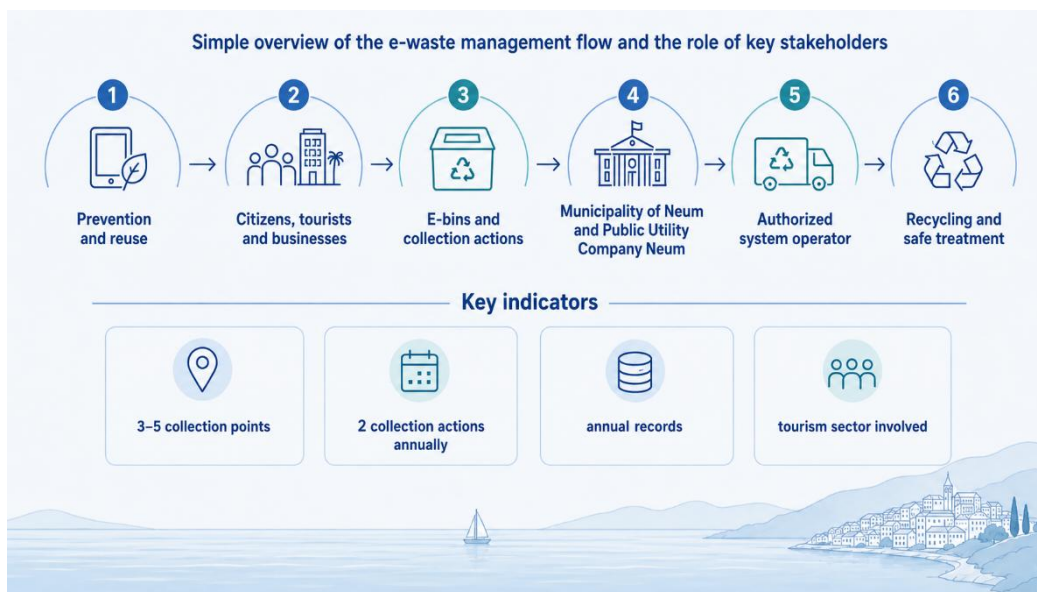


Figure 3. Model of the local e-waste management system in the Municipality of Neum

6. Recommendations and Measures for Improving the E-Waste Management System

6.1. Measure 1: Establishment of a Local Coordination Mechanism for E-Waste

Description of the measure:

The Municipality of Neum should establish a small operational working group for e-waste, which will coordinate the implementation of the Action Plan. The working group need not be a new administrative body, but rather a functional mechanism that brings together the Municipality, JP Komunalno Neum, the authorized operator, the tourism sector, schools and relevant public institutions.

Activities:

- appointing a contact person for e-waste in the Municipality of Neum;
- forming a working group of 5–7 members;
- defining an annual activity plan;
- holding at least two coordination meetings per year;
- preparing an annual report on the implementation of the Action Plan.

Responsible body: Municipality of Neum – Department for Housing and Communal Affairs, Construction and Development.

Partners: JP Komunalno Neum, ZEOS or another authorized operator, the Tourist Board, schools, the Health Centre, hotels.



Deadline: short-term, 0–6 months.

Indicative cost: 3,000–5,000 KM per year.

Indicators:

- contact person appointed;
- working group formed;
- number of meetings held per year;
- annual e-waste report produced.

6.2. Measure 2: Formalizing Cooperation with Authorized System Operators

Description of the measure:

The Municipality of Neum should sign or update an agreement or protocol on cooperation with the authorized e-waste system operator. The protocol should clearly define: collection locations, the manner of emptying containers, the take-back of larger quantities from legal entities, record-keeping of quantities, reporting, educational activities and the responsibilities of the parties.

ZEOS states that citizens can deposit e-waste in containers or recycling yards free of charge, while legal entities can use organized take-back in accordance with the operator's rules. [10]

Activities:

- analysis of the existing relationship between the Municipality and the operator;
- preparation of a model agreement;
- defining locations and the frequency of emptying;
- defining the obligation to submit data on quantities;
- defining cooperation in campaigns.

Responsible body: Municipality of Neum.

Partners: ZEOS eco-system d.o.o., other authorized operators, JP Komunalno Neum.

Deadline: 0–6 months.

Indicative cost: 2,000–4,000 KM.

Indicators:

- cooperation protocol signed;
- reporting form established;
- number of e-waste take-backs per year;
- quantity of e-waste recorded in the formal system.



6.3. Measure 3: Establishment of Local Records and an Initial E-Waste Database

Description of the measure:

Currently there is no reliable local database on quantities of e-waste. The first year of implementing the Action Plan should be the year for establishing the initial records. Without a baseline value, it is not possible to objectively measure progress.

Activities:

- developing a simple form for recording e-waste;
- recording quantities from the e-container;
- recording take-backs from public institutions and legal entities;
- an annual questionnaire for hotels, apartments, shops and public institutions;
- producing an initial report “State of E-Waste in the Municipality of Neum”.

Responsible body: Municipality of Neum.

Partners: JP Komunalno Neum, ZEOS, hotels, public institutions, schools.

Deadline: 0–12 months.

Indicative cost: 6,000–12,000 KM.

Indicators:

- record-keeping form produced;
- number of entities included in the records;
- initial database produced;
- initial report produced;
- baseline value established for kg of e-waste per year.

6.4. Measure 4: Expansion of the Network of Collection Points for Small E-Waste

Description of the measure:

The existing e-container is an important start, but it is necessary to expand the availability of the service. It is proposed to establish at least 3–5 accessible collection points for small e-waste by 2030. The locations should be visible, safe and connected with the everyday movement of citizens and tourists. ^[12, 15]

Proposed locations:

- the existing location in Ruđer Bošković Street;



- the area near the Municipality building or a public institution;
- the area of a school or sports hall;
- an area of heavier tourist traffic;
- a location agreed with JP Komunalno Neum or the future recycling yard.

Activities:

- analysis of locations and accessibility;
- agreement with the operator on procuring or assigning containers;
- placing clear instructions on the containers;
- a QR code with a map and instructions;
- regular monitoring of the condition of the containers.

Responsible body: Municipality of Neum.

Partners: ZEOS, JP Komunalno Neum, schools, public institutions.

Deadline: 2026–2028.

Indicative cost: 15,000–35,000 KM, with the possibility that part of the infrastructure is financed by the system operator.

Indicators:

- number of e-containers installed;
- number of locations marked on the map;
- number of container emptyings per year;
- quantity of small e-waste collected;
- reduced number of reports of e-waste next to municipal containers.

6.5. Measure 5: Regular Collection Campaigns for Large E-Waste

Description of the measure:

E-containers are intended mainly for small e-waste. For large devices, such as refrigerators, air conditioners, washing machines, televisions and large IT equipment, it is necessary to organize special collection campaigns.

Implementation model:

- two campaigns per year: one before the tourist season and one after the season;
- citizens register devices in advance by telephone, an online form or the local community;



- legal entities use the direct registration and take-back procedure with the authorized operator;
- collection is carried out at a temporary collection point or according to the agreed take-back model.

Responsible body: Municipality of Neum and JP Komunalno Neum.

Partners: ZEOS/another authorized operator, local communities, hotels, apartments.

Deadline: continuously, from 2026.

Indicative cost: 10,000–20,000 KM per year.

Indicators:

- number of campaigns organized per year;
- number of households and legal entities that handed over equipment;
- quantity of large e-waste collected;
- number of large devices removed from informal flows.

6.6. Measure 6: “Green Tourism Sector Without E-Waste”

Description of the measure:

The tourism sector is one of the key stakeholders in Neum. Hotels, apartments, restaurants and shops use and periodically replace electrical and electronic equipment. It is necessary to introduce a voluntary but systematic protocol for the tourism sector.

The Development Strategy of Neum emphasizes sustainable tourism, the promotion of tourist potential and the preservation of the environment, which makes this measure directly aligned with the municipality's development priorities. ^[7]

Activities:

- developing a short guide for hotels and apartments;
- establishing a form for reporting e-waste from tourist facilities;
- an annual campaign for collecting e-waste from accommodation and catering facilities;
- awarding the label “We Manage E-Waste Responsibly” to participating entities;
- including information on the proper disposal of e-waste in tourist information materials.

Responsible body: Municipality of Neum.

Partners: the Tourist Board, hotels, apartments, restaurants, ZEOS, JP Komunalno Neum.

Deadline: 2026–2030.

Indicative cost: 8,000–15,000 KM per year.

Indicators:



- number of tourist entities included in the programme;
- number of guides distributed to entities;
- quantity of e-waste collected from the tourism sector;
- number of facilities with the responsible e-waste management label;
- number of tourist information materials containing instructions on e-waste.

6.7. Measure 7: Programme for Public Institutions and Schools

Description of the measure:

Public institutions are significant generators of waste from IT equipment, lighting, printers, cables, monitors and other devices. The Waste Management Plan of the Municipality of Neum lists public institutions as waste generators, including flows that may contain electrical and electronic equipment, fluorescent tubes and other problematic fractions. ^[5]

Activities:

- an annual inventory of written-off equipment in public institutions;
- establishing a rule that equipment is not disposed of in municipal waste;
- a special campaign for collecting e-waste from schools, the Municipality, the Health Centre and public enterprises;
- educational lessons in primary and secondary schools;
- a school competition or quiz on e-waste.

Responsible body: Municipality of Neum.

Partners: primary schools, Neum High School, the Health Centre, JP Komunalno Neum, ZEOS.

Deadline: 2026–2030.

Indicative cost: 5,000–10,000 KM per year.

Indicators:

- number of public institutions submitting an annual equipment inventory;
- number of students included in education;
- number of workshops held;
- quantity of e-waste collected from public institutions;
- number of functional devices directed to reuse.



6.8. Measure 8: Programme for Reuse, Repair and Donation of Equipment

Description of the measure:

Not every old device is immediately waste. Some computers, monitors, printers, tablets and other IT equipment can be repaired, cleaned, reset to factory settings and donated to schools, associations or public institutions. This measure is important for the circular economy and for reducing waste generation.

Among good practices, the BiH LAP emphasizes the importance of reuse, repair, creative reuse (upcycling) and a second life cycle for products. ^[1, 14]

Activities:

- establishing a protocol for inspecting functional IT equipment;
- cooperation with local repair services or IT experts;
- mandatory data erasure before donation;
- donating functional equipment to schools, associations or public institutions;
- recycling of unusable equipment through authorized operators.

Responsible body: Municipality of Neum.

Partners: schools, local IT services, ZEOS, public institutions, economic entities.

Deadline: 2026–2030.

Indicative cost: 10,000–25,000 KM per year.

Indicators:

- number of devices inspected;
- number of devices repaired;
- number of devices donated;
- quantity of equipment directed to reuse instead of recycling;
- number of users of donated equipment.

6.9. Measure 9: Communication Campaign “E-Waste Does Not Go to the Landfill”

Description of the measure:

The success of the system depends on the awareness of citizens, tourists and businesses. The campaign should be simple, seasonally adapted and constantly visible.

Key messages:

- e-waste does not go in the ordinary container;



- e-waste does not go to the landfill;
- small devices are deposited in the e-container;
- large devices are handed over through campaigns or to the authorized operator;
- working devices can be repaired or donated;
- proper disposal of e-waste protects the sea, the coast and health.

Activities:

- a visual identity for the campaign;
- announcements on the websites of the Municipality and JP Komunalno Neum;
- posts on social media;
- posters in the Municipality building, schools, hotels and tourist information points;
- an information leaflet for households and apartments;
- a seasonal campaign before summer.

Responsible body: Municipality of Neum.

Partners: JP Komunalno Neum, the Tourist Board, schools, hotels, ZEOS.

Deadline: continuously.

Indicative cost: 8,000–15,000 KM per year.

Indicators:

- number of announcements per year;
- number of leaflets distributed;
- number of posters installed;
- number of campaigns before and after the season;
- number of citizens and tourists reached by the campaign;
- increase in the quantities of e-waste collected after the campaign.

6.10. Measure 10: Harmonization of Local Decisions and Municipal Procedures

Description of the measure:

It is necessary to supplement local decisions, instructions and municipal procedures in order to clearly define that e-waste must not be disposed of in mixed municipal waste, next to containers or at the landfill, but exclusively through separate collection and handover to authorized operators. ^[5]



The Waste Management Plan of the Municipality of Neum has already recognized legal problems, including the need for special decisions, guidelines and the regulation of obligations in the area of waste collection and removal. ^[5]

Activities:

- a legal analysis of the existing decisions;
- preparation of amendments to the decision on communal order or special instructions on e-waste;
- defining obligations for public institutions and legal entities;
- defining the actions of the communal inspectorate in cases of improper disposal;
- adopting the document at the competent level.

Responsible body: Municipality of Neum.

Partners: the Municipal Council, JP Komunalno Neum, the communal inspectorate, the legal department.

Deadline: 2026–2027.

Indicative cost: 3,000–7,000 KM.

Indicators:

- legal analysis produced;
- amendment to the decision or instructions adopted;
- number of entities familiarized with the new rules;
- number of recorded irregularities.

6.11. Measure 11: Safe Temporary Storage and Connection with the Future Recycling Yard

Description of the measure:

Until a complete recycling yard or transfer station is established, it is necessary to provide a supervised temporary location for e-waste collected through campaigns, public institutions or larger waste generators. The location must be covered, marked, accessible to the operator and protected from unauthorized access.

This measure is aligned with the strategic project of remediating and developing Klepovica and establishing planned waste management in the Development Strategy of the Municipality of Neum. ^[7]

Activities:

- selecting a temporary location;
- procuring pallets, cages or containers for safe storage;



- marking the categories of e-waste;
- training the staff of JP Komunalno Neum;
- an agreement with the operator on take-back.

Responsible body: JP Komunalno Neum and the Municipality of Neum.

Partners: ZEOS/another authorized operator, the Environmental Protection Fund of the FBiH, HNŽ.

Deadline: 2027–2029.

Indicative cost: 30,000–80,000 KM.

Indicators:

- temporary location established;
- number of categories of e-waste that can be safely stored temporarily;
- number of staff trained to handle e-waste;
- reduced number of cases of e-waste being disposed of at the landfill.

6.12. Measure 12: Monitoring Improper Disposal and Removal of E-Waste from At-Risk Locations

Description of the measure:

It is necessary to introduce the practice of recording e-waste at illegal dumpsites, next to containers, on beaches, in the hinterland and around the landfill. E-waste found at such locations should be separated and handed over to the authorized operator.

The Development Strategy states that unsanitary and illegal dumpsites pose a direct risk to human health and can cause fires, toxic gases, unpleasant odours, dust and groundwater pollution. ^[7]

Activities:

- including e-waste in the regular rounds of the communal inspectorate;
- photographic documentation of locations;
- separate set-aside of e-waste during clean-up actions;
- informing the public about sanctions;
- an annual analysis of problematic locations.

Responsible body: Municipality of Neum – communal inspectorate.

Partners: JP Komunalno Neum, local communities, schools, NGOs, the system operator.

Deadline: continuously.

Indicative cost: 5,000–15,000 KM per year.

Indicators:



- number of locations recorded;
- number of devices removed;
- quantity of e-waste removed from the environment;
- number of inspections carried out;
- reduction in the recurrence of improper disposal.

Although the Action Plan contains 12 individual measures, for the sake of clarity they can be grouped into five priority directions of implementation: coordination, record-keeping, collection infrastructure, collection campaigns and the involvement of key sectors.



Figure 4: Summary of the key directions of implementation of the Action Plan 2026–2030.

7. Implementation Plan of the Action Plan

Cod e	Measure	Key activities	Responsib le body	Partners	Deadline	Cost	Indicators
M1	Coordination mechanism for e-waste	appoint a contact person, working group, annual plan	Municipality of Neum	JP Komunalno, ZEOS, Tourist Board	0–6 months	3,000–5,000 KM/yr	contact person, working group, 2 meetings per year
M2	Protocol with the operator	agreement, reporting, locations, take-back	Municipality of Neum	ZEOS/another operator	0–6 months	2,000–4,000 KM	protocol signed, reporting form
M3	Local record-keeping	forms, database, initial report	Municipality of Neum	JP Komunalno, hotels, institutions	0–12 months	6,000–12,000 KM	baseline report, number of entities in the database



Cod e	Measure	Key activities	Responsib le body	Partners	Deadline	Cost	Indicators
M4	Additional e-containers	selecting locations, installation, labelling	Municipality of Neum	ZEOS, JP Komunalno	2026–2028	15,000 – 35,000 KM	3–5 collection points, kg of waste collected
M5	Campaigns for large e-waste	two campaigns per year, registration, handover to operator	JP Komunalno	Municipality, ZEOS, local communities	continuous ly	10,000 – 20,000 KM/yr	two campaigns per year, kg of large e-waste
M6	Tourism sector without e-waste	guide, registration, label for facilities	Municipality of Neum	Tourist Board, hotels	2026–2030	8,000–15,000 KM/yr	number of facilities involved, kg from tourism
M7	Public institutions and schools	equipment inventory, education, school campaigns	Municipality of Neum	schools, Health Centre, ZEOS	2026–2030	5,000–10,000 KM/yr	number of workshops, number of students, kg from institutions
M8	Repair and reuse	inspection, repair, donation, recycling of the remainder	Municipality of Neum	IT services, schools, NGOs	2026–2030	10,000 – 25,000 KM/yr	number of devices repaired and donated
M9	Campaign “E-Waste Does Not Go to the Landfill”	posters, social media, leaflets, QR map	Municipality of Neum	JP Komunalno, Tourist Board	continuous ly	8,000–15,000 KM/yr	number of posts, number of leaflets, increase in quantities
M10	Local regulations	amendments to decisions, instructions, rules for legal entities	Municipality of Neum	Municipal Council, JP Komunalno	2026–2027	3,000–7,000 KM	amendments/instructions adopted
M11	Safe temporary storage	location, cages, staff training	JP Komunalno	Municipality, ZEOS, Fund	2027–2029	30,000 – 80,000 KM	location established, staff trained
M12	Monitoring improper disposal	rounds, record-keeping, removal	Municipality of Neum	JP Komunalno, NGOs, schools	continuous ly	5,000–15,000 KM/yr	number of locations, number of devices removed

Table 1: Implementation Plan of the Action Plan

8. Monitoring, Reporting and Evaluation System

8.1. Institutional Monitoring Mechanism

The implementation of the Action Plan is monitored by the Municipality of Neum, through the competent communal service and the contact person for e-waste. JP Komunalno Neum provides data on field activities, while the authorized operator provides data on the quantities taken over. ^[1]

The e-waste working group should prepare, once a year, a report that is submitted to the mayor, the Municipal Council and the relevant partners.



8.2. Key Indicators

Area	Indicator	Baseline value	Target value by 2030
Infrastructure	number of e-containers/collection points	1	at least 5
Quantities	kg of formally collected e-waste	to be determined in 2026	increase of at least 20% per year after the baseline value is established
Large e-waste	number of collection campaigns	0 or irregular	at least 2 per year
Tourism	number of tourist entities involved	0	at least 50
Public institutions	number of institutions submitting an annual equipment inventory	0	all key public institutions
Education	number of educational activities	occasional	at least 4 per year
Reuse	number of devices repaired/donated	0	at least 30 per year
Regulations	local instruction/decision on e-waste	does not exist	adopted by the end of 2027
Improper disposal	number of devices removed from at-risk locations	to be determined in 2026	annual reduction in recorded cases

Table 2: Key Indicators

8.3. Annual Reporting

The annual report should contain:

- the number and locations of e-waste collection points;
- quantities collected by category;
- the number of collection campaigns;
- the number of public institutions and economic entities involved;
- the number of educational activities;
- an overview of costs and sources of financing;
- identified problems;
- recommendations for the following year.

8.4. Evaluation and Updating of the Plan

A mid-term evaluation should be carried out in 2028. A final evaluation is carried out in 2030, with a recommendation for a new planning cycle. The Plan may be updated earlier if changes occur in regulations, the availability of financing, infrastructure or the obligations of the system operators.



Figure 5. Overview of the monitoring of the implementation of the Action Plan and the key indicators up to 2030

9. Financial Framework and Sources of Financing

The indicative total cost of implementing the Action Plan for the period 2026–2030 is estimated at **250,000–500,000 KM**, depending on how much of the infrastructure is financed by the system operators, the Environmental Protection Fund of the FBiH, EU projects or other donors. ^[7]

Potential sources of financing

- the budget of the Municipality of Neum;
- JP Komunalno Neum, in respect of operational activities;
- authorized e-waste system operators;
- the Environmental Protection Fund of the FBiH;
- the Ministry of Trade, Tourism and Environmental Protection of HNŽ;
- EU programmes, including Interreg and cross-border cooperation;
- contributions from the tourism sector through voluntary programmes and campaigns;
- donor funds and partnerships with the private sector.



10. Conclusion

The Action Plan for the prevention and management of electronic waste in the Municipality of Neum represents a practical local instrument for implementing the objectives of the eWAsTER project and the Local Action Plan for BiH. Its value lies in the fact that it translates the general recommendations into a concrete coastal and tourist area, where improper disposal of e-waste can have consequences for the soil, groundwater, the sea, public health and the tourist image. ^[1, 2]

Neum already has the initial elements of a system: a communal enterprise, an e-container, experience in the eWAsTER project, the interest of the local administration and a strategic framework that recognizes the need for planned waste management. However, for the system to be functional, it must be expanded, formalized and measured. ^[7, 12, 13]

The priorities for the coming period are: establishing coordination, signing a protocol with the operator, recording quantities, expanding the network of collection points, regular campaigns for large e-waste, involving the tourism sector, strengthening public awareness and preventing the disposal of e-waste at the Klepovica landfill.

With this Action Plan, the Municipality of Neum can become an exemplary model of a small coastal municipality that connects the protection of the sea, sustainable tourism, the circular economy and the responsible management of special categories of waste.



11. Sources and Literature

The documents and online sources used for developing the Action Plan and for the references included in the text are listed below.

- [1] LOCAL ACTION PLAN. BOSNIA AND HERZEGOVINA, eWAsTER Project, Version 2, Association LINK Entrepreneurial Center, June 2025.
- [2] Interreg Euro-MED eWAsTER Project, official project website: <https://ewaster.interreg-euro-med.eu/>
- [3] Interreg Euro-MED eWAsTER, "The Municipality of Neum held a workshop at the Neum High School", 13.02.2025: <https://ewaster.interreg-euro-med.eu/2025/02/13/the-municipality-of-neum-held-a-workshop-at-the-neum-high-school/>
- [4] Interreg Euro-MED eWAsTER, "Validation Workshop #4 Highlights – Neum, BiH", 26.09.2025: <https://ewaster.interreg-euro-med.eu/2025/09/26/validation-workshop-4-highlights-neum-bih/>
- [5] Waste Management Plan for the period 2021 to 2025 – Municipality of Neum, ZGI d.o.o. Mostar, October/November 2020.
- [6] Waste Management Plan of the Herzegovina-Neretva Canton 2025–2030, Draft Plan, Ministry of Trade, Tourism and Environmental Protection of HNŽ, 2025.
- [7] Development Strategy of the Municipality of Neum for the period 2023–2030, Municipality of Neum, November 2023.
- [8] ZEOS eko-sistem, "Groups of E-Waste": <https://www.zeos.ba/bs/14/pages/6/grupe-e-otpada>
- [9] ZEOS eko-sistem, "Important Information on E-Waste": <https://zeos.ba/bs/5/news/631/vazne-informacije-o-e-otpadu>
- [10] ZEOS eko-sistem, "Hand Over E-Waste": <https://www.zeos.ba/bs/19/pages/11/predaj-e-otpad>
- [11] ZEOS eko-sistem, "E-Waste Management": <https://www.zeos.ba/bs/36/pages/9/upravljanje-e-otpadom>
- [12] Municipality of Neum, "PHOTO | The first e-container for electrical and electronic waste installed in Neum": <https://neum.ba/foto-u-neumu-postavljen-prvi-e-kontejner-za-elektricni-i-elektronski-otpad/>
- [13] J.P. Komunalno Neum d.o.o., "About Us": <https://komunalno-neum.com/wp/o-nama/>
- [14] Akta.ba, "Neum collects old computers and printers to help schools and reduce waste", 07.05.2026: <https://www.akta.ba/vijesti/bih/204286/neum-prikuplja-stare-racunare-i-printere-za-pomoc-skolama-i-smanjenje-otpada>
- [15] ZEOS eko-sistem, "E-Waste Containers Emptied in Municipalities in the FBiH", 25.12.2025: <https://www.zeos.ba/bs/5/news/779/ispraznjeni-kontejneri-za-e-otpad-u-opcinama-u-fbih>
- [16] Municipality of Neum, "The 4th eWAsTER validation workshop held in Neum": <https://neum.ba/u-neumu-odrzana-4-ewaster-radionica-validacije/>