LOCAL ACTION PLAN. BULGARIA

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LOCAL ACTION PLAN

BULGARIA

eWaster Project | Preventing e-waste from polluting MED waster by turning waste into a resource.

Version 1

Date: 2025-02

Contents

1. EXECUTIVE SUMMARY

The proliferation of electronic devices in our daily lives has led to a pressing issue: electronic waste, commonly known as e-waste. As these devices reach the end of their lifecycle, managing them responsibly and sustainably becomes increasingly important. Addressing this challenge head-on is the eWasTER project, a collaborative initiative funded by the Interreg Euro-Med program.

Spanning eight European regions, eWasTER aims to bridge the gap between existing regional and local policies and the goals outlined in the EU's Circular Economy Action Plan. This ambitious plan seeks to transition from the conventional "take, make, dispose" model to a more sustainable approach where resources are utilized for as long as possible. eWasTER directly contributes to this objective by focusing on enhancing the entire e-waste management process.

Beyond ensuring compliance with legislation, eWasTER fosters a collaborative environment among participating regions, facilitating the exchange of best practices and shared learning. Through knowledge transfer, information sharing, and joint policy development, the project enables regions to tailor effective solutions to their unique circumstances. This collaborative approach not only ensures diverse geographical impact but also strengthens the capacity of individual regions, creating a ripple effect that can advance circular e-waste management practices across the EU.

By involving partners like UBBSLA, from Bulgaria, which actively contributes to develop the method of reuse and repair, the eWasTER project not only addresses policy gaps and promotes best practices but also practically realizes the goals of the circular economy. In Bulgaria, the implementation of this plan, supported by key actors like UBBSLA, will be especially important for aligning with legislation and circular economy goals while contributing to environmental protection and sustainable development.

2. ABBREVIATIONS

AP	Action Plan
BP	Best Practices
CPU	Central Processing Unit
CWC	Chemical Weapons Convention
EC	European Commission
EEA	Environmental Executive Agency
EEE	Electrical and Electronic Equipment
EP	European Parliament
EPR	Extended Producer Responsibility
ERDF	European Regional Development Fund
EU	European Union
E-waste	Electronic waste
HS	Harmonized System
KPI	Key Performance Indicator
LAP	Local Action Plan
LoW	European List of Wastes
MBT	Mechanical-Biological Treatment
OECD	Organization for Economic Co-operation and Development
OECD	Organization for Economic Co-operation and Development
POM	Put on Market
PRO	Producer Responsibility Organization
RDF	Refuse-derived Fuel
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 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

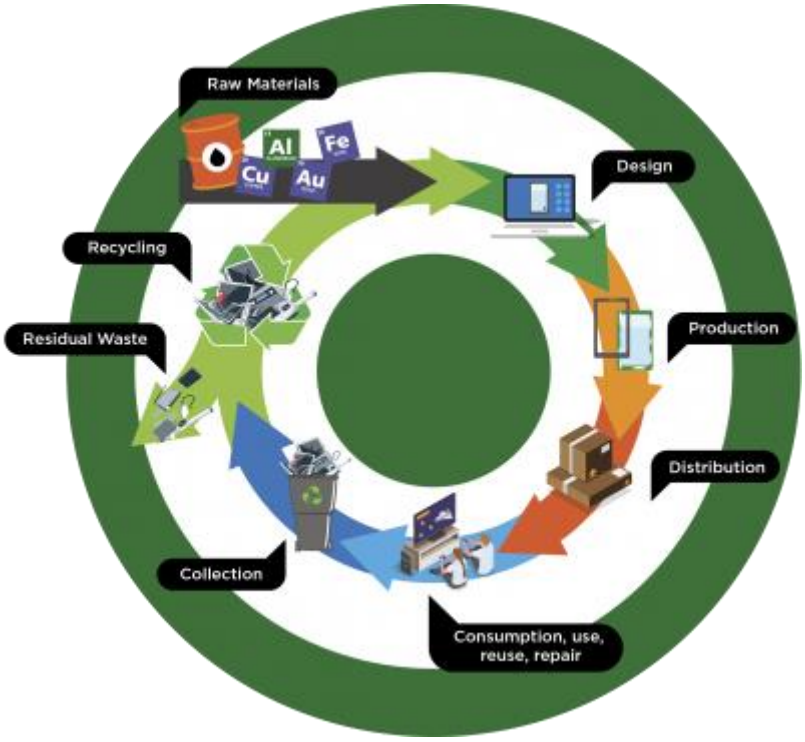
4.1. Introduction to WEEE challenge

Electrical and electronical 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 c-funded by the European Union (Interreg Euro-Med project) consisting of 10 partners from 8 European countries namely:

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

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

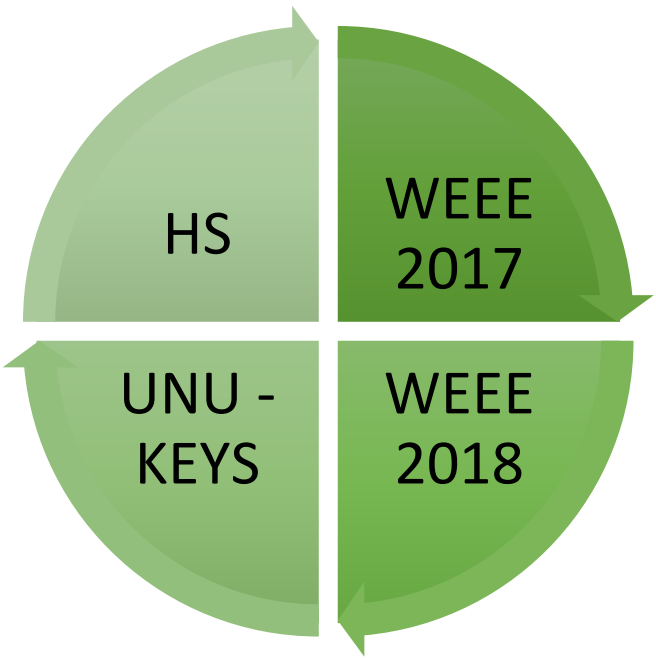
- WP1: To create local and regional Action Plans for e-waste prevention and management, based on the project self-assessment tools and the project "Methodology for designing Strategies for Mediterranean e-waste prevention and management"
- WP2: To demonstrate and test the feasibility and effectiveness 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 underlined 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, may potential options be 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

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 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.

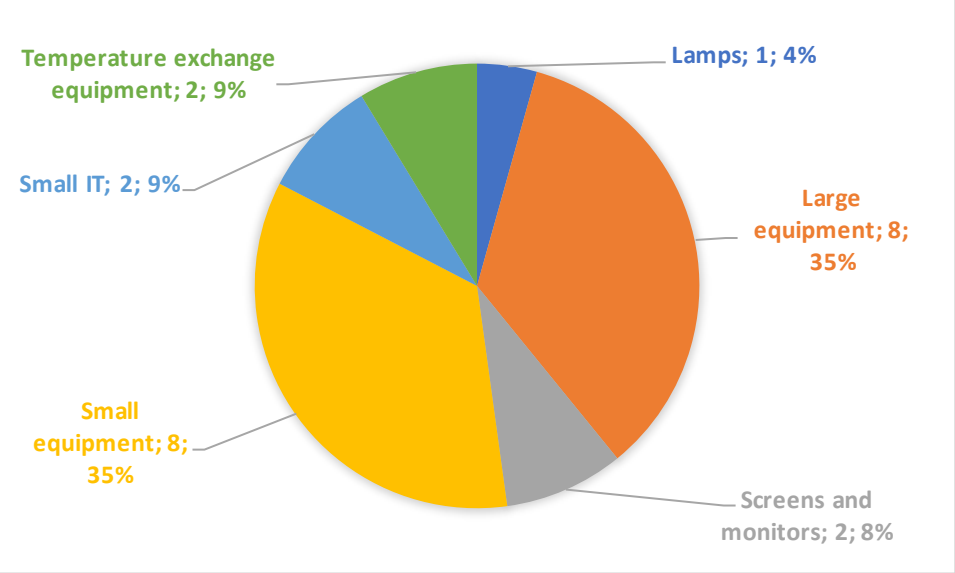
EEE CATEGORY UNDER EU-6 (2018)	**EEE CATEGORY UNDER EU-10 (2017)**
Lamps	Lighting equipment
Large equipment	Large household appliances
Large equipment	Consumer equipment
Large equipment	IT and telecommunications equipment
Large equipment	Electrical and electronic tools
Large equipment	Toys
Large equipment	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	Acount 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

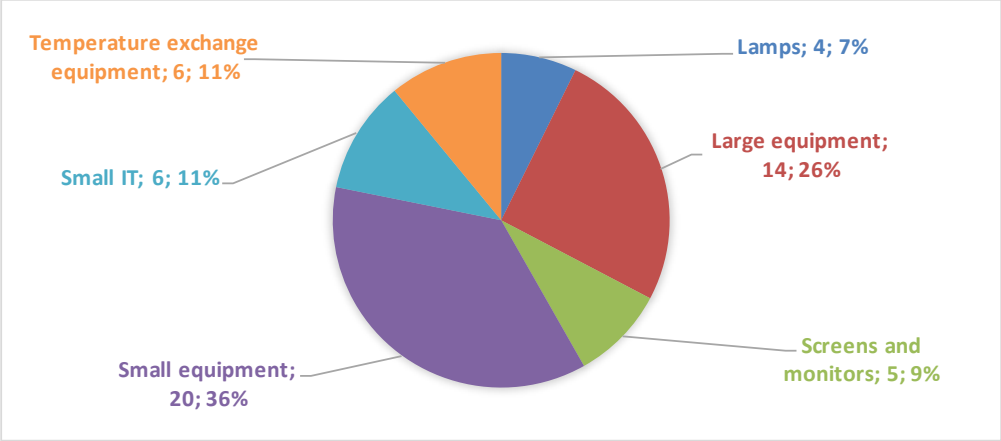
Classification of e-waste under the Basel Convention

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.

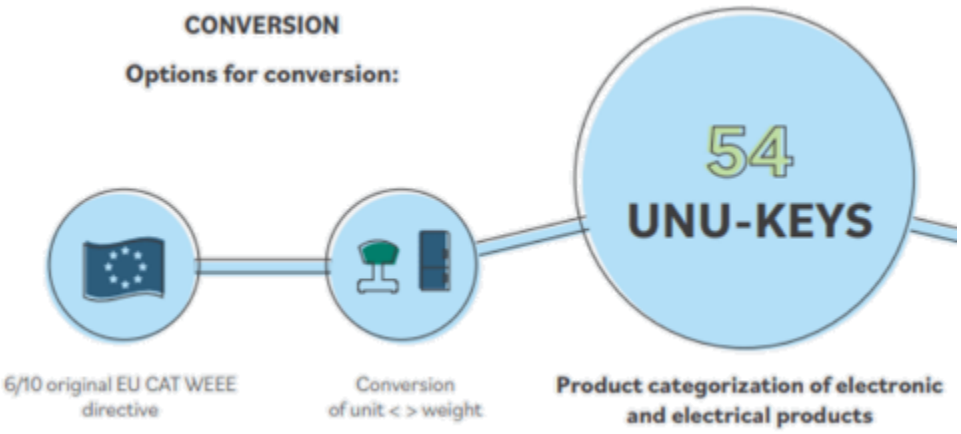
UNU-KEYS

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



EEE category under EU-6. Source: Own



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.

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 logics.
- 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.

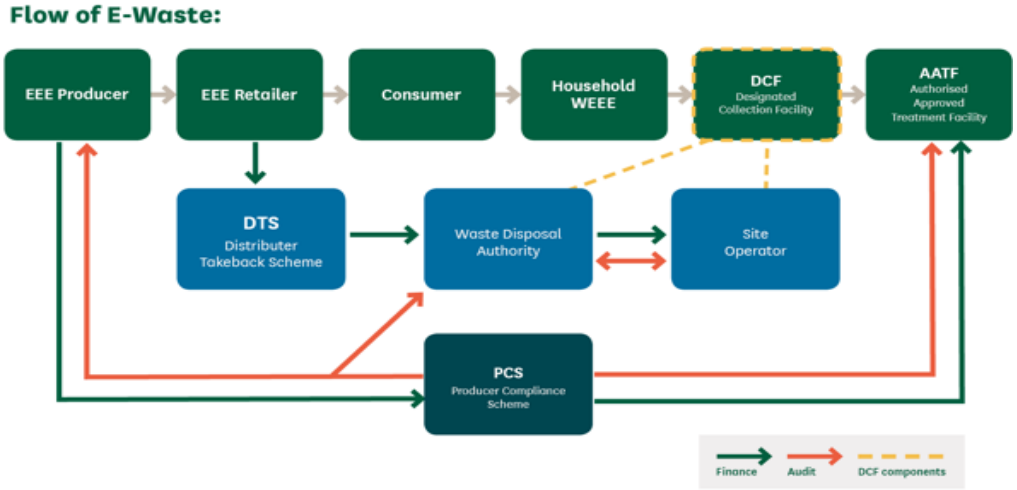
Enforcement bodies are to set up national targeted inspections and measures for:

- 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 or 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.



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.

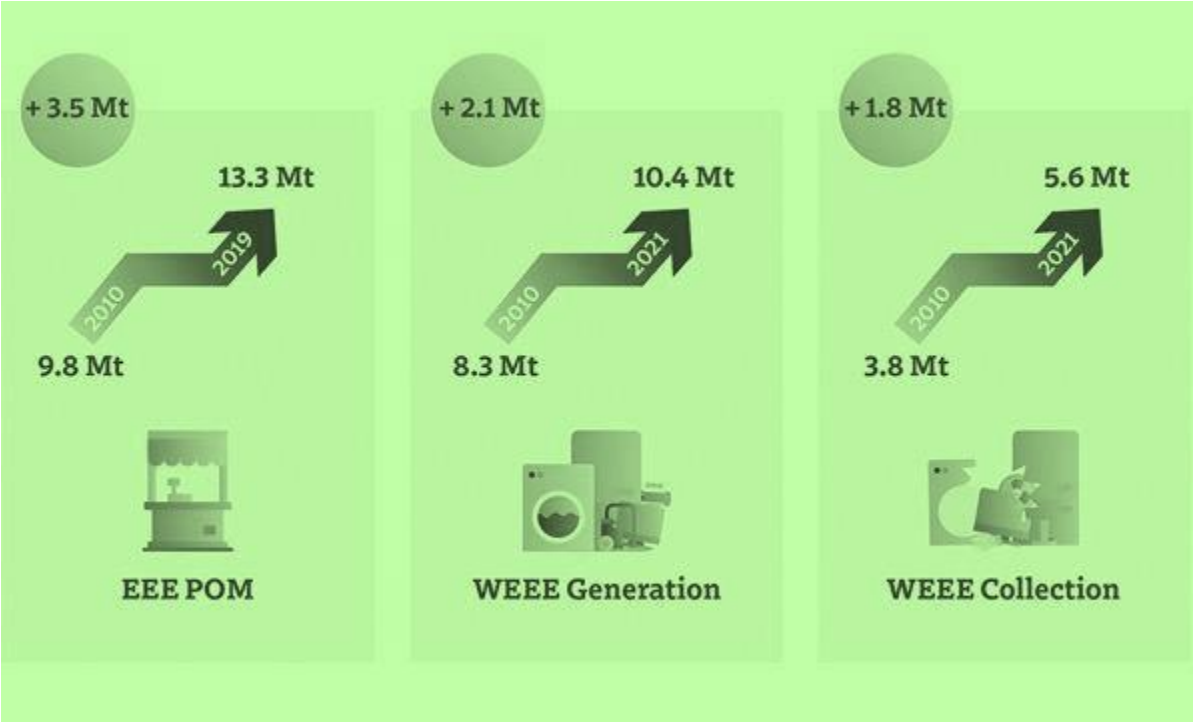
Integration with Policy Frameworks: Standard monitoring systems are often integrated into broader policy frameworks, such as Extended Producer Responsibility (EPR) programs, to ensure alignment with regulatory requirements.

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.

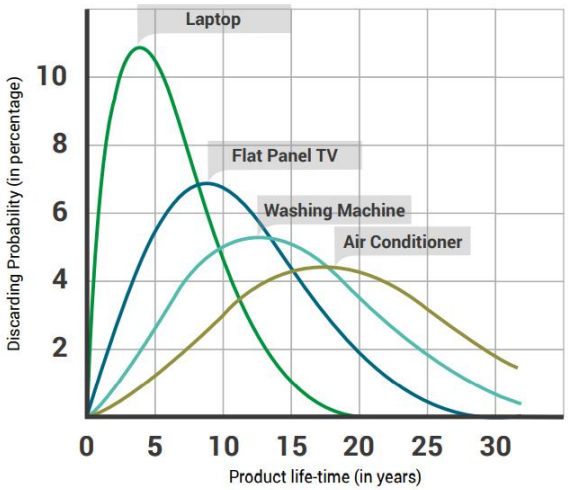
Regulations and directives often govern the responsibilities of manufacturers, distributors, and consumers regarding e-waste management from the point of "putting on the market" to the eventual disposal or recycling of these devices. This includes obligations for proper disposal, recycling, and handling 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.

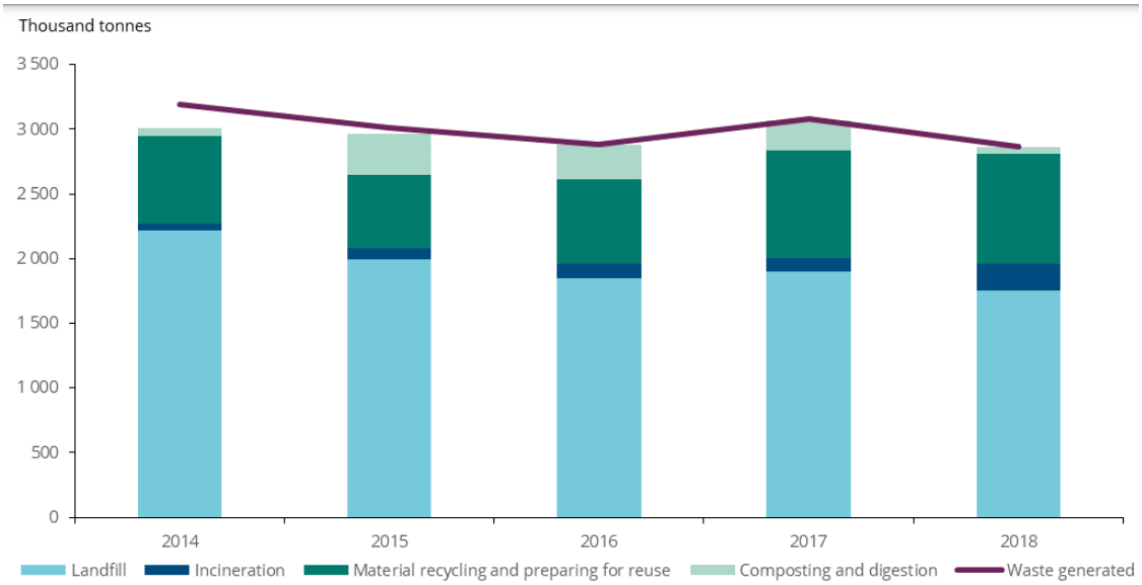
9. THE AREA UNDER ANALYSIS

9.1. WEEE CONTEXT IN THE AREA UNDER ANALYSIS

Waste generation in Bulgaria has decreased between 2014 and 2018 (latest available data). In 2018 the country generated 2.86 million tonnes of municipal waste. This corresponds to 407 kg/cap in 2018, which is below the EU average of 496 kg/cap in the same year. This implies a decrease from 442 kg/cap in 2014. The country still has a high level of landfilling, however, the amount of municipal waste sent to landfill decreased from 69 % in 2014 to 61 % in 2018 of the amounts generated. Recently, Bulgaria invested in Mechanical-Biological Treatment (MBT) plants with an installed annual capacity of 1.189.678 tonnes in 2020. This corresponds to around 42 % of the generated municipal waste in 2018.

Bulgaria has managed to increase recycling rates over the past years, diverting today just under a third of the municipal solid waste (MSW) generated to recycling (material recycling and composting/digestion).

There are no dedicated waste incineration plants in Bulgaria. However, three cement plants and one thermal power plant have permits to incinerate waste, with a total annual capacity of nearly 500 thousand tonnes, both for refuse-derived fuel (RDF) from domestic sources and imported RDF. This results in a small share of 7 % of municipal waste (output from MBT treatment) being incinerated in 2018, an increase compared to 2 % in 2014. However, due to the recently installed MBT capacity, it can be expected that the share of incineration (MBT outputs incinerated in coincineration plants) will increase at the expense of landfilled waste.



Municipal waste generation and treatment in Bulgaria between 2014 and 2018, in thousand tonnes (Source: Eurostat)

Positive aspects of Bulgarian performance include the following:

- Bulgaria has adopted EPR policies to ensure producers take responsibility for the end-of-life phase of their products, which has contributed to some progress in WEEE management.
- Bulgaria has invested in waste treatment plants, including MBT facilities, which are essential for managing waste and increasing recycling rates.
- Bulgaria is working towards EU-mandated targets for recycling WEEE and packaging waste. Specific measures to meet these targets include improvements in collection systems and increased investment in processing facilities.
- Recent efforts have been made to enhance separate collection systems for municipal and packaging waste, which positively impacts the overall circular economy and WEEE management.
- Bulgaria benefits from EU funding for circular economy initiatives, which helps in improving infrastructure and WEEE management processes.

Potential Issues includes the following:

- Bulgaria has lower collection rates for WEEE compared to the EU average. Despite improvements, the country struggles to meet EU collection targets for electrical and electronic waste
- Despite a decrease, a significant portion of waste still goes to landfill, limiting the potential for resource recovery and circular economy initiatives.
- Although EPR is in place, there are concerns about the effectiveness of its implementation. Coordination between producers, municipalities, and recyclers needs improvement.
- There is a need for more consumer education on the importance of properly disposing of e-waste to increase WEEE collection rates

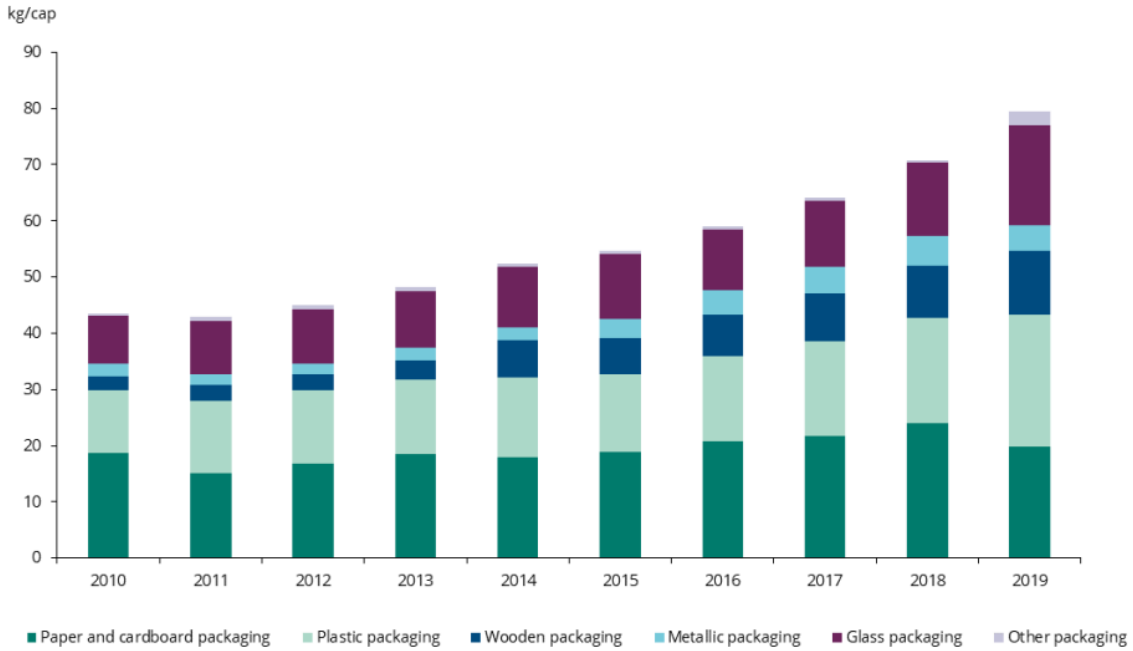
- Bulgaria faces issues with tracking and reporting accurate data on WEEE flows, hindering effective policy-making and monitoring of progress towards circular economy goals

Bulgaria intends to make the following new investments:

- Bulgaria is set to receive significant investments through EU Recovery Funds aimed at improving waste management, including WEEE collection and recycling.
- There are plans to invest further in modernizing waste treatment infrastructure, such as MBT plants, to increase the capacity for recycling and reduce reliance on landfills.
- Initiatives are underway to foster cooperation between the public sector, private companies, and NGOs to enhance the efficiency of waste collection and recycling programs.
- Future improvements will focus on creating a more circular economy by reducing waste generation, increasing recycling rates, and promoting sustainable business practices related to electronic equipment

9.2. SITUATION OF THE WEEE POLICY

In Bulgaria, 554 490 tonnes (79.5 kg/cap) of packaging waste were generated in 2019, which is well below the EU average of 177 kg/cap. Packaging waste generation continuously increased since 2010 for all types of packaging.



Packaging waste generation in Bulgaria between 2010 and 2019, in kg per capita (Source: Eurostat)

The per capita amount of packaging placed on the market is the second lowest of all EU Member States, and analysis done in 2018 suggests that the total quantity of packaging reported as being placed on the market may be underestimated. The analysis estimated the amount of packaging within MSW based on composition of MSW and assumptions on the share of packaging in each material 6 within MSW, and compared it with reported packaging placed on the market. However, after this analysis was done, Bulgaria introduced the requirement for annual third-party

auditing by financial auditors of the Producer Responsibility Organisations (PROs) of the data of packaging placed on the market and packaging waste managed. Since the auditing was introduced, the reported packaging placed on the market increased by 40 000 tonnes.

The capture rate is a good performance indicator of the effectiveness of the separate collection system. The capture rate is calculated by dividing the separately collected weight of a certain material for recycling by the weight of the material in total municipal waste.

	Residual waste composition (%)([b])	Residual waste composition (tonnes)([a])	Separately collected amounts (tonnes) ([b])	Materials in total MSW (tonnes)	Capture rates (%)
Reference year	2019	2018	2018		
Mixed municipal waste, total		2 306 191			
Paper and cardboard	8 %	184 495	106 912	291 407	37 %
Metals	2 %	46 124	30 302	76 426	40 %
Glass	4 %	92 248	70 569	162 817	43 %
Plastic	11 %	253 681	77 718	331 399	23 %
Bio-waste	25 %	576 548	202 775	779 323	26 %
Textiles	5 %	69 186	-	69 186	-
Wood	2 %	46 124	13 819	59 943	23 %

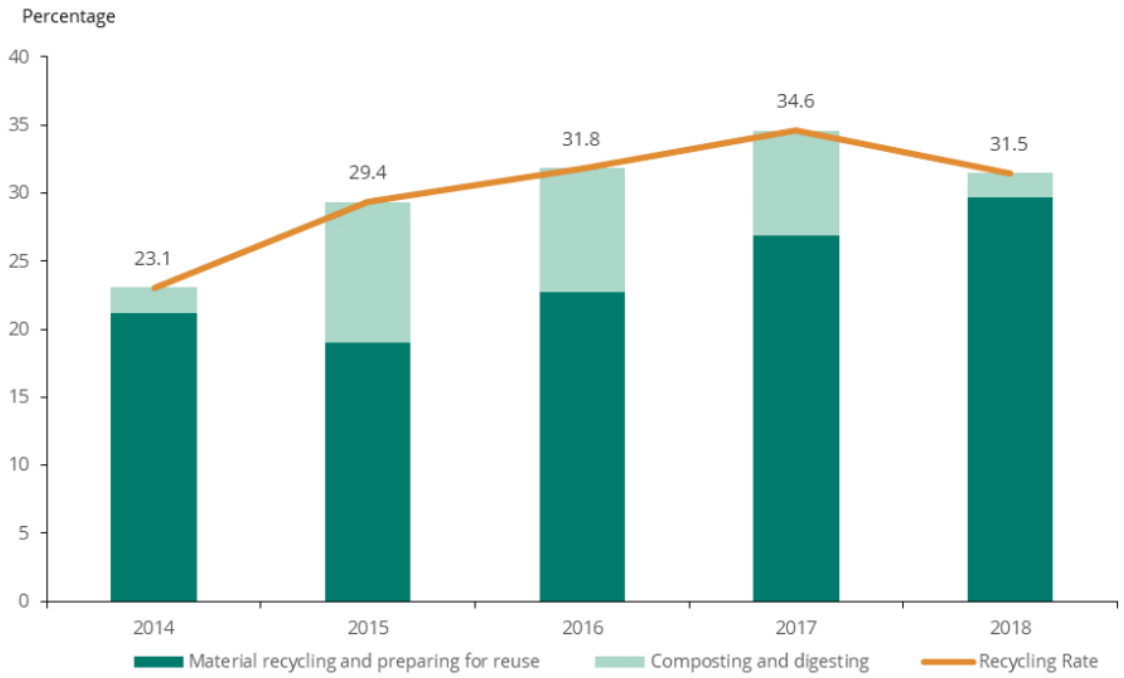
([a]) Note: Share of material in residual waste (household waste only) multiplied with the amount of residual waste in 2018 as reported in the questionnaire by MOEW (2019)

Capture rates for different waste fractions in Bulgaria (Source: EEA-ETC/WMGE questionnaire by MOEW (2019), and ExEA and MOEW (2021))

The calculated capture rates indicate that there is room for improvement to capture higher amounts of all materials. The highest capture rates are achieved for glass and metals, which is probably due to the involvement of informal waste pickersin the collection and the comparatively high value of metals waste. However, the waste composition data used for the calculation of the capture rates include a fine fraction accounting for 28 % of the waste, which most likely includes small-sized paper, metals, glass, plastic, textiles and wood materials, and especially bio-waste. Therefore, the calculated capture rates as shown in Table above are probably overestimated.

The overall recycling rate of Bulgaria increased from 23 % in 2014 to 35 % in 2017 and decreased again down to 31 % in 2018. The decline in 2018 is due to a lower composting rate.

In this analysis the recycling rate is calculated by dividing the summed amounts of recycling of materials and of composting and digestion by the total generated amounts. The data source used is the Eurostat data set Municipal waste by waste management operations [env_wasmun] (following the OECD/Eurostat Joint Questionnaire); Data reported by Member States according to Article 10.2(a) of the Waste Framework Directive are not used for this assessment as the reporting methods differ by Member States, resulting in a lack of comparability between Member States. The data source used here is assumed to be the best available proxy, given that data in accordance with the rules on the calculation of the attainment of the targets defined in Article 11a are not yet available.



Recycling rate in Bulgaria between 2014 and 2018, in percentage (Source: Eurostat)

The actual distance to the target for the most recent data point is a key factor determining the likelihood of meeting/not meeting the target. The closer the Member State is to the target already, the more likely that the target will be met. For Bulgaria, in 2018, 29.7 % of the materials were reported to be recycled and 1.8 % went to composting and digesting, resulting in a total recycling rate of 31.5 %, 23.5 percentage points below the 2025 target of 55 %.

However, the data used for this analysis are based on a different methodology than the calculation rules for the target. The actual impact of the application of the new calculation rules to the recycling rate has not been quantified yet in Bulgaria. According to the Bulgarian authorities, with the new calculation method, the recycling rate for municipal waste is expected to change with the application of new calculation method. A few Member States have provided quantified estimates indicating how the application of the new reporting rules would influence the recycling rate (compared to the data reported to Eurostat under the Joint Eurostat/OECD questionnaire), resulting in reductions between 3.8 and 13 percentage points, and on average 5.5-6.7 percentage points. While the effect depends on how Bulgaria currently reports the data, an effect of a reduction with 5 percentage points is therefore assumed for this assessment, bringing the recycling rate down to 26.5 %. However, this assumption will not result in a change of the assessment for this SRF.

Summary result

Distance to target > 15 percentage points	Based on the currently available data, Bulgaria's recycling rate was 31.5 % in 2018, which is 23.5 percentage points below the 2025 targets. Considering however the impact of the new calculation rules, we assume a reduction with 5 percentage points for this assessment, resulting in an estimated recycling rate of 26.5 %, 28.5 percentage points below the target.
Robustness of the underlying information	The currently available data do not yet reflect the calculation rules applicable to the target. Bulgaria has not yet quantified the influence of the new calculation rules on the recycling rate. However, also a recycling rate which would be 5 percentage points below the currently reported, would not change the assessment for this SRF.

The recycling rate in the five-year period from 2014 to 2018 increased with 8 percentage points, from 23.1 % to 31.5 %. This indicates that previous efforts made over the last years to increase recycling in Bulgaria. The highest increase of the recycling rate took place in 2015, with an increase by 6.3 percentage points. In Bulgaria, this increase is mainly due to a significant rise in the composting and digestion of bio-waste between 2014 and 2015, from 2 % to 10 %. In the following years the recycling rate kept growing but at a slower pace. However, this rise might not relate to household waste, but to waste from businesses, parks, gardens and markets. The reported quantities of composted waste refer to the quantities of separately collected waste entering the composting plants. The recycling of materials between 2015 and 2018 increased steadily from 19 % to 28 %. On average, the increase over the past five years amounted to 2.1 percentage points annually.

The Bulgarian authorities reported the rise in recycled metal to be due to a real increase in recycled volumes as some of the biggest recycling companies increased the recycled amounts in 2017 thanks to the larger amount of collected waste.

9.2.1. Legal Framework in Bulgaria

- Waste Management Act, amended by the Law for amendment and supplement of the Waste Management Act (State Journal 19/05.03.2021).
- Ordinance on packaging and packaging waste.
- Ordinance on separate collection of biowaste and treatment of biodegradable waste.

The Ordinance on packaging and packaging waste and the Ordinance on separate collection of biowaste and treatment of biodegradable waste have recently been amended by Decree № 420 of 31 December 2020 amending and supplementing normative acts of the Council of Ministers.

The Bulgarian Waste Management Act, first adopted in 2003 and revised in 2012 and 2021 sets the responsibilities and the obligations between the state and local authorities regarding the organisation of waste management in Bulgaria. According to the Act, municipalities have an obligation to collect paper and cardboard waste, metal waste, plastic waste and glass waste separately. The Act also defines penalties for mayors of the municipalities that do not meet the requirements of the law.

Most requirements of the WFD are transposed, except for Article 22 Member States shall take measures, as appropriate (...) to encourage: a) the separate collection of biowaste with a view to the composting and digestion of bio-waste deviated since the collection of bio-waste did not refer to household waste in Bulgaria. However, the separate collection of bio-waste from households was set in the National Strategic Plan 2010-2020, aiming for the gradual reduction of the amount of biodegradable waste going into landfill (ExEA and MOEW, 2021).

Timely transposition of the revised Waste Framework Directive into national law

Timely transposition of the Waste Framework Directive as amended by Directive 2018/851, into national law within the foreseen period is key for a waste management system in line with EU requirements.

Bulgaria has transposed the amended Waste Framework Directive into national law on 4 March 2021 with a delay of less than 12 months after the deadline of 5 July 2020.

Responsibilities for meeting the targets, and support and enforcement mechanisms, e.g. tools, fines etc.

Clearly defined responsibilities, enforcement and support mechanisms for meeting the targets across different entities and governance levels are important for achieving high recycling rates. The clearer the responsibilities for meeting the target and the accountability for failing the targets are, the higher the chance that the targets will be met.

The Ministry of Environment and Water (MOEW) is responsible for developing and implementing national waste management policy, including drafting and enforcement of legislation, strategies and programmes, as well as regulation of activities in the public and private sectors. The Ministry performs some of these activities through its Executive Environment Agency (ExEA) and a network of regional competent authorities – the Regional Inspectorates of Environment and Water (RIEW), which control the implementation of waste management legislation.

The national recycling targets for municipal waste are set in the Bulgarian Waste Management Act (Art 31). These targets can be achieved individually by the municipalities or at a regional level through Regional Waste Management Associations. The targets setting process at the regional level is defined in decisions taken during the general meetings of each of the Waste Management Associations.

Waste organisation and treatment within the territory of municipalities is the responsibility of municipal mayors, who usually contract it through public procurement. Municipalities in Bulgaria that build or use a joint regional landfill or treatment facility establish regional associations as legal entities, or enter into regional agreements. Local authorities are responsible for drafting municipal waste 10 management programmes. There are regional waste management associations but no plans/programmes on the regional level.

According to the Waste Management Act, municipalities have an obligation to collect paper and cardboard waste, metal waste, plastic waste and glass waste separately (Republic of Bulgaria, 2003). According to the recent revision of the Act, municipalities are also obliged to organise separate collection of bio-waste (Art. 19). Guidance for municipalities on how to organise the separate collection is defined in the 2014-2020 Waste management plan.

The Bulgarian Waste Management Act stipulates 'administrative violations and sanctions. But the sanctions that apply to failure to implement a range of actions for which mayors/municipalities have responsibility are considered too soft. For some actions these fines are lower than the costs incurred to achieve the desired outcomes. According to the Waste Management Act (Art. 151), the fines that can be levied range from BGN 3 000 (EUR 1 500) to BGN 10 000 (EUR 5 000), in case of, inter alia, failure to prevent the disposal of waste in unauthorized places, the creation of illegal landfills or lack of cleaning up, as well as lack of measures to implement separate collection. The fines have remained unchanged at low levels also in the revised Waste Management Act. The fines can be imposed only to individuals, the mayors or other officials for instance, but not to entire municipalities.

The main mechanism giving incentives for municipalities to work towards these targets is a reduction in the landfill tax for municipalities which meet the targets. When a municipality fulfils the goals set under Art. 31 of the Waste Management Act the landfill tax is reduced by 50 %. The purpose of the deductions as an economic instrument is to stimulate the municipalities to reduce the quantities of landfilled

waste aimed at increasing the amount of recycled and recovered waste, and to accumulate funds for the construction of infrastructure for waste treatment.

9.2.2. Waste Management Plan(s)

The Bulgarian National Waste Management Programme (NWMP) covering 2003–2007 introduced the waste management hierarchy as well as the proximity, producer-responsibility and polluter-pays principles. The NWMP for 2009–2013 put particular focus on waste prevention and minimisation, increased recycling and recovery rates, improving source separation, collection and transportation, improving data quality, and strengthening of administrative capacity and public participation, amongst other things. One of the key targets of the NWMP 2014–2020 was on biodegradable waste, namely the planned construction of composting and anaerobic digestion plants with a total annual capacity of 654 thousand tonnes. The NWMP 2014 – 2020 also defines a target of 50 % recycling of at least four material streams, with additional streams being chosen by municipalities.

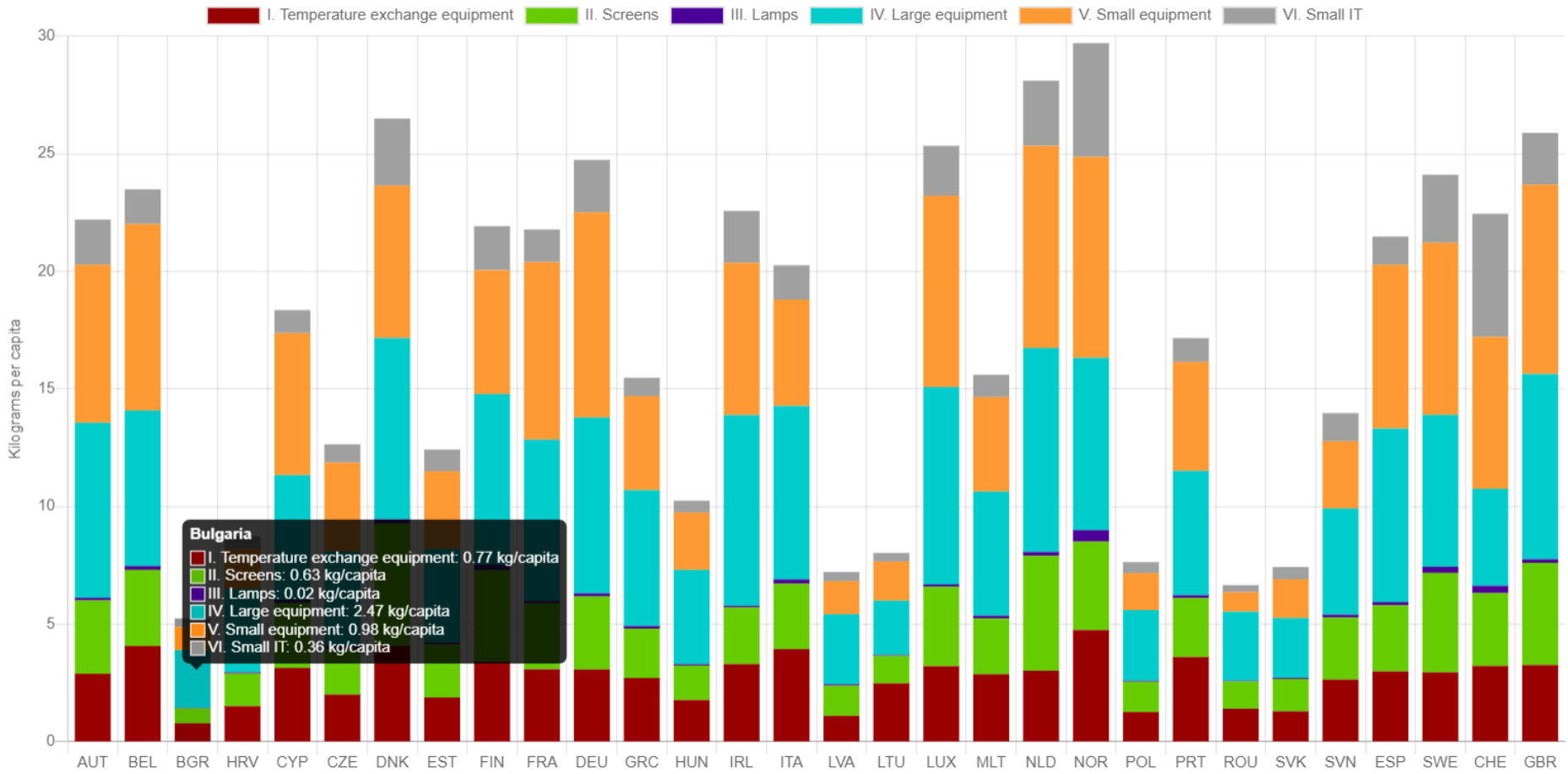
The National Waste Management Plan (NWMP) 2021-2028 (НАЦИОНАЛЕН ПЛАН ЗА УПРАВЛЕНИЕ НА ОТПАДЪЦИТЕ 2021-2028 Г) was adopted with the Decision 459 /17 June 2021 of the Council of Ministers of the Republic of Bulgaria. The NWMP and the National Waste Prevention Program (NWPP), as an integral part of it, refer to the entire territory of the Republic of Bulgaria. It builds on the key principles of prevention, extended producer responsibility, polluter pays, proximity and self-sufficiency, and public participation (Ministry of Environment and Water, 2021). The NWMP provides a framework for local authorities in developing waste management policy at regional and local level. The NWMP requires local authorities to develop municipal programs in accordance with the structure, objectives and provisions of the NWMP and encourages municipalities to develop regional waste management plans within the territorial scope of regional waste management.

According to the Bulgarian waste management act (WMA) adopted in 2012, the national WMP and the NWPP have to be evaluated at least every six years and to be updated when necessary. 5 The NWMP covers all waste streams with dedicated chapters on targeted waste streams. As regards collection of municipal waste, municipalities are responsible for the collection of waste on their territory. From 1999 to 2018 the share of the population covered by the systems for organised waste collection and transportation of household waste increased from 77.6 % to 99.8 %. The NWMP includes an action plan to improve the separate collection of packaging waste. Responsible for the implementation are the packaging waste recovery organizations, the Ministry of Environment and Water, the Regional Inspectorate of Environment and Wate and the municipalities.

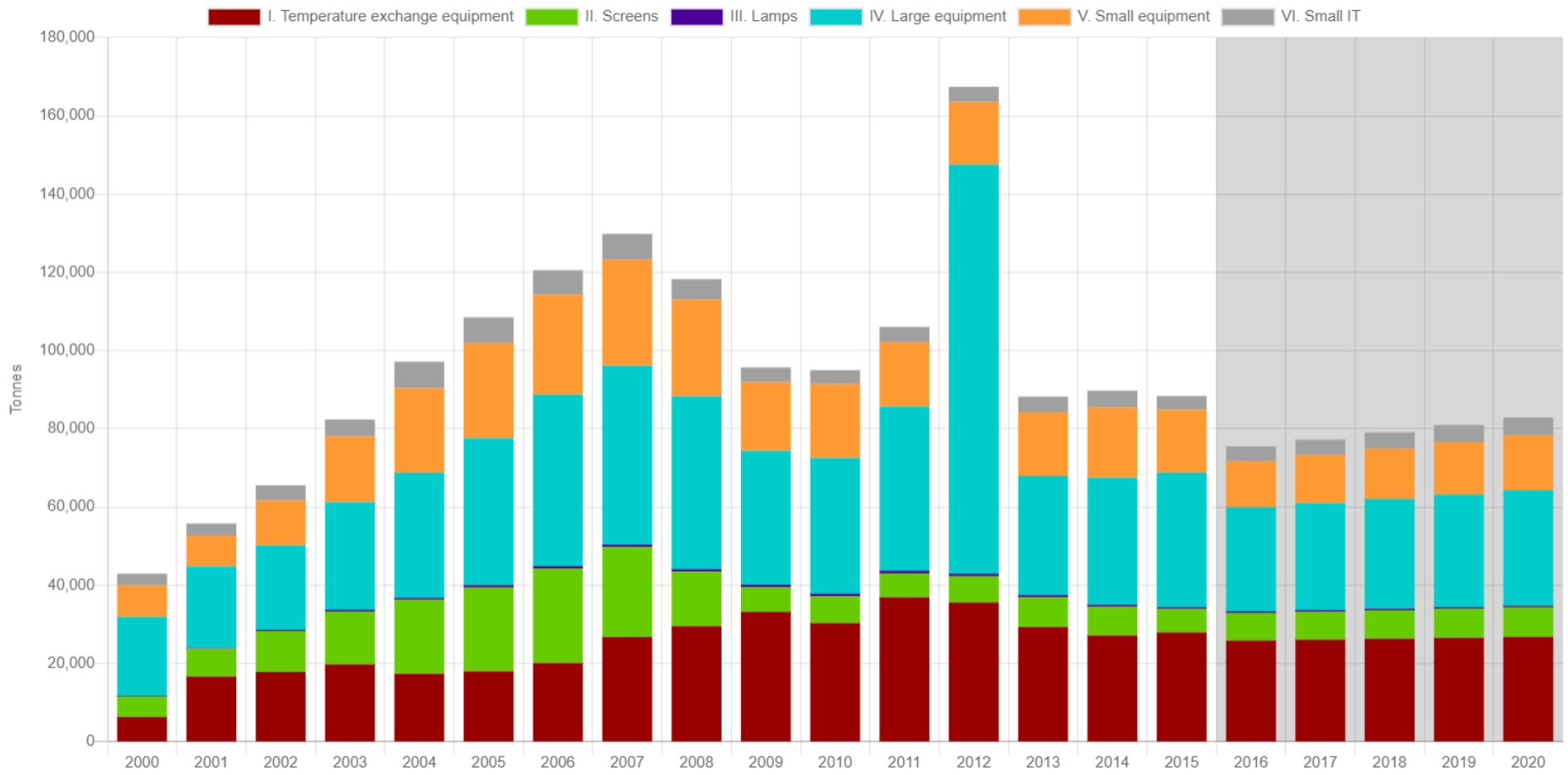
Implementation of previous early warning recommendations

Bulgaria had been considered of being at risk of missing the 2020 target of 50 % preparation for reuse / recycling for municipal waste by the European Commission, and it received a set of policy recommendations.

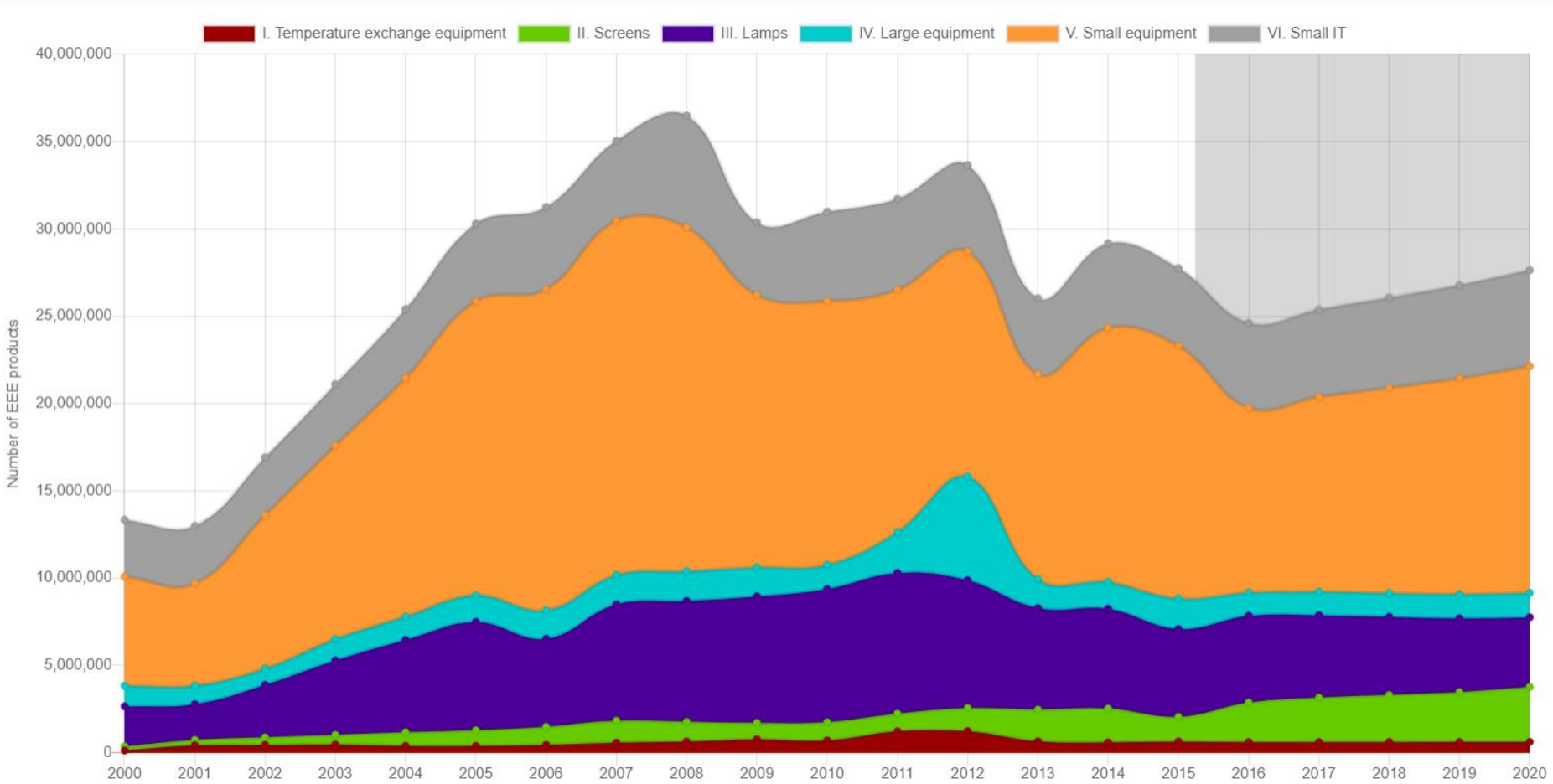
9.2.3. Rates and figures related to the country and region



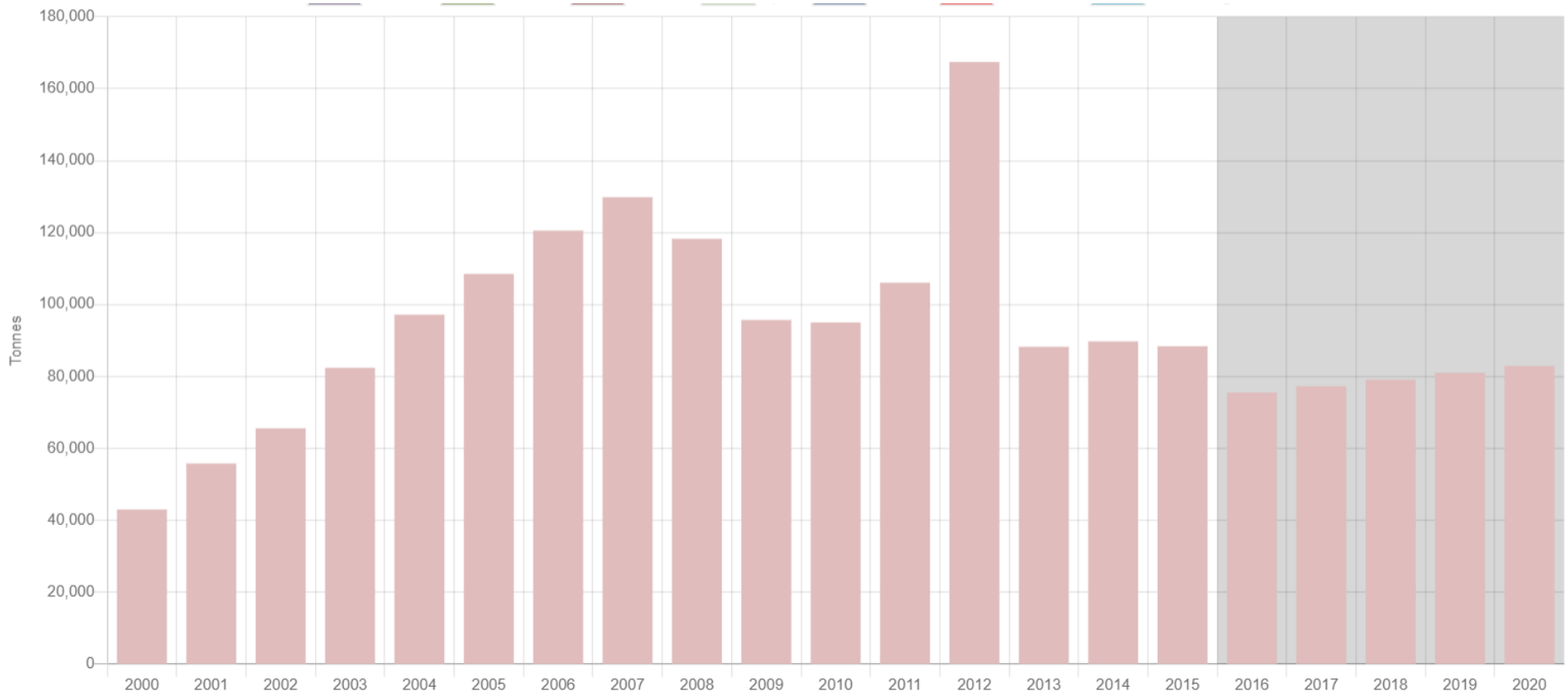
Weight per capita of EEE - Placed on the Market in 2020. Source: Urban Mine Platform



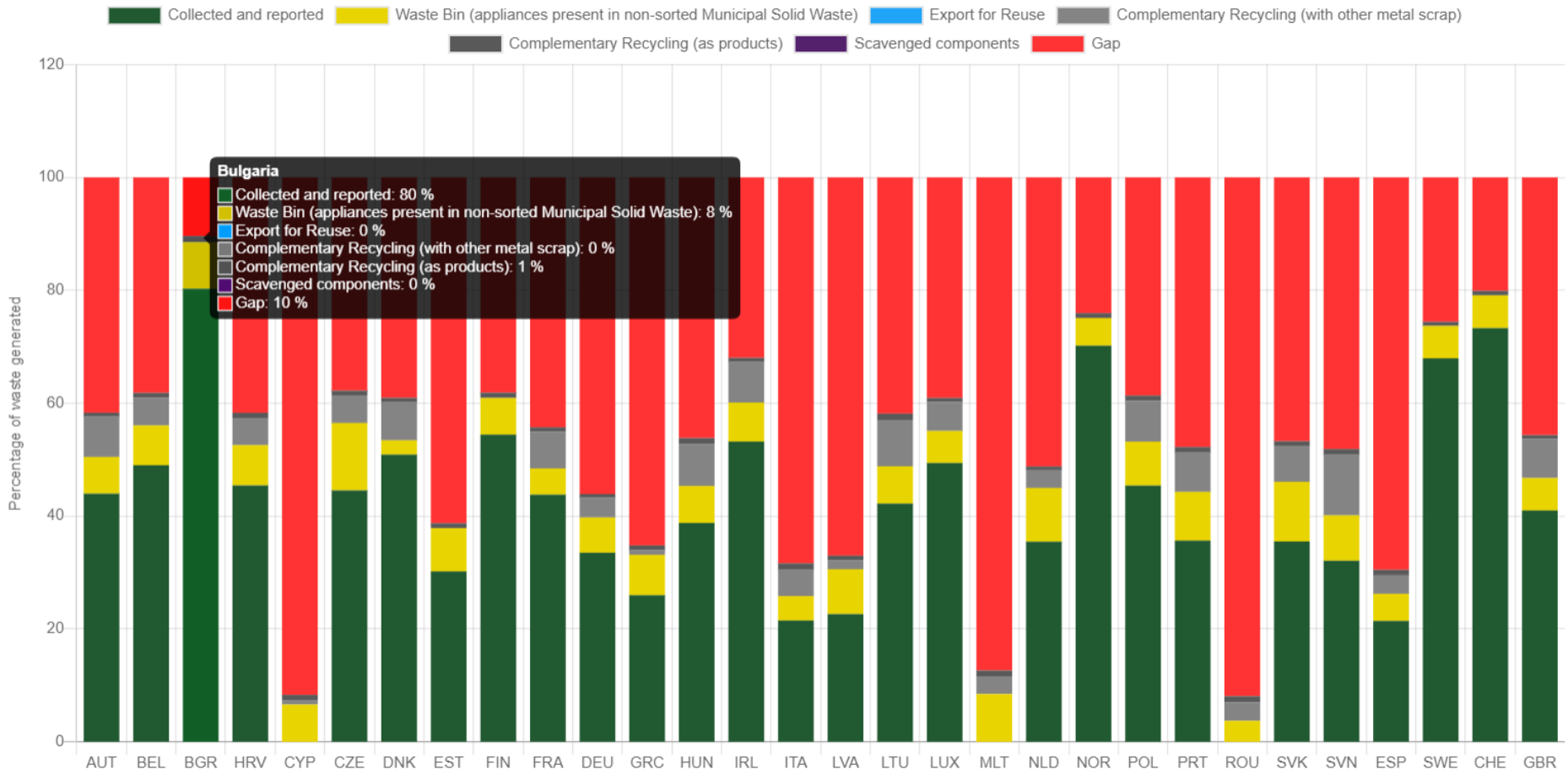
Weight of EEE - Placed on the Market in Bulgaria. Source: Urban Mine Platform



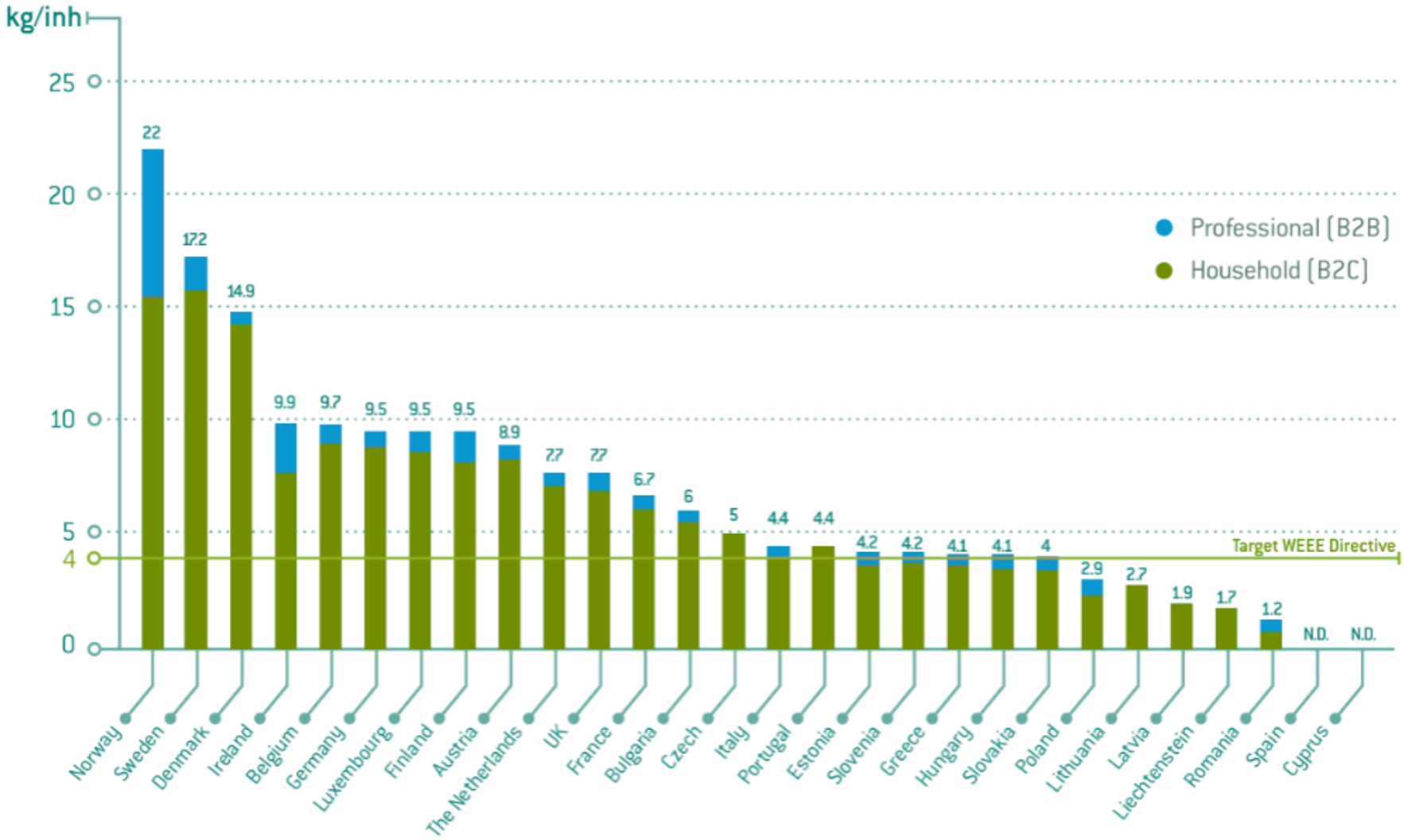
Number of EEE products - Placed on the Market in Bulgaria. Source: Urban Mine Platform



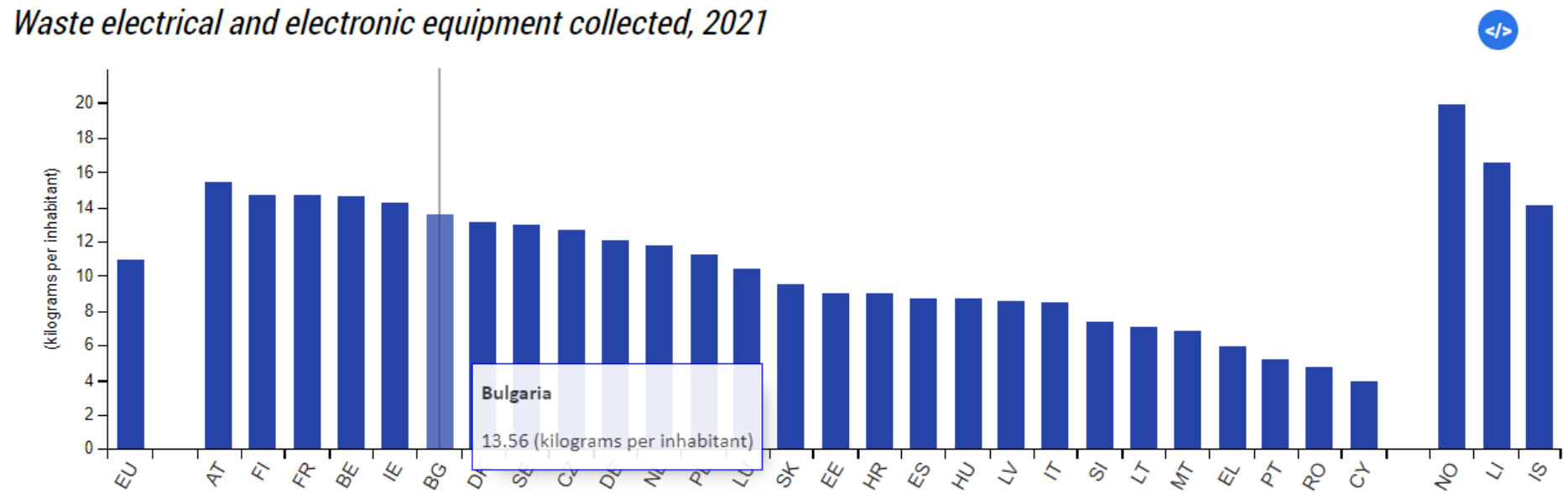
Weight of EEE - Placed on the Market in Bulgaria. Source: Urban Mine Platform



Percentage of collected EEE from waste generated in 2015 for All collection categories. Source: Urban Mine Platform



Total WEEE collected in 2010 by European countries (source: Eurostat)

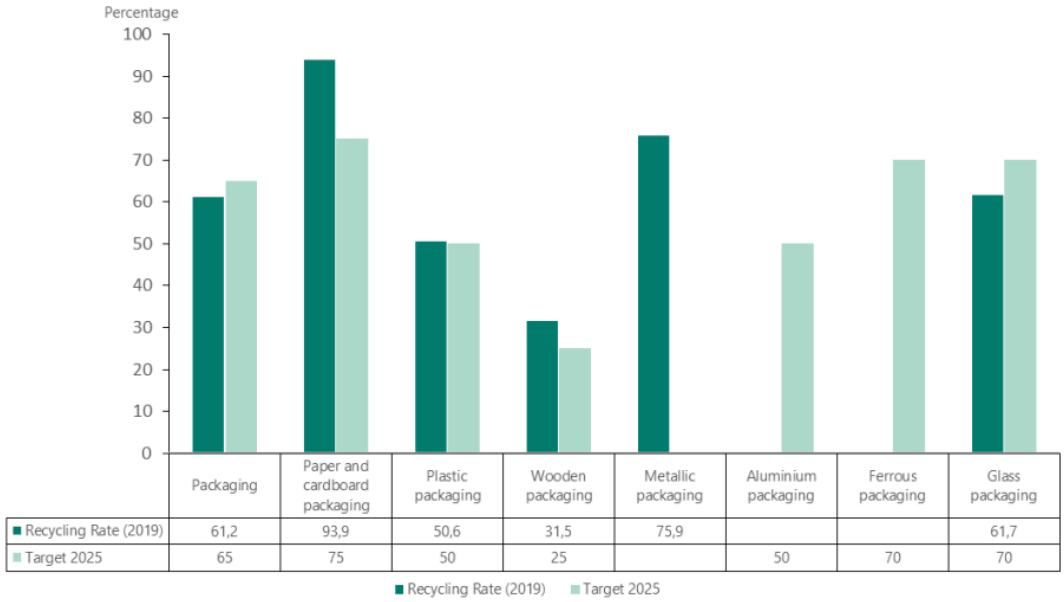


Source: Eurostat

9.2.4. Regional status: Improvements and challenges

Bulgaria needs to archive 65 % recycling target for packaging waste in 2025 as well as the material specific packaging waste recycling targets (50 % of plastic; 25 % of wood; 70 % of ferrous metals; 50 % of aluminum; 70 % of glass; 75 % of paper and cardboard). In order to conclude on this likelihood, the analysis takes stock of the status of several factors that are proven to influence the levels of recycling in a country.

The actual distance to the target for the most recent data point is a key factor determining the likelihood of meeting or not meeting the target. This analysis is based on data reported by Bulgaria to Eurostat in accordance with Commission Decision 2005/270/EC as last amended by the Commission Implementing Decision 2019/665 (EC, 2019), published in the dataset Recycling rates of packaging waste for monitoring compliance with policy targets, by type of packaging. The latest available data refer to 2019.



	Packaging	Paper and cardboard packaging	Plastic packaging	Wooden packaging	Metallic packaging	Aluminium packaging	Ferrous packaging	Glass packaging
Recycling Rate (2019)	61,2	93,9	50,6	31,5	75,9			61,7
Target 2025	65	75	50	25		50	70	70

Packaging recycling rates for Bulgaria in 2019, in percentage. Source: Eurostat.

In Bulgaria the overall recycling rate for packaging is 61 %, 4 percentage points below the 2025 target. The recycling rate for glass is 8.3 percentage points below the target. The reported recycling rates for paper and cardboard packaging, plastic packaging and wooden packaging exceed the 2025 targets with 18.9 percentage points, 0.6 percentage points and 6.5 percentage points respectively. For metallic packaging no separate data are available for steel and aluminum packaging. The metallic packaging recycling rate is 75.9 %, 5.9 percentage points above the target for steel.

There are some known issues related to data quality, mainly regarding the underreporting of packaging put on the market. The policy recommendations provided by the European Commission in 2018 on audits of the data reported by producers or Producer Responsibility Organisations (PROs) on amounts of packaging placed on the market has reportedly been addressed. In an annual certified report to the Minister of Environment and Water, an independent financial auditor certifies the exact quantities placed on the market by the members of each PRO.

The National Statistical Institute covers the total amount of packaging placed on the market at national level through its statistical observations, on the basis of production and foreign trade statistics, one of the methodologies recognized by Eurostat. As a consequence of the auditing, the quantities of packaging placed on the market in the

scope of recovery organizations for the period from 2017 to 2019 has increased by about 40 000 tonnes. Still, Bulgaria's reported recycling rates for plastics and paper/cardboard packaging waste are among the highest of all EU Member States in 2019, and it remains unclear how such high recycling rates can be achieved with a separate collection system for packaging waste from households that operates only low-density bring point collection, and does not cover all municipalities.

However, steps have been taken to reduce free-riding: the recent revision of the Bulgarian waste legislation, not yet visible in the currently available data, extends the registration of packaging producers to distance sellers (online sales) and requires electronic registration from all persons/entities putting packaging on the market.

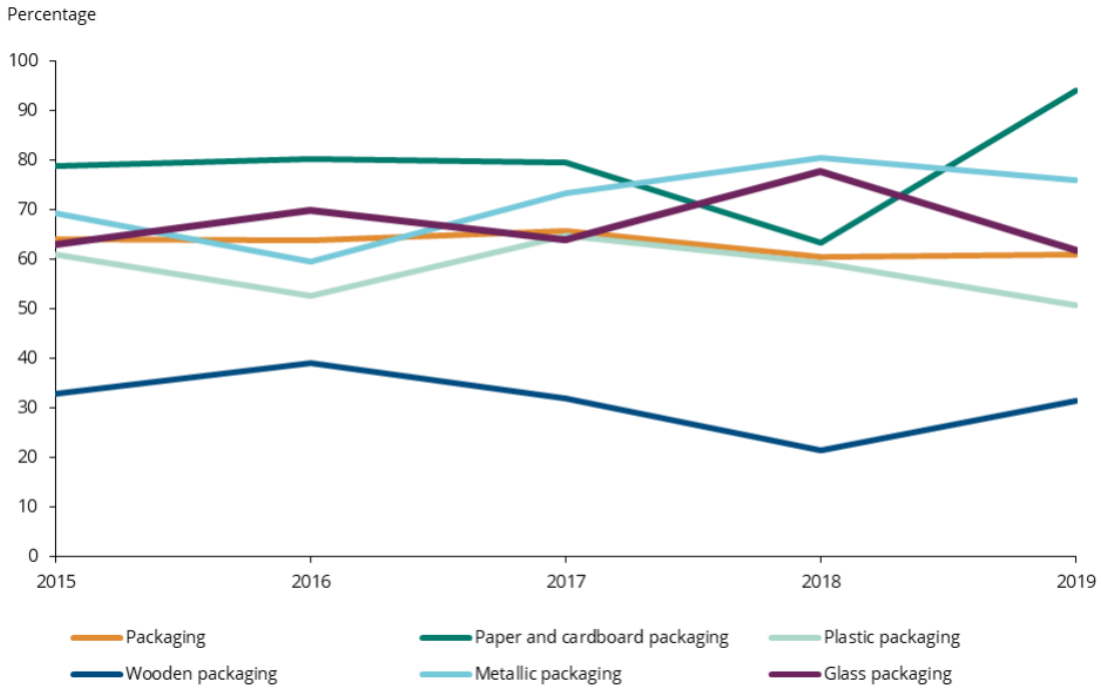
The recycling rates presented are based on the calculation rules of the Commission Decision 2005/270 before it was amended by the Commission Implementing Decision 2019/665 and will likely differ from the recycling rates to be reported according to the new calculation rules. The new calculation rules will only be mandatory to be used for the reference year 2020 and onwards. A key difference in the new calculation rules compared to the old rules is that the amount of sorted packaging waste that is rejected by the recycling facility shall not be included in the reported amount of recycled packaging waste.

The actual impact of the application of the new calculation rules to the recycling rate has not been quantified yet in Bulgaria. The current calculation point for the recycling rate is the entry of the recycling process. Recycling losses are currently not applied. As a matter of sensitivity analysis, to assess what the impact of these new calculation rules could be (change in calculation point), recycling losses found in literature are applied to the packaging recycling rates as reported for reference year 2019:

- Paper and cardboard packaging: decrease by 10 %, from 93.9 % to 84.5 %
- Plastic packaging: decrease by 21 % 1, from 50.6 % to 39.9 %
- Metal packaging: decrease by 14 %, from 75.9 % to 65.3 %
- Glass packaging: decrease by 5 %, from 61.7 % to 58.6 %
- Wooden packaging: decrease by 11 % from 31.5 % to 39.9 %
- Total packaging: Calculated based on the amounts of each packaging material generated and recycled in, the recycling rate would drop from 61.0 % to 53.7 %.

Taking these possible recycling loss rates into account, the distance to the recycling targets is significantly larger when the new calculation rules will be applied. Bulgaria would still exceed the recycling target for both wood and paper and cardboard packaging. For all other fractions the recycling rates would be below the target.

The development of the historical trend in the recycling rate indicates previous efforts towards packaging waste recycling. In this analysis the recycling rate reported in the Eurostat dataset Recycling rates of packaging waste for monitoring compliance with policy targets, by type of packaging (latest data year: 2019) is used. The recycling trends for packaging waste by material in Bulgaria are illustrated in Figure below.



Trend in packaging waste recycling rates in Bulgaria between 2015 and 2019, in percentage (Source: Eurostat).

Bulgaria's recycling rates fluctuated significantly over the past five years (2015-2019). In 2019, the recycling targets for 2025 are exceeded for wooden packaging and paper and cardboard. For plastics the recycling rate decreased by 10.2 percentage points. For metallic packaging there was an increase by 6.7 percentage points. Bulgaria's overall packaging recycling rate decreased by 3.1 percentage points over the past five years.

Summary Result

Total packaging	RR < 55% and increase in last 5 years < 10 percentage points	The recycling rate decreased by 3.1 percentage points over the past five years and is estimated at 53,7 % if the new calculation rules would be applied (taking into account losses in the recycling plants).
Paper and cardboard packaging	RR > 75	The recycling rate increased by 15.2 percentage points over the past five years and is estimated at 84.5 % if the new calculation rules would be applied (taking into account losses in the recycling plants).
Ferrous metals packaging	RR > 65% and increase in last 5 years > 5 percentage points	The trend in recycling rates for ferrous and aluminium packaging waste over the last five years cannot be quantified, as data is only available for total metals packaging, so this trend is used instead as a proxy. The metals packaging recycling rate increased by 6.7 percentage points over the past five years and is estimated at 65.3 % if the new calculation rules would be applied (taking into account losses in the recycling plants).
Aluminium packaging	RR > 50%	

Glass packaging	RR < 60% and increase in last 5 years	The recycling rate decreased by 1.2 percentage points over the past five years and is estimated at 58.6 % if the new calculation rules would be applied (taking into account losses in the recycling plants).
Plastics packaging	RR < 40%, and increase in last 5 years > 10 percentage points	The recycling rate decreased by 10.2 percentage points over the past five years and is estimated at 39.9 % if the new calculation rules would be applied (taking into account losses in the recycling plants).
Wooden packaging	RR > 25%	The recycling rate decreased by 1.2 percentage points over the past five years and is estimated at 28.0 % if the new calculation rules would be applied (taking into account losses in the recycling plants).
Robustness of the underlying information		The assessment is limited by the fact that the recycling rates for 2019, as reported by Bulgaria to Eurostat, do not yet reflect the new calculation rules, and the impact of the new calculation rules has therefore been estimated based on literature. In Bulgaria there is also an issue with underreporting packaging put on the market. However, the trends over time seem to be robust as there are no breaks in time series indicated.

9.3. ACTORS INVOLVED IN THE POLICY INSTRUMENT

9.3.1. Main actors in the policy

GREENTECH BULGARIA

Organization for the recovery of end-of-use electrical and electronic equipment (WEEE), has the noble and responsible task of building a system for the separate collection of old electrical and electronic equipment, at specialized and accessible places for citizens.

Regardless of the number of organized places for separate collection of WEEE, without the good will and awareness of all citizens of the Republic of Bulgaria, this task is impossible.

Places where can hand over old electrical and electronic equipment:

Company/Municipality	Site address	Municipality
МЕТРО-КЕШ ЕНД КЕРИ БЪЛГАРИЯ ЕООД	бул. Европа № 182	Столична
МЕТРО-КЕШ ЕНД КЕРИ БЪЛГАРИЯ ЕООД	ул. Костиевска № 1	Пловдив
ДОВЕРИЕ БРИКО БЪЛГАРИЯ АД	бул. Захари Стоянов-Пром. Зона юг-запад	Бургас
ДОВЕРИЕ БРИКО БЪЛГАРИЯ АД	бул. Шести септември № 233-А	Пловдив
ДОВЕРИЕ БРИКО БЪЛГАРИЯ АД	hк .Струмско, ул. Яне Сандански № 1	Благоевград
Община Венец	ул. Кирил и Методий 24	Венец
Об_ИНА БАНСКО	УЛ.Н.ВАПЦАРОВ 1	Банско
Община Враца	ул. Стефанаки Савов № 6	Враца
Община Каспичан	ул. Мадарски Конник” № 91	Каспичан
Община Никола Козлево	пл.23 Септември5	Никола Козлево
ВАМИ ЕЛЕКТРИК ЕООД	УЛ.СТАРА ПЛАНИНА 3	Варна
ВАМИ ЕЛЕКТРИК ЕООД	УЛ.ЦАР СИМЕОН 76	Варна
ЕКОСТИЙЛ ЕООД	hп гара Биримирци	Столична
АГЕНЦИЯ ПО ЗАЕТОСТТА	бул. Дондуков 3	Столична
БТК АД	ул.Цар Освободител № 11	Айтос
БТК АД	пл Акад.Николай Хайтов № 3	Асеновград
БТК АД	ул.Железарска № 4	Асеновград
БТК АД	Пл. Никола Вапцаров № 6	Банско
БТК АД	ул. България 33	Белене
КО-МЕД МЕДИЦИНТЕХНИК ООД	ул. Волга 49, ет.1, офис 2	Пловдив
БТК АД	МОЛ бул.Варненчик 186	Варна
БТК АД	бул. Ломско шосе бл.171	Столична
БТК АД	Сердика Метростанция 4	Столична
БТК АД	Обеля ул.275 No 24	Столична
БТК АД	МОЛ България, ул. Каблешков и бул. България	Столична

Модус Трейд ЕООД	ул. Пенчо Славейков 32, ет.1, ап.1	Варна
Роял Електроникс ООД	бул. Кл. Охридски № 8, ТУ, уч. Бл. 7, хале 4	Столична
Хемус инт. Трейд ко ООД	Студентски град, Акад. Борис Стефанов 3	Столична
РЕТЕЛ АД	бул. Г. М. Димитров бл. 60, маг 2 и 3	Столична
РЕТЕЛ АД	ул. Академик Георги Бончев блок 29А	Столична
РЕТЕЛ АД	бул. Цар Освободител 64	Пирдоп
РЕТЕЛ АД	бул. Цар Освободител 57А	Пирдоп
Сатекс ООД	ул. Панайот Волов” 15	Шумен
Сатекс ООД	ул. Симеон Велики” 25	Шумен
Ромпетрол България АД	бул. Ломско шосе 175	Столична
Ромпетрол България АД	бул. Ронен 23	Столична
Ромпетрол България АД	кв. Друнба 1, бул. Цветан Лазаров 34	Столична
Ромпетрол България АД	бул. Александър Екзарх 11	Столична
Стройкомплект Г ЕООД	кв. Добрудна, Индустриална зона	Шумен
Ес Ес Експрес ООД	ул. Ришки проход 35, бензиностанция Ромпетрол	Шумен
Логос ЕООД	ул. България 2А, бензиностанция Ромпетрол	Каварна
Логос ЕООД	с. Оброчище, бензиностанция Ромпетрол	Каварна
ДМТ ОЙЛ ЕООД	ул. Д.Ковачев 4, бензиностанция Ромпетрол	Добрич-град
ДМТ ОЙЛ ЕООД	с. Бранище, главен път Добрич-Ахелой, бензиностанция Ромпетрол	Добрич-град
СТАНДАРТ ОЙЛ ООД	гр. Долни чифлик, Промишлена зона, бензиностанция Ромпетрол	Варна
СТАНДАРТ ОЙЛ ООД	с. Ветрино, ул. Иван Вазов 6, бензиностанция Ромпетрол	Варна
Дивна ООД	ул. Княз Борис I № 28	Първомай
Атлантик ООД	ул. Раковски 16, бензиностанция Ромпетрол	Омуртаг
Хармония-Р ЕООД	ул. Църковна независимост 16, бензиностанция Ромпетрол	Русе
Община Павликени	бул. Руски № 4	Павликени
ОБ_ИНА ПАЗАРДЖИК	бул. България 2	Пазардник
ОБ_ИНА ПИРДОП	ПЛ.ТОДОР ВЛАЙКОВ	Пирдоп
Община Първомай	ул. Братя Миладинови - юг № 50	Първомай

Рестийл ЕООД	ул. Кременица” № 2.	Столична
Индустриални суровини ЕООД	ул. Кременица” № 2.	Столична
Индустриални суровини ЕООД	ул. Искърско шосе, Гара Искър	Столична
Метарекс ООД	ЗПЗ	Варна
Метарекс ООД	мест. Планова	Варна
Колбис Мендународен трансфер АД	Централен офис,ул. Свети св. Кирил и Методий 47	Столична
Колбис Мендународен трансфер АД	Принт център, пл. България 1	Столична
ДОВЕРИЕ БРИКО БЪЛГАРИЯ АД	ул. Македония 2	Пловдив
Община Хитрино	ул. Възрандане № 45	Хитрино
ОБ_ИНА ЧЕЛОПЕЧ	бул. Трети март №1	Челопеч
Евросет ООД	нк. Люлин, ул. 705 No- магазин и склад	Столична
Евросет ООД	нк. Стрелбище, ул. Йордан Йовков 7, бл.8, вх. Б, магазин 1	Столична
Евросет ООД	нк. Иван Вазов, ул. Д-р Стефан Сарафов 22, магазин 3	Столична
Евросет ООД	нк. Драгалевци, ул. Захари Зограф 57, магазин 3	Столична
Евросет ООД	ул. Алцеко 10, магазин	Пловдив
Ай Би Ем България АД	1057гр.СофияСтоличнаул.Драган Цанков 36, СТЦ Интерпред	Столична
дм България ЕООД	Цар Симеон Велики 20А	Видин
дм България ЕООД	ул. Менделеев 2Б, Ритейл парк, маг.7	Пловдив
дм България ЕООД	ул. Търговска 34	Rмбол
БТК АД	МОЛ Парадайз Център, бул. Черни връх 100	Столична
БТК АД	Люлин 4, бул. Панчо Владигеров 28	Столична
ЕЛМАК ООД	Магазин Темакс България ЕООД, бул. 25-ти Септември 43	Добрич-град
ЕЛМАК ООД	Магазин Темакс България ЕООД, бул. Ришки проход 191	Шумен
ЕЛМАК ООД	Магазин Темакс България ЕООД, ул. Добрудна 13	Разград
ЕЛМАК ООД	Магазин Темакс България ЕООД, ул. Иларион Драгостинов 16	Велико Търново

ТЕХНОПРО БЪЛГАРИЯ ООД	ул. Ангел Стоянов 8, Склад за търговия на едро	Добрич-град
ТЕХНОПРО БЪЛГАРИЯ ООД	бул. Липник 52, вх. 1, Магазин търговия на дребно	Русе
ТЕХНОПРО БЪЛГАРИЯ ООД	ул. Цар Петър 2, Магазин за търговия на дребно	Добрич-град
БТК АД	гр. София, м-н Фантастико на бул. Сливница и ул. Чавдарица	Столична
МСИ ТУЛС ООД	гр. София, ул. Хенри Ибсен 5, магазин МСИ	Столична
БТК АД	гр. Търговище, ул. Сюрен 1	Търговище
БТК АД	гр. София бул. Тотлебен №36 Кауфланд	Столична
БТК АД	гр. София Пазар Хадни Димитър ул. Макгахън пав. 45/3	Столична
БТК АД	гр. София, район Красно село, ул. Хайдушка поляна №8 – Център за Управление на мрeната на БТК АД	Столична
ВюПОЙНТ ООД	гр. София, бул. Арсеналски 81А	Столична
ВюПОЙНТ ООД	гр. София, бул. Арсеналски 81В	Столична

The Ordinance introduces the requirements of Directive 2012/19/EU of the European Parliament and of the Council of 4 July 2012 on waste from electrical and electronic equipment (OJ, L 197/24.07.2012). These legal acts regulate the extended responsibility of the persons who put EEE on the market to organize and finance the collection and recycling of waste from this type of products. The financing of the systems for separate collection, reuse, recycling and/or recovery of WEEE is carried out through a product tax or an eco-tax. If you are a manufacturer, importer or commercial representative of a person with headquarters in another EU member state, which places EEE on the market of the Republic of Bulgaria, you must register in the register maintained by the Environmental Executive Agency (EEA) and submit information on the EEE placed on the market within 20 days of the end of each quarter. If you are a member of an Organization for the recovery of WEEE, it submits the reports for you. Based on the submitted information, the persons who place the EEE on the market pay fees to fulfill the obligations for separate collection, reuse, recycling and/or recovery of the WEEE, and you have the right to choose whether to pay a product fee to the Enterprise for the management of the activities of environmental protection (PUDOOS) or to pay a fee to an Organization for the recovery of WEEE. Fees are not paid by individuals who fulfill goals individually, as they finance the costs of collection, reuse, recycling and/or recovery of WEEE themselves.

According to the Ordinance on determining the procedure and amount for payment of a product tax, a product tax is paid to PUDOOS when EEE is placed on the market of the Republic of Bulgaria. It is paid for each individual type of EEE, and the weight of the battery or accumulator is excluded from the weight of the EEE, which is fully or partially powered by batteries or accumulators. A product fee is not paid by persons who participate in a collective system represented by a recovery organization, or by persons who individually fulfill the obligations of separate collection, reuse, recycling

and/or recovery of WEEE. In these cases, the obliged persons pay the Recovery Organization a fee, which is more popularly known as an "eco-tax", and the Organization undertakes the implementation of objectives for the separate collection, reuse, recycling and/or recovery of WEEE.

Eltechresurs

organization for the recovery of waste from end-of-use electrical and electronic equipment (WEEE), holding Decision OOp - WEEE - 02 - 04/24.11.2022, issued by the Ministry of Environment and Water.

Eltechresurs AD concludes a contract with the relevant producer or person who puts EEE on the market. Eltechresurs AD fulfills its obligations under the contract with the members of its collective system, against the payment of a contribution for any electrical and electronic equipment manufactured or imported/introduced on the territory of the country for which it is issued a certificate. The accumulated funds from the fees of the members of Eltechresurs AD are invested in the construction of a sustainable system for the utilization of waste.

Eltechresurs AD has the necessary material and technical base and a developed network of operators and representative offices throughout the country and offers comprehensive participation in the process of recycling EEE waste, including management, logistics and professional fulfillment of the goals of the contract.

Main activity and priorities

- Inclusion in a collective system of utilization and fulfillment of obligations for separate collection and treatment of EEE waste;
- Separate collection covering the largest possible part of waste users/generators;
- Increasing the amount of reuse, recycling and recovery of EEE waste;
- Reduction of the harmful impact on the environment and human health from the formation and management of mass-distributed waste;
- Hierarchical waste management - 1. prevention, 2. reuse, 3. recycling, 4. other recovery and 5. disposal;
- Encouraging and developing ecologically oriented behavior, both of the ordinary consumer and of the companies;
- Moving to a circular economy. Waste should not only be seen as a threat to man, but also as a resource, through the proper use of which the use of raw materials can be minimized. The main objective is the efficient use of the materials contained in the waste, effectively returning it to the economy and contributing to the rational use of natural resources.

Official representatives and manufactures

Gorene Bulgaria EOOD
Sony Europe BV, Bulgaria Branch
BSH Household appliances Bulgaria EOOD
Liebherr - Hausgerete Maritsa EOOD
Robert Bosch Ltd
Hilti Bulgaria EOOD
Axon Bulgaria EOOD
Spectrum Brands Bulgaria Ltd
Boryana EOOD
Keten Ltd
Andreas Stil Ltd
Wurt-Bulgaria Ltd
Dea Ltd
Ahi Carrier Eichvak Bulgaria EOOD
Xerox Bulgaria Ltd
Konica Minolta Business Solutions Bulgaria EOOD
Canon Bulgaria Ltd
MMS Inc. Ltd
Orbiko Bulgaria EOOD
Sapir Bulgaria Ltd
Vasilias International Ltd
Devin AD
GTS Ltd
Grundfos Bulgaria EOOD

NOORO

National Waste Recovery and Recycling Organization (or "NOORO" for short) was created to work for the effective management of mass-distributed waste and to contribute to long-term and successful environmental protection. NOORO acts as a recovery organization for the recovery of waste according to the requirements of the current Bulgarian legislation and works daily for better management and efficient functioning of the systems for separate collection and recovery of electrical and electronic equipment and batteries and accumulators.

Electroutilization

Bulgarian organization that received permission, according to the requirements of the Law on Waste Management, issued by the Minister of Environment and Water, to carry out activities as an organization for the utilization of obsolete electrical and electronic equipment.

Established as a commercial company without the right to distribute profits and has as its subject of activity: organizing and managing the activities of separate collection, transportation, recycling and utilization of mass-distributed waste.

"Electroutilization" E AD owns Permit No. OOp-IUEEO-06-00/29.08.2014. issued by the Ministry of the Environment and Waters for carrying out activities as a Recovery Organization to fulfill the obligations of manufacturers and importers of electronic and electrical equipment under Art. 64, para. 1 in connection with Art. 62, para. 1 of the Waste Management Act.

ELEKTROOPOLZOTVORIAVANE EAD together with the BURGAS MUNICIPALITY organizes a campaign for the separate collection of old electrical appliances /stoves, washing machines, refrigerators, radiators, irons, mixers, hair dryers, computers, printers, etc.

Teneco Recycling

Teneco Recycling Ltd. is an organisation engaged in the recovery of waste electrical and electronic equipment (WEEE) which has been licensed since 2015. Leading partner of companies and businesses that market electronic and electrical equipment in accordance with the principles of circular economy.

Teneco Recycling
Recycling brings life

Teneco Recycling is a single-member limited liability company with a private ownership regime meeting the requirements of the Waste Management Act (WMA) and the secondary legislation implementing its application.

The Constituent Act of the Organisation conforms with the requirements of Articles 16 and 17 of the WMA. Membership in Teneco Recycling enables businesses to fulfil their obligations in the field of circular economy and separate collection and recovery of waste electrical and electronic equipment sold on the Bulgarian market. In this way, producers and importers of electrical and electronic equipment reduce their EEE fee costs by participating in the Teneco Recycling system.

The organisation applies successful practices to meet its circular economy and waste management objectives, in particular:

- reducing waste to be disposed of
- efficient WEEE collection and recycling

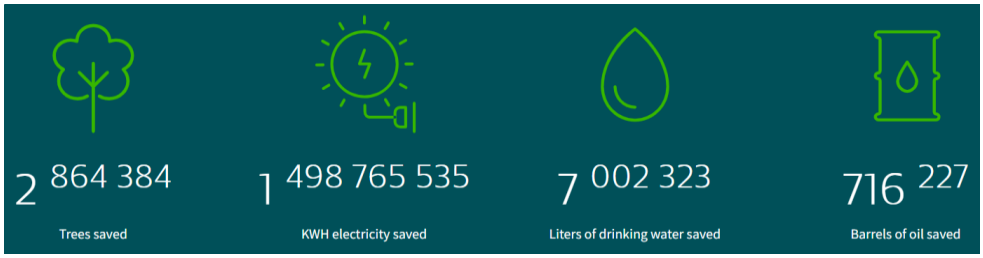
- establishment and maintenance of WEEE management systems.

All these activities contribute to protecting the environment, conserving natural resources and improving living conditions. Optimising waste management costs is one of Teneco Recycling's top priorities. To this end, the organisation runs a number of campaigns involving businesses and local authorities.

ECOPACK

Ecopack Bulgaria is a prominent organization committed to sustainable waste management, focusing on the collection, recycling, and recovery of packaging waste across the country. Founded by producers and importers, it operates as a non-profit and ensures that companies comply with Bulgaria's Extended Producer Responsibility (EPR) for waste reduction. By working with 88 municipalities, Ecopack supports separate collection systems and facilitates the recycling of diverse materials, including plastics, paper, glass, and metals. Beyond waste management, Ecopack places a strong emphasis on public education, running programs like the "Recycling School" and interactive recycling centers to teach children and communities about the environmental impact of waste. Through campaigns such as "Old Paper for a New Book," it engages citizens directly, helping to foster a culture of recycling and environmental responsibility in line with circular economy principles. Ecopack's overarching goal is to minimize waste, increase recycling rates, and build a more sustainable Bulgaria.

ECOPACK
PACKAGING WASTE RECOVERY ORGANIZATION



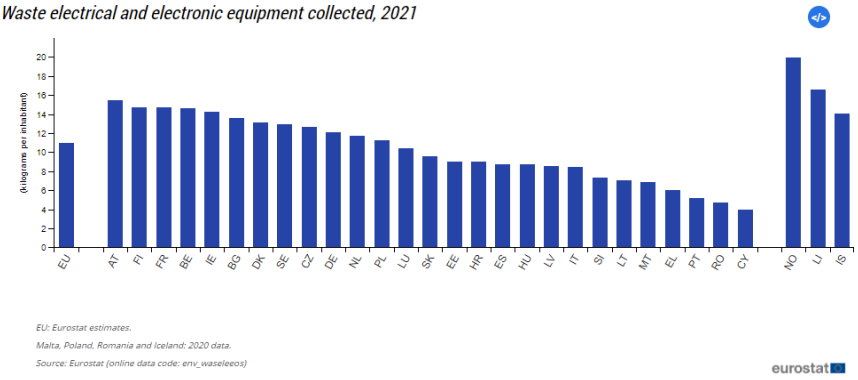
10. THE EEE/WEEE ECONOMIC CONTEXT

10.1. EU

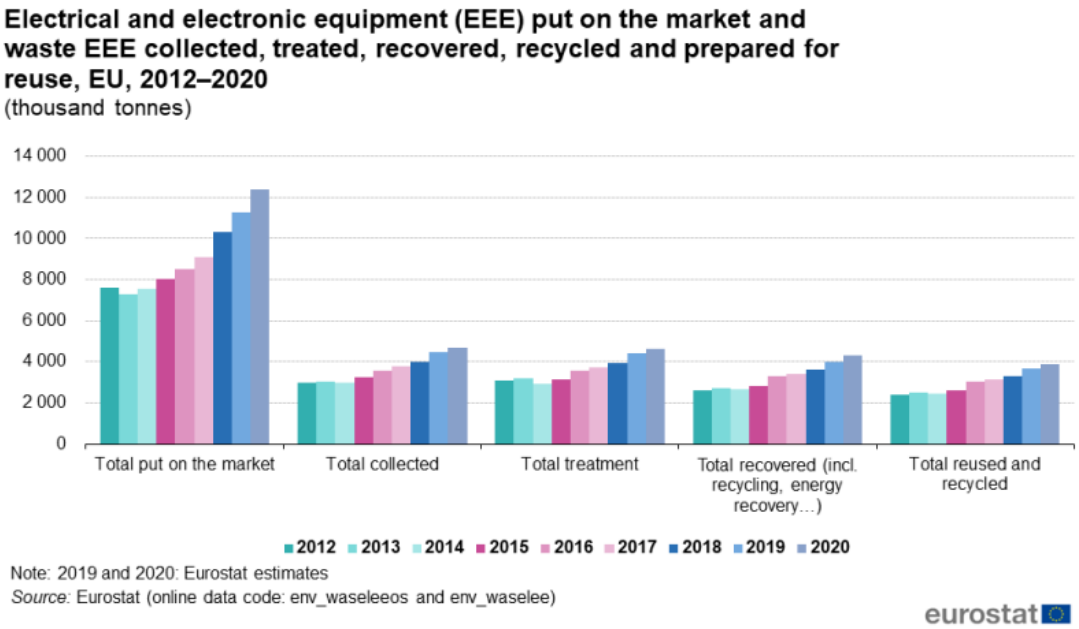
The Annex V of WEEE Directive describes the minimum recovery targets to in article 11. Regarding all WEEE separately collected in accordance with Article 5 and sent for treatment in accordance with Articles 8, 9 and 10, Member States shall ensure that producers meet the minimum targets set out in Annex 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.



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



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

10.2. EEE/WEEE BUSINESS ENVIRONMENT AND EMPLOYMENT

10.2.1. NATIONAL AND REGIONAL

Bulgaria is at the forefront of the global shift towards a circular economy, using innovation and collaboration to redefine its economic landscape. With a wealth of cultural heritage and natural beauty, Bulgaria is poised to take a leading role in sustainable development. The waste management is undergoing a transformational evolution. The city of Sofia, for example, has adopted decentralized composting initiatives, turning organic waste into nutrient-rich soil for urban gardens. This decentralized approach not only reduces reliance on landfills, but also promotes community engagement and sustainability.

In the fertile plains of Bulgaria, the revival of traditional agricultural practices is intertwined with modern principles of sustainability. Farmers use regenerative agriculture techniques, such as crop rotation and silviculture, to improve soil health and biodiversity. Initiatives such as the "Bulgarian organic" label give consumers the opportunity to support local, ecological and clean food production.

Bulgaria's dynamic startup ecosystem catalyzes green innovation, stimulating forward-thinking solutions to environmental challenges. From solar-powered irrigation systems to blockchain-based supply chain transparency, Bulgarian startups are using technology for sustainable impact. Initiatives such as Cleantech Bulgaria provide vital support and mentoring to budding eco-entrepreneurs. Bulgaria's virgin mountains, crystal clear lakes and picturesque villages are not only tourist attractions, but also priceless natural treasures. The concept of circular tourism is gaining momentum, promoting responsible tourism practices that minimize environmental impact and support local communities. Eco-lodges, organic farms and nature walks offer immersive experiences rooted in sustainability.

The textile industry in is in the process of a circular revolution, and initiatives such as "from old to new" are leading. By collecting and upcycling discarded clothing, these

initiatives breathe new life into old fabrics while reducing waste and supporting vulnerable communities. Local artisans transform their favorite clothes into unique, eco-friendly fashion pieces, promoting a culture of conscious consumption.

In 2022, the energy crisis in Europe posed new challenges in the aftermath of the pandemic. The Bulgarian economy was still recovering from that crisis when it was faced with new difficulties stemming from the Russian aggression against Ukraine. After the GDP contracted by 4.1% in 2020, the economy grew by 7.1% in 2021 against a background of strong export and consumption growth. The growth rate proved to be higher than expected in 2022, despite deteriorating global conditions and higher prices of energy sources, as well as food prices, supported by public investment and positive net exports. The impact of soaring prices on households and companies was mitigated through temporary subsidies and energy and food price caps, as well as through public support programmes.

Although short-term growth prospects are expected to deteriorate, the Bulgarian labour market outlook is relatively good. Since 2020, unemployment levels have remained stable and low, fluctuating around 5%, both during the peak of the COVID-19 pandemic and subsequently. During Q3 2022, it fell to a record low of 3.7%, although there was an increase in youth unemployment. The employment rate is also on the rise, with a particularly strong growth in the service sectors, offsetting losses following the outbreak of the pandemic. The labour market outlook of highly skilled and low-skilled workers differs substantially, the employment rate of professionals with higher education being much higher compared to those with lower secondary education or lower. While labour shortage is generally low, it is prevalent among highly skilled workers, which is often pointed out as a problem by Bulgarian employers. This is due to emigration, skills mismatch and the large share of people who are not active in the labour market.

The average monthly number of unemployed persons registered in the employment directorates between January and December 2022 was 147 804 and decreased by 18.6% or 33 682 unemployed persons less compared to the same period of the previous year.

According to the official data from the 2021 census, in the last 10 years the population of the Republic of Bulgaria has decreased by 11.5% from 7 3645 70 to 6 5197 89 people. The number of economically active persons in Bulgaria stands at 2 835 388 people, a decrease by 13.6% compared to 2011. Men account for 51.4% of the labour force in the country, while women make up 48.6%.

According to expert estimates, at the beginning of 2022 the active employers in Bulgaria were 379 000, employing 2 195 533 persons.

Severoiztochen Region

Between January and December 2022, the economic situation in the North East planning region was dominated by the seasonal nature of labour supply and demand, due to the structure of the local economy. The highest demand for labour was registered in sectors of a seasonal nature: agriculture, tourism, retail and wholesale and the processing industry (agri-food industry, clothing and glass, and porcelain and faience industry). Summer is generally the busiest period for these sectors and this is also when a peak in employment is registered. In the autumn and winter, business activity drops, leading to a decline in the demand for labour.

The increased economic activity and GDP growth observed in recent years in the four provinces of the North East Region led to a rise in employment and a decline in unemployment. According to NSI data for 2021 the employment rate of the age group

15-64 years in the North East region stood at 61.1% compared to the national rate of 68.1%. Compared to the same period of the previous year, this marked a decrease of 6.6 percentage points in the employment rate of the population in the North East Region. In this regard it should be noted that the national average also decreased by 0.7 percentage points.

As at 31 December 2022, the number of unemployed persons registered with job centres in the North East Region was 21 479, marking a year-on-year increase.

In 2022, employers in the region mostly sought personnel in the field of personal services: chefs, bar, waiting and kitchen staff, room cleaning staff, valets, administrators, hotel staff. Employers advertised a large number of vacancies for sales assistants, cashiers and teachers. The needs for skilled workers were mainly in the food and clothing sectors (tailors, upholsters, cutters, bakers) and in the sectors of metallurgy and mechanical engineering (welders, fitters, mechanics, turners, car mechanics). There was a demand for machine operators, assembly workers, drivers, operators of specialised agricultural machinery, agricultural and food science technicians. The vacancies for unskilled workers were generally for washing and cleaning staff, security guards, janitors, seasonal workers in forestry and agriculture, general workers, etc.

The North East Region continued to experience a shortage of highly skilled personnel, particularly ICT engineers, mechanical engineers, civil engineers and technicians, teaching professionals (foreign language graduates), medical professionals (doctors, nurses, speech therapists). The shortage of skilled workers in tourism, hotel and restaurant management, which are essential for many local labour markets in the North East Region, continues to increase.

10.3. EEE/WEEE EDUCATION, SKILLS AND CAPACITY BUILDING

10.3.1. NATIONAL AND REGIONAL

In Bulgaria, education on Waste Electrical and Electronic Equipment (WEEE) and circular economy principles is becoming a core part of the curriculum in many schools, aimed at fostering environmental responsibility among students from an early age. The country's approach highlights the integration of environmental literacy in schools, focusing on resource conservation, waste reduction, and sustainable practices. Practical projects such as school gardens, recycling programs, and environmental workshops are popular and instill a sense of lifelong stewardship in young citizens. This aligns with broader national goals to strengthen Bulgaria's circular economy by shaping future generations with a solid foundation in sustainability practices.

Key initiatives in WEEE education include projects led by organizations like Ecopack Bulgaria, which provides resources like the "Recycling School" platform. This online resource offers eco-lessons accessible to schools across the country, promoting hands-on learning about recycling and sustainability. Another notable initiative is the "Old Paper for a New Book" campaign, where students recycle paper and, in return, receive books. This program has seen strong participation, with thousands of students and parents involved each year, helping to save natural resources and reinforce recycling habits among the youth.

Additionally, private sector companies such as Ecologica Bulgaria Ltd contribute by developing e-waste management curricula, which are used in schools and for training start-ups. These programs aim to enhance technological and environmental knowledge, strengthening sustainable practices and compliance with WEEE handling regulations. Such corporate and NGO partnerships play a crucial role in shaping a culture of environmental responsibility and aligning Bulgaria with EU directives on sustainable waste management.

These educational programs are complemented by Bulgaria's strategic emphasis on the circular economy under initiatives like the Competitiveness and Innovation in Enterprises (CIE) program, which supports SMEs in adopting resource-efficient practices. Together, these educational and industry-led efforts underscore Bulgaria's commitment to fostering a sustainable, circular economy with informed and proactive future generations.

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.

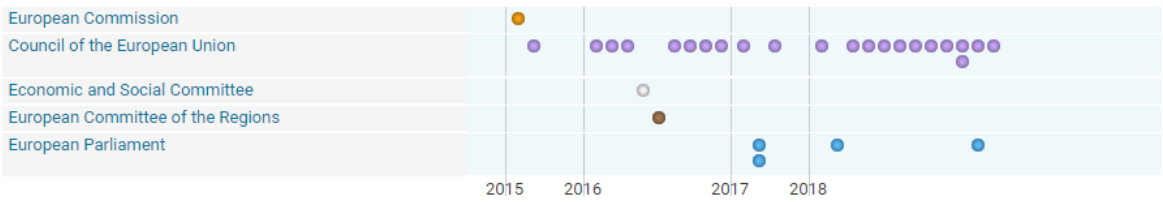
These ideas were included in original Directive 2008/98/EC on waste, respectively amending Directive (EU) 2018/851, as part of a package of measures on the circular economy. It sets out the legal framework for waste management in the European Union (EU). It aims to protect the environment and human health 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:

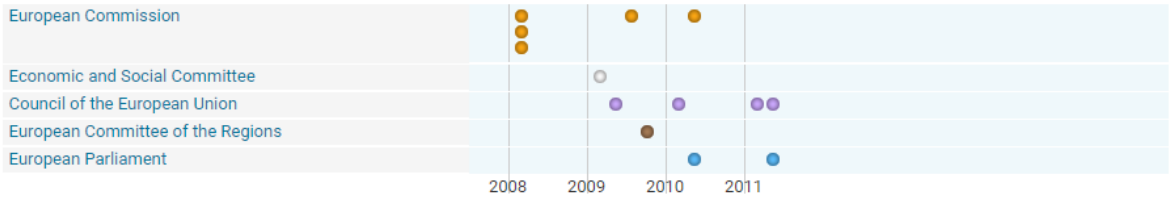
- Some applications defined in a comprehensive way (ex: mercury in fluorescent lamps or tubes, lead in cathode ray tubes, or alloying elements, chromium for anti-corrosion applications...);
- Spare parts for the repair or reuse of EEE put on the market before 1st July 2006. If the market for new components 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 (chlorofluorocarbures, 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.

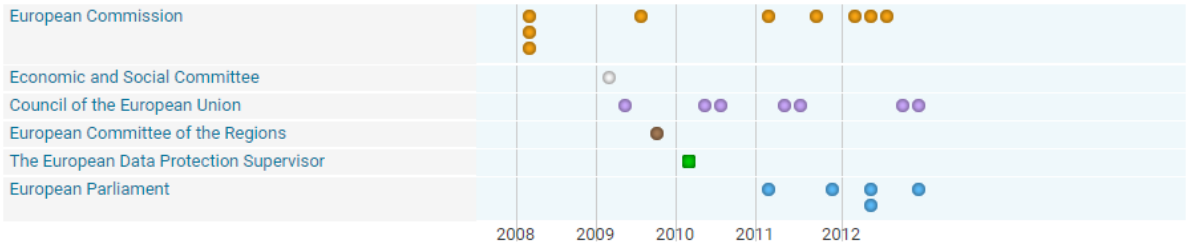
This regulation was replaced by the Regulation (EC) No 1005/2009. This regulation sets out rules for the manufacture, import, export, sale, use, recovery, recycling, reclamation, and disposal of ozone-depleting substances. It establishes information and action requirements for products and equipment 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.

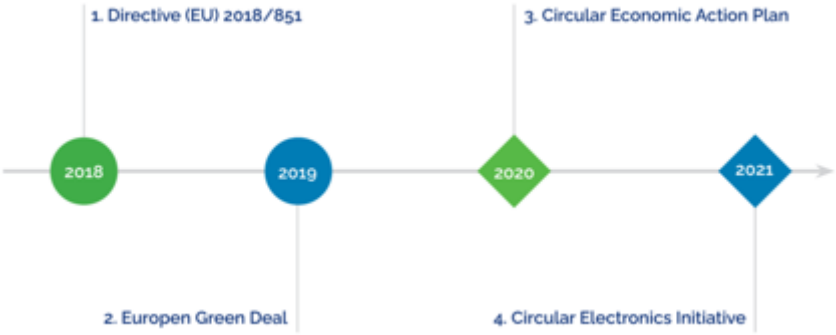
The electronics sector and ICT have also been identified as a “key product value chain” under Commission’s second Circular Economy Action Plan. The CEAP 2020 in this respect envisages the following measures:

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.



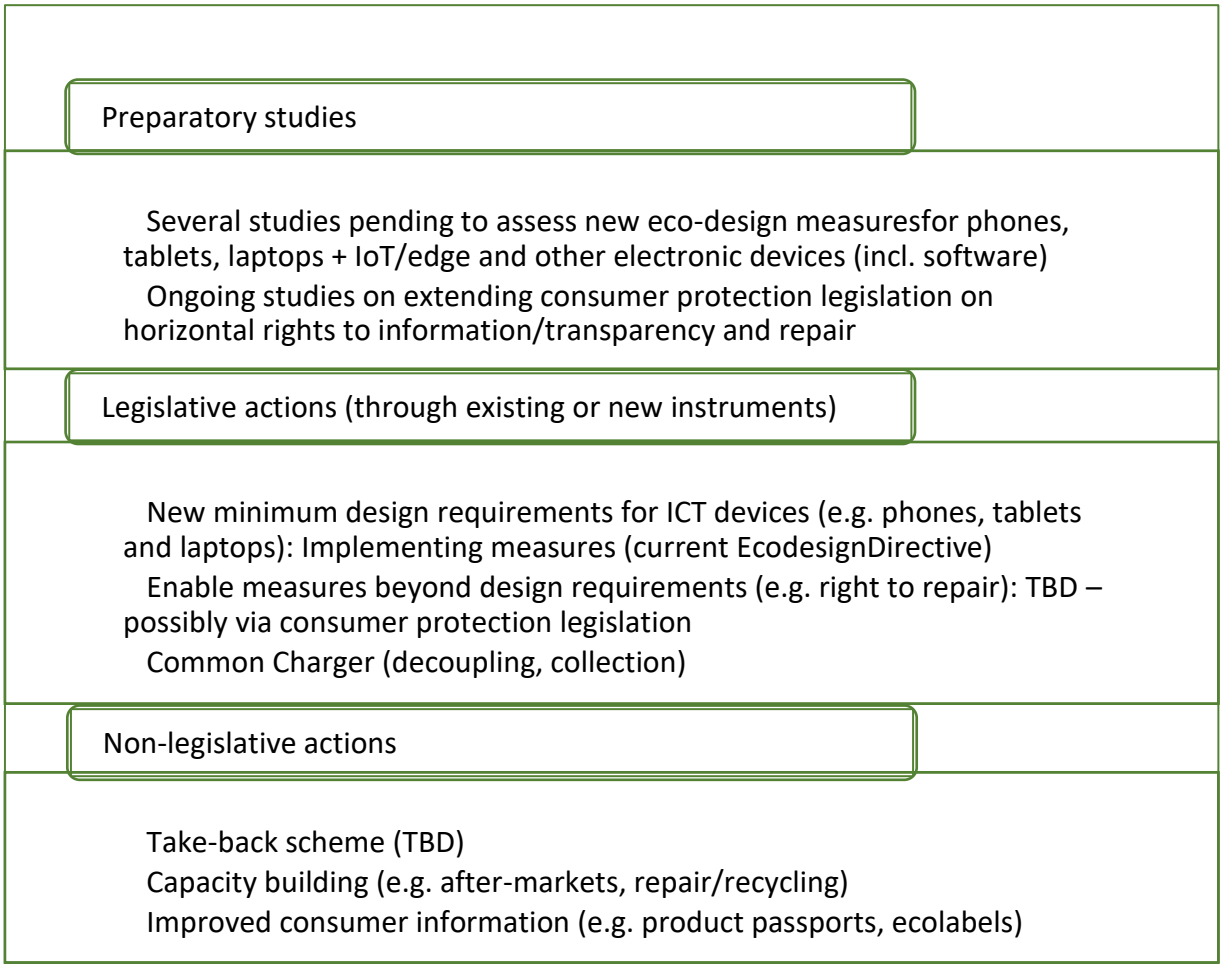
In the Commission work programme for 2021, published on 19 October 2020, the non-legislative initiative was announced for the fourth quarter of the year.

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').



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 a 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.

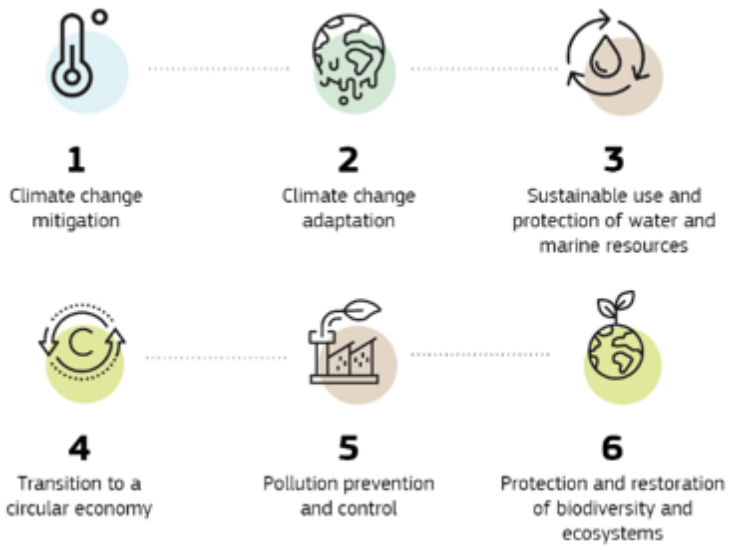
- The EU Taxonomy

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.

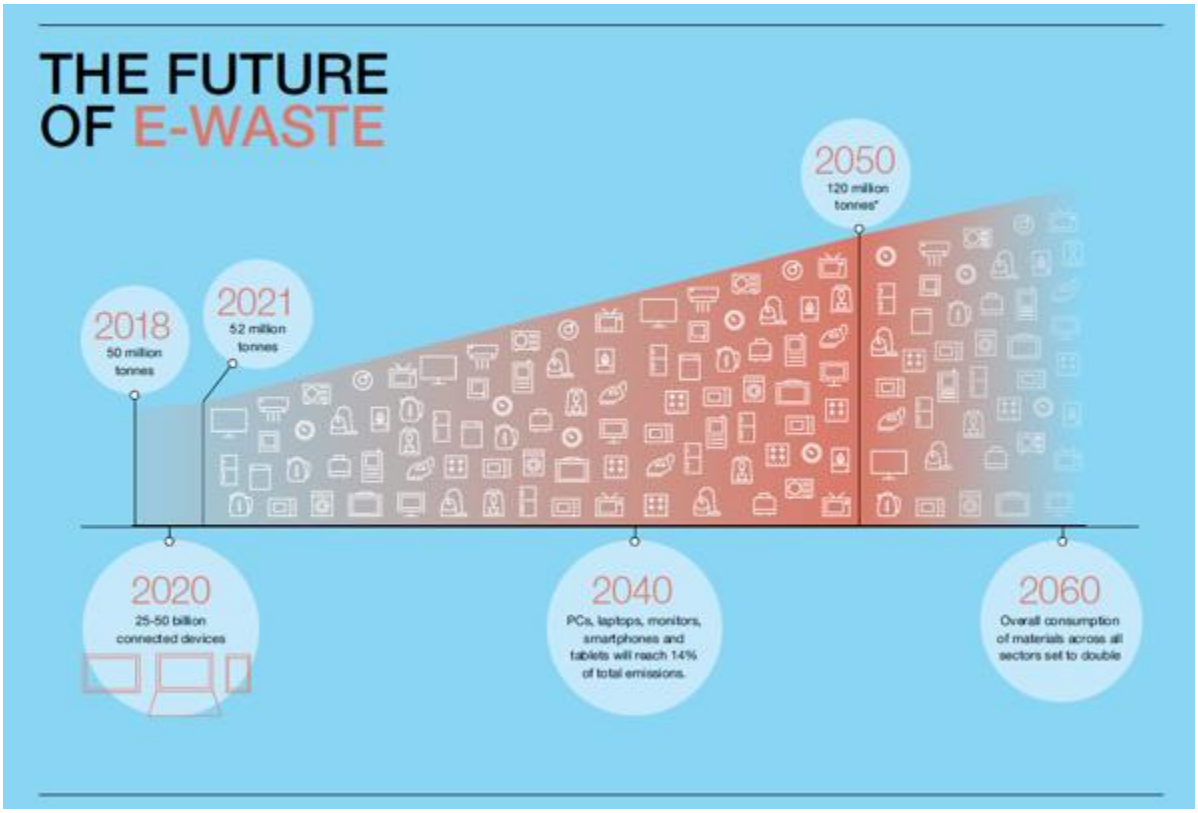
Principles and objectives for the EU Taxonomy (https://ec.europa.eu/sustainable-finance-taxonomy/)

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/)

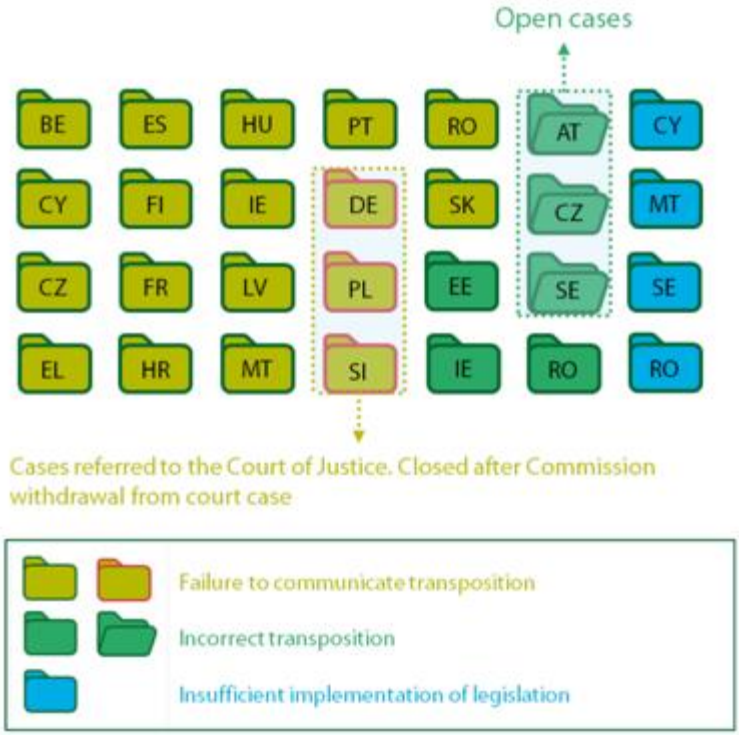


11.2. NATIONAL, REGIONAL AND LOCAL POLICIES

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.



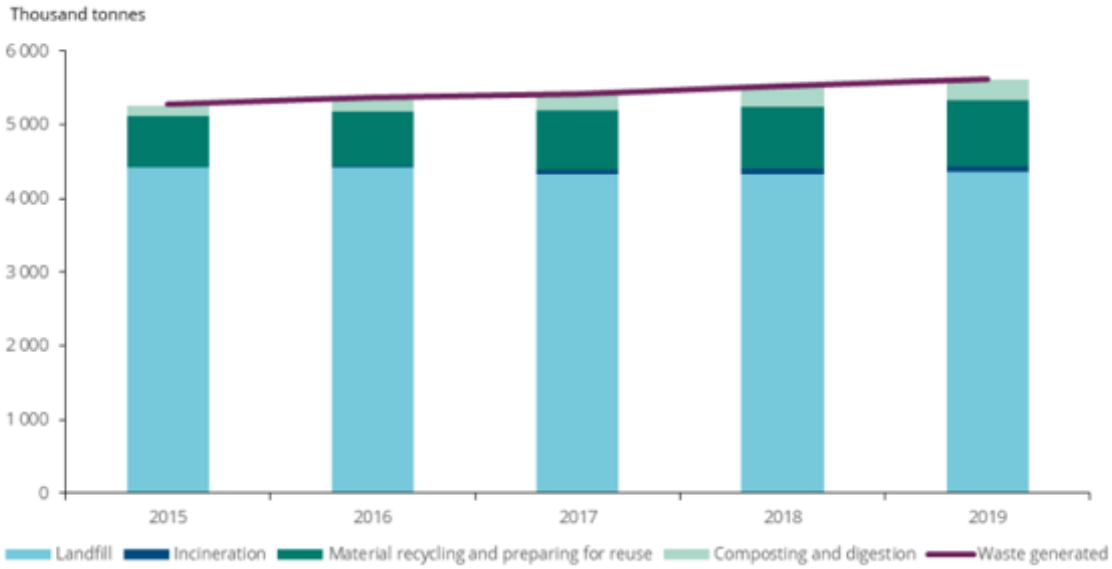
Infringement processes related to the WEEE Directive (EÚD_přezkum_04.pdf)

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.

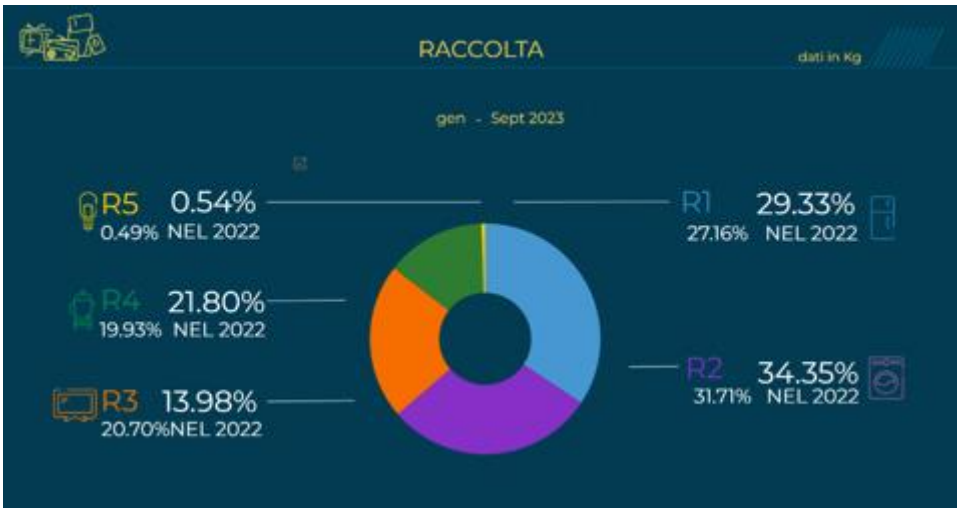
All economic operators performing collection and transport activities for separately collected waste electrical and electronic equipment must ensure optimum conditions are met such that the equipment collected can be prepared for reuse or recycling, including the isolation of dangerous substances in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

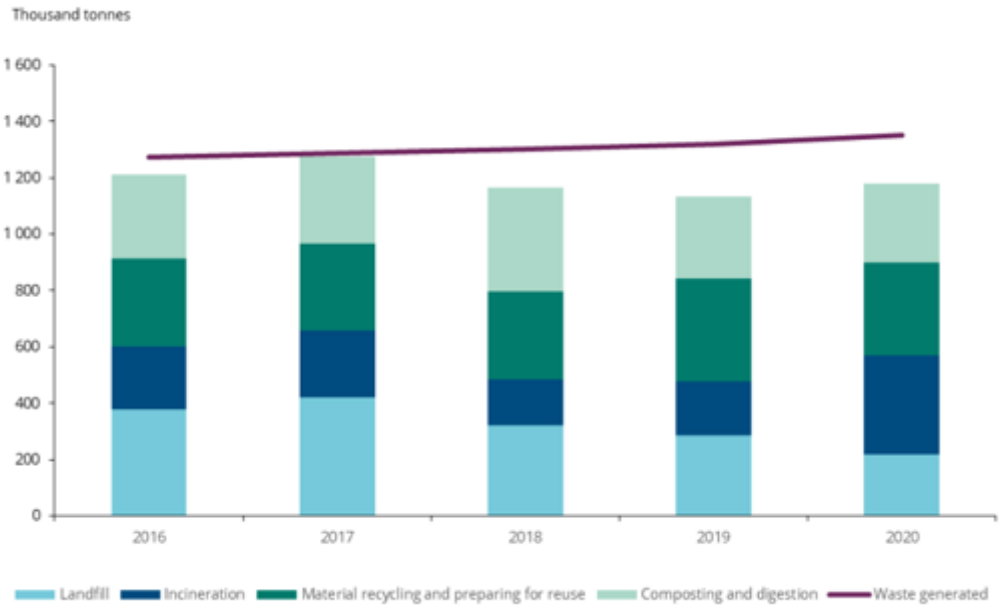
LITHUANIA

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.



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:

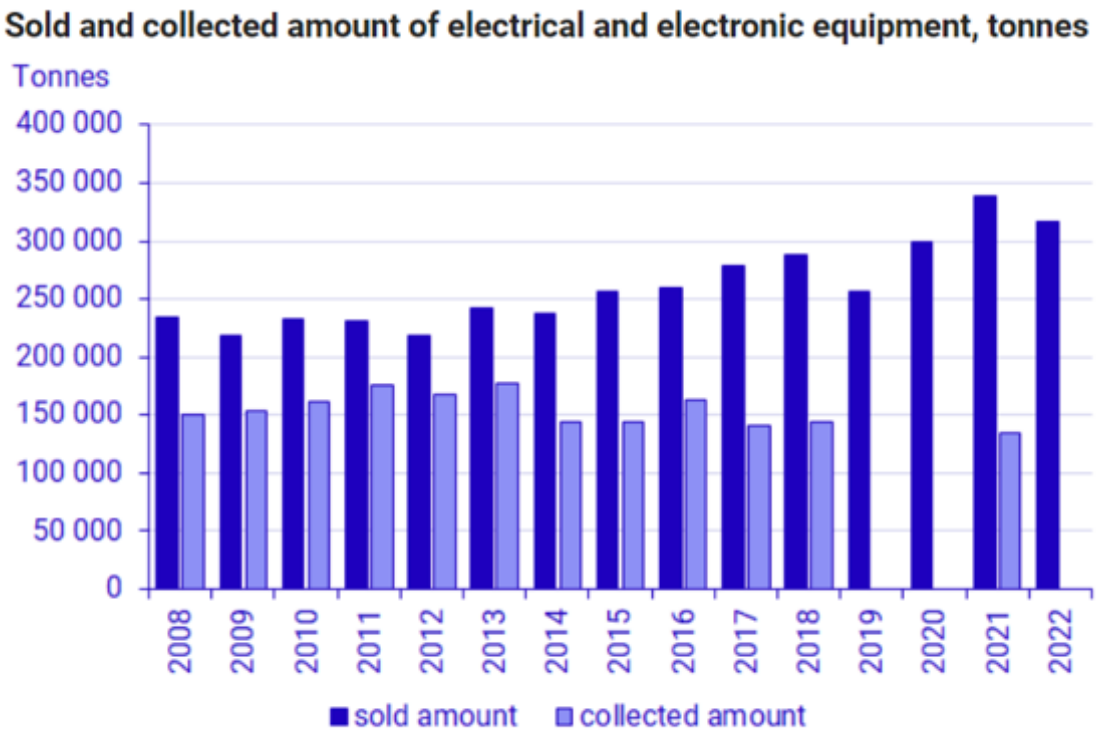
- assuming financial responsibility for waste electrical and electronic equipment (WEEE) from equipment sold in Sweden from 13 August 2005.
- assuming financial responsibility for WEEE from equipment sold in Sweden before 13 August 2005.

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.



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 n° 152-D/2017, 11 December. This diploma established the conditions for the organization and management of an Integrated Waste Electric and Electronic Equipment Management System (SIGREEE).

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

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).

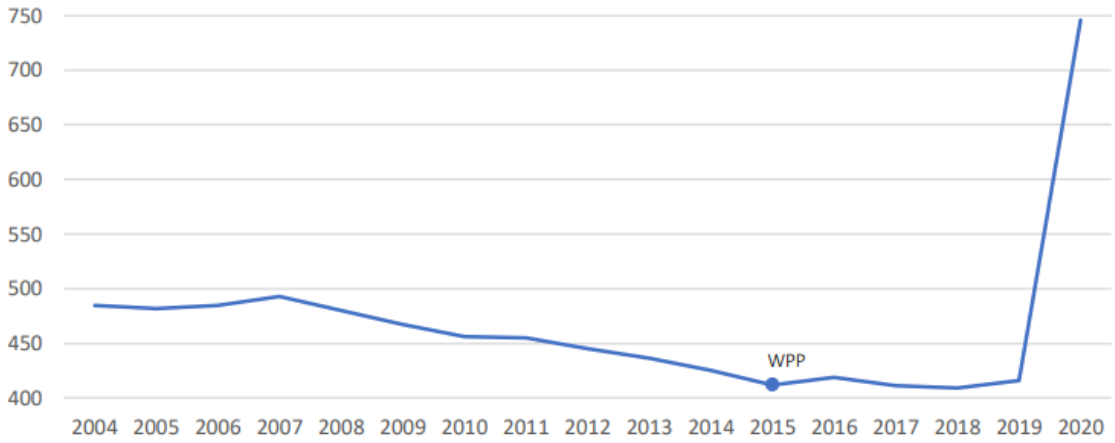
• Producers are to finance the take-back, sorting, and correct treatment of put on market for WEEE. • Retailers and municipalities to free of charge take back WEEE from households.

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-quantites 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 Oifigiuil 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 3Oth 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 in the field of e-waste is aimed at promoting a circular economy, where resources are maximized, and minimizing the negative impacts of e-waste on the environment and human health. Effective implementation of this legislation requires the cooperation of all levels of management, from local communities to international organizations, and a commitment to sustainable development and environmental responsibility.

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.

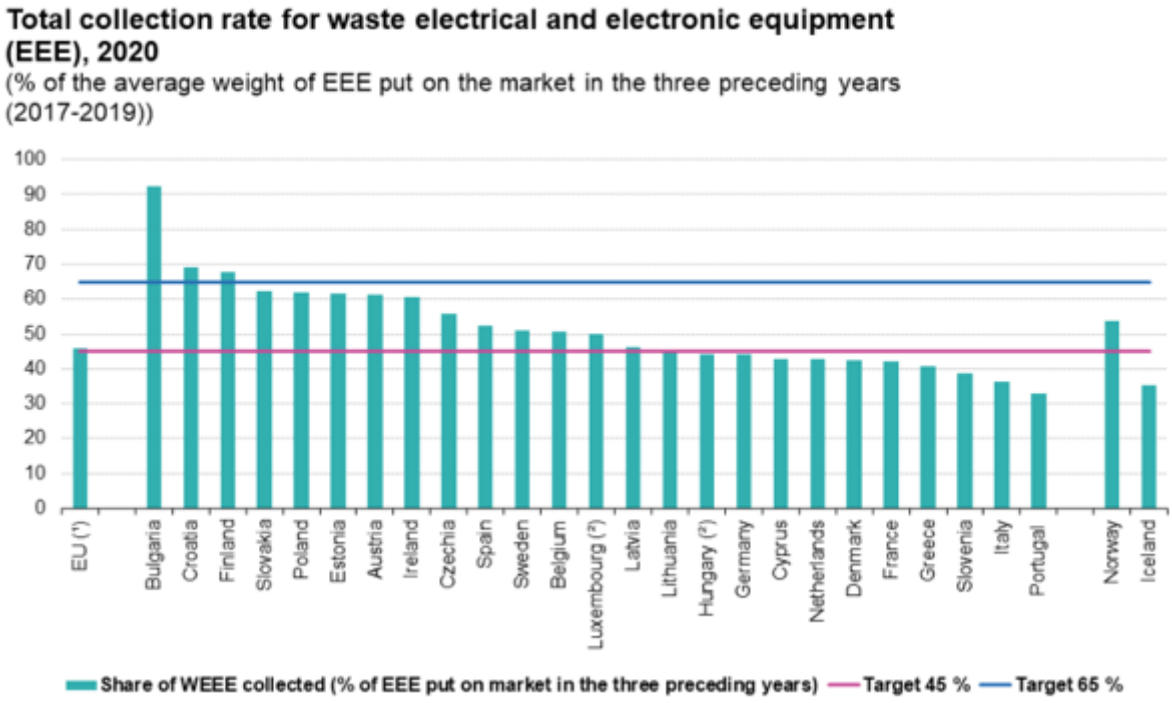
Generally, the Waste Act establishes the rights and obligations of persons in the field of waste management and regulates the obligations of waste generators (citizens, municipalities, towns and companies), the obligations of persons who collect, transport, treat, use and dispose of waste (landfills, 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%.



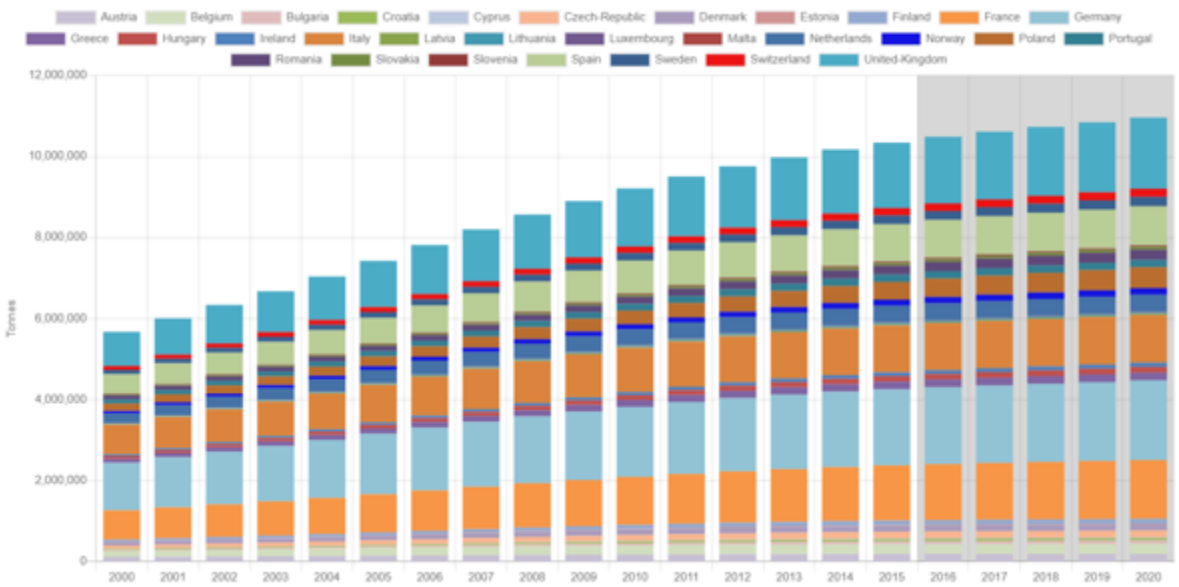
Source: Eurostat (online data code: env_waseleeos and env_waselee)

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.

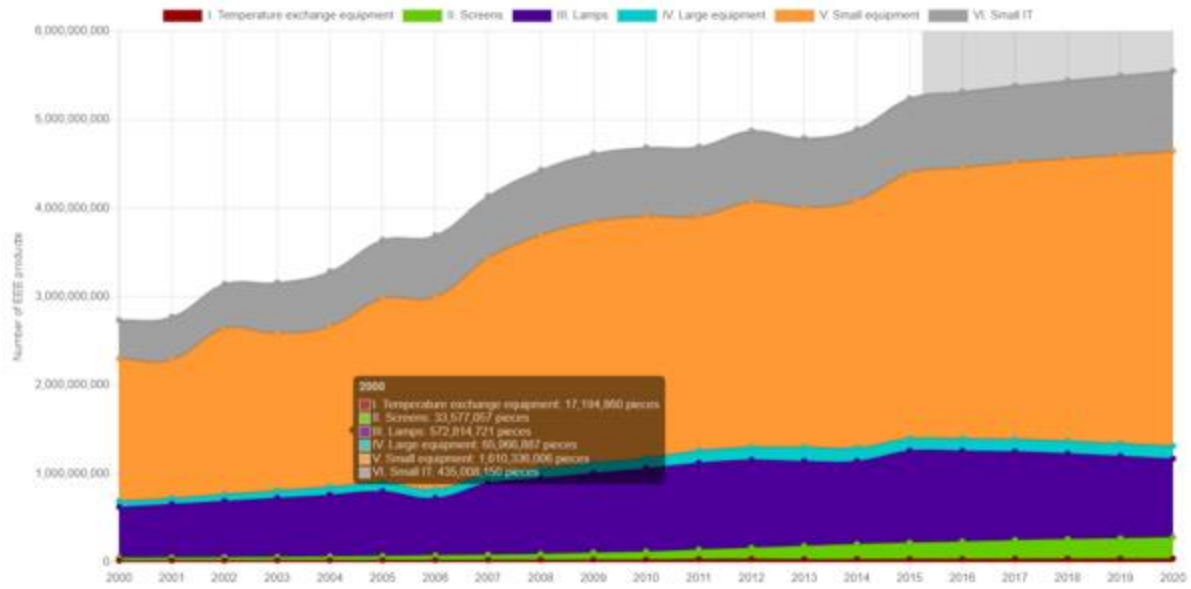
One of the obstacles in reaching collection targets is that considerable amounts of WEEE are diverted to other, undocumented WEEE flows. Unwanted WEEE flows need to be reduced and steered into the formal WEEE management regime. It is estimated that 1.4 Mt (2.7 kg/inhabitant) was collected with metal 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.

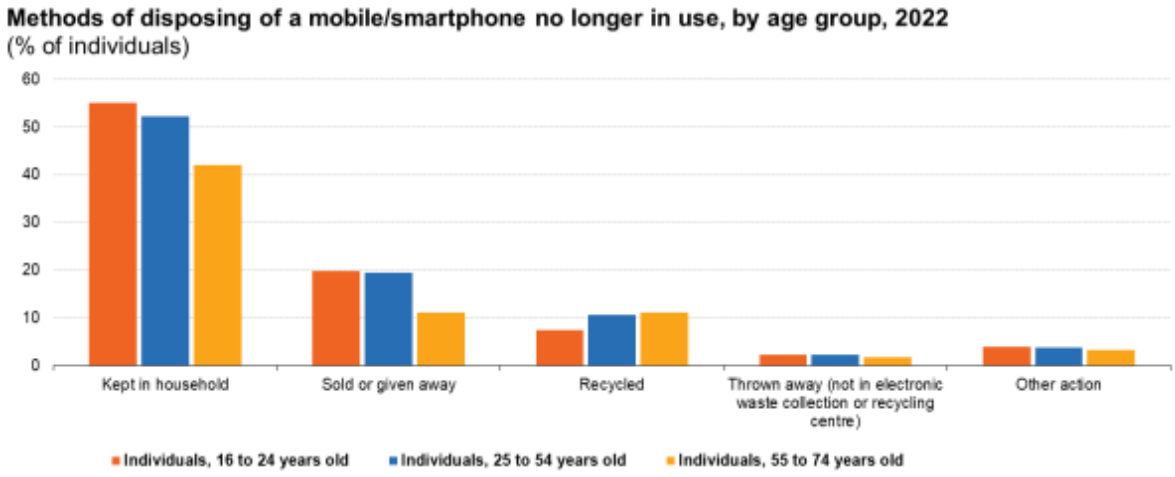


Number of EEE products - Waste Generated in EU28 + Norway and Switzerland.

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.



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 in 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 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.

Manufacture 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.


Norway
Finland
Russia
United Kingdom
Ireland
Denmark
Poland
Belarus
Germany
Ukraine
France
Romania
Kazakhstan
Mongolia
Italy
Spain
Portugal
Greece
Turkey
Uzbekistan
Kyrgyzstan
Turkmenistan
China
Syria
Iraq
Iran
Afghanistan
Pakistan
Morocco
Tunisia
Algeria
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Saudi Arabia
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Myanmar (Burma)
Western Sahara
Mauritania
Mali
Niger
Chad
Sudan
Oman
Yemen
Thailand
Vietnam
Bay of Bengal
Arabian Sea
Gulf of Aden
Guinea
Nigeria
South Sudan
Ethiopia
Somalia
Kenya
Malaysia
Gulf of Guinea
Gabon
DRC
Tanzania
Indonesia

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.

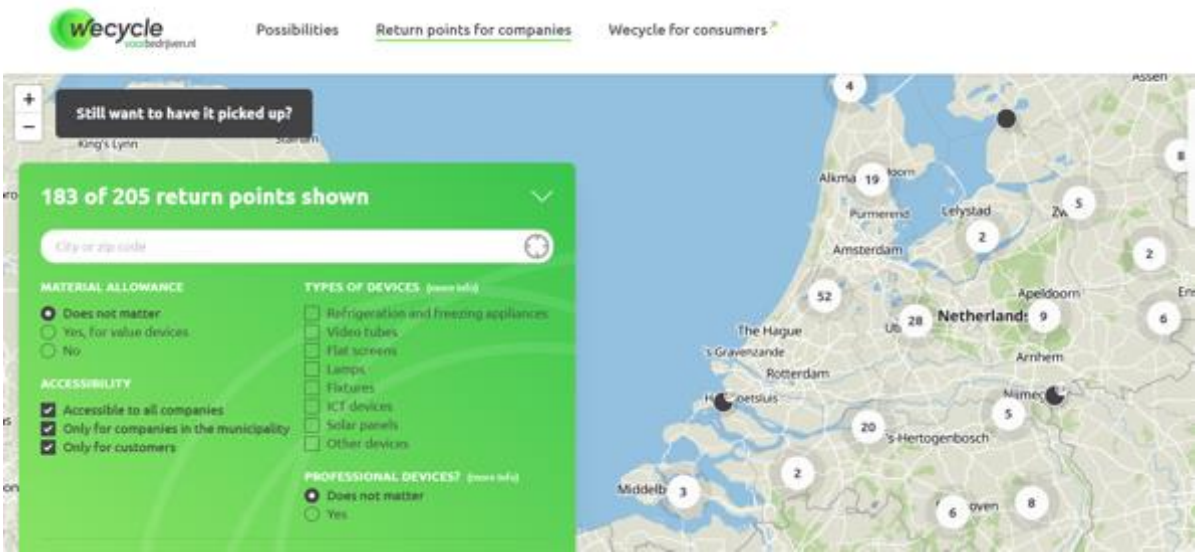
In 2022, the OPEN Foundation has collected a total of 159 million kilos of e-waste in collaboration with our chain partners. In addition, more than 11 million kilos were offered to certified processors via metal recyclers: 2% more than last year; a good start to our effort to minimize the most important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

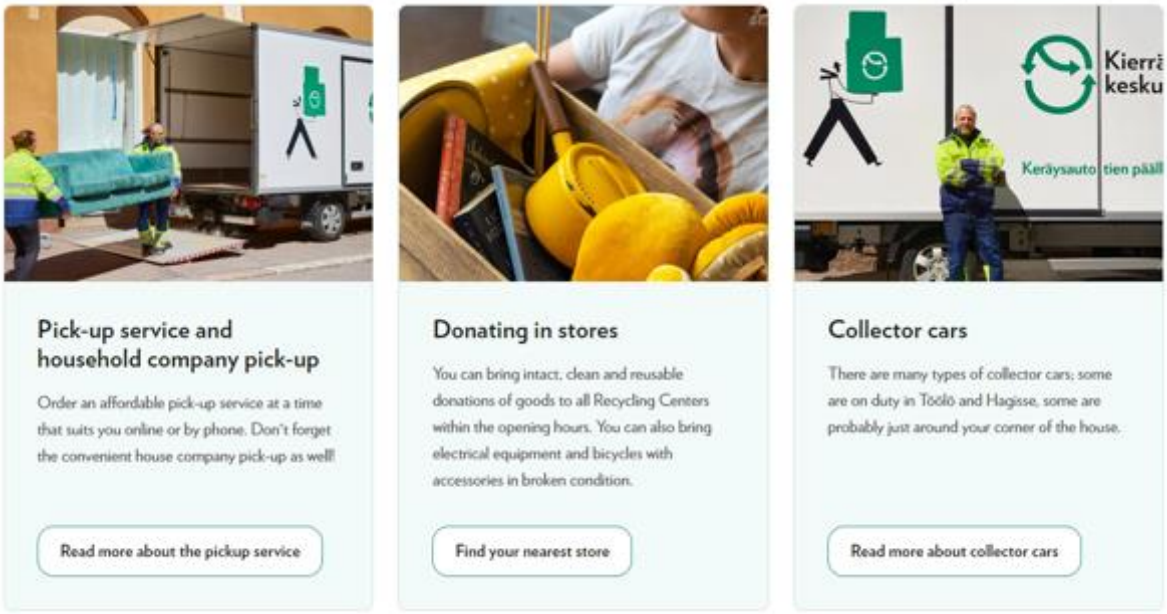
Introducion

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.

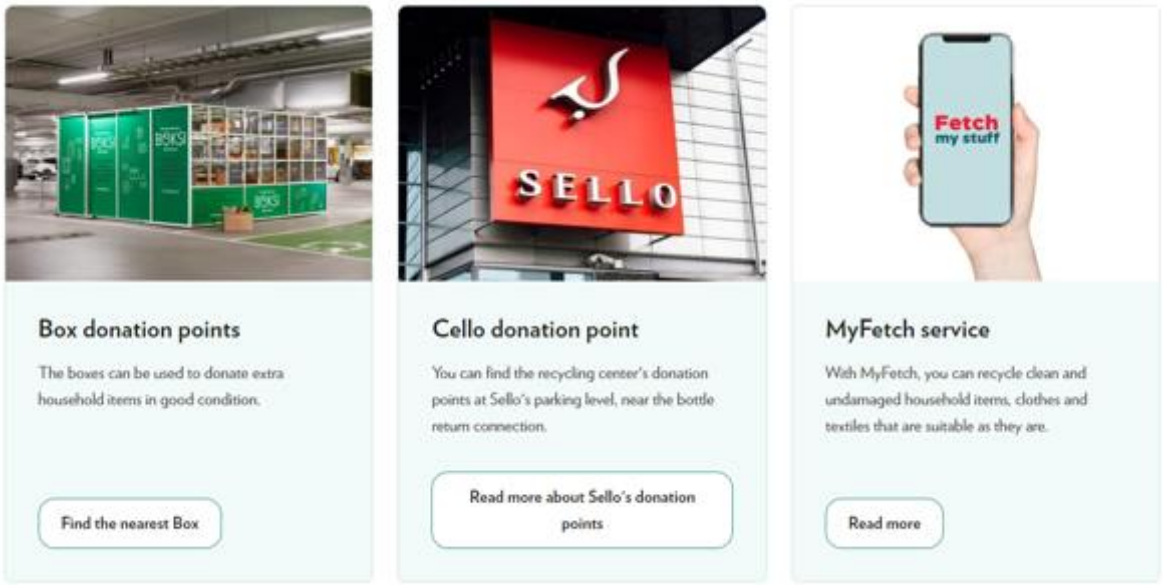
Citizens, companies and institutions can hand in small EEE (including laptops and chargers) in any of Kierratyskeskus´recycling centres. Kierratyskeskus also has a pick-up service for a small fee. Once or twice a year, the organisation plans a collection tour with 30 stops around the metropolitan area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



The recycling center's donation points 1



The recycling center's donation points 2

Best practice 6: Ö3-Wundertüte. AUSTRIA

Introduction

Ö3 Wundertute (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 recyling 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 know 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 form all

data-bearing devices. Then they then asses 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.

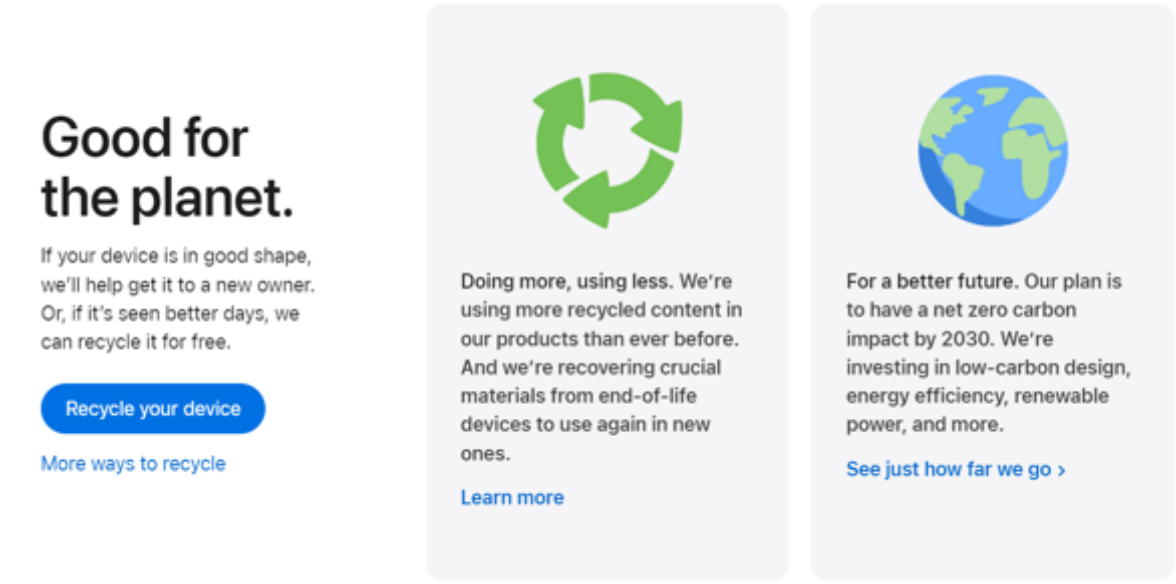
Key factors

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.



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 Fairephone'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

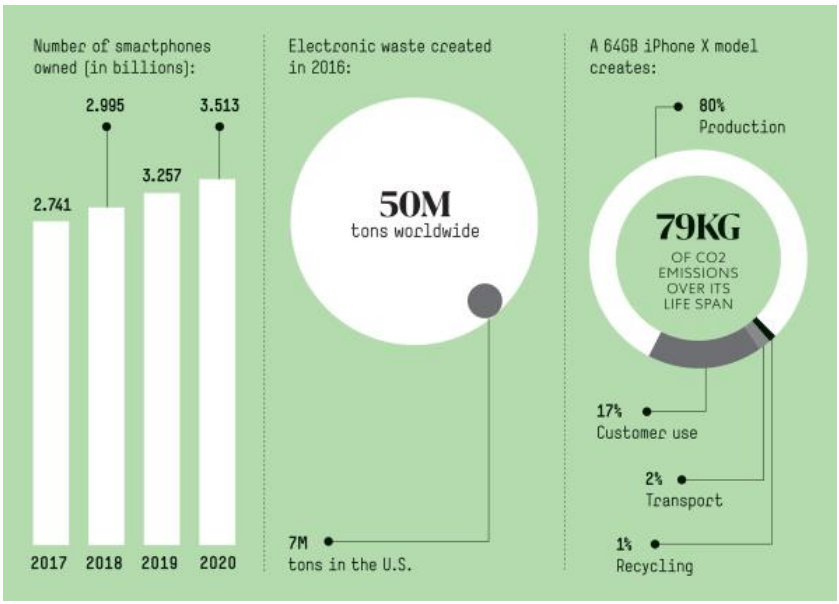
Introduction

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.

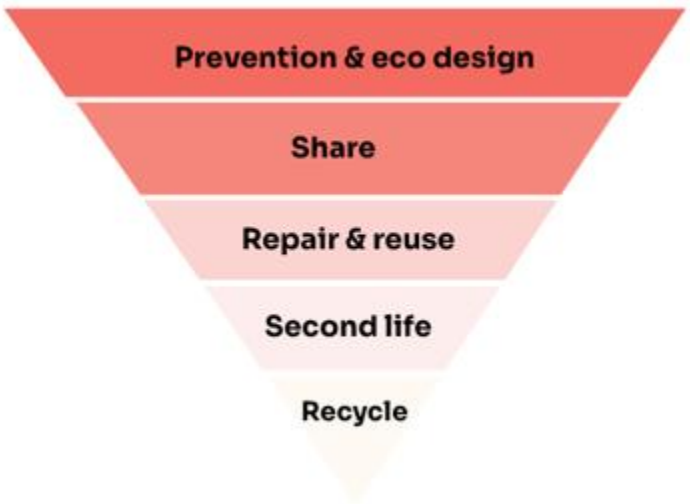
Bolt operates in over 500 cities in more than 45 countries in Europe, Africa, Western Asia, and Latin America. The company has more than 150 million customers and more than 3 million driver and courier partners.

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

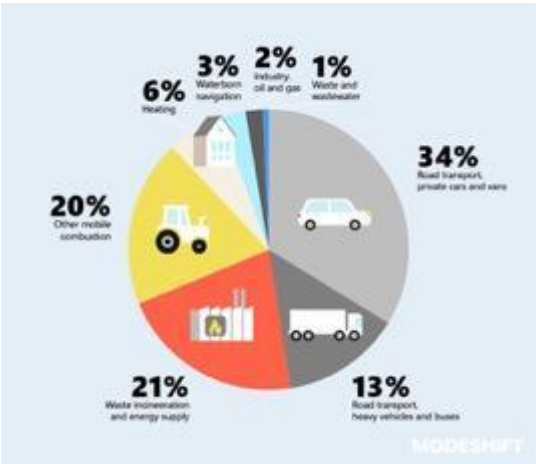
One of the projects where a certain percentage of the budget goes is to Bolt's e-scooters. This program consists in recycling the electric scooters that are at the end of the life cycle thus managing to reduce waste from hardware, thereby embedding circular economy principles across the scooter operations.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

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

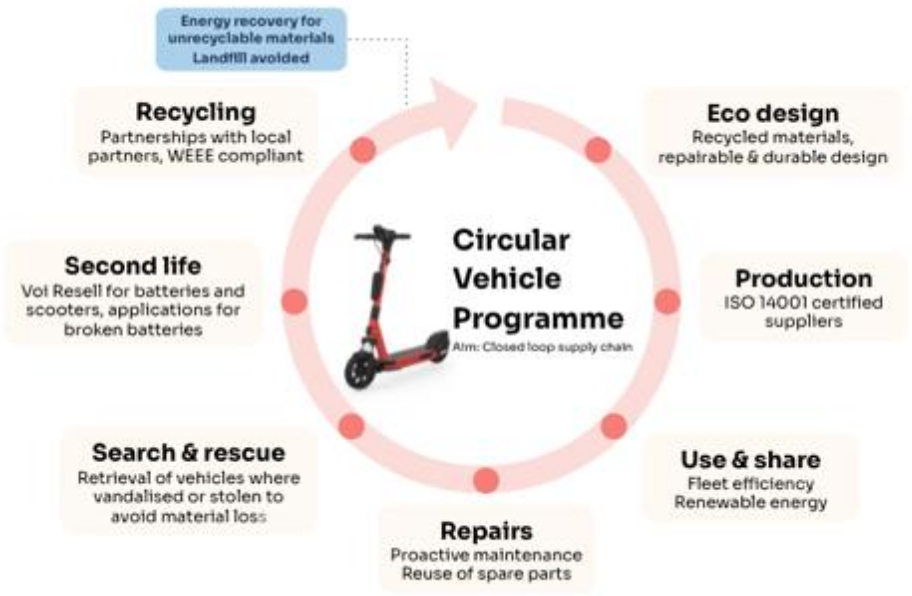
Voi, as a provider of electric scooters, falls under the category of producers of electrical and electronic equipment. As such, it has responsibilities under the Waste Electrical and Electronic Equipment (WEEE) regulations. These responsibilities include ensuring the correct disposal and treatment of 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 area 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, Union of Bulgarian Black Sea Local Authorities (UBBSLA) will be in charge of carrying out the pilot called WEEE BEHAVE, which will implement a competition and awareness campaign at schools and city halls, presenting the idea that cooperation is required at every level of the society.

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

School-Based Competition & Awareness Campaign

- Number of participating students: This measures the reach of the campaign within the school system.
- Number of participating schools: This shows how widespread the campaign is across the school district.
- Student engagement: This could be measured through surveys, focus groups, or observation of student participation in campaign activities.
- Changes in student attitudes and behaviors: This could be measured through pre- and post-campaign surveys or assessments of student knowledge and understanding of cooperation.
- Teacher involvement: This measures the level of support from teachers and their engagement in the campaign.

- Number of external organizations (NGOs, sponsors) supporting the campaign.

City Hall Awareness & Participation Campaign

- Number of participating city departments: This shows how many departments are involved in the campaign and committed to cooperation.
- Number of city hall employees involved: This measures the reach of the campaign within the city government.
- Changes in city hall policies and practices: This could be measured through an analysis of new policies or changes in existing ones that promote cooperation.
- Public awareness of the campaign: This could be measured through surveys or media coverage.
- Community engagement: This measures the level of participation from the wider community in campaign activities.
- Number of new policies or procedures introduced to improve cooperation between departments

Overall Campaign Impact & Long-Term Sustainability

- Number of campaign events and activities: This shows the level of activity generated by the campaign.
- Media coverage: This measures the amount of media attention the campaign receives, which can help to raise awareness and promote cooperation.
- Social media engagement: This measures the level of online interaction with the campaign, such as likes, shares, and comments.
- Partnerships: This measures the number of partnerships that are formed between schools, city hall, and other organizations as a result of the campaign.
- Sustainability: This measures the extent to which the campaign's impact continues beyond the pilot phase.

Also, UBBSLA 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.

14. 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.

15.REFERENCES

- 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
- Annarita Colasante , Idiano D'Adamo, Piergiuseppe Morone, Paolo Rosa (2021). Assessing the circularity performance in a European cross-country comparison. Elsevier. https://doi.org/10.1016/j.eiar.2021.106730
- 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 Environment Agency (2022). Early warning assessment related to the 2025 targets for municipal waste and packaging waste. https://www.eea.europa.eu/publications/many-eu-member-states/early-warning-assessment-related-to
- 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
- Langenbucher, Kristine and Marius Lüske (2022), "Trends and challenges in the Bulgarian labour market", in OECD, Reaching Out and Activating Inactive and Unemployed Persons in Bulgaria, OECD Publishing, Paris. https://doi.org/10.1787/1cf6f9f9-en
- 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
- MOEW, 2019, Waste composition 2019, (https://www.moew.government.bg/static/media/ups/tiny/%D0%A3%D0%9E%D0

%9E%D0%9F/%D0
%9C%D0%BE%D1%80%D1%84%D0%BE%D0%BB%D0%BE%D0%B3%D0%B8%D1%8F/%D0%9D%D0%
B0%D1%86%D0%B8%D0%BE%D0%BD%D0%B0%D0%BB%D0%BD%D0%BE%2022%20%D0%9E%D0% B1%D1%89%D0%B8%D0%BD%D0%B8.xls

- OECD (2016), Extended Producer Responsibility: Updated Guidance for Efficient Waste Management, OECD Publishing, Paris. DOI: http://dx.doi.org/10.1787/9789264256385-en
- Republic of Bulgaria, 2003, Waste Management Act.
- 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,kg%2Finhabitant)%20in%202021
- Sitnikov, Catalina Soriana et al. (2023). Performance of EU Countries in Managing Electrical and Electronic Equipment Waste in the Context of the Circular Economy, Amfiteatru Economic, ISSN 2247-9104, The Bucharest University of Economic Studies, Bucharest, Vol. 25, Iss. 62, pp. 115-133, https://doi.org/10.24818/EA/2023/62/115
- 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/
- World Bank Group (2019). BULGARIA SPENDING REVIEW. Public Disclosure Authorized Public Disclosure Authorized Public Disclosure Authorized Improving Efficiency and Effectiveness of Waste Management Spending. https://documents.worldbank.org/en/publication/documents-reports/documentdetail/177091548920144916/bulgaria-spending-review-improving-efficiency-and-effectiveness-of-waste-management-spending