# National E-waste Monitor 2024

KYRGYZSTAN

Funded and supervised by:

Federal Ministry
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Nuclear Safety and Consumer Protection

Umwelt Bundesamt

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KYRGYZSTAN

# Colophon

This report was prepared through a collaborative effort involving the United Nations Institute for Training and Research, the Ministry of Natural Resources, Ecology and Technical Supervision of the Kyrgyz Republic, and the Center "Cooperation for Sustainable Development."

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# List of abbreviations

| ABBREVIATIONS | |
|---|---|
| CIS | Commonwealth of Independent States |
| CSD | Center Cooperation for Sustainable Development |
| EAEU/EEU | Eurasian Economic Union |
| EEE | Electrical and electronic equipment |
| EEE POM | Electrical and electronic equipment placed on the market |
| EPR | Extended Producer Responsibility |
| ESM | Environmentally Sound Management |
| EU | European Union |
| E-waste/WEEE | Waste electrical and electronical equipment |
| GDP | Gross Domestic Product |
| Inh | Inhabitant |
| HS Code | Harmonised System Code |
| kg | kilogram |

| ABBREVIATIONS | |
|---|---|
| kt | (Metric) kiloton, or 1,000,000 kg |
| MSW | Municipal Solid Waste |
| Mt | Million metric tons, or 1,000,000,000 kg |
| NGO | Non-governmental organization |
| ppi | pieces per inhabitant |
| PPP | Purchasing Power Parity |
| SDGs | Sustainable Development Goals |
| SMEs | Small and medium-sized enterprises |
| SSP | Common socioeconomic pathways |
| UNECE | UN Economic Commission for Europe |
| UNITAR | United Nations Institute for Training and Research |
| UNU | United Nations University |
| VAT | Value Added Tax |

# Executive summary

**With a global generation of 53.6 million metric tons (Mt) in 2019 [1], e-waste is one of the fastest growing waste streams in the world. E-waste contains both harmful substances and rare and valuable materials, which can lead to environmental, sanitary, and economic problems if not managed in an environmentally sound manner.**

According to the *Regional E-Waste Monitor for the CIS + Georgia - 2021* [2], the volume of e-waste generation in Kyrgyzstan in 2019 was 10 kilotons (kt) per year, or 1.5 kilograms (kg) per person per year. However, the level of official collection and recycling of e-waste is very low, around 0.1%. For Kyrgyzstan, as for many countries of the world, the problem of collection and recycling of e-waste is an urgent one.

***Kyrgyzstan generated 10kt of e-waste in 2019.***

**Waste and e-waste policies and legislation in Kyrgyzstan**

The state policy of Kyrgyzstan in the field of waste management is defined in the National Development Strategy of the Kyrgyz Republic for 2018 - 2040 [3], as well as in the National Development Program of the Kyrgyz Republic until 2026 [4]. The National Development Strategy provides for the adoption of measures to reduce waste generation, on recycling, reuse, and safe disposal of waste. The document also stipulates the need to introduce economic mechanisms aimed at the development of recycling, with the recovery of valuable materials, including from e-waste. The National Development Program introduces systematic solutions of waste recycling issues, low-waste and resource-saving technologies, and other objectives of environmental policy.

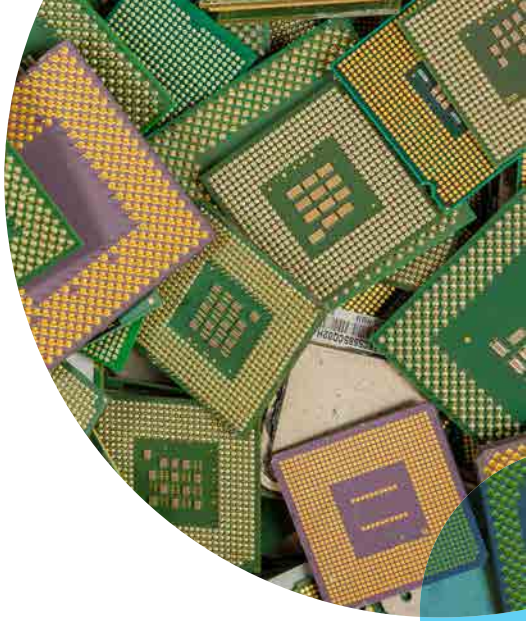
***The Law on Production and Consumption Waste of 2023 regulates the issue of waste management in Kyrgyzstan, including e-waste.***

The issue of e-waste management is regulated by the general legal framework on waste management. The main normative legal act of Kyrgyzstan in this field is the new Law on Production and Consumption Waste adopted in August 2023 [5]. This Law defines the basic principles of state policy in the field of waste management and establishes requirements for waste management, including hazardous waste, licensing of activities in this area, state accounting[1] and maintenance of the waste cadastre. An important innovation of this Law is to ensure compliance with recycling standards by entities engaged in the production of goods on the territory of Kyrgyzstan, and with the import of goods from underdeveloped countries or import of goods from member states of the Eurasian Economic Union (EEU), including through treatment fees paid by producers and importers.

Environmental safety in the field of production, consumption, and waste management is regulated by the Law of May 8, 2009 N° 151 General technical regulations to ensure environmental safety in the Kyrgyz Republic [6]. The technical regulation establishes requirements for the national register of waste disposal facilities, preparation of passports[2] of hazardous waste, permitting system for transboundary movement of waste, and others.

[1] State accounting in the field of waste management is conducted by the National Statistical Committee on the basis of reports of legal entities and individuals on waste generated, treated, recycled, transferred to other persons or received from other persons, as well as disposed wastes.

[2] A document certifying the quantitative and qualitative characteristics of the waste.



Specific requirements for e-waste management are regulated by the Resolution of the Government of the Kyrgyz Republic dated December 28, 2015 No. 885 Procedure for handling hazardous waste in the territory of the Kyrgyz Republic [7]. This document establishes requirements for the management of certain types of hazardous waste, including mercury-containing waste and waste batteries. The requirements define the conditions for collection, storage, transportation, and accounting of these hazardous wastes.

***Specific requirements for mercury-containing waste and waste batteries management are defined by a Resolution of the Government of Kyrgyz Republic.***

Kyrgyzstan does not have national standards relating to e-waste management. Several interstate standards, which regulate the sphere of waste management, have been adopted in the country as national standards [2]:

- GOST 30772-2001 Resource saving. Waste management. Terms and definitions.
- GOST 30773-2001 Resource saving. Waste management. Stages of the technological cycle. Basic provisions.
- GOST 30775-2001 Resource saving. Waste management. Classification, identification and coding of wastes. Basic provisions.

**Infrastructure for e-waste management in Kyrgyzstan**

The e-waste collection and recycling sector in Kyrgyzstan is currently undeveloped. There are only a few individual companies that collect and dismantle e-waste and then transfer it for recycling (Annex 1).

The country faces various urgent problems in the field of e-waste collection and recycling, including:

- the lack of specific legislative requirements for e-waste management.
- the lack of developed infrastructure for collection of e-waste from the population and for e-waste recycling technologies.
- the activities of the informal sector for e-waste recycling.
- the lack of support measures for e-waste collection and recycling enterprises.
- the low level of public awareness of the importance of separate collection and recycling of e-waste.
- the lack of a system of collection and processing of statistical data on e-waste collection and recycling, which complicates the process of monitoring and control of this activity.

### E-waste projection until 2050

The volume of e-waste generated in Kyrgyzstan is expected to continue growing. According to UNITAR data, the annual growth of e-waste generation will be approximately 500 tons and will reach almost 26 kt per annum by 2050, more than double that of 2019. This emphasises the importance of taking decisive measures to improve e-waste management in Kyrgyzstan in order to reduce the negative impact on the health and environment and effectively use the resource potential of e-waste.

***E-waste generated in Kyrgyzstan is expected to reach 26 kt per annum by 2050.***

The e-waste management system in Kyrgyzstan can develop according to two scenarios: “Business as Usual,” characterised by no change to the current situation, or “Circular Economy,” characterised by constant improvement in overall e-waste management. Both scenarios include opportunities and challenges for the country, which are determined by their respective impact of hazardous constituents on the environment and human health, reuse of valuable materials, and overall environmental and socioeconomic damage.

In the “Business as Usual” scenario, the total accumulated amount of unmanaged e-waste from 2023 to 2050 could reach 554 kt, while the “Circular Economy” scenario would reduce the total amount of unmanaged e-waste to 225 kt, ensuring the recovery and recycling of 136.1 kt of valuable materials and reducing greenhouse gas emissions by 100%.

E-waste management can have significant economic benefits by reducing production costs, creating revenue opportunities from recycling valuable materials, reducing disposal costs and fines, and stimulating economic growth through sustainable resource use. Realisation of the “Circular Economy” scenario will achieve a positive economic effect in the e-waste management system in Kyrgyzstan in the amount of USD $18 million, while the “Business as Usual” scenario may result in costs of USD $82 million between now and 2050.

Thus, the results of the “Business as Usual” and “Circular Economy” scenarios projections clearly demonstrate the importance of moving toward a sustainable e-waste management system and show that the introduction of measures aimed at improving resource efficiency and reducing waste can lead to significant economic, environmental, and social gains.

### Measures to develop e-waste management

To achieve such approaches, Kyrgyzstan needs to take measures to improve legislation and statistics and to develop infrastructure, technologies, and measures to support the collection and recycling of e-waste. Important measures to be taken include the development of financial incentives for e-waste recycling, including the improvement of the new system of extended producer responsibility (EPR), as well as raising public awareness. This report presents recommendations and a practical national roadmap for environmentally sound management of future e-waste, developed through national stakeholder dialogues.

# Chapter 1.
# Introduction

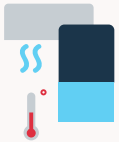
## A. WHAT IS E-WASTE AND WHY DOES IT NEED ATTENTION?

Electrical and electronic equipment (EEE) includes a wide range of products, including nearly all household or business items with circuitry or with electrical components that have a power or battery supply, such as basic kitchen appliances, toys, and devices for listening to music, as well as information and communication technology items such as mobile phones, laptops, etc. EEE is also increasingly used in transport, health, and security systems, as power generation equipment, and in more traditional products such as clothing and furniture [1].

EEE becomes e-waste once it has been discarded by its owner as waste without the intent of reuse [8]. E-waste, also commonly referred to as waste electrical and electronic equipment (WEEE), encompasses a wide range of products that can be categorised in different ways, including by product type or size.

However, in global practice, for statistical purposes, WEEE is classified by similar functions, comparable material composition, average weight, and similar end-of-life attributes. The report, *E-waste Statistics Guidelines on Classification, Reporting and Indicators - Second Edition*, divides EEE into 54 different product-based categories referred to as UNU-KEYs (Annex 2) [9]. The 54 EEE product categories are grouped into six general categories that correspond closely to their waste management characteristics. This categorisation is compliant with the European Union Waste Electrical and Electronic Equipment Directive (WEEE Directive) (Figure 1).

**Figure 1.** Six categories of EEE that correspond closely to their waste management characteristics



**1. Temperature exchange equipment:**
more commonly referred to as cooling and freezing equipment. Typical equipment includes refrigerators, freezers, air conditioners, and heat pumps.

**2. Screens and monitors:**
typical equipment includes televisions, monitors, laptops, notebooks, and tablets.

**3. Lamps:**
typical equipment includes fluorescent lamps, high intensity discharge lamps, and LED lamps.

**4. Large equipment:**
typical equipment includes washing machines, clothes dryers, dishwashing machines, electric stoves, large printing machines, copying equipment, and photovoltaic panels.

**5. Small equipment:**
typical equipment includes vacuum cleaners, microwaves, ventilation equipment, toasters, electric kettles, electric shavers, scales, calculators, radio sets, video cameras, electrical and electronic toys, small electrical and electronic tools, small medical devices, small monitoring, and control instruments.


**6. Small IT and Telecommunication equipment:**
typical equipment includes mobile phones, Global Positioning System (GPS) devices, pocket calculators, routers, personal computers, printers, and telephones.

E-waste is one of the fastest growing waste streams globally, resulting from the high consumption rate of such equipment, short product lifecycles, and lack of repair options.

### Hazardous materials in e-waste

This waste stream poses a threat to the environment and can have adverse effects on climate change and human health if not treated properly, as the waste contains many hazardous materials and substances, including heavy metals, chemicals, and flame retardants [1]. For example, gas discharge lamps and backlighting of older flatscreen displays contain mercury, and monitors and television sets with cathode ray tubes contain lead. EEE may also contain polyvinyl chloride (PVC) and polytetrafluoroethylene (PTFE), which adversely affect the respiratory mucosa membranes and the central nervous and reproductive systems. Printed circuit boards (and other plastic components) contain brominated flame retardants (BFRs) such as tetrabromobisphenol-A (TBPA) or polybrominated diphenyl ethers (PBDEs). Certain EEE may contain beryllium, mercury, cadmium, and gallium arsenide (GaAs), which are hazardous substances to human health and the environment. Temperature exchange equipment, such as refrigerators and air conditioners, contains substances that are harmful to the ozone layer such as chlorofluorocarbons (CFCs) and hydrochlorofluorocarbons (HCFCs) and that are greenhouse gases such as CFCs, HCFCs, hydrofluorocarbons (HFCs), and others.

However, e-waste also represents an economic and environmental opportunity through the recovery of valuable materials, thus avoiding the waste of natural resources and energy, securing the supply of raw materials for industry, and reducing the environmental impact while providing job opportunities. Specifically, e-waste can contain precious metals such as gold, copper, and nickel, as well as rare materials of strategic value such as indium and palladium [1]. As such, it is essential to improve the environmentally sound management of e-waste at the global level.

## B. KYRGYZ CONTEXT

Kyrgyzstan is a state in Central Asia. The area of the territory is 199,945 km$^2$. According to the National Statistical Committee of the Kyrgyz Republic, the country's population as of January 1, 2023 was 7,037,600 people [10]. The population density is 35.2 people per 1 km$^2$. The major cities of the country are the capital city of Bishkek as well as Osh and Jalal-Abad.

Annually, 1-1.3 Mt of municipal solid waste (MSW)[3] is generated and collected[4] in Kyrgyzstan, but the system of separate waste collection is poorly developed. The total volume of waste generated as a result of manufacturing of goods (production waste), as well as in the course of human activity (consumption waste[5]), in 2021 amounted to 213.6 kt (Table 1). The rate of waste treatment (recovery[6], disposal) at companies, where the waste was generated, and transfer to other companies for treatment, amounted to 3.1%. This indicator decreased by 2.6 percentage points from 2020.

Generation (collection) of MSW in 2021 was 185 kg/capita, which is 16 percentage points higher than in 2017. By comparison, in Kazakhstan this indicator in 2021 amounted to 222 kg/capita, which is 20 percentage points higher than in Kyrgyzstan.

**Table 1.** Data on production and consumption waste in Kyrgyzstan for 2017 - 2021 [11]

| | 2017 | 2018* | 2019 | 2020 | 2021 |
|---|---|---|---|---|---|
| Waste generation, kt/year | 12,654 | 182,739 | 151,841 | 114,117 | 213,639 |
| Municipal solid waste (household garbage) collection, kt/year | 982 | 1,048 | 1,148 | 1,176 | 1,230 |
| Waste treatment (recovery, disposal) at companies, where the waste was generated, transfer to other companies for treatment kt/year | 5,134 | 4,702 | 6,081 | 6,550 | 6,523 |
| Rate of waste treatment at companies (recovery, disposal), transfer to other companies for treatment, % | 40.6 | 2.6 | 4 | 5.7 | 3.1 |
| Waste generation per capita, kg | 2,061 | 30,116 | 24,485 | 18,042 | 33,190 |
| Generation (collection) of municipal solid waste per capita, kg | 160 | 168 | 180 | 180 | 185 |

** from 2018 - including waste from mining dumps*

[3] Data are based on solid waste disposal volume (see Table 1).
[4] The volume of MSW generation is the volume of collected and transported MSW from waste collection places (garbage cans, containers, etc.).
[5] Consumption waste - products, materials, and substances that have lost their consumer qualities due to physical or moral wear and tear. Consumption waste also includes solid domestic waste, which arises in the process of human activity [5]. Thus, e-waste is classified as consumer waste. However, there is no specific list of consumption waste.
[6] For the purpose of this publication, recovery includes recycling and energy recovery.

The sharp jump in waste generation between 2017 and 2018 is due to a change in methodology: from 2018 on, the statistical data on production and consumption waste generation has included data on waste from mining dumps. Waste from mining dumps is very rarely exposed to the waste treatment (recovery) process, which, as a result, significantly reduces general rates of waste treatment. As of 2021, 99.7% of production and consumption waste in Kyrgyzstan was generated in the mining sector (Table 2).

At the end of 2021, there were 2.6 billion tons of production and consumption wastes in Kyrgyzstan (Table 3), of which hazardous wastes amounted to 2.4 billion tons. The majority of hazardous waste (2.2 billion tons or 91.7%) is classified as low-hazardous waste (hazard class IV waste, see section 4.a.iii for the classification of hazardous waste).

**Table 2.** Cumulative volume of production and consumption waste by types of economic activity in 2021 [11]

| TYPES OF ECONOMIC ACTIVITY | CUMULATIVE VOLUME OF WASTE, kt/YEAR | SHARE OF ECONOMIC ACTIVITY IN CUMULATIVE VOLUME OF WASTE, % |
|---|---|---|
| Mining | 2,582,753 | 99.7 |
| Manufacturing industry | 1,550 | 0.06 |
| Electricity, gas and air conditioning supply | 5,410 | 0.2 |
| Water supply, cleaning, waste treatment and recovery of secondary raw materials | 0.7 | 0 |
| Construction | 0 | 0 |
| Professional, scientific and technical activities | 0 | 0 |
| Total: | 2,589,713 | 100 |

*Note: statistical data on waste in other types of economic activities (agriculture, wholesale and retail trade, etc.) is not available.*

Table 3 presents data on the cumulative volume of production and consumption waste, including hazardous waste for 2017 - 2021 based on data from the National Statistical Committee of Kyrgyzstan.

**Table 3.** Cumulative volume of production and consumption waste in Kyrgyzstan, including hazardous waste, broken down by waste hazard classes for 2017 - 2021 [11][12]

| | 2017* | 2018 | 2019 | 2020 | 2021 |
|---|---|---|---|---|---|
| Production and consumption waste, kt/year<br>*They include:* | 128,420 | 2,130,054 | 2,275,789 | 2,383,153 | 2,589,713 |
| Waste of the first hazard class (extremely hazardous) | 0.3 | 0.3 | 0.3 | 0.3 | 0.2 |
| Waste of the second hazard class (highly hazardous) | - | 126,873 | 129,167 | 134,313 | 139,345 |
| Waste of the third hazard class (moderately hazardous) | 25.8 | 17.4 | 39.6 | 46.6 | 40.1 |
| Waste of the fourth hazard class (mildly hazardous) | - | - | 2,000,832 | 2,141,421 | 2,243, 758 |

** 2017: without waste from mining dumps*

Table 4 presents data on hazardous waste generation (I-III hazard classes) per capita. For the period 2017 - 2021, there is a decrease in the generation of hazardous waste of I-III hazard classes by 10%. In 2021, 11,291 kt of hazardous waste was generated, with 57% of it treated. Thus, Kyrgyzstan has achieved high indicators of hazardous waste treatment, including through treatment of medical waste, mercury lumps, and other types of hazardous e-waste on local enterprises.

**Table 4.** Hazardous waste generation and rate of recycling hazardous waste for 2017 - 2021 [13]

| | 2017 | 2018 | 2019 | 2020 | 2021 |
|---|---|---|---|---|---|
| Hazardous waste generation (I-III hazard classes), kt | 12,610 | 12,003 | 11,223 | 11,546 | 11,291 |
| Hazardous waste generation per capita, kg | 2,016 | 1,879 | 1,720 | 1,755 | 1,673 |
| Rate of treated hazardous waste, % | 40 | 39 | 54 | 56 | 57 |
| Rate of disposed hazardous waste, % | 0 | 0.1 | 0.1 | 0 | 0.1 |

However, the waste management system in Kyrgyzstan requires active development. There are many problems related to the introduction of separate waste collection, collection of separate statistical data on production and consumption waste and their processing, handling of specific types of waste, etc. There are no official statistics on e-waste collection and recycling in Kyrgyzstan, which complicates the monitoring and control of these activities.

This publication presents UNITAR data on e-waste, which is summarised in Chapter 4c and Table 10.

## C. ABOUT THIS REPORT

This report is intended for national stakeholders involved in e-waste management in Kyrgyzstan: public authorities and the economic sector, the (interested) general public, non-governmental organisations (NGOs), academia, and stakeholders in e-waste based in other countries. The report starts with a brief description of the methodology employed herein in Chapter 2. To create long-term projections out to 2050, existing regional statistics from the *Regional E-Waste Monitor for the CIS + Georgia - 2021* [2] on EEE placed on the market, lifespans, e-waste generated, and collection and recycling of e-waste were used. The international context of e-waste management is described in Chapter 3. Chapter 4 discusses the current situation of e-waste management in Kyrgyzstan. Chapter 5 details challenges and opportunities and sets out the directions of development of the e-waste management system in Kyrgyzstan out to 2050 under two contrasting scenarios, focusing on the associated opportunities for preventing environmental and health impacts and recycling valuable materials. The two contrasting scenarios have been developed based on one variant of target indicators of the UNITAR tool:

1. The “Business as Usual” scenario, which represents current consumption, lifespan, and disposal patterns extrapolated out to 2050, adjusted for economic and demographic factors.
2. The “Circular Economy” scenario, in which product lifespans are projected to increase due to more reuse, repair, and remanufacturing, while sharing of certain equipment becomes more common, and e-waste collection and recycling infrastructure is incrementally developed until 100% recycling rate is reached in 2048 and then is maintained thereafter.

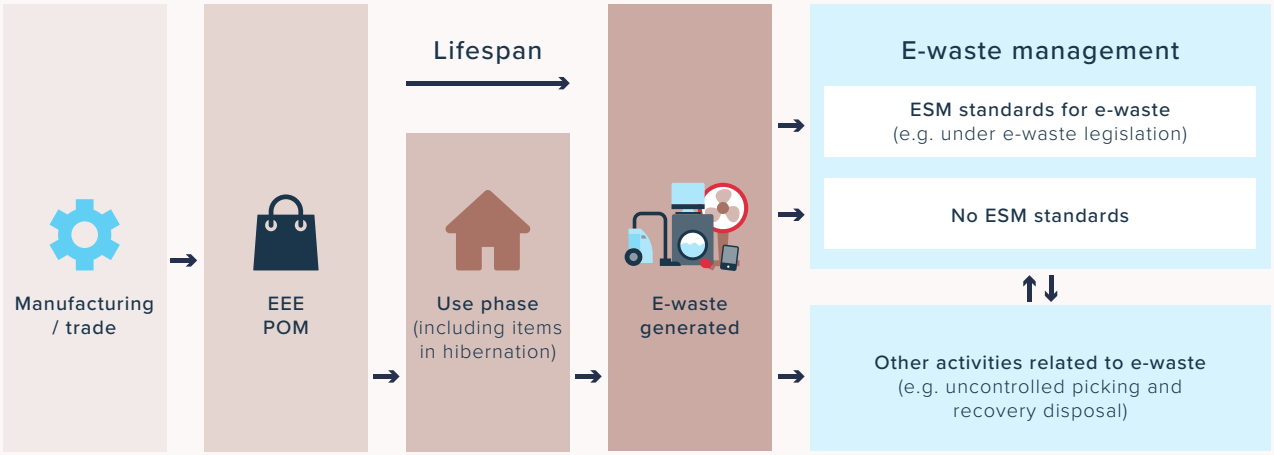
Chapter 6 provides a number of recommendations, focusing on improving legislation and statistics; development of infrastructure, technologies, and measures to support e-waste collection and recycling; financing of the system; as well as capacity-building and awareness-raising, developed through national stakeholder dialogues. The recommendations are translated into a practical national Roadmap for the environmentally sound management of future e-waste developed as part of national stakeholder dialogues and presented in Chapter 7.

# Chapter 2.
# Methodology

## A. E-WASTE STATISTICS

The measurement framework of e-waste projections follows a mass balance approach over the entire life cycle of EEE. This approach is consistent with global e-waste statistics guidelines [9][14]. The approach covers production, imports, exports, placing on the market, e-waste generation, e-waste management, and other e-waste-related activities (Figure 2). It covers any product supplied to the national market for consumption and use by households, businesses, or public authorities. Calculations were made for 54 products - the so-called UNU-KEYs. The UNU-KEYs are a product-based classification in which each UNU-KEY has a homogeneous lifespan, average weight, material composition, and hazardousness profile. The UNU-KEYs can be linked to the six e-waste categories and are used to measure e-waste statistics (see Annex 2).

**Figure 2.** E-waste Statistics Framework[7]




The EEE POM is obtained by deducting the exports from the EEE imported and domestically produced. The market entry includes EEE placed on the market by households, businesses, and the public sector. A product's lifespan is the period of time from when it is placed on the market until it becomes e-waste (see Figure 2). This includes the hibernation phase - the hoarding time of the equipment prior to actually being discarded at the end of its life - as well as the passing on of the equipment from one owner to another (reuse). The lifespan of EEE is expressed as a Weibull function and varies per UNU-KEY, with the shape and scale parameters associated with the average lifespan for each UNU-KEY individually. After a certain lifetime sampled from the Weibull function, the product is disposed of and becomes waste. E-waste generated in a country refers to the total weight of e-waste resulting from EEE that had been POM in that country, prior to any other activity, such as collection, preparation for reuse, treatment, or recovery, including recycling and exporting of e-waste.

In general, e-waste management involves the collection, transportation, storage, treatment, recycling, recovery, and disposal of waste, including aftercare of disposal sites. It can be undertaken by an economic actor within a legal framework, but waste handling carried out by informal economic actors (e.g. informal waste-picking) and illegal waste handling also exist. In this context, 'waste management' is differentiated from 'other waste-related activities', as proposed by the UNECE's Waste Statistics Framework [16]. The 'other waste-related activities' include waste dumping, waste-picking and scavenging, disposal, etc. and may include the informal sector. It is vitally important that e-waste undergoes depollution, that hazardous parts are disposed of in an environmentally sound manner, and that recyclable components are properly recycled. This is typically, but not exclusively, performed under the requirements of national e-waste legislation. Therefore, in this report and in the e-waste statistics guidelines, the e-waste flow is referred to as 'e-waste formally collected'. This term, also referred to as 'e-waste managed environmentally soundly', implies that the e-waste is collected under the specific legislation for e-waste (or in a similar manner).

[7] Environmentally sound management of hazardous wastes or other wastes means taking all practical steps to ensure that hazardous wastes or other wastes are managed in a manner that protects human health and the environment against the adverse effects that may result from such wastes (Basel Convention on the Control of Transboundary Movements of Hazardous Wastes and Their Disposal, art. 2 (8)) [15].

### B. E-WASTE PROJECTIONS TO 2050

All calculations were made using UNITAR's new "E-Waste Collected Tool" for Kyrgyzstan. This is an Excel-based interactive tool for setting e-waste collection targets to explore the resulting amounts of managed and unmanaged waste, the corresponding recovered and lost materials, their value and the associated compliant recycling costs, and the environmental and socioeconomic impacts (including costs) due to release of hazardous substances and loss of valuable materials. The tool can be used by trained national stakeholders for further assessment and updating. For more technical and methodological information, refer to UNITAR's E-waste Collected Tool Manual [17].

The flows of generated e-waste are projected using the same framework as the e-waste statistics described in section 2.a and are split into two scenarios [18]:

- a "Business as Usual" scenario
- a "Circular Economy" scenario

EEE POM from 1980 to 2020 was obtained from the readily available country-level data, collected from authorities and e-waste stakeholders as part of the *Regional E-Waste Monitor for the CIS + Georgia - 2021* [2]. The historic solar photovoltaic installation figures for Kyrgyzstan, which form the fastest-growing part of POM, were downloaded from a global dataset compiled by the International Renewable Energy Agency (IRENA). The EEE POM data has been broken down into relatively detailed product groups (UNU-KEYs; 54 groups in total). It is projected into the future with an empirical relationship between EEE POM and country-level scenarios for Gross Domestic Product (GDP) purchasing power parity (PPP) per capita, established from the global historic EEE POM and GDP data [1]. We use GDP PPP and population scenario projections from the Shared Socioeconomic Pathways (SSPs), which represent a plausible range of regional and global socioeconomic futures with various degrees of cooperation, competition, urbanisation, education, technological development, and other relevant indicators [19]. The SSP scenarios are described in detail in Annex 3.

In the "Business as Usual" scenario, present-day consumption patterns for EEE goods are projected from 2023 to 2050 with some adjustments according to the underlying economic conditions, population, consumer behaviour, product lifespans, and e-waste management infrastructure (see Table 5). We also factored in full or partial obsolescence of EEE POM for selected products by 2050, as well as stock saturation constraints (see below).

In the "Circular Economy" scenario, additional behavioural and/or technological changes are assumed to occur between 2023 and 2050 for selected product groups (UNU-KEYs), capturing the main aspects of circular economy transition specific to the EEE sector. These changes (with illustrations for selected UNU-KEYs) include [18]:

1. **Full or partial obsolescence of select EEE POM by 2050 (also applicable to "Business as Usual"**
   A near-complete drop in EEE POM of new video equipment, e.g. video recorders, DVDs, Blu-rays, set-top boxes, and projectors (UNU-KEY 0404), driven by advances in smartphones and internet streaming
2. **Stock saturation constraints per capita (also applicable to "Business as Usual")**
   Household electrical products such as fridges (UNU-KEY 0108) reaching market saturation in wealthier countries, when it does not make sense for an average household to have more than a certain number of items of a given product, even if they can afford them
3. **Improved durability**
   A gradual increase in both designed and user-driven lifespans across most EEE products, including greater product reuse via second-hand markets (included in the lifespans implicitly)
4. **Less hoarding**
   Products such as laptops (UNU-KEY 0303) and mobile phones (UNU-KEY 0306) either being used for longer periods, reused, or recycled instead of being hoarded, leading to reduced overall stock across households
5. **More sharing**
   Products such as household tools (UNU-KEY 0601) being shared more, leading to more product use and the associated reduction in lifespan, as well as reduced overall stock across households

Further details on the "Circular Economy" and "Business as usual" scenarios, including a detailed set of assumptions for each UNU-KEY, are provided in the Annex 2 and in Table 5.

- The e-waste generated is calculated using the EEE POM and lifespan projections for both the "Business as Usual" and "Circular Economy" scenarios.
- The e-waste recycling rate is calculated by dividing 'e-waste managed in an environmentally sound manner' by 'e-waste generated'. The recycling rate in Kyrgyzstan for 2020 to 2050 is extrapolated from the present-day (2023) base value of 0.1% from the *Regional E-Waste Monitor for the CIS + Georgia - 2021* [2]. In the "Business as Usual" scenario, the recycling rate is kept as a constant of 0.1%, while in the "Circular Economy" scenario, it is incrementally increased, linearly with time, from 0.1% to 100% in 2048 with this level of recycling continuing through 2050.
- The amounts of 'unmanaged e-waste' are calculated as 'e-waste generated' minus 'e-waste managed environmentally soundly'.

The resulting effects of e-waste management are calculated using the material compositions per UNU-KEY category obtained from the ProSUM project [20] for EEE POM in 2018. The environmental impacts of managing e-waste are based on the quantifications of 'e-waste managed environmentally soundly' and 'unmanaged e-waste' from the *Regional E-Waste Monitor for the CIS + Georgia - 2021* [2]. More information about the SSP and photovoltaic forecasts is given in Annex 3 and Annex 4.

**Table 5.** E-waste projections under "Business as Usual" and "Circular Economy" scenarios [18]

| PARAMETER | 1980 - 2023 | 2023 - 2050 'BUSINESS AS USUAL' SCENARIO | 2023 - 2050 'CIRCULAR ECONOMY' SCENARIO |
|---|---|---|---|
| **EEE POM** | Country-level and product-level (54 UNU-KEY) data was taken from the Regional E-waste Monitor for the CIS+Georgia - 2021 [2]. Country-level solar photovoltaic data was downloaded from IRENA | Country-level SSP projections for GDP PPP and population were downloaded from the IIASA SSP Database [19]. These were adjusted using the World Bank data for historic country-level GDP PPP [21] and in Kyrgyzstan's population [22]. Further details are provided in the E-Waste Collected Tool Manual [17].<br><br>POM projections were derived using country-level empirical correlations between UNU-KEYs and GDP PPP, as described in *The Global E-waste Monitor 2020* [1]. We also factored in full or partial obsolescence of EEE POM for selected products by 2050 and stock saturation constraints. | Same as the "Business as Usual" scenario, except that per UNU-KEYs, additional changes were built in full or partial obsolescence of EEE POM for selected products by 2050, stock saturation constraints, improved durability, less hoarding, and more sharing. The changes result in less EEE POM than in the "Business as Usual" scenario for most UNU-KEYs. Further details are provided in Annex 2. |
| **Lifespan** | UNU-KEY-level data for product lifespans was taken from the *Regional E-waste Monitor for the CIS + Georgia - 2021* [2]. | Same as 1980 - 2023. | Products become more durable (30% longer lifespans) and/or get utilised more (leading to 15% shorter lifespans). |
| **E-waste generated** | Calculated from above datasets. | Calculated from above datasets. | Calculated from above datasets. |
| **E-waste recycling rate** | Taken from the *Regional E-waste Monitor for the CIS + Georgia - 2021* [9]. | The recycling rate for 2023 (0.1%) remained unchanged. | Gradual increase from 0.1% to 100% of waste recycling rate in 2048, remaining at 100% until 2050. |

### C. STAKEHOLDER CONSULTATIONS AND NATIONAL ROADMAP DEVELOPMENT

A stakeholder consultation method was used to collect various stakeholders' inputs, needs, and interests related to e-waste management processes. The list of stakeholders involved included state agencies, central and local authorities, manufacturers, importers and retailers of EEE, e-waste collectors and recyclers, the environmental community represented by non-governmental organisations, universities, and research institutes.

To study the current situation in Kyrgyzstan, a questionnaire was conducted with all stakeholders involved, and individual meetings with stakeholders were conducted in order to obtain more information and clarify data. A total of 19 consultations and meetings were held.

To establish a dialogue between stakeholders, the National Forum "E-waste Management in Kyrgyzstan: current situation and next steps" was held in Bishkek on May 23-24, 2023. The Forum served as a platform for increasing capacity and strengthening stakeholder interaction, facilitating the exchange of international and regional best practices, and contributing to the development of e-waste management policy in Kyrgyzstan. The conclusions and recommendations of the consultations and the National Forum are reflected in this publication.

The national roadmap for the environmentally sound management of e-waste, which is an integral part of this document, is based on the discussion of the working groups organised within the National Forum, as well as the results of questionnaires and meetings with stakeholders, analysis of national legislation, and experience of CIS countries in the field of e-waste management. Specific activities and actions, deadlines, forms of completion and executors in the national roadmap are defined, taking into account the priorities set by the public, private, and civil sectors.

# Chapter 3.

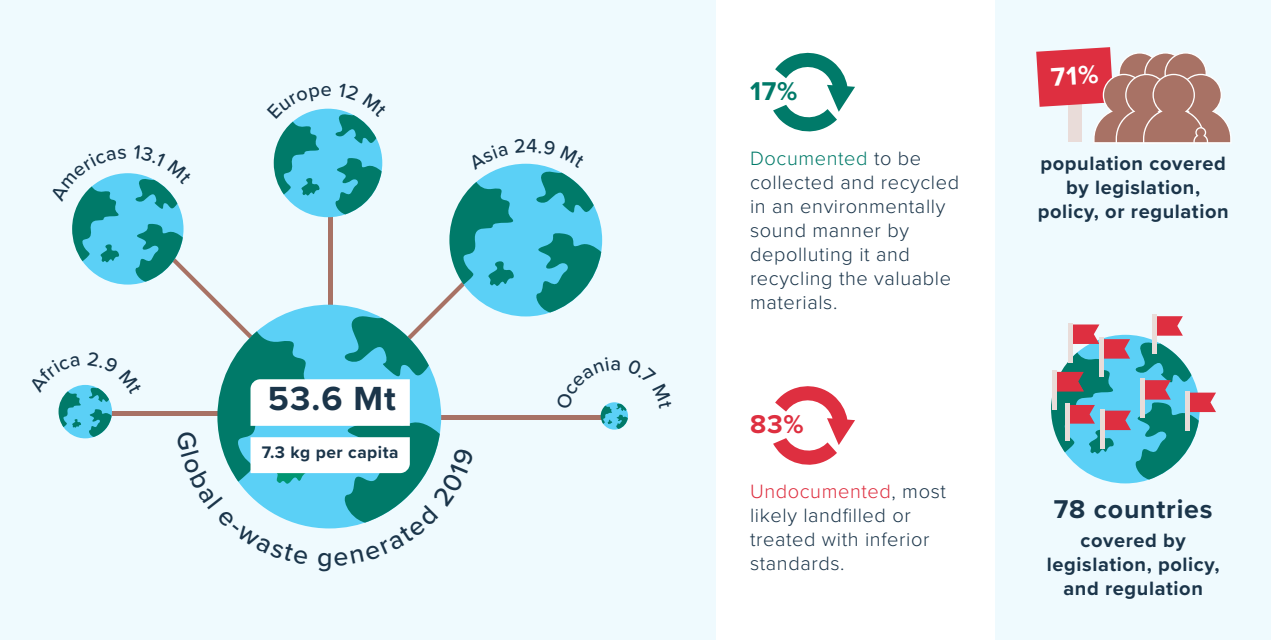
# International experience of e-waste management

## A. GLOBAL E-WASTE STATISTICS

The *Global E-waste Monitor 2020* provides the most comprehensive update of global e-waste statistics.

According to *The Global E-waste Monitor 2020*, the world generated 53.6 million metric tons (Mt) of e-waste in 2019 - an average of 7.3 kg per capita. This amount increased by 21%, from 44.4 Mt in 2014, and is projected to reach 74.7 Mt by 2030 [23]. Asia is the major producer of e-waste in net weight (24.9 Mt), followed by the Americas (13.3 Mt), Europe (12 Mt), Africa (2.9 Mt), and Oceania (0.7 Mt). However, looking at the generation per capita, Europe is ranked first with 16.2 kg, followed very closely by Oceania (16 kg per capita), the Americas (13.3 kg per capita), Asia (5.6 kg per capita), and Africa (2.5 kg per capita) [1].

**Figure 3.** Overview of key statistics 2019 as published in *The Global E-waste Monitor 2020*




Working from data reported by countries, *The Global E-waste Monitor 2020* estimated that only 17.4% (9.3 Mt) of e-waste generated was formally collected and recycled in 2019, which was an increase of 1.8 Mt from 2014. The vast majority of e-waste generated (82.6% or 44.3 Mt) was not formally collected or managed in an environmentally sound manner. This share of undocumented e-waste was most likely mixed in with other waste streams (such as metals and plastics), inappropriately recycled, sent to landfills, or incinerated, leading to loss of valuable resources and the release of hazardous substances into the environment. There are very high discrepancies among continents in terms of reporting. Europe has the highest reporting rate, with 42.5% of e-waste documented to be formally collected and recycled, followed by Asia (11.7%), the Americas (9.4%), Oceania (8.8%), and Africa (0.9%) [1] [23].

## B. GLOBAL AND REGIONAL POLICY OVERVIEW

In order to cope with the growing amount of e-waste, governments around the world need to introduce or improve specific legislation and enforcement for environmentally sound management of e-waste.

According to *The Global E-waste Monitor 2020*, at the end of 2019, 78 of 193 countries worldwide had a national e-waste policy, legislation, or regulation in place, covering 71% of the world's population[8]. However, in many countries, policies are not legally binding and are not appropriately supported financially, thus hindering their proper implementation. As well, most legal frameworks focus on improving e-waste management, but not on reducing the volume of e-waste generated, e.g. by supporting eco-design and favoring EEE repair and reuse practices [1].

According to the *Regional E-waste Monitor for the CIS+Georgia - 2021* [2], the twelve countries reviewed[9] have well-developed legal and regulatory frameworks in the field of waste management. Georgia, Moldova, and Ukraine have e-waste-specific legislation or regulation, while Belarus, Kazakhstan, and Russia regulate e-waste through bylaws in the national legislation (i.e. by specifically mentioning e-waste in their general waste laws). All other countries have laws for general waste management, but do not regulate e-waste specifically. There is a regulatory framework for an EPR system for e-waste in six countries (Belarus, Georgia, Kazakhstan, Kyrgyzstan, Moldova, and Russia) with differing levels of implementation, and an EPR system is currently being developed in two countries (Armenia and Ukraine). For more information on each country, refer to the *Regional E-waste Monitor for the CIS+Georgia - 2021* [2].

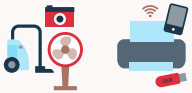
## C. E-WASTE COLLECTION AND RECYCLING TARGETS OF THE EUROPEAN UNION

In the European Union, e-waste is regulated by the Directive 2012/19/EU on waste electrical and electronic equipment (WEEE Directive).

The WEEE Directive set collection, recycling, reuse, and recovery targets for all six categories of e-waste [24], which have been increased over time (the below provide the target as per latest update).

Table 6 shows the WEEE Directive minimum targets for recovery, preparation for reuse, and recycling[10] by category from August 2018.

**Table 6.** Minimum targets for e-waste recovery, preparation for re-use and recycling applicable by category to the European WEEE Directives

| CATEGORY | |
|---|---|
|  1. Temperature exchange equipment<br>4. Large equipment (any external dimension more than 50 cm) | 85% shall be recovered, and 80% shall be prepared for reuse and recycled |
|  2. Screens, monitors, and equipment containing screens having a surface greater than 100 cm² | 80% shall be recovered, and 70% shall be prepared for reuse and recycled |
|  5. Small equipment (no external dimension more than 50 cm)<br>6. Small IT and telecommunication equipment (no external dimension more than 50 cm) | 75% shall be recovered, and 55% shall be prepared for reuse and recycled |
|  3. Lamps | 80% shall be recycled |

[8] Note: this apparent wide coverage of population is due to the fact that the most populous countries, such as China and India, have national legal instruments in place.
[9] Armenia, Azerbaijan, Belarus, Georgia, Kazakhstan, Kyrgyzstan, Moldova, Russia, Tajikistan, Turkmenistan, Ukraine, and Uzbekistan.
[10] According to the WEEE Directive, "recovery" means any operation the principal result of which is waste serving a useful purpose by replacing other materials which would otherwise have been used to fulfil a particular function, or waste being prepared to fulfil that function, in the plant or in the wider economy; "preparing for re-use" means checking, cleaning, or repairing recovery operations, by which products or components of products that have become waste are prepared so that they can be reused without any other pre-processing; and "recycling" means any recovery operation by which waste materials are reprocessed into products, materials or substances whether for the original or other purposes. It includes the reprocessing of organic material but does not include energy recovery and the reprocessing into materials that are to be used as fuels or for backfilling operations.

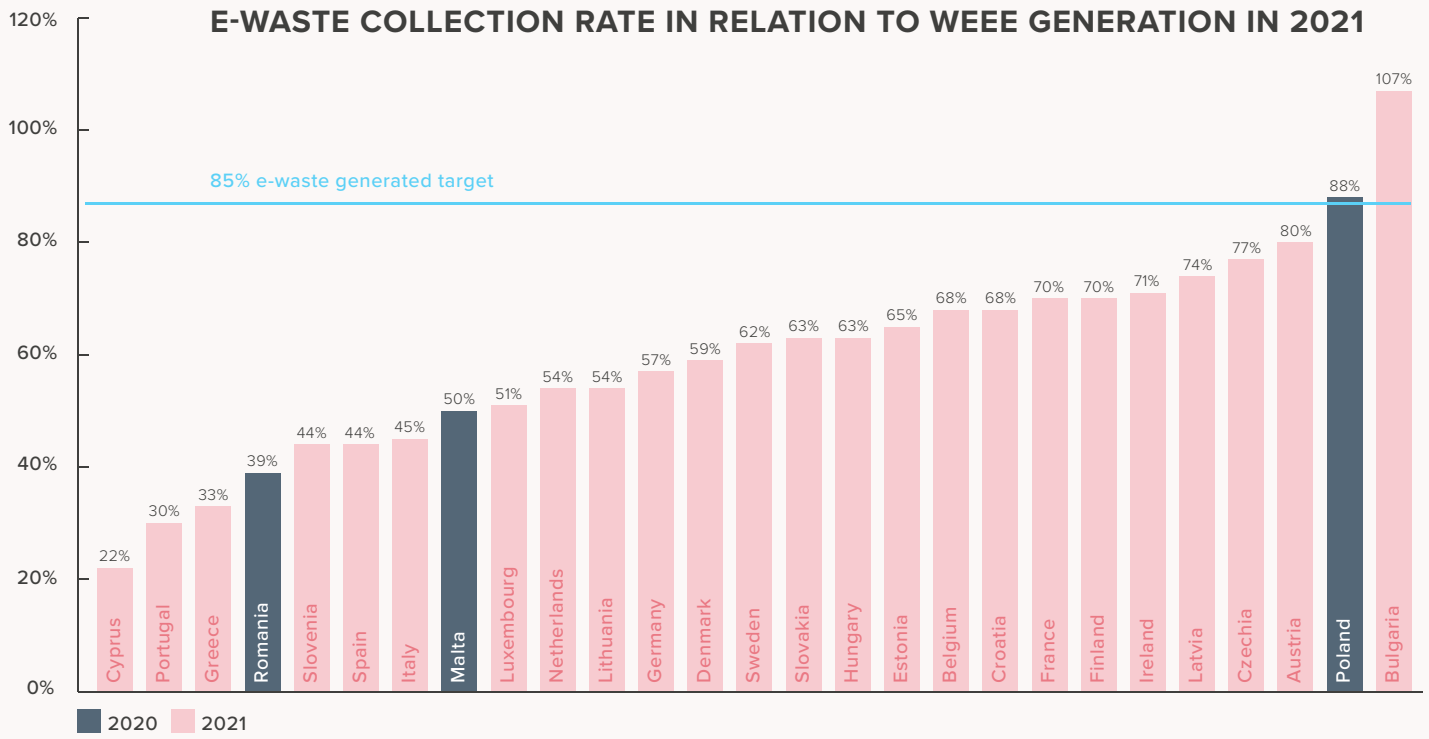
Article 7 of the WEEE Directive states that, starting in 2019, the minimum collection rate to be achieved annually shall be either 65% of the average weight of EEE placed on the market in the three preceding years in the Member State concerned or 85% of WEEE generated on the territory of that Member State.

The WEEE Directive provides two methods to calculate the collection rate, namely the "EEE POM method", calculated as the mass of e-waste collected divided by the average amount of EEE POM in the three preceding years, and the "WEEE Generated method", calculated by mass of e-waste collected divided by the mass of WEEE Generated in the same year. For the purposes of this report, the "WEEE Generated method" is used.

In 2021, the formal collection of e-waste was 4.9Mt (11 kg/inhabitant), resulting in a collection rate of 58% [UNITAR database].

These results reveal that the amount of collected e-waste has significantly increased in recent years and that the increase of EEE placed on the market was even larger. In fact, a large majority of the EU is not reaching the target set in the WEEE Directive.

**Figure 4.** Overview of e-waste collection rate in relation to WEEE Generation for Member States of the EU-27 in 2021 [UNITAR database]

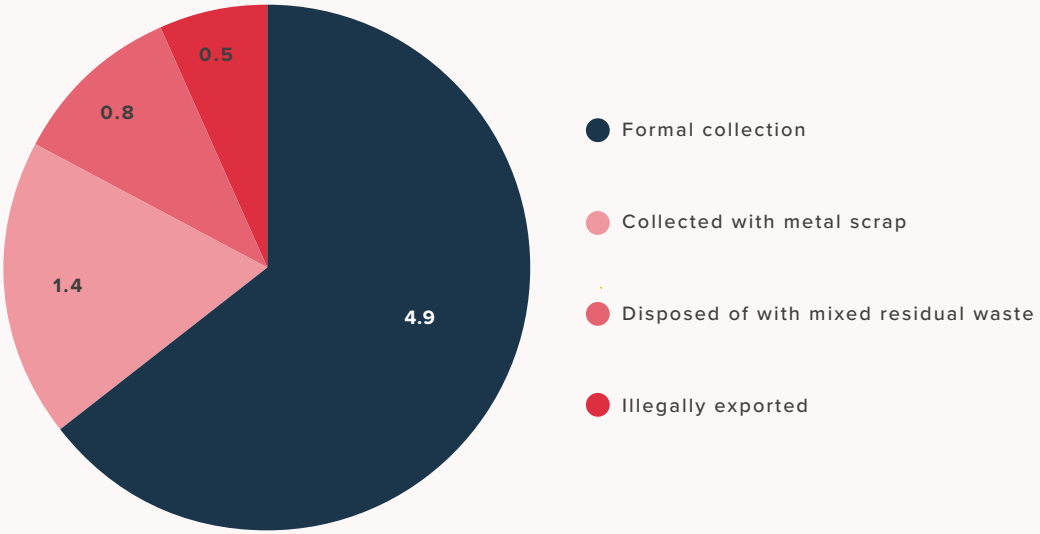


A recent study by UNITAR and the WEEE Forum [23] reveals that considerable amounts of e-waste are diverted to other undocumented flows, thus preventing EU countries from reaching the collection targets. It was estimated that:

- 1.4 Mt (2.7 kg per capita) was collected with metal scrap and recycled, but not with the same environmental and material efficiency standards as e-waste formally managed would be
- 0.8 Mt (1.5 kg per capita) was disposed of with mixed residual waste and ended up in incinerators and landfills
- 0.5 Mt (1 kg per capita) was illegally exported outside the EU27, and 0.6 Mt (1.1 kg per capita) was exported for reuse. The exports for reuse and illegal exports are hardly monitored in most countries, partially due to the lack of trade codes for used EEE.

Additionally, the study estimated that 3 Mt of e-waste is hoarded in households.

**Figure 5.** Proportion of documented and undocumented e-waste flows in the EU in 2021, in million tons [23][25][26]



# Chapter 4.
# Current situation of e-waste management in Kyrgyzstan

## A. CURRENT E-WASTE AND OTHER RELEVANT WASTE POLICIES AND LEGISLATION IN KYRGYZSTAN

### i. Policy

The state policy of Kyrgyzstan in the field of waste management is reflected in the National Development Strategy of the Kyrgyz Republic for 2018 - 2040 [3], as well as in the National Development Program of the Kyrgyz Republic until 2026 [4].

In accordance with the National Development Strategy of the Kyrgyz Republic for 2018 - 2040, a policy of sustainable waste management should be implemented through intersectoral, interregional, and intermunicipal cooperation. The policy should be focused on the complete elimination of uncontrolled landfills, prevention of expansion of new landfills, and reduction of existing landfills on the territory.

The task of the National Development Strategy in the field of waste recovery and recycling infrastructure development is to use best practices of waste recovery and recycling and install controlled landfills using technologies that ensure minimal risk to humans and the environment. The installation of landfills using modern technologies is envisaged outside the cities of Bishkek, Jalal-Abad, Karakol, Cholpon-Ata, Naryn, Osh, Talas, Tokmok, and Kara-Balta. The National Development Strategy also provides for the subsequent adoption of measures to reduce waste generation and enhance reuse, recycling, and safe disposal. The document also stipulates the need to introduce economic mechanisms aimed at the development of recycling, with the extraction of useful components of waste, including electronic and electrical waste. The Strategy establishes the need to develop an economically efficient infrastructure for processing and recovery of household waste in cities.

Within the framework of the National Development Strategy, the National Development Program of the Kyrgyz Republic until 2026 has been developed. The document provides for the introduction of low-waste, resource-saving technologies, launch of waste management programs in all urban settlements, and contains other objectives in the field of environmental policy. The National Program establishes the need for a systematic approach in resolving issues related to waste reuse, minimisation of waste generation, sound collection, and recycling. Due to the National Program, these actions should be focused primarily on production waste. The importance of informing and involving the public in the problem of sound waste recovery is also noted. The National Program provides for projects to develop integrated measures for sustainable waste and secondary resource management, as well as the development of a state program for sustainable waste management. However, to date, this state program has not been adopted.

The Action Plan for the implementation of the National Program [27] provides for the construction of a waste treatment plant by private investment in 2025, as well as the development of the practice of transferring waste collection, transportation, and disposal functions from state to the private sector.

Within the framework of promoting the policy of sound management of e-waste, Kyrgyzstan became a member of the Agreement on Cooperation of the Member States of the Commonwealth of Independent States in the field of electronic and electrical equipment waste management [28], having signed and ratified the Agreement in accordance with domestic procedures. The purpose of the Agreement is to promote the establishment of a regional system of e-waste management in order to maximise the involvement of such waste in economic turnover as a source of secondary raw material through the application of the best-available technologies.

Thus, the policy of Kyrgyzstan in the field of waste management, including e-waste, promotes the development of environmentally sound approaches to the formation of waste collection and recycling systems.

**ii. General legal requirements**

In Kyrgyzstan, e-waste management issues are regulated within the general legal framework for waste management. There is no separate legislative act regulating e-waste management in Kyrgyzstan. The legislation does not contain a clear definition of e-waste, which makes it difficult to correctly classify and account for it within the current legal system.

The main normative legal act of Kyrgyzstan in the sphere of waste management is the new Law On Production and Consumption Waste adopted on August 17, 2023. [5]. The new Law:

- Defines the basic principles of state policy in the field of waste management and establishes requirements for waste management, including harmful waste, licensing of activities in this area, state accounting, and maintenance of the waste inventory, as well as the implementation of the principle of extended producer responsibility.
- Is supplemented with such concepts as “municipal waste,” “secondary raw materials,” “secondary material resources,” “waste recycling,” and others.
- Includes municipal waste, which means consumption and production waste in the list of municipal waste. This list is approved by the Cabinet of Ministers of the Kyrgyz Republic. Currently, this list has not been approved.
- Introduces a new principle of state policy aimed at preventing the use of hazardous chemicals. This principle creates a legislative basis for the search for alternative, less hazardous materials in the production and use of e-waste, and for ensuring safe disposal of e-waste in Kyrgyzstan.
- Provides for the acquisition and relinquishment of ownership of waste by legal entities or individuals, including individual entrepreneurs, state, and other bodies. As well, alienation of hazardous waste to another entity handling waste is allowed only for the purpose of its subsequent treatment, disposal, or recycling.
- Establishes a number of requirements for waste processing. According to the Law, waste processing should be carried out in an environmentally sound manner in accordance with the requirements of the regulatory legal acts of Kyrgyzstan in the field of waste management. Waste treatment facilities put into operation are subject to registration in the register of waste treatment facilities, which is maintained by the operator of the EPR. The Law prohibits the operation of waste treatment facilities that are not included in the register of such facilities. The Law also requires licensing of waste processing activities of all hazard categories on the basis of a positive conclusion of the state environmental expertise. The licensing procedure is determined by the Cabinet of Ministers of Kyrgyzstan.
- Subject to the activities of companies, entrepreneurs, and individuals on treatment, recycling, disposal, transportation (including transboundary) of wastes of I-V hazard classes to licensing in accordance with the Law of Kyrgyzstan On Licensing and Permit System in the Kyrgyz Republic [29].
- Currently does not, however, cover all of the abovementioned activities in the field of waste management of all hazard classes [29] and thus is in need of revision.

As well, Government Resolution No. 559 dated August 5, 2015 [30] approves the Procedure of production and consumption waste management in Kyrgyzstan. The Resolution:

- Regulates the activities of legal entities and individuals in the field of production and consumption waste management.
- Establishes environmental requirements for waste disposal and waste disposal facilities.
- Determines the procedure for developing draft standards for waste generation and setting limits for their disposal in view of waste management standardisation. Standards of waste generation determine the types and quantities of waste generated at a company, as well as the methods of their treatment. Disposal limits determine the maximum amount of specific types of waste allowed for placement at the waste disposal facility[11]. Waste disposal facilities can be located on the territory of the company, the waste’s owner, or outside of the company. Waste disposal facilities must comply with

[11] Waste disposal facility - landfills, accumulators, dumps, sludge dumps, tailings ponds, rock dumps and other specially equipped places for storage and disposal of wastes [5].

the environmental requirements set by this Resolution. Draft standards of waste generation and establishment of limits on their placement are developed for the objects of economic activity of the 1st category of hazard by individuals and legal entities, in the course of whose activities production and consumption wastes are generated. Thus, the regulation also includes e-waste generated at hazard category I facilities and requires the determination of ways to handle it, including through its use, treatment, disposal, and transfer to other entities for further use, treatment, and disposal.

- Establishes requirements for separate collection of waste used as secondary material resources. In this case, secondary material resources include production and consumption waste that can be reused immediately or after additional treatment. Such waste must be collected separately, in accordance with the directions of its use and processing. If separate collection of such waste is not possible, the waste should be transferred to specialised enterprises for sorting. Requirements for separate collection of e-waste are not separately established.

Thus, e-waste management in Kyrgyzstan is regulated by general requirements and approaches to hazardous waste management.

### iii. Hazardous waste classification

Kyrgyz legislation [5][31] divides waste by degree, class, and hazard level (Table 7).

**Table 7.** Waste Hazard Classification in Kyrgyzstan

| | |
|---|---|
| **Waste by hazard degree** | Hazardous |
| | Non-hazardous |
| **Waste by class of hazard** | Hazard class I - extremely hazardous |
| | Hazard class II - highly hazardous |
| | Hazard class III - moderately hazardous |
| | Hazard class IV - mildly hazardous |
| | Hazard class V - practically non-hazardous |
| **Waste by hazard level (according to the Basel Convention on the Control of Transboundary Movements of Hazardous Wastes and their Disposal)** | G - Green |
| | A - Amber |
| | R - Red |

The elements of waste hazard classification do not relate to each other directly. They are used for different purposes. For example, the hazard degree of waste is used for transportation, licensing, and, in general, environmentally sound waste management. The waste hazard class can be used for the purposes of the Classifier of hazardous waste and preparation of hazardous waste passports. The waste hazard level under the Basel Convention is used for the purposes of transboundary movement.

In Kyrgyzstan, the Classifier of hazardous waste [31] is designed to determine the class of hazard, hazard level, and waste coding. Waste coding consists of 9 blocks of multi-digit codes and takes into account the main type of activity from which the waste originates, the physical state of the waste, the method of recovery, the potentially hazardous components, hazard level, etc.

The hazard level of waste in the coding is determined according to the Basel Convention on the Control of Transboundary Movements of Hazardous Wastes and their Disposal [15]. According to this Convention, three levels of waste hazard (G - green, A - amber, R - red) are established for the purposes of transportation, treatment, storage, and disposal.

Waste attribution to a certain coding is made by the waste producer independently or with the involvement of individuals and legal entities engaged in waste management activities.

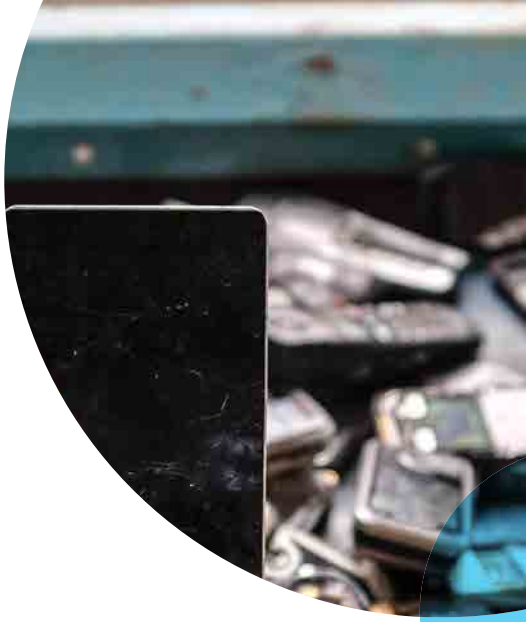
If the Waste Classifier does not specify the hazard class of a waste, it is established by the producer or owner of the waste in coordination with the Ministry of Natural Resources, Ecology and Technical Supervision of Kyrgyzstan, based on the assessment of the waste's hazardous properties [5].

According to the Hazardous Waste Classifier, e-waste can be classified as both production and consumption waste according to the following positions (Table 8).

**Table 8.** Excerpt from the Kyrgyz Hazardous Waste Classifier

| WASTE GROUP NUMBER | NAME OF WASTE | HAZARD LEVEL OF THE WASTE ACCORDING TO THE BASEL CONVENTION | HAZARD CLASS OF WASTE ACCORDING TO THE KYRGYZ WASTE CLASSIFIER | PROPERTIES DETERMINING THE HAZARDOUSNESS OF WASTE, ACCORDING TO THE KYRGYZSTAN WASTE CLASSIFIER | UNU-KEYS |
|---|---|---|---|---|---|
| **14** | ***GROUP.* "WASTE FROM THE USE OF SUBSTANCES AS SOLVENTS" (EXCLUDING CHEMICAL)** | | | | |
| | Electronic waste | A - amber | II - highly hazardous | Unspecified | Unspecified |
| **16** | ***GROUP.* "INDUSTRIAL WASTE NOT OTHERWISE DEFINED IN THE CLASSIFIER"** | | | | |
| | Transformers and capacitors containing polychlorinated benzenes or toluenes, and polychlorinated biphenyls | R - red | I - extremely hazardous | H11 - toxic substances | Unspecified |
| | Other defective electronic equipment | G - green | III - moderately hazardous | Unspecified | Unspecified |
| | Other defective equipment | A - amber | III - moderately hazardous | Unspecified | Unspecified |
| **18** | ***GROUP.* "WASTE FROM MEDICAL AND VETERINARY SERVICES AND RESEARCH ORGANISATIONS"** | | | | |
| | Other written-off equipment | A - amber | III - moderately hazardous | Unspecified | 0801, 0802 |
| **20** | ***GROUP.* "HOUSEHOLD AND TRADE-RELATED WASTE"** | | | | |
| | Refrigerators (containing freons), individual component parts | G - green | IV - mildly hazardous | Unspecified | 0108, 0109 |
| | Typewriters | G - green | IV - mildly hazardous | Unspecified | Unspecified |
| | Electronic equipment, individual component parts | G - green | IV - mildly hazardous | Unspecified | Unspecified |
| | Fluorescent and other mercury-containing wastes | A - amber | I - extremely hazardous | H11 - toxic substances | 0502, 0503 |
| | Batteries | A - amber | III - moderately hazardous | H08 - corrosive substances, H12 - ecotoxic substances | Unspecified, when the waste battery is a component of e-waste.<br><br>Once the battery is separated from the e-waste device, it is not classified as e-waste in legislation, but rather as battery waste. |
| | Lead battery recharge waste | A - amber | III - moderately hazardous | H08 - corrosive substances, H12 - ecotoxic substances | |
| | Acid battery waste | A - amber | Unspecified | H08 - corrosive substances, H12 - ecotoxic substances | |
| | Ni-Cr dry cell batteries | G - green | Unspecified | H11 - toxic substances, H12 - ecotoxic substances, H13[12] | |
| | Mercury dry cell batteries | A - amber | Unspecified | H6.1 - toxic substances, H11 - toxic substances, H12 - ecotoxic substances | |
| | Other dry cell batteries | A - amber | Unspecified | H08 - corrosive substances, H12 - ecotoxic substances | |

[12] H13 - Substances capable of forming other materials in any way after removal, and these materials have any of the specified hazardous properties.



The first class (extremely hazardous) includes fluorescent and other mercury-containing wastes, transformers, and capacitors containing polychlorinated benzenes or toluene and polychlorinated biphenyls. The second class (highly hazardous) includes electronic waste. The third (moderately hazardous) and fourth (mildly hazardous) classes include other defective electronic equipment, batteries, refrigerators (containing freons), separate component parts, and other such hazardous parts.

Waste containing toxic/ecotoxic substances includes batteries, lead battery recharge waste, Ni-Cr dry cell batteries, Ni-Cr dry cell batteries, mercury dry cell batteries, other dry cell batteries, fluorescent and other mercury-containing waste, transformers, and capacitors containing polychlorinated benzenes or toluene, as well as polychlorinated biphenyls.

Activities on management of the mentioned types of e-waste containing toxic substances are subject to licensing in Kyrgyzstan.

It should be noted that the international classification of e-waste is not included in the legislation of Kyrgyzstan, which makes it difficult to keep a uniformed record of e-waste data at the national, regional, and international levels.

**iv. Hazardous waste management**

Hazardous waste management plays an important role in ensuring environmental safety. Hazardous waste containing harmful substances can pose a serious threat to the environment and human health if not properly managed. Taking into account that EEE contains hazardous components (lead, mercury, cadmium, etc.), e-waste is regarded as hazardous waste[13] in Kyrgyzstan.

Kyrgyz legislation establishes requirements for environmental safety when handling production and consumption waste, including hazardous waste. These requirements are aimed at preventing harm to the environment or human health and are included in the General Technical Regulations on Environmental Safety in the Kyrgyz Republic [6].

According to the General Technical Regulations, enterprises should be equipped with technical means and technologies for treatment and safe disposal of production and consumption waste. Producing and handling waste with an unidentified class of hazard for the environment is prohibited. Enterprises shall prepare passports for hazardous wastes according to the established form. Transportation of hazardous waste to the places of accumulation[14], storage, recovery, and disposal should be carried out on specially equipped and marked vehicles with the necessary documents for transportation, including the passport of hazardous waste. As well, enterprises must keep records on wastes (including volumes of their generation, use, and treatment), conduct inventory of wastes and objects of their disposal, and comply with other requirements of the General Technical Regulations.

Hazardous waste management is also regulated by the Procedure for Hazardous Waste Management in the Kyrgyz Republic, approved by the Government Resolution No. 885 dated December 28, 2015 [7]. This document establishes requirements for the management of certain types of hazardous waste, including mercury-containing waste and used batteries. The requirements determine the conditions of collection, storage transportation, and accounting of these hazardous wastes. This document also contains a list of types of hazardous waste, the disposal of which is allowed together with household waste. E-waste is not included in this list, so disposal of e-waste in the residues of household waste is not allowed. It should be noted that this document does not establish specific safety requirements for the regulation of e-waste management processes as hazardous waste.

[13] Hazardous waste - production and consumption waste containing substances that have hazardous properties and are present in such quantity and in such form that they pose an immediate or potential danger to human health or the environment both on their own and when they come into contact with other substances (paragraph 15) of Article 2 of the Law On Production and Consumption Waste dated August 15, 2023.
[14] Accumulation of waste is storage of waste for a period not exceeding 11 months for the purpose of its further treatment, recovery, disposal [5].

### v. Extended Producer Responsibility

The EPR mechanism was introduced in Kyrgyzstan by the new law On Production and Consumption Waste dated August 15, 2023. Within the framework of the EPR mechanism, the Cabinet of Ministers of Kyrgyzstan establishes the list of goods and packaging of goods subject to recycling after loss of their consumer properties, as well as the norms of their recycling. Recycling norms are established upon the proposal of the EPR operator, taking into account economic conditions, potential danger of waste to human health and the environment, as well as the technological feasibility of recycling. Recycling norms are subject to revision every three years. Recycling norms for each group of goods and packaging of goods in this List are set as a percentage of the total amount of goods and packaging of goods put into circulation in the territory of Kyrgyzstan, expressed in mass units. Presently, a draft Resolution of the Cabinet of Ministers of the Kyrgyz Republic has been developed, which establishes norms of recycling from the use of goods (Table 9).

**Table 9.** Draft recycling norms for EEE

| NAME OF GROUPS OF GOODS SUBJECT TO RECYCLING AFTER LOSS OF CONSUMER PROPERTIES RECYCLING NORMS OF WASTE FROM THE USE OF GOODS, % | RECYCLING NORMS OF WASTE FROM THE USE OF GOODS, % | | | | | | |
|---|---|---|---|---|---|---|---|
| | 2024 | 2025 | 2026 | 2027 | 2028 | 2029 | 2030 |
| Computers, home appliances, batteries, refrigeration equipment, etc. | 20 | 30 | 50 | 60 | 80 | 100 | 100 |
| Electric lighting equipment | 10 | 20 | 40 | 50 | 70 | 85 | 100 |

Recycling norms shall be met by producers, importers of goods by either of the following:

1. Own (individual) recycling of waste from the use of goods
2. Concluding contracts with entities engaged in the recycling of waste from the use of goods and paying the treatment fee

Producers and importers of goods have the right to create associations to ensure fulfillment of recycling norms.

Fulfillment of recycling norms is confirmed by the producer or importer of goods by submitting reports to the EPR operator on the fulfillment of recycling standards or by paying the treatment fee.

If producers and importers of goods choose to recycle waste independently and do not meet minimum recycling standards, they must pay the treatment fee, which is calculated by multiplying the treatment fee rate by the difference between the established and actually achieved value of the amount of recycled waste from the use of goods.

Treatment fee rates are set by the Cabinet of Ministers of Kyrgyzstan on the proposal of the EPR operator. Treatment fee rates have not currently been approved. When setting the rates, average amounts of costs for collection, transportation, processing, and recycling of a unit of a product or unit of mass of a product that has lost its consumer properties are taken into account. The treatment fee rate may include the costs of creating infrastructure facilities designed for these purposes.

The treatment fee is not payable respective to the quantity of goods or packaging of goods that are exported from the territory of the Kyrgyz Republic.

The administrator of treatment fee payments is the EPR operator.

Thus, the legislative basis for the implementation of the EPR is currently established in Kyrgyzstan, with the Cabinet of Ministers of Kyrgyzstan carrying out further work on the implementation of the EPR mechanism and achievement of the proposed high standards of e-waste recycling.

**vi. Restriction of Hazardous Substances (RoHS)**

Technical Regulation TR EAEU 037/2016 is in force in the territory of the Eurasian Economic Union (EAEU), including Kyrgyzstan. It establishes mandatory requirements to limit the use of hazardous substances in electrical and radioelectronic products placed on the market in the territory of the EAEU, as well as permissible concentrations of hazardous substances contained in homogeneous materials [32].

Specifically, this Regulation prohibits the use of lead, mercury, cadmium, hexavalent chromium, and polybrominated diphenyl ethers in 12 categories of electrical and radioelectronic products included in the scope of application of the Regulation. The concentration of hazardous substances in homogeneous materials shall not exceed 0.1%, or 0.01% for cadmium.

Electrical and radioelectronic products shall be placed on the market in the territory of the Customs Union, including Kyrgyzstan, provided that they have passed confirmation of compliance with the requirements of this Regulation in accordance with the established procedure. The Regulation is currently being updated in view of adding the following substances to the list of controlled hazardous substances: diethylhexyl phthalate, butylbenzyl phthalate, dibutyl phthalate, diisobutyl phthalate.

**vii. E-waste management standards**

Kyrgyzstan has adopted several interstate standards in the field of waste management as national standards [2]:

- State standard 30772-2001 Resource saving. Waste management. Terms and definitions
- State Standard 30773-2001 Resource saving. Waste management. Stages of the technological cycle. Basic provisions
- State Standard 30775-2001 Resource saving. Waste management. Classification, identification and coding of wastes. Basic provisions

However, there are currently no national standards relating to e-waste management in Kyrgyzstan.

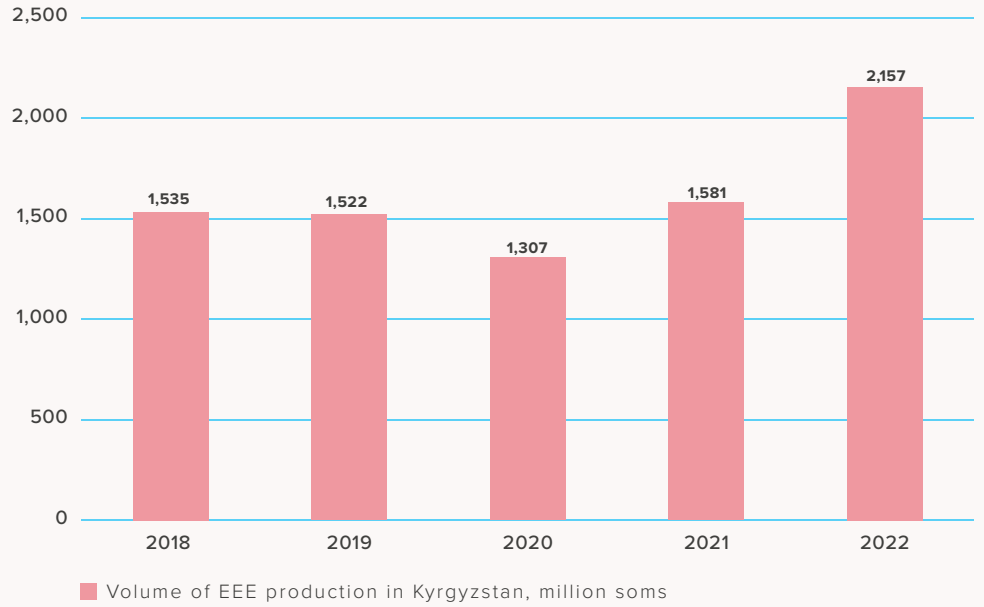
**viii. Enforcement of the legislation on waste**

State control over waste management is carried out by authorised state bodies in the sphere of ecological and technical safety, sanitary and epidemiological supervision, and by local self-government bodies.

State control in the field of waste management includes control over compliance with the requirements of the legislation on waste management, detection of violations of these requirements, and taking measures to eliminate them. Control over compliance with environmental and other standards in waste management, prosecution for violation of waste legislation, reliability of waste reporting, etc. is also provided for.

Thus, in Kyrgyzstan, the main legal norms for waste and hazardous waste are defined, which partially cover the regulation of e-waste. However, there are many problems and gaps both in the legislation itself - e.g. further implementation of EPR mechanisms, lack of classification of e-waste in accordance with the WEEE Directive, and low level of implementation and enforcement of the legislation.

**Figure 6.** Volume of EEE production in Kyrgyzstan, million soms [33]




## B. CURRENT NATIONAL INFRASTRUCTURE FOR MANAGING E-WASTE

Many stakeholders are involved in e-waste management in Kyrgyzstan: government agencies, local executive bodies, EEE producers, importers and retailers, waste collectors and recyclers, producers of recycled products, NGOs, and the civil sector. The statistics, roles, and activities of the stakeholders are described below.

### i. EEE production

In 2022, EEE production amounted to 2,157 million soms (USD $24.3 million) or 0.5% of the total industrial output (425,946 million soms (USD $4.8 billion)). The EEE production increased by 40% between 2018 and 2022 (Figure 6).

The largest producers of EEE are Kyrgyzelectronics LLC (assembly of computer equipment, servers, multifunctional devices) and Mailuu-Suu Lamp Plant LLC (production of electric light bulbs). Likewise, import of electrical products is actively developing in Kyrgyzstan and most goods that are placed on the market are imported. According to the underlying estimated datasets of the global transboundary flows monitor, Kyrgyzstan imports 1.5 kt used-EEE (or very low priced EEE) as of 2019 [34]. This is around 8% of the total weight compared to the total EEE POM of 18.5 kt (CIS) in 2019 [2]. The top exporting countries are Turkey (24%), Russia (23%), and Uzbekistan (22%). For the period of January to December 2022, imports of the main types of EEE (household and office appliances, computers, mobile phones, medical equipment, etc.) to Kyrgyzstan amounted to about 54 billion soms (USD $647.5 million) or 7% of the total imports of goods (Annex 5) [35]. The main importing countries are China, Turkey, Russia, and Kazakhstan [35].

Neither manufacturers nor importers of EEE, with rare exceptions, are engaged in collection and recycling of e-waste. Some stores in the country have a Trade-In system, which allows consumers to get a discount when buying small-sized equipment (cell phones, tablets, etc.) in exchange for used-but-functional equipment. Such equipment is serviced and repaired, after which, as a rule, it is resold at a discount as used. In rare cases, it is handed over to the informal sector to retrieve spare parts. However, further actions with non-working spare parts remain the responsibility of the informal sector, which does not always dispose of them in an environmentally sound manner.

Thus, in Kyrgyzstan there is practically no system of collection and transfer for recycling of e-waste generated in the course of activities of companies - producers and importers. The mechanism of extended obligations of producers and importers is not yet definitively established, which complicates the development of the system.

### ii. Collection and recycling of e-waste

The waste recycling sector (all types of waste) in Kyrgyzstan covers about 90 enterprises, which is 0.5% of the total industry. The infrastructure for collection and recycling of e-waste in Kyrgyzstan is practically undeveloped. Some companies are known to collect and dismantle e-waste and then transfer it for recycling (Annex 1). According to stakeholder consultations, as a rule, these companies are oriented to work with legal entities and provide services on self-removal of waste from such entities. The technical equipment of such companies is at a low level; they mostly use manual sorting technology, which limits their production capabilities. Indeed, the cost of e-waste recycling equipment is unaffordable for most companies.

It is also known about the activities of companies that are engaged in recycling of e-waste by pyrolysis method.

According to the requirements of the new Kyrgyz Law On Production and Consumption Waste, commissioned waste treatment facilities must be registered in the register of waste treatment facilities; otherwise, they cannot carry out their activities. However, this register has not yet been created.

### iii. Informal sector

Due to lack of adequate infrastructure and lack of legislative regulation, many people turn to the informal sector, which is interested in extracting valuable components from e-waste.

According to stakeholder consultations, informal collectors and recyclers are mainly involved in collecting e-waste from the public, extracting valuable parts from e-waste and reselling them, including illegal export of e-waste outside the country. Such collectors and recyclers may ignore the necessary

measures in the e-waste recycling process, violating occupational health and safety, including the use of personal protective equipment, as well as using non-environmental ways of handling e-waste's hazardous parts.

**iv. The environmental community**

The environmental community, represented by NGOs, research institutes (RRIs), and universities, is involved in the development of the e-waste management system in Kyrgyzstan through outreach and information support, as well as through capacity-building and awareness-raising of their staff.

A number of universities and NGOs have bins for separate collection of waste, such as glass, plastic, and waste paper. However, e-waste collection garbage cans are not available.

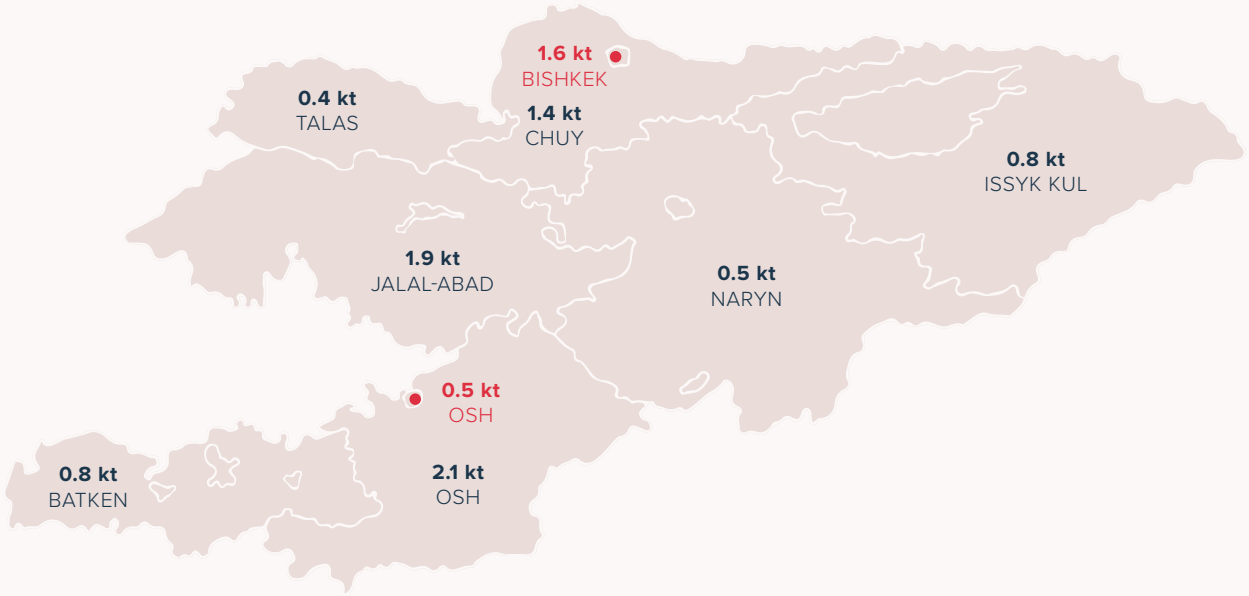
Thus, a number of infrastructure challenges remain relevant. These include the near absence of public e-waste collection points, the lack of e-waste recycling infrastructure and technologies, and the development of the informal sector.

## C. E-WASTE STATISTICS IN KYRGYZSTAN

During the decade 2010-2019 in Kyrgyzstan, there was a steady increase in the volume of EEE placed on the market. According to UNITAR [2], this indicator increased by nearly 30% over the period (from 2.2 kg per capita in 2010 to 2.8 kg per capita in 2019). Furthermore, the volume of EEE placed on the market in Kyrgyzstan in 2019 was less than half that of the average for Central Asia (6.5 kg per capita).

The increase in the volume of EEE placed on the market naturally leads to an increase in e-waste generation. Specifically, the amount of e-waste generated in Kyrgyzstan for 2010-2019 increased nearly threefold: from 0.7 kg per capita (3.7 kt) to 1.5 kg per capita (10.1 kt). It should be noted that e-waste generation in Kyrgyzstan is one of the lowest in the whole of Central Asia. The indicator of e-waste generation per capita is 2.7 times lower than the average for Central Asia (4.1 kg per capita).

**Figure 7.** Map of e-waste generation in the Kyrgyz Republic (2019)[15]




Assuming an even distribution of e-waste per capita across the regions and taking into account the regions' various populations, the largest amount of e-waste was generated in Osh (2.1 kt), Jalal-Abad (1.9 kt), and Chui (1.5 kt) oblasts. The lowest volume of e-waste generation is in Batken (0.8 kt), Issyk-Kul (0.8 kt), Naryn (0.5 kt), and Talas (0.4 kt) oblasts (Figure 7).

[15] The data is calculated by multiplying the number of population of each region (according to the KR Demographic Yearbook 2016-2020) by the per capita e-waste generation rate of 1.5 kg.

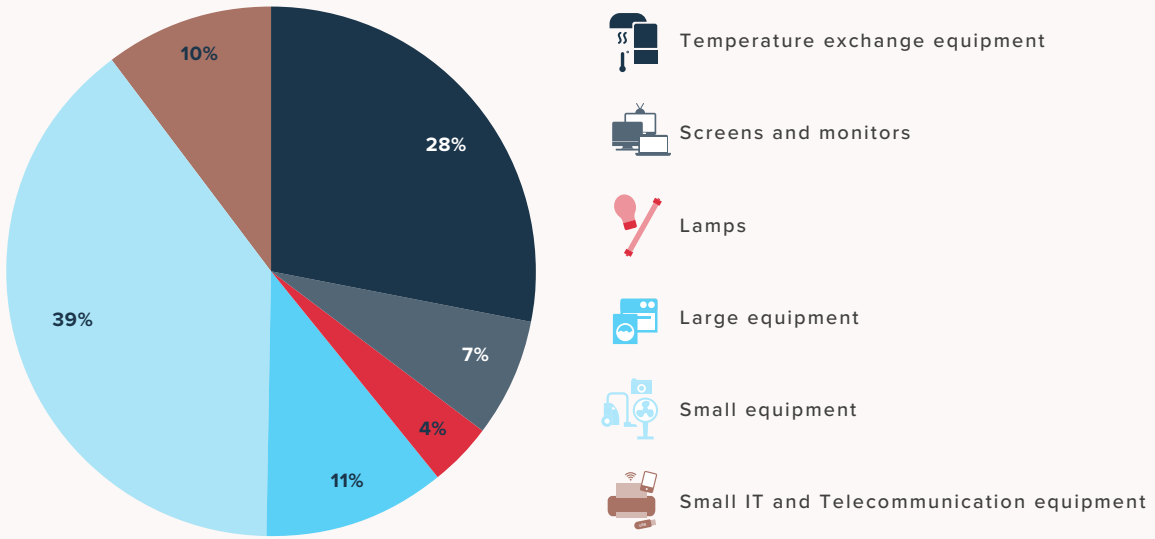
According to UNITAR data, in Kyrgyzstan in 2019, the volumes of e-waste placed on the market amounted to 18.5 kt, and the volumes of e-waste generated was 10 kt. The level of collection and recycling of e-waste was 0.1% (Table 10).

**Table 10.** Key data on EEE and e-waste in Kyrgyzstan in 2019 [2]

| INDICATORS | VALUES |
|---|---|
| EEE placed on the market | 18.5 kt<br>2.8 kg per capita |
| E-waste generated | 10 kt<br>1.5 kg per capita |
| Collection and recycling of e-waste | Close to 0 kt<br>0 kg per capita |
| Environmentally sound collection rate of e-waste, % | 0.1 % |

Figure 8 presents the volumes of e-waste generated in Kyrgyzstan by 6 categories for 2019. The highest share of e-waste generation in Kyrgyzstan falls on small-sized equipment (Category V) - 39%, and the lowest on lamps (Category III) - 4%.

**Figure 8.** E-waste generation in Kyrgyzstan by category of e-waste, 2019 [2]




According to the UNITAR E-waste Collection Tool [17], the annual growth of e-waste generation will be approximately 500 tons and will reach almost 26 kt per annum by 2050. National statistical reporting in the field of waste management is formed on the basis of two forms [2]. Form 1 [37] contains data on generation and management of production and consumption waste of all hazard classes within the company. Form 2 [38] includes data on production and consumption waste, including data on ferrous and non-ferrous metals in MSW.

Thus, these forms provide some data on hazardous waste. However, there are currently no official national statistics on e-waste, including collection and recycling, in Kyrgyzstan. The lack of statistical data complicates the accounting of e-waste and the assessment of e-waste's environmental impact and economic consequences and hampers quality decision-making in the field of e-waste management.

# Chapter 5.
# Challenges and opportunities

## A. PROJECTIONS OUT TO 2030 AND 2050: ENVIRONMENTAL IMPACT AND RESOURCE POTENTIAL OF E-WASTE IN KYRGYZSTAN

### E-waste generation

According to the UNITAR E-waste Collection Tool [36], the volume of e-waste generated in Kyrgyzstan is expected to continue increasing.

Figure 9a shows projected managed and unmanaged e-waste generation to 2030 and 2050 in the absence of measures to improve e-waste management in Kyrgyzstan (the "Business as Usual" Scenario). Figure 9b shows the cumulative volumes of managed and unmanaged e-waste to 2030 and 2050 under the "Business as Usual" Scenario.

As shown in Figure 9a, unmanaged e-waste could reach 17 kt per annum by 2030 and 26 kt per annum by 2050.

**Figure 9a.** Generation of managed and unmanaged e-waste in 2023, 2030 and 2050 under the "Business as Usual" scenario (kt) [36]

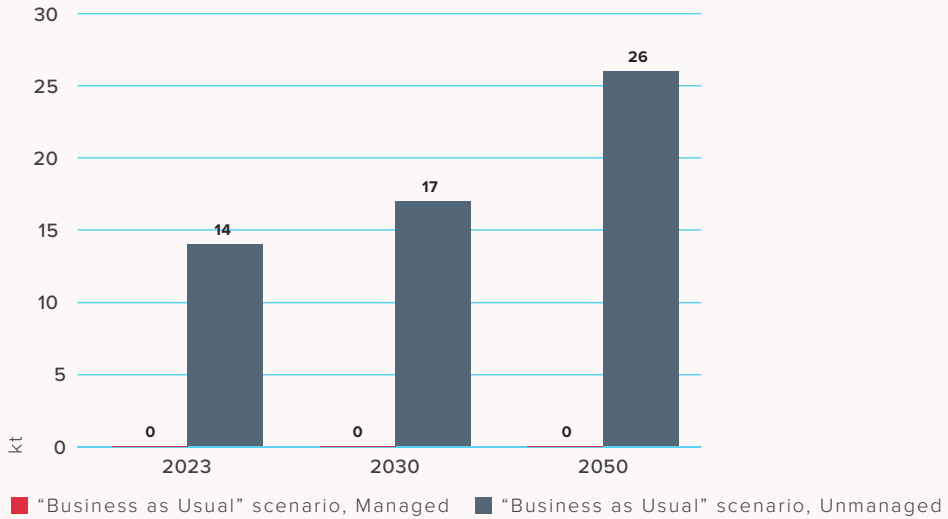
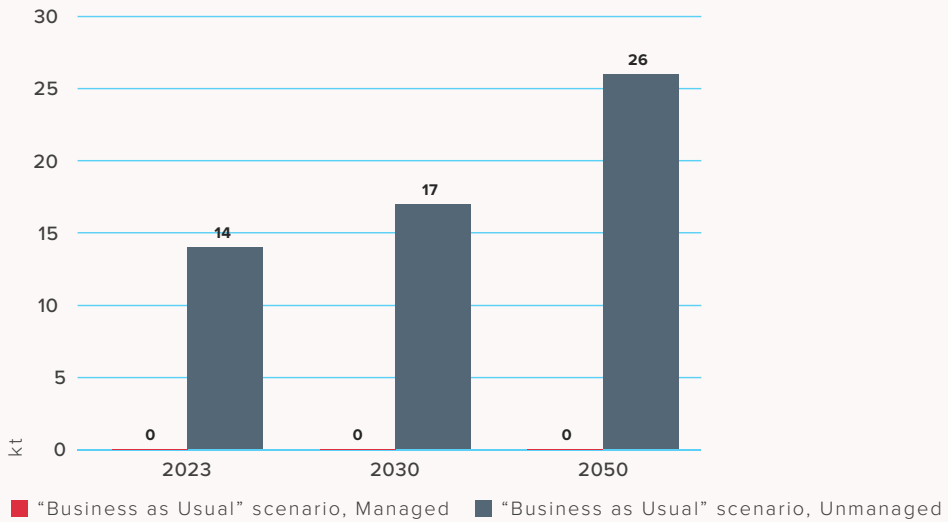



**Figure 9b.** Total accumulated e-waste volumes from 2023 to 2030 and from 2023 to 2050, under the "Business as Usual" scenario (kt) [36]



### Hazardous substances in e-waste

Hazardous substances in e-waste (lead, mercury, chlorofluorocarbons, etc., see chapter 1.a) negatively affect human health and pollute the environment. Projections for the content of hazardous components in managed/unmanaged e-waste to 2030 and 2050 for the "Business as Usual" scenario are presented in Table 11.

**Table 11.** Projected content of hazardous substances in managed/unmanaged e-waste for 2023 - 2030 and 2023 - 2050, under the "Business as Usual" scenario [36]

| HAZARDOUS SUBSTANCES | CUMULATIVE 2023 - 2030, TONS | | CUMULATIVE 2023 - 2050, TONS | |
|---|---|---|---|---|
| | Managed | Unmanaged | Managed | Unmanaged |
| CFC-12 | 0 | 3 | 0 | 3 |
| HCFC-22 | 0.25 | 226 | 0.85 | 780 |
| HC (R600a) | 0.01 | 10 | 0.05 | 49 |
| HFC-134a | 0.01 | 6 | 0.01 | 13 |
| HFC-32 | 0 | 2 | 0.01 | 9 |
| HFC-410A | 0.05 | 48 | 0.25 | 228 |
| Mercury (Hg) | 0 | 0.46 | 0 | 1 |
| Lead (Pb) | 0.07 | 67 | 0.15 | 139 |

### Valuable materials in e-waste

In addition to hazardous components and toxic substances, e-waste contains valuable materials such as steel, copper, aluminum, precious, and other types of metals. In modern mining practices, primary extraction of raw materials often causes significant negative impacts on the environment. Fluctuations in market prices, material shortages, and raw material supply risks create the need to introduce methods for extracting secondary raw materials and reducing pressure on primary raw materials. In this respect, e-waste is an important source of secondary raw materials [1].

Table 12 presents the forecast of the content of valuable materials in the total generation of e-waste for 2023-2030 and 2023-2050 for the "Business as Usual" Scenario.

**Table 12.** Projected content of valuable materials in managed/unmanaged e-waste for 2023 - 2030 and 2023 - 2050, under the "Business as Usual" scenario [36]

| VALUABLE MATERIALS | CUMULATIVE 2032 - 2030, TONS | | CUMULATIVE 2023 - 2050, TONS | |
|---|---|---|---|---|
| | Managed | Unmanaged | Managed | Unmanaged |
| Plastic | 22 | 20,345 | 64 | 58,798 |
| Glass | 0.08 | 69 | 11 | 10,363 |
| Iron (Fe) | 48 | 44,172 | 216 | 197,095 |
| Aluminum (Al) | 9 | 7,896 | 37 | 33,871 |
| Copper (Cu) | 5 | 4,955 | 24 | 22,063 |
| Silver (Ag) | 0 | 2 | 0.01 | 9 |
| Gold (Au) | 0 | 0.48 | 0 | 2 |
| Platinum (Pt) | 0 | 0 | 0 | 0.01 |
| Palladium (Pd) | 0 | 0.13 | 0 | 0.48 |

As with any country, the availability of valuable materials and the development of an environmentally friendly e-waste management system can become a platform for creating sustainable recycling businesses and jobs for Kyrgyzstan as well.

### Environmental costs of pollution by e-waste

According to UNITAR, the current economic damage of the e-waste management system is:

- Economic losses in Kyrgyzstan associated with the environmental and social consequences of unmanaged e-waste are estimated at USD $92 million (8.2 billion soms) for 2023 (Table 13). This is mainly due to uncontrolled hazardous substances and greenhouse gas emissions. Costs amount to 0.9% of GDP in 2022 [39]
- No revenue from processing valuable materials

**Table 13.** Economic losses in 2023, 2030, and 2050, under the "Business as Usual" scenario [36]

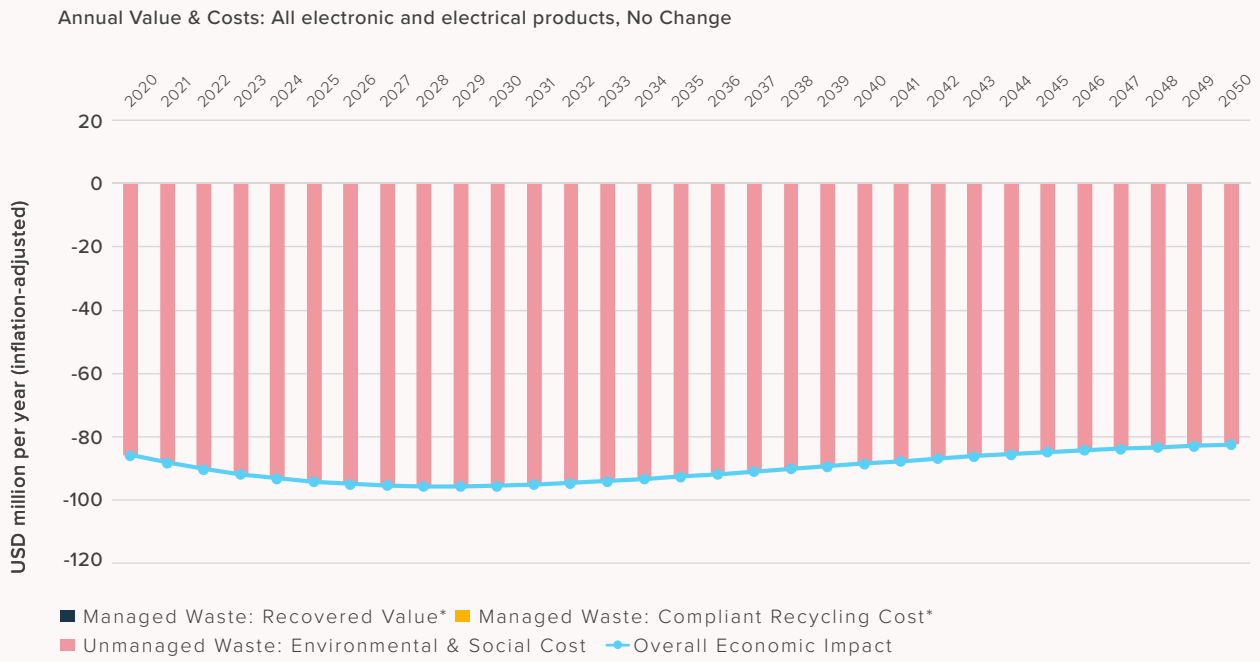
| ECONOMIC INDICATORS, MILLION USD PER YEAR | | | |
|---|---|---|---|
| | 2023 | 2030 | 2050 |
| Environmental and social costs of unmanaged e-waste | -92 | -95 | -82 |
| Cost of environmentally sound managed e-waste | 0 | 0 | 0 |
| Revenue from managed e-waste recycling | 0 | 0 | 0 |
| Total economic effect | -92 | -95 | -82 |

Under the "Business as Usual" Scenario, with no change to e-waste collection and recycling rates and taking into account the corresponding inflation rates, the following consequences are expected by 2050 (Figure 10):

- Environmental and social losses will amount to losses of USD $82 million (7.3 billion soms) per year
- No revenue from processing valuable materials

The reduction of environmental and social losses by 2050 by USD $10 million compared to 2023 can be explained by the reduction of hazardous constituents, e.g. mercury, in EEE. This reduction therefore decreases the environmental and socioeconomic impact of unmanaged waste.

**Figure 10.** Dynamics of environmental and socio-economic impacts, under the "Business as Usual" scenario [36]




*The numbers for these parameters are so little that they do not appear in the Figure

With the development of the e-waste management system according to the "Business as Usual" scenario, the loss of valuable materials and the release of hazardous constituents and toxic substances contained in e-waste will have significant environmental and economic consequences for Kyrgyzstan by 2030 and 2050.

The predicted negative impact highlights the need to take consistent action to improve the e-waste management system in accordance with a clearly defined system development scenario and specific targets that will help track its growth and development.

## B. INTERACTION BETWEEN E-WASTE COLLECTION AND RECYCLING AND THE SUSTAINABLE DEVELOPMENT GOALS

In September 2015, all United Nations Member States adopted the ambitious 2030 Agenda for Sustainable Development and identified 17 Sustainable Development Goals (SDGs) and 169 targets aimed at ending poverty, protecting the planet, ensuring prosperity, and fostering peace through global partnership.

Considering the issues and opportunities associated with e-waste, improving e-waste management would contribute to the achievement of several SDGs related to environmental protection and health, employment, and economic growth, as detailed below.

**Figure 11.** 17 Sustainable Development Goals (SDGs) [40]


### Environmental protection and health

The hazardousness inherent to e-waste leads to various environmental and health-related issues, including the pollution of air, water, and soil, if the e-waste is mismanaged. SDG 3 on good health and well-being, and more specifically Target 3.9, tackles the reduction of the number of deaths and illnesses caused by hazardous chemicals and air, water, and soil pollution and contamination. Under SDG 6 on clean water and sanitation, Target 6.1 is focused on achieving universal and equitable access to safe and affordable drinking water for all, and Target 6.3 is focused on reducing pollution, eliminating dumping, and minimising release of hazardous chemicals and materials. SDG 14 on life below water and Targets 14.1 and 14.2 refer to marine pollution and the protection of the marine ecosystem.

Most e-waste is generated in cities, so it is particularly important to improve collection and recycling rates in urban areas. Under SDG 11 on sustainable cities and communities, target 11.6 seeks to reduce the adverse per capita environmental impact of cities by paying special attention to air quality and to municipal and other waste management.

Under SDG 12 on responsible consumption and production, target 12.4 intends to achieve the environmentally sound management of chemicals and all waste throughout the life cycle in accordance with agreed international frameworks, and to significantly reduce their release into air, water, and soil in order to minimise their adverse impacts on human health and the environment. Target 12.5 addresses the issue of over-consumption of goods and over-production of waste and aims to substantially reduce waste generation through prevention, reduction, repair, recycling, and reuse.

Under SDG 12, more specific sub-indicators have been recognised for monitoring growth in e-waste - i.e. e-waste has been included in the work plan and the documentation around indicator 12.5.1 on the national recycling rate and tons of material recycled, and under indicator 12.4.2 on hazardous waste generated per capita and proportion of hazardous waste treated by type of treatment.

### Employment and economic growth

Solid waste management and recycling employs between 19 and 24 million women and men worldwide, of which four million work in the formal waste and recycling sector [41]. For now, e-waste is often processed in the informal sector, which is associated with work safety and security issues. However, due to the presence of valuable materials, the management of e-waste can be an opportunity for entrepreneurs to create sustainable businesses and green jobs and to contribute to economic growth in the recycling and refurbishing sector. Under SDG 8 on decent work and economic growth, Target 8.3 aims to promote development-oriented policies that support productive activities, decent job creation, entrepreneurship, creativity, and innovation, and to encourage the formalisation and growth of micro-, small-, and medium-sized enterprises. Target 8.8 calls for the protection of labour rights and promotes safe and secure working environments for all workers, including migrant workers - particularly women migrants - and those in precarious employment.

### C. POSSIBLE WAYS OF DEVELOPING AN E-WASTE MANAGEMENT SYSTEM IN KYRGYZSTAN

Given the potential environmental, social, and economic impacts on the environment and economy of Kyrgyzstan, as well as the lack of a reliable e-waste management system in Kyrgyzstan, it is clear that improving e-waste management in Kyrgyzstan must be carried out in accordance with the principles of a circular economy.

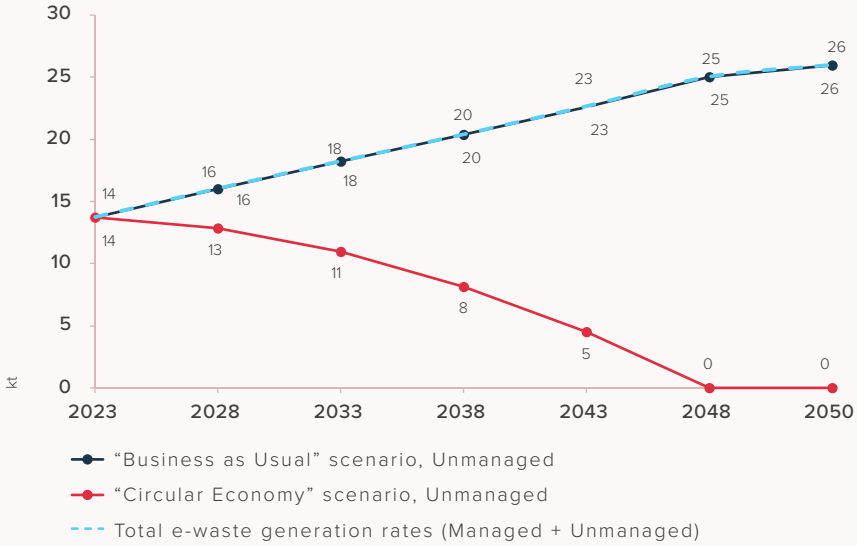
E-waste management within the "Circular Economy" scenario can be implemented in various ways. To assess the forecast for this scenario, this publication uses target indicators demonstrating an intensive increase in the share of collection and recycling of e-waste in Kyrgyzstan from 0.1% in 2023 to 100% in 2048 and maintaining this level in the future (Table 14). High targets for the collection and recycling of e-waste are set, taking into account the high standards proposed at the legislative level for the recycling of EEE waste as part of the implementation of the EPR (see Table 9).

**Table 14.** Proposed e-waste collection and recycling targets (managed e-waste) for the "Circular Economy" scenario

| | 2023 (current level) | 2028 | 2033 | 2038 | 2043 | 2048 | 2053 |
|---|---|---|---|---|---|---|---|
| Indicator value | 0.1% | 20% | 40% | 60% | 80% | 100% | 100% |

Comparing the forecast results for the two scenarios shows a significant difference in the volume of unmanaged e-waste, which has serious negative impacts on the environment and human health (Figure 12).

**Figure 12.** Projections of unmanaged e-waste generation under two scenarios of e-waste management [36]



The “Circular Economy” scenario would reduce the total amount of unmanaged e-waste by more than half by 2050, from 554 kt to 225 kt, by incorporating it into a system of “managed” e-waste through collection and recycling (Figure 13).

**Figure 13.** Total volumes of accumulated e-waste under two scenarios of e-waste management [36]

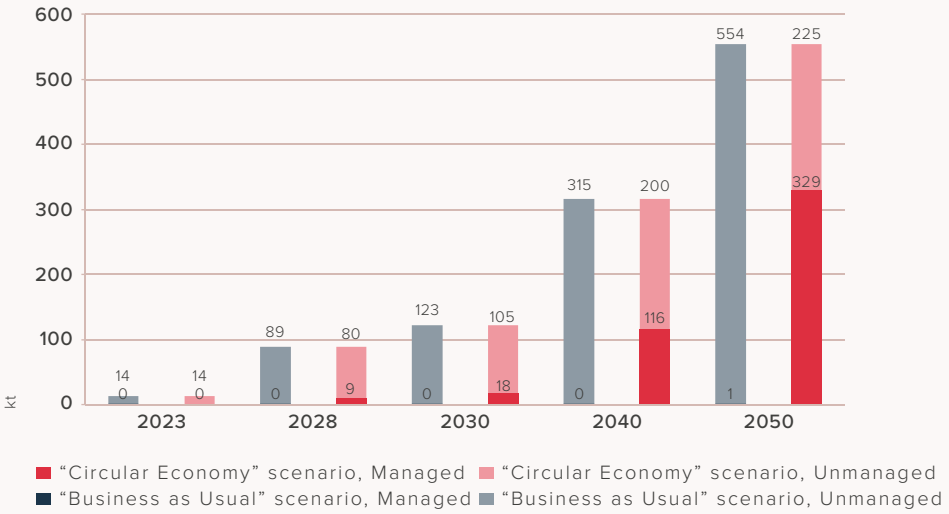



Table 15 presents UNITAR’s projections of hazardous constituents in e-waste if there is no progress in developing e-waste management (the “Business as Usual” scenario) as well as if Kyrgyzstan makes significant progress in e-waste management and improves collection rates (the “Circular Economy” scenario).

**Table 15.** Projected content of hazardous substances in managed/unmanaged e-waste for 2023 - 2050, under two scenarios of e-waste management [36]

| HAZARDOUS INGREDIENTS | “BUSINESS AS USUAL” SCENARIO, CUMULATIVE 2023 - 2050, TONS | | “CIRCULAR ECONOMY” SCENARIO, CUMULATIVE 2023 - 2050, TONS | |
|---|---|---|---|---|
| | Managed | Unmanaged | Managed | Unmanaged |
| CFC-12 | 0 | 3 | 0.76 | 3 |
| HCFC-22 | 0.85 | 780 | 407 | 373 |
| HC (R600a) | 0.05 | 49 | 29 | 20 |
| HFC-134a | 0.01 | 13 | 5 | 8 |
| HFC-32 | 0.01 | 9 | 6 | 4 |
| HFC-410A | 0.25 | 228 | 136 | 92 |
| Mercury (Hg) | 0 | 1 | 0.39 | 0.61 |
| Lead (Pb) | 0.15 | 139 | 56 | 83 |

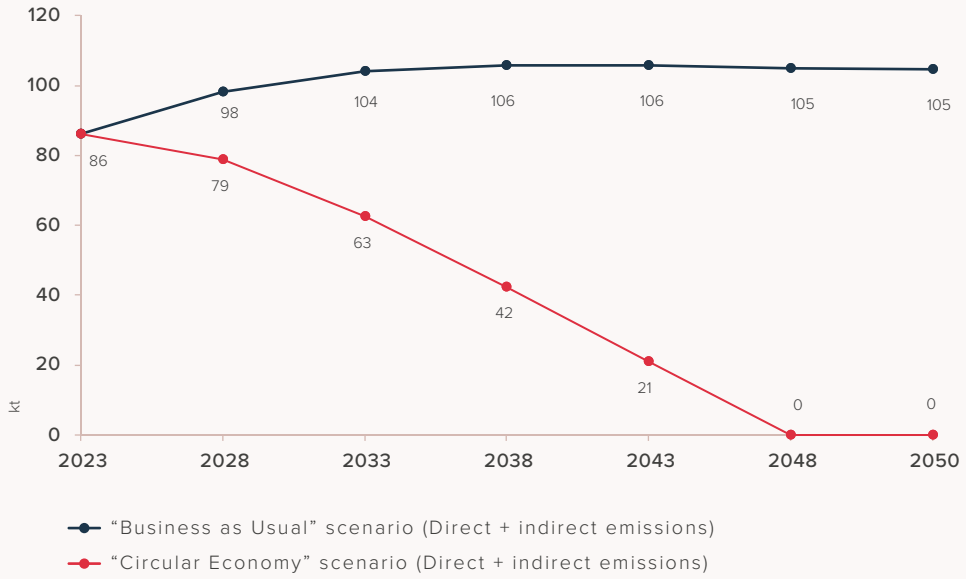
By 2050, implementation of the "Circular Economy" scenario will allow 186.4 kt of valuable materials to be extracted and processed from e-waste (including 116.4 kt of iron, 19.7 kt of aluminum, and 28.3 kt of plastic) (Table 16). These materials can be reused as secondary resources for the production of EEE, building materials, vehicles, etc.

**Table 16.** Projected content of valuable materials in managed/unmanaged e-waste for 2023 - 2050, under two scenarios of e-waste management [36]

| VALUABLE MATERIALS | "BUSINESS AS USUAL" SCENARIO, CUMULATIVE 2023 - 2050, TONS | | "CIRCULAR ECONOMY" SCENARIO, CUMULATIVE 2023 - 2050, TONS | |
|---|---|---|---|---|
| | Managed | Unmanaged | Managed | Unmanaged |
| Plastic | 64 | 58,798 | 28,335 | 30,527 |
| Glass | 11 | 10,363 | 8,930 | 1,443 |
| Iron (Fe) | 216 | 197,095 | 116,442 | 80,869 |
| Aluminum (Al) | 37 | 33,871 | 19,697 | 14,211 |
| Copper (Cu) | 24 | 22,063 | 13,001 | 9,087 |
| Silver (Ag) | 0.01 | 9 | 5 | 4 |
| Gold (Au) | 0 | 2 | 0.91 | 0.78 |
| Platinum (Pt) | 0 | 0.01 | 0.01 | 0 |
| Palladium (Pd) | 0 | 0.48 | 0.26 | 0.21 |

Recycling e-waste can significantly reduce greenhouse gas emissions. When e-waste is recycled, a significant portion of its components can be recovered or recycled, reducing the need to manufacture new parts and thus reducing greenhouse gas emissions associated with the extraction and production of new materials. As well, many components, such as metals and plastics, can be recycled and used repeatedly, which also reduces greenhouse gas emissions. Direct and indirect greenhouse gas emissions from the e-waste management system in Kyrgyzstan will increase under the "Business as Usual" scenario and could reach 105 kt by 2050. The development of an e-waste management system according to the "Circular Economy" scenario will prevent 80% of greenhouse gas emissions by 2043, which will amount to 21 kt and will reduce greenhouse gas emissions by 100% by 2048 (Figure 14).

**Figure 14.** Projections of direct and indirect greenhouse gas emissions from e-waste management in $CO_2$-equivalents [36]




Managing e-waste can have a significant economic impact by reducing production costs, creating revenue opportunities from recycling valuable materials, reducing disposal costs and fines, and stimulating economic growth through the sustainable use of resources. The implementation of the "Circular Economy" scenario will achieve a positive economic impact of USD $18 million (1.6 billion soms) in e-waste management in Kyrgyzstan, while the "Business as Usual" scenario could result in costs of USD $82 million (7.3 billion soms) (Figure 15), which are mainly due to the hidden environmental and social costs of unmanaged e-waste. In the "Circular Economy" scenario, overall e-waste management could have a net positive impact of USD $18 million (1.6 billion soms) by 2050, mainly from revenues from e-waste recycling through the production of secondary raw materials.

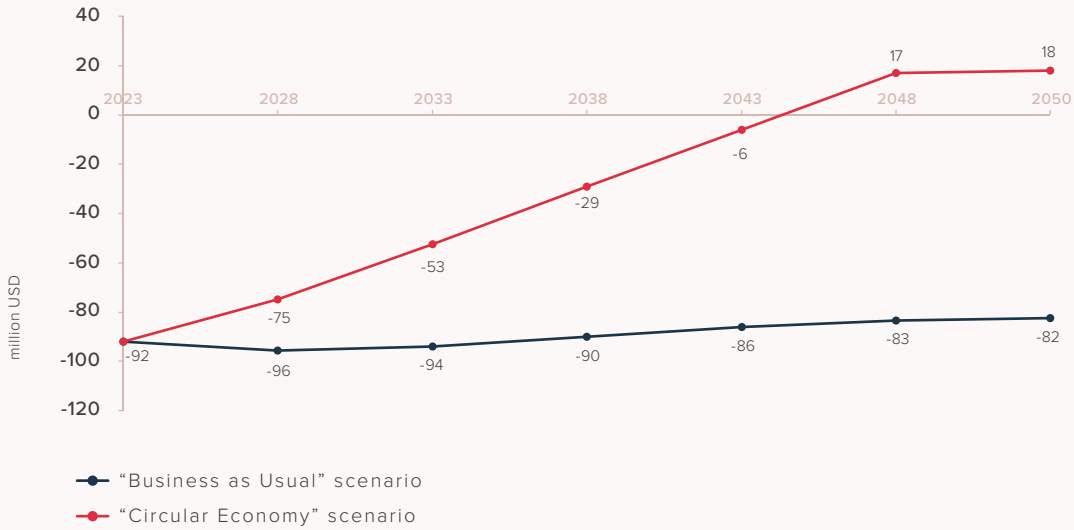
**Table 17.** Economic revenues and losses in 2023, 2030, and 2050, under two scenarios of e-waste management [36]

| ECONOMIC INDICATORS, MILLION USD PER YEAR | CURRENT YEAR | "BUSINESS AS USUAL" SCENARIO | "CIRCULAR ECONOMY" SCENARIO |
|---|---|---|---|
| | 2023 | 2050 | 2050 |
| Environmental and social costs of unmanaged e-waste | -92 | -82 | 0 |
| Recycling costs of managed e-waste | 0 | 0 | -17 |
| Revenues from managed e-waste recycling | 0 | 0 | 35 |
| Overall economic effect | -92 | -82 | 18 |

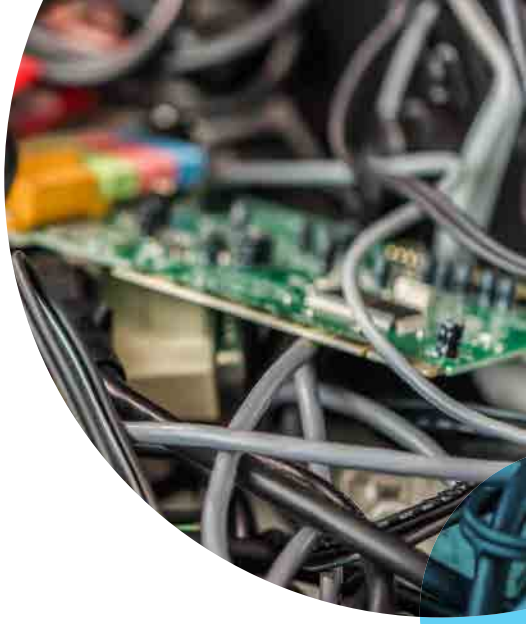
* Negative values represent costs/negative impacts on the environment and society.

As can be seen from Figure 15, the "Circular Economy" scenario will achieve a positive economic effect as early as 2044, which will grow as the volume of recycled waste increases, the development of recycling and reuse technologies and rising prices for valuable materials.

**Figure 15.** Total economic effect of e-waste management system under two e-waste management scenarios, in million USD [36]




Thus, the results of forecasts for the "Business as Usual" scenario and the "Circular Economy" scenario clearly demonstrate a significant difference in the future development of waste management in Kyrgyzstan. The "Business as Usual" scenario assumes that unmanaged e-waste will continue to grow, resulting in increased environmental and health impacts and the loss of valuable resources and economic benefits. By contrast, the "Circular Economy" scenario envisions reducing unmanaged waste, reducing greenhouse gas emissions and pollution, and increasing economic benefits through improved resource efficiency. The results of the forecasts for the "Business as Usual" and "Circular Economy" scenarios clearly ascertain the importance of the transition to sustainable e-waste management. Implementing measures to improve resource efficiency and reduce waste could provide significant economic, environmental, and social benefits to Kyrgyzstan.



# Chapter 6.
# Future directions of development of the e-waste management system in Kyrgyzstan

The results of forecasting the environmental and socioeconomic impacts of the existing e-waste management system in Kyrgyzstan, the relationship between e-waste collection and recycling and sustainable development goals, and the international and regional agreements that Kyrgyzstan has acceded all emphasise the need to take decisive measures to improve the e-waste management system. On the basis of international regional experience and results of the national dialogue of stakeholders within the framework of consultations and the National Forum in Bishkek, held on May 23-24, 2023 with stakeholders, the necessary measures in the actual directions of development of the e-waste management system in Kyrgyzstan were identified. The implementation of these measures is inextricably linked to the collective efforts of all stakeholders, including government authorities, manufacturers, and importers of electronic equipment and machinery, assemblers, e-waste recyclers, and all other stakeholders.

### A. IMPROVEMENT OF LEGISLATION ON THE REGULATION OF E-WASTE

One of the main directions of e-waste management system development is improvement of legislation. To improve the situation at the legislative level, it is necessary to:

- Introduce amendments and additions to the legislation to define the concept of “e-waste” and a specific set of legislation on e-waste management, which include as well as develop and approve regulations and national standards governing the procedure for handling e-waste
- Adopt norms for recycling of waste goods, including EEE, as part of the implementation of the EPR, as well as develop bylaws necessary for the full implementation of the EPR
- Develop and approve the state program on sustainable waste management, including tasks in the sphere of e-waste management
- Introduce appropriate amendments to the Law On Licensing and Permit System in the Kyrgyz Republic to bring it in line with the requirements of the new Law On Production and Consumption Waste and to cover relevant activities on waste management of all hazard classes in terms of licensing
- Ensure effective interaction between stakeholders and decision-makers in order to develop joint measures for improving legislation and developing the sphere of e-waste management
- Strengthen control over transboundary shipments of EEE, used EEE, and e-waste
- Improve the licensing system and establish qualification requirements for e-waste collection points in accordance with international standards for collection and recycling
- Ensure compliance with e-waste management legislation by all stakeholders, in particular by strengthening liability for its violation, including liability for unsafe and illegal handling of e-waste
- Ensure that information concerning core e-waste statistics is annually published for at least six e-waste categories, at least covering:
  - EEE Placed on Market
  - E-waste Generated
  - separately collected in accordance with the legislation
- Set legally binding targets on:
  - e-waste collection. From a specific year, the minimum collection rate to be achieved annually shall comply with a specific target (%) of e-waste generated on or a set of gradual increasing targets over time.
  - e-waste recovery of the amounts of e-waste formally collected. The achievement of the targets shall be calculated, for each category, by dividing the weight of the WEEE that enters the recovery or recycling/preparing for reuse facility, after proper treatment in accordance with national legislation with regard to recovery or recycling, by the weight of all separately collected WEEE for each category, expressed as a percentage.

### B. IMPROVEMENT OF THE STATISTICAL DATA COLLECTION AND PROCESSING SYSTEM FOR E-WASTE GENERATION, COLLECTION, AND RECYCLING

Improving statistics on e-waste collection and recycling is important for monitoring progress in waste management, policy making, and legislation. The following key actions should be taken in this area:

- Implement the e-waste classification system according to the European Union Directive 2012/19/EU on the recycling of electrical and electronic equipment (e-waste), for uniform application and accounting of e-waste categories in the framework of regional and national monitoring
- Ensure uniform recording, availability, completeness, and monitoring of e-waste data on an annual basis and introduce and improve official statistics on e-waste; the statistics should comply with international standards developed in the UN Partnership for Measuring Development [9] and should annually measure and publish:
  - the amounts of EEE Placed on the Market (using the apparent consumption methodology from UNITAR EEE POM tool, or national register data)
  - E-waste Generated
  - Formal e-waste collection under the EPR system
  - E-waste collection rate
- Improve the capacity of state statistical agencies in the field of e-waste statistics
- Introduce the use of the e-waste Collection Tool [36] developed by UNITAR to monitor e-waste generation volumes, as well as to forecast the socioeconomic and environmental impact of e-waste collection and recycling over a certain period of time up to 2050
- Increase the capacity of specialised enterprises and small and medium-sized enterprises (SMEs) to collect and process data in the field of e-waste management and subsequently on reporting, completion of reporting forms, and deadlines
- Conduct a study to identify the volume of export and import of EEE that is not declared (illegal imports) and strengthen measures to combat it
- Monitor the collection and recycling of e-waste within the framework of the introduced EPR mechanism

### C. DEVELOPMENT OF INFRASTRUCTURE AND IMPROVEMENT OF TECHNOLOGIES FOR COLLECTION AND RECYCLING OF E-WASTE

Technologies for collection and recycling of e-waste are one of the most important links in the e-waste management system, as they directly influence the provision of safe waste management and the reduction of environmental and health impacts. The following key measures should be taken in this area:

- Create a network of e-waste collection points (including opening branches of waste collection companies in all regional centers, installation of containers in public places, etc.) and ensure their uniform territorial coverage throughout the country
- Develop and implement the best available technologies, including technologies for recycling various types of plastics contained in e-waste
- Launch technological lines for treatment of hazardous components of e-waste
- Ensure recycling of collected e-waste at local enterprises
- Establish cooperation and logistics with international recyclers to transfer certain parts of e-waste abroad for recycling and recovery
- Consider the possibility of recovering precious metals contained in e-waste at national refineries

### D. NECESSARY MEASURES TO SUPPORT THE E-WASTE COLLECTION AND RECYCLING SECTOR

The e-waste collecting and recycling sector is challenging in terms of economic benefits, as it requires significant investments in infrastructure and technology. The following key measures should be taken to support this sector:

- Include the sector of e-waste collection and recycling in the programs for the development and support of SMEs adopted by the Government of Kyrgyzstan
- Develop financial mechanisms to encourage manufacturers and importers to switch to their own e-waste collection system by attracting local recyclers
- Provide favorable investment conditions for the creation and development of e-waste collection and recycling enterprises, attracting necessary technical specialists and introducing modern technologies in this area
- Introduce mechanisms of state support for e-waste collection and recycling enterprises at the level of central government authorities, including such instruments as tax incentives, subsidies, and other forms of financial assistance

- Introduce mechanisms of support of e-waste collection and recycling companies by local executive bodies, including provision of land plots, equipment, etc.
- Establish a direct dialogue between collectors, recyclers, and state authorities to strengthen cooperation and transparency of the parties' activities

### E. FINANCING OF E-WASTE COLLECTION AND RECYCLING SYSTEM

To fully develop the e-waste management system in the country, specific financing instruments are needed. The following measures should be taken within the framework of this direction:

- Develop and implement mechanisms for the implementation of the EPR provided for by the new Law On Production and Consumption Waste
- Develop tools to support and finance the infrastructure for collection and recycling of e-waste generated from the population by municipalities
- Increase competence of the public, private, and civil sectors to utilise the opportunities of international and national grants, business accelerators, start-up support, and other tools in the field of innovative approaches to the development of an e-waste management system in the country

### F. PARTNERSHIP BETWEEN THE FORMAL AND INFORMAL SECTOR FOR E-WASTE COLLECTION AND RECYCLING

The informal sector plays an important role in e-waste collection and recycling in countries where formal waste management systems are not yet developed. Developing cooperation between the formal and informal sectors is important at this stage. The following actions should be taken in this area:

- Raise awareness of the informal sector on the benefits of running a legal recycling business, existing legal requirements and support measures, and the impact of e-waste on human health in case of improper waste management
- Develop incentives for informal e-waste sector participants to transfer waste to specialised enterprises
- Establish partnership programs aimed at providing the informal sector with access to resources and infrastructure for waste collection and recycling
- Consider providing financial support to informal sector representatives to purchase necessary infrastructure
- Develop joint formal and informal sector initiatives for e-waste collection and recycling

### G. CAPACITY BUILDING AND STAKEHOLDER AWARENESS ON E-WASTE MANAGEMENT AND COMMUNITY OUTREACH

Awareness of e-waste management among all stakeholders contributes to the support and development of all elements of the e-waste management system and serves as an important standalone element of the system. The following actions should be taken in this area:

- Strengthen public and stakeholder awareness on the potential environmental and health impacts of e-waste, as well as on the safe handling of e-waste and the importance of e-waste collection
- Increase the culture of consumer behavior in favor of extending the life of electronic equipment
- Develop incentive mechanisms to encourage consumers to collect and hand over e-waste to specialised companies
- Conduct guest lectures on a regular basis, from company representatives in the field of environmental protection, as well as training on separate waste collection, negative impact of e-waste, MSW, plastic, glass, paper, etc.

The national Roadmap for environmentally sound e-waste management was developed in accordance with the abovementioned measures, as well as the approved action plans of the state bodies of the Kyrgyz Republic in the field of waste management [42].

# Chapter 7.

# National roadmap for environmentally sound management of future e-waste for 2024 - 2028

| N° | ACTIVITIES | DEADLINES | STATUS | PERFORMERS |
|---|---|---|---|---|
| **1. Improvement of legislation in the field of e-waste management** | | | | |
| 1.1 | Amendments to the Resolution of the Government of the Kyrgyz Republic dated December 28, 2015 No. 885 On approval Procedure for handling hazardous waste in the territory of the Kyrgyz Republic, in part of regulating the procedure for handling e-waste by individuals and legal entities, including certain types of e-waste (large-size etc.) | 2024 - 2025 | Updated Resolution of the Government of the Kyrgyz Republic dated December 28, 2015 No. 885 | Ministry of natural resources, ecology, and technical supervision<br>International and national experts |
| 1.2 | Development and approval of bylaws aimed at implementing the EPR mechanism, including approval of recycling norms of waste from the use of goods, including EEE | 2024 - 2025 | Approved bylaws | Ministry of natural resources, ecology and technical supervision<br>International and national experts<br>Industry business associations<br>Other interested state authorities |
| 1.3 | Development and approval of the state program on sustainable waste management, including targets for collection and recycling of e-waste and measures in the field of e-waste management | 2024 - 2025 | Approved state program | Ministry of natural resources, ecology, and technical supervision<br>International and national experts |
| 1.4 | Strengthening inspection controls and other control measures, including at the state border, for transboundary shipments of EEE, used EEE, and e-waste | annually | Reports on inspections and control measures carried out | Ministry of natural resources, ecology, and technical supervision<br>State Customs Service under the Ministry of Finance |
| 1.5 | Development and implementation of effective ways of interaction between stakeholders and decision-makers to collect proposals for improve waste legislation | 2024 - 2025 | Regulations on interaction between the relevant state bodies have been drafted | Ministry of natural resources, ecology, and technical supervision<br>Ministry of Economy and Commerce<br>State Customs Service under the Ministry of Finance<br>Ministry of Agriculture<br>Ministry of Health<br>National Statistical Committee<br>Ministry of Internal Affairs<br>Plenipotentiary representation of the President of the Kyrgyz Republic in oblasts, local self-government bodies and others |
| **2. Improvement of the collection and processing system of statistical data on e-waste generation, collection, and recycling** | | | | |
| 2.1 | Inclusion in the Hazardous Waste Classifier approved by Government Decision No. 9 of January 15, 2010 of the classification of e-waste according to the European Union Directive 2012/19/EU on the recycling of EEE for uniform application and accounting of e-waste categories within regional and national monitoring | 2027 | Updated Hazardous Waste Classifier | Ministry of natural resources, ecology, and technical supervision |
| 2.2 | Use of UNITAR “E-waste Collected Tool” by state authorities to forecast, track, and monitor e-waste generation, collection, and recycling, and to analyze the socioeconomic and environmental impact of e-waste in the country | 2024 - 2028 | Reports | National Statistical Committee |

| N° | ACTIVITIES | DEADLINES | STATUS | PERFORMERS |
|---|---|---|---|---|
| 2.3 | Development of an action plan to organise monitoring of e-waste collection and recycling volumes under the introduced EPR mechanism, including by recording data on EEE sales, reporting on collected and recycled waste, etc. | 2024 - 2025 | Action plan for organisation of monitoring of e-waste collection and recycling within the framework of the EPR mechanism | Ministry of natural resources, ecology and technical supervision (EPR Operator)<br>National Statistical Committee<br>Producers / importers |
| 2.4 | Amendments to statistical reporting forms in order to introduce accounting and monitoring of e-waste data | 2024 - 2025 | Updated statistical reporting forms | National Statistical Committee<br>Ministry of natural resources, ecology, and technical supervision |
| 2.5 | Amendments to statistical reporting forms in accordance with international standards developed within the framework of the UN Partnership on Measuring Information and Communication Technologies for Development (indicating volumes of EEE placed on the market, volumes of e-waste generated, volumes of e-waste collected under the EPR mechanism, and e-waste collection rate) | 2027 - 2028 | Updated forms of statistical reporting | National Statistical Committee<br>Ministry of natural resources, ecology, and technical supervision |
| 2.6 | Annual publication of e-waste statistics for six categories of e-waste, including data on EEE placed on the market, e-waste generated, separately collected e-waste according to legislation | 2027 - 2028 | Information on the official website of the National Statistical Committee | National Statistical Committee<br>Ministry of natural resources, ecology, and technical supervision |
| 2.7 | Conducting a study to identify exports and imports of electrical and electronic equipment that are not declared (illegal imports) | 2024 - 2025 | Report on the research | State authorities exercising customs, environmental and sanitary-epidemiological control<br>Ministry of natural resources, ecology, and technical supervision |
| 2.8 | Conducting trainings in the field of e-waste statistics for state statistical offices in order to increase their capacities | 2024 - 2025 | Reports on training events | National Statistical Committee<br>Ministry of natural resources, ecology, and technical supervision<br>International and national experts |
| 2.9 | Conducting information campaigns for representatives of businesses operating in the field of collection and recycling of e-waste on preparation and submission of departmental and statistical reporting forms | 2024 - 2025 | Protocols of events<br>Reports on events | Ministry of natural resources, ecology, and technical supervision<br>National Statistical Committee<br>Collectors / recyclers<br>Industry business associations |
| 3. Development of infrastructure and improvement of technologies for collection and recycling of e-waste | | | | |
| 3.1 | Creation of a network of e-waste collection points (including opening of branches of waste collection companies in all regional centers, installation of containers in public places, etc.) and ensuring their uniform territorial coverage throughout the country | 2024 - 2025 | Map of the network of e-waste collection points<br>Reports of state authorities on opening of e-waste collection points | Local state administrations<br>Executive bodies of local self-government<br>Producers / importers<br>Collectors / recyclers<br>EPR Operator |
| 3.2 | Creation of modern technological enterprises for e-waste recycling | 2024 - 2025 | Map of the network of enterprises<br>Reports of state authorities on the establishment of enterprises | Local state administrations<br>Executive bodies of local self-government<br>Producers / importers<br>Recyclers<br>EPR operator |

| N° | ACTIVITIES | DEADLINES | STATUS | PERFORMERS |
|---|---|---|---|---|
| 4. Necessary support measures for the e-waste collection and recycling sector and financing | | | | |
| 4.1 | Development of recommendations to incentivise manufacturers and importers to switch to their own e-waste recycling system | 2024 - 2025 | Recommendations | Ministry of Finance<br>Ministry of Economy and Commerce<br>Banks, financial institutions<br>Producers / importers<br>Ministry of natural resources, ecology, and technical supervision (EPR Operator) |
| 4.2 | Amendments to the Tax code of the Kyrgyz Republic on providing tax benefits to e-waste collection and recycling companies, as well as VAT exemption for import of waste sorting lines, equipment, and other waste recycling facilities | 2025 - 2026 | Updated Tax Code | Ministry of natural resources, ecology, and technical supervision;<br>Ministry of Finance<br>Industry business associations |
| 4.3 | Holding training and consulting meetings for e-waste collection and recycling companies on business plan development, investment attraction, obtaining subsidies and soft loans | annually | Protocols of events<br>Reports of events | Ministry of natural resources, ecology, and technical supervision;<br>Collectors / recyclers<br>NGOS. |
| 4.4 | Development and implementation of targeted investment programs for creation and development of e-waste collection and recycling companies, attraction of necessary technical specialists to the country and introduction of modern technologies in this field | 2024 - 2028 | Report on implementation of investment programs | National Investment Agency;<br>Ministry of natural resources, ecology, and technical supervision (EPR Operator)<br>Ministry of Economy and Commerce<br>Collectors / recyclers<br>Industry Business Associations |
| 4.5 | Development of an action plan for the implementation of preferential loans and subsidising mechanisms for e-waste collection and recycling companies | 2025 - 2027 | Action Plan | Ministry of Finance<br>Banks, financial institutions<br>Ministry of Economy and Commerce<br>Collectors / recyclers<br>Industry business associations |
| 4.6 | Use of funds planned to be received from the treatment fee under the EPR mechanism for the development of the e-waste collection and recycling system | annually | Reports on the use of treatment fee funds | Ministry of natural resources, ecology, and technical supervision (EPR Operator)<br>Collectors / recyclers |
| 4.7 | Organisation of consultative seminars, round tables for the public, private, and civil sector on the use of international and national grants, business accelerators, startup support and other tools in the field of innovative approaches to the development of e-waste management system in the country | annually | Protocols of events<br>Reports of events | Ministry of natural resources, ecology, and technical supervision (EPR Operator)<br>National Investment Agency<br>International and national experts<br>Industry Business Associations<br>NGOs |

| N° | ACTIVITIES | DEADLINES | STATUS | PERFORMERS |
|---|---|---|---|---|
| **5. Partnership between the formal and informal sector for e-waste collection and recycling** | | | | |
| 5.1 | Conducting a research on informal sector activities, assessing their needs and building synergies | 2026 | Research report | International organisations<br>National experts |
| 5.2 | Developing measures to legalise the informal sector, and integrate it into the e-waste management system | 2026 | List of measures | Local state administrations<br>Executive bodies of local self-government |
| 5.3 | Development and implementation of incentive measures, including partnership programs aimed at transferring e-waste collected by the informal sector to the formal recycling system | 2026 | List of incentive measures | Ministry of natural resources, ecology, and technical supervision (EPR Operator)<br>Local state administrations<br>Executive bodies of local self-government<br>Financial institutions<br>Industry business associations |
| 5.4 | Conducting consulting seminars, round tables for representatives of the informal sector on legalisation of waste recycling business, improving legal literacy, licensing, obtaining subsidies etc. | annually | Protocols of events<br>Reports on events | Ministry of natural resources, ecology, and technical supervision (EPR Operator)<br>International and national experts<br>Collectors / Recyclers<br>NGOS |
| **6. Capacity development and education of stakeholders on e-waste management, and public outreach** | | | | |
| 6.1 | Organization of consulting seminars, round tables for state authorities on environmentally sound e-waste management, introduction to international directives and initiatives on e-waste management and other issues | 2024 - 2025 | Protocols of events<br>Reports on events | Ministry of natural resources, ecology, and technical supervision (EPR Operator)<br>International and national experts<br>Industry business associations<br>NGOS |
| 6.2 | Conducting capacity development training workshops for EEE producers and suppliers, industry associations, e-waste educators, specialised waste management companies | annually | Protocols of events<br>Reports on events | Producers / importers<br>Local state administrations<br>Executive bodies of local self-government<br>All stakeholders |
| 6.3 | Conducting public information campaigns on the negative impact of e-waste on the environment and human health | annually | Protocols of events<br>Reports on events | Producers / importers<br>Local state administrations<br>Executive bodies of local self-government<br>All stakeholders |
| 6.4 | Stimulating public initiatives aimed at preventing e-waste generation, including the "Repair Wave" initiative | 2024 - 2025 | Recommendations | Ministry of natural resources, ecology, and technical supervision (EPR Operator)<br>Local state administrations<br>Executive bodies of local self-government<br>NGOs |

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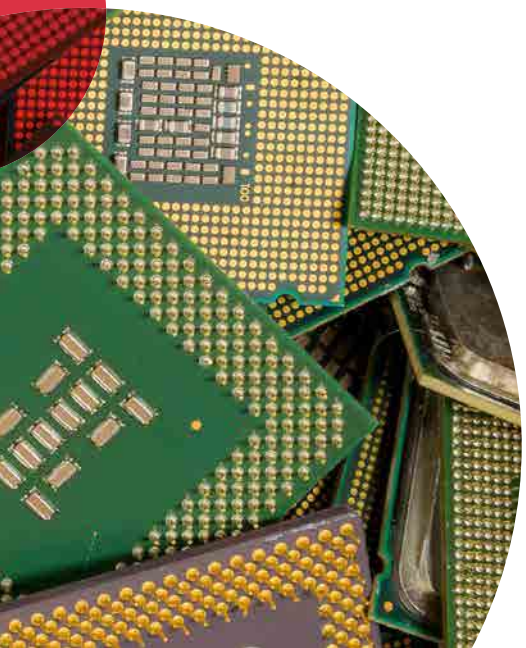
# Chapter 9.
# Annexes

**Annex 1. List of e-waste collection and recycling companies in Kyrgyzstan.**

| N° | COMPANY | CITY |
|---|---|---|
| **1.** | Tazar App | Bishkek |
| **2.** | “Kant Tire Processing Plant" LLC | Chui region, Issyk-Ata district, village Ak-Kuduk |
| **3.** | IE "Alchikeev Ilmar" | Bishkek |



Annex 2. UNU-KEYs linked to e-waste categories and “Business as Usual” scenario settings.

| UNU KEY | UNU KEY DESCRIPTION | E-WASTE CATEGORY | POM TARGET RELATIVE (FULL OR PARTIAL OBSOLESCENCE) = FRACTION OF THE PRESENT-DAY POM PROJECTED TO REMAIN BY 2050 | MAXIMUM STOCK IN PIECES PER INHABITANT. (SATURATION) = PROJECTED MAXIMUM NUMBER OF PIECES OF EQUIPMENT PER INHABITANT TO BE REACHED IN STOCKS AT SOME POINT BETWEEN PRESENT AND 2050 |
|---|---|---|---|---|
| **0001** | Central Heating (household installed) | Large Equipment | | 0.1 |
| **0002** | Photovoltaic Panels (incl. inverters) | Large Equipment - PV panels | | |
| **0101** | Professional Heating & Ventilation (excl. cooling equipment) | Large Equipment | | 0.0015 |
| **0102** | Dishwashers | Large Equipment | | 0.4 |
| **0103** | Kitchen equipment (e.g. large furnaces, ovens, cooking equipment) | Large Equipment | | 0.6 |
| **0104** | Washing Machines (incl. combined dryers) | Large Equipment | | 0.4 |
| **0105** | Dryers (wash dryers, centrifuges) | Large Equipment | | 0.15 |
| **0106** | Household Heating & Ventilation (e.g. hoods, ventilators, space heaters) | Large Equipment | | 0.8 |
| **0108** | Fridges (incl. combi-fridges) | Temperature Exchange Equipment | | 0.7 |
| **0109** | Freezers | Temperature Exchange Equipment | | 0.15 |
| **0111** | Air Conditioners (household installed and portable) | Temperature Exchange Equipment | | 0.6 |
| **0112** | Other Cooling equipment (e.g. dehumidifiers, heat pump dryers) | Temperature Exchange Equipment | | 0.06 |
| **0113** | Professional Cooling equipment (e.g. large air conditioners, cooling displays) | Temperature Exchange Equipment | | 0.5 |
| **0114** | Microwaves (incl. combined, excl. grills) | Small equipment | | 0.4 |
| **0201** | Other small household equipment (e.g. small ventilators, irons, clocks, adapters) | Small equipment | | |
| **0202** | Equipment for food preparation (e.g. toaster, grills, food processing, frying pans) | Small equipment | | 6 |
| **0203** | Small household equipment for hot water preparation (e.g. coffee, tea, water cookers) | Small equipment | | |

| UNU KEY | UNU KEY DESCRIPTION | E-WASTE CATEGORY | POM TARGET RELATIVE (FULL OR PARTIAL OBSOLESCENCE) = FRACTION OF THE PRESENT-DAY POM PROJECTED TO REMAIN BY 2050 | MAXIMUM STOCK IN PIECES PER INHABITANT. (SATURATION) = PROJECTED MAXIMUM NUMBER OF PIECES OF EQUIPMENT PER INHABITANT TO BE REACHED IN STOCKS AT SOME POINT BETWEEN PRESENT AND 2050 |
|---|---|---|---|---|
| **0204** | Vacuum Cleaners (excl. professional) | Small equipment | | 0.7 |
| **0205** | Personal Care equipment (e.g. toothbrushes, hair dryers, razors) | Small equipment | | 2 |
| **0301** | Small IT equipment (e.g. routers, mice, keyboards, external drives & accessories) | Small IT | | 2 |
| **0302** | Desktop PCs (excl. monitors, accessoires) | Small IT | 0.1 | |
| **0303** | Laptops (incl. tablets) | Screens and monitors | | 1.5 |
| **0304** | Printers (e.g. scanners, multi functionals, faxes) | Small IT | | 0.4 |
| **0305** | Telecommunication equipment (e.g. (cordless) phones, answering machines) | Small IT | 0 | |
| **0306** | Mobile Phones (incl. smartphones, pagers) | Small IT | | 2 |
| **0307** | Professional IT equipment (e.g. servers, routers, data storage, copiers) | Large Equipment | | 0.05 |
| **0308** | Cathode Ray Tube Monitors | Screens and monitors | 0 | |
| **0309** | Flat Display Panel Monitors (LCD, LED) | Screens and monitors | | 0.2 |
| **0401** | Small Consumer Electronics (e.g. headphones, remote controls) | Small equipment | | 4 |
| **0402** | Portable Audio & Video (e.g. MP3, e-readers, car navigation) | Small equipment | 0 | |
| **0403** | Music Instruments, Radio, Hi-Fi (incl. audio sets) | Small equipment | 0.2 | |
| **0404** | Video (e.g. Video recorders, DVD, Blu-Ray, set-top boxes) and projectors | Small equipment | 0.1 | |
| **0405** | Speakers | Small equipment | | 1.25 |
| **0406** | Cameras (e.g. camcorders, photo & digital still cameras) | Small equipment | 0 | |
| **0407** | Cathode Ray Tube TVs | Screens and monitors | 0 | |
| **0408** | Flat Display Panel TVs (LCD, LED, Plasma) | Screens and monitors | | 1 |

| UNU KEY | UNU KEY DESCRIPTION | E-WASTE CATEGORY | POM TARGET RELATIVE (FULL OR PARTIAL OBSOLESCENCE) = FRACTION OF THE PRESENT-DAY POM PROJECTED TO REMAIN BY 2050 | MAXIMUM STOCK IN PIECES PER INHABITANT. (SATURATION) = PROJECTED MAXIMUM NUMBER OF PIECES OF EQUIPMENT PER INHABITANT TO BE REACHED IN STOCKS AT SOME POINT BETWEEN PRESENT AND 2050 |
|---|---|---|---|---|
| **0501** | Small lighting equipment (excl. LED & incandescent) | Small equipment | | |
| **0502** | Compact Fluorescent Lamps (incl. retrofit & non-retrofit) | Lamps | 0 | |
| **0503** | Straight Tube Fluorescent Lamps | Lamps | 0.5 | |
| **0504** | Special Lamps (e.g. professional mercury, high & low pressure sodium) | Lamps | | 1 |
| **0505** | LED Lamps (incl. retrofit LED lamps) | Lamps | | |
| **0506** | Household Luminaires (incl. household incandescent fittings & household LED luminaires) | Small equipment | | 60 |
| **0507** | Professional Luminaires (offices, public space, industry) | Large equipment | | 6 |
| **0601** | Household Tools (e.g. drills, saws, high-pressure cleaners, lawn mowers) | Small equipment | | 3 |
| **0602** | Professional Tools (e.g. for welding, soldering, milling) | Large equipment | | 0.05 |
| **0701** | Toys (e.g. car racing sets, electric trains, music toys, biking computers, drones) | Small equipment | | 10 |
| **0702** | Game Consoles | Small IT | | 0.4 |
| **0703** | Leisure equipment (e.g. sports equipment, electric bikes, juke boxes) | Large equipment | | |
| **0801** | Household Medical equipment (e.g. thermometers, blood pressure meters) | Small equipment | | |
| **0802** | Professional Medical equipment (e.g. hospital, dentist, diagnostics) | Large equipment | | |
| **0901** | Household Monitoring & Control equipment (alarm, heat, smoke, excl. screens) | Small equipment | | |
| **0902** | Professional Monitoring & Control equipment (e.g. laboratory, control panels) | Large equipment | | |
| **1001** | Non-cooled Dispensers (e.g. for vending, hot drinks, tickets, money) | Large equipment | | 0.0015 |
| **1002** | Cooled Dispensers (e.g. for vending, cold drinks) | Temperature Exchange Equipment | | 0.005 |

UNU-KEYs linked to e-waste categories and “Circular Economy” scenario settings.

| UNU KEY | UNU KEY DESCRIPTION | E-WASTE CATEGORY | CIRCULAR ECONOMY OBSOLESCENCE POM TARGET RELATIVE | CIRCULAR ECONOMY SATURATION STOCK PPI TARGET ABSOLUTE | MODEL SETTINGS APPLIED IN THE CALCULATIONS (X MEANS THAT IT HAS BEEN APPLIED) | | |
|---|---|---|---|---|---|---|---|
| | | | | | CIRCULAR ECONOMY IMPROVED DURABILITY | CIRCULAR ECONOMY REDUCED HOARDING | CIRCULAR ECONOMY INCREASED SHARING |
| **0001** | Central Heating (household installed) | Large Equipment | 0 | | X | X | |
| **0002** | Photovoltaic Panels (incl. inverters) | Large Equipment - PV panels | | | X | | |
| **0101** | Professional Heating & Ventilation (excl. cooling equipment) | Large Equipment | | | X | | |
| **0102** | Dishwashers | Large Equipment | | | X | X | |
| **0103** | Kitchen equipment (e.g. large furnaces, ovens, cooking equipment) | Large Equipment | | | X | | |
| **0104** | Washing Machines (incl. combined dryers) | Large Equipment | | | X | X | X |
| **0105** | Dryers (wash dryers, centrifuges) | Large Equipment | | | X | X | X |
| **0106** | Household Heating & Ventilation (e.g. hoods, ventilators, space heaters) | Large Equipment | | | X | X | |
| **0108** | Fridges (incl. combi-fridges) | Temperature Exchange Equipment | | | X | X | |
| **0109** | Freezers | Temperature Exchange Equipment | | | X | X | |
| **0111** | Air Conditioners (household installed and portable) | Temperature Exchange Equipment | | | X | X | |
| **0112** | Other Cooling equipment (e.g. dehumidifiers, heat pump dryers) | Temperature Exchange Equipment | | | X | X | |
| **0113** | Professional Cooling equipment (e.g. large air conditioners, cooling displays) | Temperature Exchange Equipment | | | X | | |
| **0114** | Microwaves (incl. combined, excl. grills) | Small equipment | | | X | X | |
| **0201** | Other small household equipment (e.g. small ventilators, irons, clocks, adapters) | Small equipment | | 4 | X | X | |
| **0202** | Equipment for food preparation (e.g. toaster, grills, food processing, frying pans) | Small equipment | | 3 | X | X | |
| **0203** | Small household equipment for hot water preparation (e.g. coffee, tea, water cookers) | Small equipment | | 1.25 | X | X | |

| UNU KEY | UNU KEY DESCRIPTION | E-WASTE CATEGORY | CIRCULAR ECONOMY OBSOLESCENCE POM TARGET RELATIVE | CIRCULAR ECONOMY SATURATION STOCK PPI TARGET ABSOLUTE | MODEL SETTINGS APPLIED IN THE CALCULATIONS (X MEANS THAT IT HAS BEEN APPLIED) | | |
|---|---|---|---|---|---|---|---|
| | | | | | CIRCULAR ECONOMY IMPROVED DURABILITY | CIRCULAR ECONOMY REDUCED HOARDING | CIRCULAR ECONOMY INCREASED SHARING |
| **0204** | Vacuum Cleaners (excl. professional) | Small equipment | | | X | X | |
| **0205** | Personal Care equipment (e.g. toothbrushes, hair dryers, razors) | Small equipment | | | X | X | |
| **0301** | Small IT equipment (e.g. routers, mice, keyboards, external drives & accessories) | Small IT | | | X | X | |
| **0302** | Desktop PCs (excl. monitors, accessoires) | Small IT | | | X | X | |
| **0303** | Laptops (incl. tablets) | Screens and monitors | | | X | X | X |
| **0304** | Printers (e.g. scanners, multi functionals, faxes) | Small IT | | | X | X | X |
| **0305** | Telecommunication equipment (e.g. (cordless) phones, answering machines) | Small IT | | | | X | |
| **0306** | Mobile Phones (incl. smartphones, pagers) | Small IT | | | X | X | |
| **0307** | Professional IT equipment (e.g. servers, routers, data storage, copiers) | Large Equipment | | | X | | |
| **0308** | Cathode Ray Tube Monitors | Screens and monitors | | | | X | |
| **0309** | Flat Display Panel Monitors (LCD, LED) | Screens and monitors | | | X | X | |
| **0401** | Small Consumer Electronics (e.g. headphones, remote controls) | Small equipment | | | X | X | |
| **0402** | Portable Audio & Video (e.g. MP3, e-readers, car navigation) | Small equipment | | | | X | |
| **0403** | Music Instruments, Radio, Hi-Fi (incl. audio sets) | Small equipment | | | X | X | |
| **0404** | Video (e.g. Video recorders, DVD, Blu-Ray, set-top boxes) and projectors | Small equipment | | | X | X | |
| **0405** | Speakers | Small equipment | | | X | X | |
| **0406** | Cameras (e.g. camcorders, photo & digital still cameras) | Small equipment | | | X | X | |
| **0407** | Cathode Ray Tube TVs | Screens and monitors | | | X | X | |
| **0408** | Flat Display Panel TVs (LCD, LED, Plasma) | Screens and monitors | | | X | X | |
| **0501** | Small lighting equipment (excl. LED & incandescent) | Small equipment | | | X | X | |

| UNU KEY | UNU KEY DESCRIPTION | E-WASTE CATEGORY | CIRCULAR ECONOMY OBSOLESCENCE POM TARGET RELATIVE | CIRCULAR ECONOMY SATURATION STOCK PPI TARGET ABSOLUTE | MODEL SETTINGS APPLIED IN THE CALCULATIONS (X MEANS THAT IT HAS BEEN APPLIED) | | |
|---|---|---|---|---|---|---|---|
| | | | | | CIRCULAR ECONOMY IMPROVED DURABILITY | CIRCULAR ECONOMY REDUCED HOARDING | CIRCULAR ECONOMY INCREASED SHARING |
| **0502** | Compact Fluorescent Lamps (incl. retrofit & non-retrofit) | Lamps | | | | X | |
| **0503** | Straight Tube Fluorescent Lamps | Lamps | | | X | X | |
| **0504** | Special Lamps (e.g. professional mercury, high & low pressure sodium) | Lamps | | | X | X | |
| **0505** | LED Lamps (incl. retrofit LED lamps) | Lamps | | | X | X | |
| **0506** | Household Luminaires (incl. household incandescent fittings & household LED luminaires) | Small equipment | | | X | X | |
| **0507** | Professional Luminaires (offices, public space, industry) | Large equipment | | | X | | |
| **0601** | Household Tools (e.g. drills, saws, high pressure cleaners, lawn mowers) | Small equipment | | | X | X | X |
| **0602** | Professional Tools (e.g. for welding, soldering, milling) | Large equipment | | | X | | X |
| **0701** | Toys (e.g. car racing sets, electric trains, music toys, biking computers, drones) | Small equipment | | | X | X | |
| **0702** | Game Consoles | Small IT | | | X | X | |
| **0703** | Leisure equipment (e.g. sports equipment, electric bikes, juke boxes) | Large equipment | | | X | X | X |
| **0801** | Household Medical equipment (e.g. thermometers, blood pressure meters) | Small equipment | | | X | X | X |
| **0802** | Professional Medical equipment (e.g. hospital, dentist, diagnostics) | Large equipment | | | X | | |
| **0901** | Household Monitoring & Control equipment (alarm, heat, smoke, excl. screens) | Small equipment | | | X | X | |
| **0902** | Professional Monitoring & Control equipment (e.g. laboratory, control panels) | Large equipment | | | X | | |
| **1001** | Non- cooled Dispensers (e.g. for vending, hot drinks, tickets, money) | Large equipment | | | X | | |
| **1002** | Cooled Dispensers (e.g. for vending, cold drinks) | Temperature Exchange Equipment | | | X | | |

### Annex 3. Socioeconomic pathways underpinning the scenarios.

The “Business as Usual” and “Circular Economy” scenario projections for PM and e-waste have been calculated using the Shared Socioeconomic Pathways (SSPs) for GDP PPP, population, technology, energy, land use, and other socioeconomic indicators, which were developed by IPCC to perform climate change and broader sustainability assessments [19]. The SSPs capture a range of plausible world futures and include multiple underlying trends that both characterise and affect the crucial aspects of humanity’s development, including how material goods are consumed and recycled.

The plausible futures described by the SSPs range according to sub-national and international levels of cooperation, competition, government regulation, wealth distribution, education, urbanisation, technological development, energy use, land use, and so on. We note that gender only features in the modelled age pyramids explicitly, though both the GDP and population projections implicitly depend on the assumed levels of emancipation of women in the underlying OECD macroeconomic models from which these projections have been derived [19].

In this report, we use the SSP projections for GDP PPP and population individually in Kyrgyzstan to explore the effects of long-term socioeconomic changes on EEE POM and e-waste generated in the region out to 2050. For both the “Business as Usual” and “Circular Economy” scenarios, the three most contrasting SSP scenarios (SSP1, SSP3 and SSP5) were calculated and averaged:

- SSP1, which provides medium-level projections for both GDP PPP and population, with the underlying drivers being associated with a broad sustainability and Circular Economy transition across much of the economy and society
- SSP3, which represents a world with high population growth, regional rivalries, material-intensive consumption, and sluggish economic development across the board
- SSP5, which is characterised by rapid economic growth, fast technological progress, high energy and resource consumption, and moderate population increases

### Annex 4. Projections for Solar Photovoltaic Panels.

Solar photovoltaic panels form a relatively recent but a fast-growing stream of EEE, and though they are not yet generating considerable quantities of e-waste, they are being placed on the market in large quantities and with accelerating rates [1]. Modelling future growth in photovoltaic panels among EEE POM is difficult due to rapidly evolving economic and geopolitical conditions underpinning climate change mitigation. In this report, we use the solar photovoltaic projections from the energy transition component of the SSP scenarios out to 2050 as a basis, adjusting them according to trends in the CIS+ region from recent history (dataset of the International Renewable Energy Agency). There is a considerably different Circular Economy in the projected photovoltaic capacity under the SSP1-19 pathway compatible with the 1.5C target from the Paris Agreement, and all other SSP pathways, such as SSP2-34, SSP3-34, SSP4-26, and SSP5-60 (the suffixes in the scenario names represent target anthropogenic radiative forcing levels in 2100). Our adjusted photovoltaic projections broadly capture the differences in the underpinning SSP scenarios for solar photovoltaic installations, while also being aligned both with the relevant historic data and the IEA projections for the CIS+ region.

The projected annual installed photovoltaic capacities for each scenario in the CIS+ countries have been converted to EEE POM by calculating the annual changes of the cumulative installed capacity. The changes were converted to EEE POM by using recent global statistics for average output and weight of a single photovoltaic panel [1]. In this report, the latest technical parameters - of approximately 300 W and 20 kg per panel - were extrapolated to 2050, assuming that the bulk of the efficiency gains in photovoltaics had already taken place over the past 20 years. The photovoltaic lifespans were modelled based on the latest e-waste data from the EU [43]. The datasets are allocated to UNU-KEY 0002 Photovoltaic Panels (incl. inverters).

Annex 5. Import of main types of EEE to the Kyrgyz Republic for 2022 [35].

| HS CODE 4 CHARACTERS | EEE CATEGORY ACCORDING TO THE WEEE DIRECTIVE | UNU-KEYS | COMMODITY GROUP / PARTNER COUNTRY WITH THE HIGHEST SHARE OF IMPORTS IN THE KYRGYZ REPUBLIC'S TRADE CIRCULATION | 2022 | | | |
|---|---|---|---|---|---|---|---|
| | | | | THE QUANTITY OF GOODS IN KIND | UNIT OF MEASURE | COST | |
| | | | | | | THOUSAND SOMS | THOUSAND USD |
| **8415** | **1** | **0111 0113** | **Air conditioning units** | | | | |
| | | | Quantity, total | 57,669 | units | 834,941.2 | 10,132.3 |
| | | | China | 40,816 | units | 460,727.8 | 5,588.2 |
| | | | Kazakhstan | 8,818 | units | 179,547.8 | 2,164.6 |
| | | | Uzbekistan | 5,596 | units | 94,727.5 | 1,166.1 |
| | | | Weight, total | 130.4 | tons | 172,879.3 | 2,051 |
| | | | Lithuania | 54.8 | tons | 83,220.7 | 960.5 |
| | | | China | 46 | tons | 43,301.5 | 531 |
| **8418** | **1** | **0108 0109** | **Refrigerators, freezers and refrigeration equipment** | | | | |
| | | | Quantity, total | 125,332 | units | 1,949,458.6 | 23,525.7 |
| | | | China | 55,443 | units | 510,807.8 | 6,205.5 |
| | | | Russia | 27,274 | units | 777,753 | 9,317.4 |
| | | | Uzbekistan | 20,425 | units | 310,617.5 | 3,769.5 |
| | | | Turkey | 14,662 | units | 115,293.2 | 1,402.2 |
| | | | Weight, total | 274.3 | tons | 308,885 | 3,592.4 |
| | | | China | 102.6 | tons | 77,360.9 | 849.9 |
| | | | Russia | 64.9 | tons | 84,137 | 971.9 |
| | | | Turkey | 23.7 | tons | 26,627.3 | 321.7 |

| HS CODE 4 CHARACTERS | EEE CATEGORY ACCORDING TO THE WEEE DIRECTIVE | UNU-KEYS | COMMODITY GROUP / PARTNER COUNTRY WITH THE HIGHEST SHARE OF IMPORTS IN THE KYRGYZ REPUBLIC'S TRADE CIRCULATION | 2022 | | | |
|---|---|---|---|---|---|---|---|
| | | | | THE QUANTITY OF GOODS IN KIND | UNIT OF MEASURE | COST | |
| | | | | | | THOUSAND SOMS | THOUSAND USD |
| **8422** | **4** | **0102** | **Dishwashing machines, filling equipment** | | | | |
| | | | **Quantity, total** | **9,497** | **units** | **577,397.7** | **6,824.8** |
| | | | China | 3,404 | units | 109,302.3 | 1,295.4 |
| | | | Russia | 2,208.5 | units | 58,631.1 | 675.1 |
| | | | Turkey | 2,068 | units | 114,092.4 | 1,340.9 |
| | | | Kazakhstan | 1,334 | units | 37,131 | 447.1 |
| | | | **Weight, total** | **13,327.4** | **tons** | **8,819,990.7** | **105,808.2** |
| | | | China | 12,243.1 | tons | 8,715,461 | 104,579.7 |
| | | | Turkey | 1,046.2 | tons | 69,724.1 | 824.2 |
| **8443** | **6** | **0304** | **Printing equipment** | | | | |
| | | | **Quantity, total** | **46,308** | **units** | **719,963.2** | **8,538.3** |
| | | | China | 17,697 | units | 200,074.6 | 2,348.1 |
| | | | Republic of Korea | 8,668 | units | 62,350.3 | 741.2 |
| | | | Kazakhstan | 7,654.5 | units | 202,940.5 | 2,395.5 |
| | | | **Weight, total** | **1,452.8** | **tons** | **2,122,543.5** | **25,678.8** |
| | | | China | 1,414.5 | tons | 2,028,973.3 | 24,563.3 |
| **8450** | **4** | **0104** | **Washing machines** | | | | |
| | | | **Quantity, total** | **84,293** | **units** | **961,260.2** | **11,540.1** |
| | | | China | 30,943 | units | 298,203.2 | 3,606 |
| | | | Uzbekistan | 21,689 | units | 100,862.2 | 1,224.5 |
| | | | Russia | 12,292 | units | 215,843.5 | 2,526.7 |
| | | | Kazakhstan | 11,904 | units | 264,053.9 | 3,190.8 |
| | | | Turkey | 7,054 | units | 56,293.8 | 677 |
| | | | **Weight, total** | **2,680.6** | **tons** | **755,007.9** | **8,786.3** |
| | | | China | 2,663 | tons | 736,241.2 | 8,564.8 |

| HS CODE 4 CHARACTERS | EEE CATEGORY ACCORDING TO THE WEEE DIRECTIVE | UNU-KEYS | COMMODITY GROUP / PARTNER COUNTRY WITH THE HIGHEST SHARE OF IMPORTS IN THE KYRGYZ REPUBLIC'S TRADE CIRCULATION | 2022 | | | |
|---|---|---|---|---|---|---|---|
| | | | | THE QUANTITY OF GOODS IN KIND | UNIT OF MEASURE | COST | |
| | | | | | | THOUSAND SOMS | THOUSAND USD |
| **8471** | **2<br>6** | **0302<br>0303** | **Computer machines for automatic processing** | | | | |
| | | | Quantity, total | 476,420 | units | 5,596,484.6 | 67,283.9 |
| | | | China | 331,282 | units | 3,670,156.1 | 44,206.1 |
| | | | Germany | 82,888 | units | 43,667.6 | 517.4 |
| | | | Kazakhstan | 25,806 | units | 457,313.7 | 5,446.8 |
| | | | Malaysia | 5,393 | units | 129,877 | 1,559.5 |
| **8508** | **5** | **0204** | **Vacuum cleaners** | | | | |
| | | | Quantity, total | 321,499 | units | 931,676.2 | 11,140.4 |
| | | | China | 239,316 | units | 632,142 | 7,545.4 |
| | | | Turkey | 35,916 | units | 68,011.2 | 819 |
| | | | Kazakhstan | 14,820 | units | 113,119.5 | 1,340.6 |
| | | | Vietnam | 13,097 | units | 41,968.1 | 509.7 |
| | | | Weight, total | 13.1 | tons | 4,733.2 | 57.4 |
| | | | China | 9.3 | tons | 2,012.8 | 24.9 |
| | | | Turkey | 0.7 | tons | 1,218.1 | 14.6 |
| | | | Slovenia | 1.4 | tons | 566.5 | 6.8 |
| **8509** | **5** | **0205<br>0202** | **Electromechanical household machines** | | | | |
| | | | Quantity, total | 253,925 | units | 331,217.6 | 3,973.3 |
| | | | China | 220,138 | units | 212,439.8 | 2,539.1 |
| | | | Russia | 20,676 | units | 60,634.4 | 742.4 |
| | | | Kazakhstan | 9,129 | units | 40,449.6 | 481.8 |
| | | | Weight, total | 37.9 | tons | 7,017.2 | 85.2 |
| | | | China | 34.4 | tons | 5,181 | 63.3 |
| | | | Kazakhstan | 0.2 | tons | 633.5 | 7.6 |

| HS CODE 4 CHARACTERS | EEE CATEGORY ACCORDING TO THE WEEE DIRECTIVE | UNU-KEYS | COMMODITY GROUP / PARTNER COUNTRY WITH THE HIGHEST SHARE OF IMPORTS IN THE KYRGYZ REPUBLIC'S TRADE CIRCULATION | 2022 | | | |
|---|---|---|---|---|---|---|---|
| | | | | THE QUANTITY OF GOODS IN KIND | UNIT OF MEASURE | COST | |
| | | | | | | THOUSAND SOMS | THOUSAND USD |
| | | | Taiwan (Province of China) | 0[16] | tons | 433.1 | 5.1 |
| | | | Russia | 0.2 | tons | 282.1 | 3.4 |
| **8516** | **5** | **0114 0201 0203** | **Domestic and other electric heating appliances** | | | | |
| | | | **Quantity, total** | **2,360,964** | **units** | **2,420,527.8** | **28,892.4** |
| | | | China | 1,898,056 | units | 1,009,434.1 | 11,997.6 |
| | | | Uzbekistan | 223,756 | units | 350,114.2 | 4,225.4 |
| | | | Russia | 119,633 | units | 495,456.2 | 5,902.7 |
| | | | **Weight, total** | **2,120.4** | **tons** | **311,387.6** | **3,749.5** |
| | | | China | 1,226.9 | tons | 173,962.9 | 2,103.9 |
| | | | Turkey | 886 | tons | 108,351 | 1,296.6 |
| **8517** | **5** | **0305 0306** | **Communication equipment and parts thereof** | | | | |
| | | | **Quantity, total** | **6,299,985** | **units** | **21,506,810.8** | **258,183.8** |
| | | | China | 5,903,221,2 | units | 15,559,196.1 | 186,283.6 |
| | | | Vietnam | 127,378 | units | 2,203,706.8 | 26,688.8 |
| | | | India | 124,597 | units | 2,215,388.4 | 26,901.6 |
| **8518** | **5** | **0402** | **Microphones, loudspeakers** | | | | |
| | | | **Quantity, total** | **1,325,673** | **units** | **260,585.9** | **3,130.5** |
| | | | China | 1,278,111 | units | 130,571 | 1,563.8 |
| | | | Kazakhstan | 17,997,4 | units | 47,453 | 570.7 |
| | | | Vietnam | 12,672 | units | 31,088.1 | 382.8 |
| | | | **Weight, total** | **0,1** | **tons** | **2,836.7** | **34.8** |
| | | | Portugal | 0 | tons | 958.2 | 11.9 |
| | | | Denmark | 0 | tons | 699 | 8.6 |

[16] The value of the indicator is less than the unit of measurement.

| HS CODE 4 CHARACTERS | EEE CATEGORY ACCORDING TO THE WEEE DIRECTIVE | UNU-KEYS | COMMODITY GROUP / PARTNER COUNTRY WITH THE HIGHEST SHARE OF IMPORTS IN THE KYRGYZ REPUBLIC'S TRADE CIRCULATION | 2022 | | | |
|---|---|---|---|---|---|---|---|
| | | | | THE QUANTITY OF GOODS IN KIND | UNIT OF MEASURE | COST | |
| | | | | | | THOUSAND SOMS | THOUSAND USD |
| **8519** | **5** | **0402 0405** | **Recording or sound reproducing equipment** | | | | |
| | | | Quantity, total | **262,924** | **units** | **38,126.3** | **465.1** |
| | | | China | 256,108 | units | 19,226.1 | 238.5 |
| | | | Kazakhstan | 462 | units | 7,356.1 | 89.6 |
| | | | France | 17 | units | 6,863.1 | 80.8 |
| **8521** | **5** | **0404** | **Video recording or video playback equipment** | | | | |
| | | | Quantity, total | **2,844** | **units** | **15,342.9** | **183** |
| | | | China | 2,542 | units | 6,688.8 | 77.3 |
| | | | China Hong Kong | 81 | units | 144.1 | 1.8 |
| **8523** | **5** | **0301** | **Information carriers** | | | | |
| | | | Quantity, total | **8,630,123** | **units** | **568,911.1** | **6,784** |
| | | | China | 4,928,804 | units | 291,340.9 | 3,498.5 |
| | | | Russia | 1,766,803 | units | 89,790.9 | 1,059.3 |
| **8528** | **2** | **0309 0408** | **TVs, monitors and projectors** | | | | |
| | | | Quantity, total | **746,201** | **units** | **2,824,661** | **33,941.9** |
| | | | China | 681,241 | units | 2,086,212.8 | 25,058.2 |
| | | | Russia | 30,326 | units | 103,158.2 | 1,236.3 |
| | | | Kazakhstan | 12,590 | units | 428,154.1 | 5,179.2 |
| | | | Ukraine | 8,000 | units | 32,703.7 | 394.5 |

| HS CODE 4 CHARACTERS | EEE CATEGORY ACCORDING TO THE WEEE DIRECTIVE | UNU-KEYS | COMMODITY GROUP / PARTNER COUNTRY WITH THE HIGHEST SHARE OF IMPORTS IN THE KYRGYZ REPUBLIC'S TRADE CIRCULATION | 2022 | | | |
|---|---|---|---|---|---|---|---|
| | | | | THE QUANTITY OF GOODS IN KIND | UNIT OF MEASURE | COST | |
| | | | | | | THOUSAND SOMS | THOUSAND USD |
| **9006** | **5** | **0406** | **Cameras and their accessories** | | | | |
| | | | **Quantity, total** | **7,472** | **units** | **19,579.1** | **236.4** |
| | | | China | 7,444 | units | 19,481.2 | 235.2 |
| | | | Kazakhstan | 28 | units | 97.9 | 1.2 |
| | | | **Weight, total** | **4.6** | **tons** | **10,137.1** | **123.3** |
| | | | China | 4.6 | tons | 10,069 | 122.4 |
| | | | Kazakhstan | 0 | tons | 60.2 | 0.8 |
| **9022** | **4** | **0802** | **X-ray equipment** | | | | |
| | | | **Quantity, total** | **498** | **units** | **855,236.1** | **10,199.2** |
| | | | Spain | 137 | units | 29,369.5 | 347.8 |
| | | | Republic of Korea | 120 | units | 55,744.7 | 676 |
| | | | China | 91 | units | 254,454.7 | 3,049.7 |
| | | | **Weight, total** | **1.7** | **tons** | **34,938** | **420.4** |
| | | | Germany | 0.5 | tons | 10,069 | 122.4 |
| | | | Republic of Korea | 0.8 | tons | 60.2 | 0.8 |
| | | | USA | 0.1 | tons | 6,146.8 | 76 |
| | | | China | 0.1 | tons | 2,397.3 | 28.6 |
| **9405** | **5** | **0501 0506 0507** | **Lighting equipment** | | | | |
| | | | **Weight, total** | **2,986.7** | **units** | **1,007,439.6** | **12,207.7** |
| | | | China | 2,652.4 | tons | 833,119.9 | 10,122.5 |
| | | | Russia | 233.3 | tons | 81,696.6 | 982.4 |
| | | | Turkey | 51.7 | tons | 25,523.4 | 307.7 |
| | | | Kazakhstan | 20.9 | tons | 37,821.2 | 443.2 |
| **TOTAL** | | | | | | **53,969,976.10** | **647,570.10** |

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