UNITED NATIONS UNIVERSITY
UNU-VIE SCYCLE
Sustainable Cycles Programme

unitar
United Nations Institute for Training and Research

REGIONAL E-WASTE MONITOR

CIS + Georgia

2021

Authors:
C.P. Baldé, G. Iattoni, V. Luda,
I.C Nnorom, O. Pecheniuk, R. Kuehr

Funded and supervised by:

Federal Ministry
for the Environment, Nature Conservation
and Nuclear Safety

Umwelt Bundesamt

REGIONAL E-WASTE MONITOR

CIS + Georgia

2021

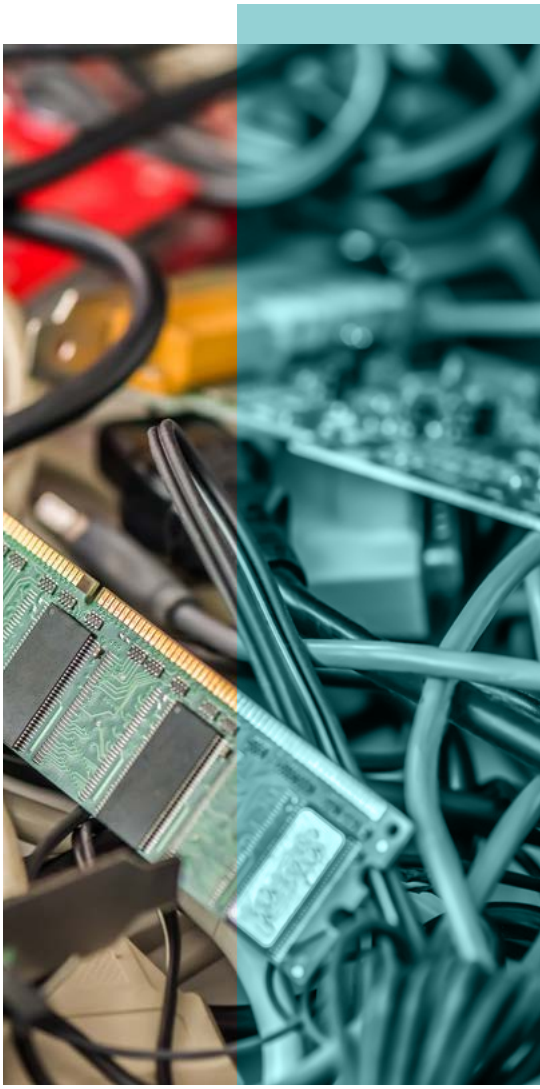
The authors would like to thank the contributors to the workshops and validation process from the various participating countries.

In particular, the following persons are acknowledged:

Armenia: Gavalyan A., Mandalyan N., Sayadyan A.
Azerbaijan: Ibrahimli S., Kazimov E., Valiyev I.
Belarus: Bushmovich A., Kirpichnik A.V., Pinihin A., Piskun A., Shilo G., Smaleva M., Poleshchuk E., Zaleskaya A.
Georgia: Dzbisauri L., Gogaladze K., Gurguliani I., Sopadze G.
Kazakhstan: Bigarayev B., Baeshova S., Batyrkhanova A., Bukenova S., Dosanova A., Dzhartybaeva A., Iskakova S., Mukhaeva S., Mustafina V., Ryskulova A., Ryspayeva A., Sadvakasova D., Shakhanova A., Shauenova A.
Kyrgyzstan: Doronina E., Kerimalieva E., Khalmuzaev A., Kutmanova D., Makhmudova G., Mambetova T., Turdumatova A.
Moldova: Nelipovschi S., Tugui T., Lungu L.
Russia: Erkenova S., Girich M., Golub O., Kislova E., Klevakina M., Kotlyar E., Mescheriakova E., Novikova I., Smirnova T., Komissarov V., Speranskaya O.
Tajikistan: Alimardonov K., Burhanova M., Khudododov S.
Ukraine: Andrushkevych O., Barinov M., Dengo Acuna A., Kostyna A., Malkov M., Rodnaya D., Tkach O., Tsyguleva O., Yavorskaya O.M.
Uzbekistan: Dekhanova N., Maksumova K.

IPEN Network
German Environment Agency: Kohlmeyer R., Sperlich K., Wollmann R.
ITU: Bel G., Grey V., McDonald R., Nahkli F.
UNEP: Atymtayev O., Coppens L., Ghafari D., Hertoghs M., Marques T.

This project was funded by the German Federal Environment Ministry's Advisory Assistance Programme (AAP) for environmental protection in the countries of Central and Eastern Europe, the Caucasus and Central Asia and other countries neighbouring the European Union (UBA-Project No. 122154). It was supervised by the German Environment Agency. The workshops during the project were co-funded by the International Telecommunication Union and the International Solid Waste Association and were co-organised by UNEP. The responsibility for the content of this publication lies with the authors.



Funded by: Federal Ministry for the Environment, Nature Conservation and Nuclear Safety; Umwelt Bundesamt

Supported by: ITU; ISWA International Solid Waste Association

In cooperation with: UN environment programme

Contact information:
For enquiries, please contact the corresponding author C.P. Baldé via scycle@unitar.org.

Please cite this publication as:
C.P. Baldé, G. Iattoni, V. Luda, I.C Nnorom, O. Pecheniuk, R. Kuehr, Regional E-waste Monitor for the CIS + Georgia – 2021, 2021, United Nations University (UNU) / United Nations Institute for Training and Research (UNITAR) – co-hosting the SCYCLE Programme, Bonn, Germany.

All authors are from UNITAR/UNU, except O. Pecheniuk, an independent consultant.

United Nations University (UNU) is an autonomous component of the UN General Assembly dedicated to generating and transferring knowledge and strengthening capacities relevant to global issues of human security, development, and welfare. The University operates through a worldwide network of research and training centres and programmes, coordinated by the UNU Centre in Tokyo. www.unu.edu.

The United Nations Institute for Training and Research (UNITAR) is a dedicated training arm of the United Nations, with a mission of developing the individual, institutional, and organisational capacity of countries and other United Nations stakeholders through high-quality learning solutions and related knowledge products and services as a means for enhancing global decision-making and providing support at the country level in overcoming global challenges. www.unitar.org.

The SCYCLE Programme, now in transition from UNU to UNITAR, envisions enabling societies to reduce the environmental load from production, use, and disposal of ubiquitous goods, especially EEE, to sustainable levels by means of independent, comprehensive, and practical research and training, providing more thorough fact bases for policy development and decision-making. SCYCLE leads the global e-waste research and related trainings, and advances sustainable e-waste management strategies based on life-cycle thinking. For detailed information on SCYCLE and its projects, including its research and training activities, visit www.scycle.info.

The Regional E-waste Monitor for the CIS + Georgia, (REM CIS+) was implemented by the Sustainable Cycles (SCYCLE) Programme and co-hosted by the United Nations University (UNU) and the United Nations Institute for Training and Research (UNITAR), in partnership with the United Nations Environment Programme (UNEP).

Disclaimer:
The designations employed and the presentation of the material in this publication do not imply the expression of any opinion whatsoever on the part of the United Nations University (UNU)/United Nations Institute for Training and Research (UNITAR) concerning the legal status of any country, territory, city, or area, or of its authorities, or concerning delimitation of its frontiers or boundaries. The boundaries and names shown and the designations used on the maps do not imply official endorsement or acceptance by the United Nations. Trademark names and symbols are used in an editorial fashion with no intention of infringement of trademark or copyright laws. Moreover, the views expressed in this publication are those of the authors and do not necessarily represent those of UNU/UNITAR, nor does the citing of trade names, companies, schemes, or commercial processes constitute endorsement.

TABLE OF CONTENTS

LIST OF FIGURES

LIST OF TABLES

Georgia
Moldova
Belarus
Russia
Kazakhstan
Ukraine
Tajikistan
Armenia
Uzbekistan
Azerbaijan
Kyrgyzstan
Turkmenistan

EXECUTIVE SUMMARY

E-waste constitutes one of the fastest growing streams of physical waste in today's global environment and is a threat to sustainable development. Data on e-waste are required to evaluate developments over time, delineate national and international policies, limit e-waste generation, prevent illegal dumping, promote recycling, and create jobs in the recycling sectors. However, few countries collect internationally comparable e-waste statistics, and many countries lack the capacity to collect e-waste data at both the regional and national level. Within the framework of the Global E-waste Statistics Partnership, the Regional E-waste Monitor for the CIS + Georgia is the first regional monitoring effort, re: e-waste statistics, legislation, and e-waste management infrastructure, to enhance the understanding and interpretation of regional e-waste data, with the goal of facilitating environmentally sound management of e-waste.

The key statistical findings of the region are that the Electrical and Electronic Equipment (EEE) placed on the market in the region increased by 10 percent—from 2.9 Mt (10.4 kg/inh) in 2010 to 3.2 Mt (11.0 kg/inh) in 2019. Belarus and Russia have large domestic production industries of EEE, whereas the other countries mostly import EEE for their EEE placed on the market. Over the same period, the e waste generation in the region increased by 50 percent to 2.5 Mt (8.7 kg/inh). Both the absolute and per inhabitant amount of e-waste generation is highest in Russia. The e-waste generated encompasses a variety of products in the region, and two category areas – temperature exchange equipment (Cat. I) and large and small equipment (Cat. IV and V) – comprise the highest share of e-waste generation at 77 percent. The annual growth rate declines for nearly all categories, but remains positive – except for screens and monitors (Cat II) and small IT equipment (Cat VI). These two categories have negative growth rates. The CIS+ countries collected and managed a total of 79 kt (0.3 kg/inh) of e-waste in 2019, which equates to a collection rate of 3.2 percent, compared to e-waste generated.

E-waste collection for environmentally sound management (ESM) takes place in Belarus, Kazakhstan, Russia, and Ukraine. As well, some countries have no e-waste collection (e.g. Georgia, Kyrgyzstan) due to lack of organised separate collection infrastructure for e-waste and/or absence of official data. Belarus has the highest e-waste collection per inhabitant and a collection rate of 33.6 percent (2.7 kg/inh), followed by Kazakhstan (8.8 percent; 0.6 kg/inh).

All twelve countries in the region have well-developed legal and regulatory frameworks in the field of waste management, but six of them have no specific legislations nor Extended Producer Responsibility (EPR) systems in place for regulating e-waste. Georgia, Moldova, and Ukraine have adopted e-waste-specific legislation or regulation. Belarus, Kazakhstan, and Russia regulate e-waste through bylaws in the national legislation (i.e. by specifically mentioning e-waste in their general waste law). Armenia and Ukraine are in a drafting process of the EPR for e-waste, and Uzbekistan has e-waste legislation in draft development. In most countries, the Ministry of Environment is the custodian government entity for legislating e-waste. Municipalities and other waste management authorities, as well as state-owned private companies, collect e-waste for further management, mostly landfilling. Producers/importers are also collectors of e-waste under the EPR, but informal operators of e-waste also exist in the region and focus on valuable e-waste fractions.

Since 2010, e-waste generation has increased in the CIS+ by 50 percent – to 2.5 Mt in 2019. The collection rate of e-waste is 3.2 percent.

The Basel Convention controls the transboundary movement (TBM) of e-waste, and all CIS+ countries have ratified it. Specific national bans on e-waste imports are enforced in Armenia, Georgia, Moldova, and Tajikistan. Additionally, Tajikistan restricts imports of used-EEE. Countries in the region do not have specific export bans in place unless the exports are non-compliant with the Basel Convention. Only eight countries in the region fulfil their formal reporting statistical obligations under the Basel Convention. Therefore, these statistics do not provide a complete picture of e-waste TBM. Per existing reportage, Belarus is the only exporter of e-waste; in 2018 and 2019, Belarus exported 14 tonnes of e-waste for resources recovery and recycling. No e-waste imports have been reported within national reports submitted to the Basel Convention by the CIS+ countries. Low quality of data and control of TBM of e-waste through the Basel Convention poses a threat to the environmentally sound management of e-waste and illegal movements. Furthermore, used-EEE imports result in more e-waste in the receiving countries and place burdens on existing e-waste management. Meanwhile, the functionality of imported used-EEE and (if mixed with e-waste) their quantities remain unknown.

Managing e-waste could be an economic opportunity, as the e-waste generated in 2019 contained 10 t of gold, 0.5 t of rare earth metals, 1 Mt of iron, 85 kt of copper, 136 kt of aluminum, and 0.7 kt of cobalt – representing a total value of 200 billion Russian rubles (or equivalent of $2.6 billion USD) of secondary raw materials. Over 95 percent of e-waste in the region is not collected or sent to ESM facilities for proper management. Most e-waste ends up in landfills, with the informal sector cherry-picking some valuable components. The hazardous substances in e-waste – comprising at least 2.4 t mercury, 1.1 t cadmium, 8.1 kt lead, and 4 kt brominated flame retardants – are poorly managed within the region and are most likely to be untreated, generating various risks to the stability of a healthy environment.

The assessment of e-waste management, statistics, and legislation and the existing challenges evidently show that changes for the improvement of the e-waste management systems applied thus far would also vary from country to country. The countries in the region will need to introduce and enforce either: a) a robust legal and policy framework focused on ESM of e-waste, or b) monitor and reinforce existing systems to make them more efficient and effective. Adequate financing of the systems, monitoring, and cooperation of all stakeholders are essential for ensuring that the policies setup for e-waste management is sustained. Seven general recommendations can be drawn from the analysis presented herein, and an all-encompassing approach, involving all actors and stakeholders in each country, would be needed in order to implement them. A somewhat strengthened transnational cooperation is necessary in order to reduce the burden of large investments and secure the necessary turn-around. The seven recommendations are: (i) Prevent More, (ii) Be More Aware, (iii) Collect More, (iv) Pollute Less, (v) Pay Adequately, (vi) Work More Safely, and (vii) Train More.

E-waste generated in the CIS+ region represents a total value of 200 billion Russian rubles (equivalent to $2.6 billion USD) of secondary raw materials.

ABBREVIATIONS

BAT	Best Available Technologies
Cat.	Category
CIS (CIS+)	Commonwealth of Independent States (+ Georgia)
CRT	Cathode Ray Tube
EAEU	Eurasian Economic Union
EEE	Electrical and Electronic Equipment
EEE POM	Electrical and Electronic Equipment Placed On Market
EHS	Environmental Health and Safety
EPR	Extended Producer Responsibility
ESM	Environmentally Sound Management
EU	European Union
E-waste	Electronic Waste, synonym of Waste Electrical and Electronic Equipment (WEEE)
inh	Inhabitant
ITU	International Telecommunication Union
kt	(Metric) Kiloton, or 1,000,000 kg
MEA	Multilateral Environmental Agreement
NGO	Non-Governmental Organisation
OEPR	Organisations of the Extended Producer Responsibility
PCB	Polychlorinated Biphenyl
POM	Placed On Market
PPP	Purchasing Power Parity
REM	Regional E-waste Monitor
SDG	Sustainable Development Goal
t	(Metric) Ton, or 1,000 kg
TBM	Transboundary Movement
UN Comtrade	United Nations Commodity Trade Statistics Database
UNDESA	United Nations Department of Economic and Social Affairs
UNDP	United Nations Development Program
UNEP	United Nations Environment Program
UNITAR	United Nations Institute for Training and Research
UNU	United Nations University
UNU-KEY	Product-based classification distinguishing 54 products, used to measure e-waste statistics
USSR	Union of Soviet Socialist Republics
WEEE	Waste Electrical and Electronic Equipment

	OFFICIAL COUNTRY NAME	NAME USED IN THE REPORT
ARM	Republic of Armenia	Armenia
AZE	Republic of Azerbaijan	Azerbaijan
BLR	Republic of Belarus	Belarus
GEO	Georgia	Georgia
KAZ	Republic of Kazakhstan	Kazakhstan
KGZ	Kyrgyz Republic	Kyrgyzstan
MDA	Republic of Moldova	Moldova
RUS	Russian Federation	Russia
TJK	Republic of Tajikistan	Tajikistan
TKM	Turkmenistan	Turkmenistan
UKR	Ukraine	Ukraine
UZB	Republic of Uzbekistan	Uzbekistan

1. INTRODUCTION

A. What is E-waste?

Electrical and Electronic Equipment (EEE) contains all products and parts that run on a power or battery supply. Upon being discarded by its owner, EEE becomes e-waste, which contains both valuable and hazardous materials.

EEE is a term used to define the wide variety of products having circuitry or electrical and electronic components that need a power or battery supply in order to perform their functions. EEE includes almost any such products available in households and businesses – including laptops, mobile phones, fridges, washing machines, dishwashers, cooking and kitchen appliances, many toys, servers, and musical instruments. The use of EEE is increasing rapidly alongside societies' general development and the rapid development of information and communications technology (ICT), and EEE is spreading quickly in emerging sectors such as electric transport, clean energy production, and smart cities, which base their services on EEE and sensors.

E-waste is discarded products or components that need a power or battery supply in order to perform their functions.

When an EEE item is discarded, it becomes Waste Electrical and Electronic Equipment (WEEE), also known as electronic waste, or e-waste. According to the StEP (Solving the E-waste Problem) Initiative, e-waste is: 'a term used to cover items of all types of EEE and its parts that have been discarded by the owner as waste without the intention of re-use' [1]. The International Telecommunication Union (ITU) and the legally binding definition of the Basel Convention also define e-waste or WEEE as 'electrical or electronic equipment that is waste, including all components, sub-assemblies, and consumables that are part of the equipment at the time the equipment becomes waste'[(1)].

Each type of e-waste has a specific size, hazardous components, and valuable materials that affect the way it must be collected, treated, recycled, or disposed of in an environmentally sound manner.

[(1)] Recommendation ITU-T L.1031/L.1032 and Technical guidelines on transboundary movements of electrical and electronic waste and used electrical and electronic equipment, especially regarding the distinction between waste and non-waste under the Basel Convention (2014).

E-waste encompasses a large variety of discarded products and is categorised into six main categories.

E-waste may be categorised in different ways, including by product type or product size. The European Union's WEEE Directive and the E-waste Statistics Standards Guidelines [2] use a treatment-oriented categorisation, with the following six main categories:

1. **Temperature exchange equipment**, including fridges, freezers, air conditioners, and heat pumps.

2. **Screens and monitors**, comprising liquid crystal displays (LCD) and light-emitting diode (LED) televisions and monitors, laptops, and tablets.

3. **Lamps**, including LED lamps, high-intensity discharge lamps, and compact and straight tube fluorescent lamps.

4. **Large equipment**, including dishwashers, washing machines, ovens and central heating systems, large printing systems, and photovoltaic panels.

5. **Small equipment**, comprising microwaves, grills and toasters, personal care products, speakers, cameras, audio sets and headphones, as well as toys, household tools, and medical and monitoring systems.

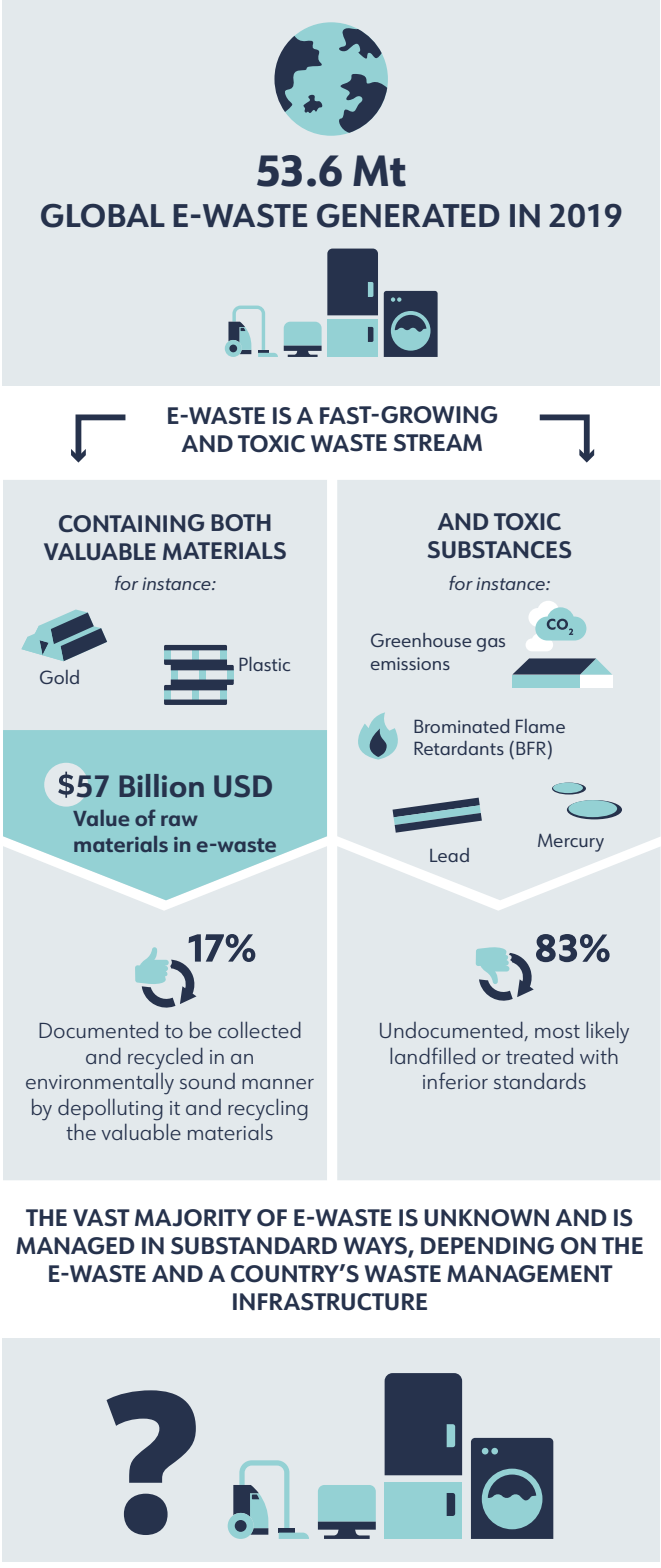
6. **Small IT and Telecommunication equipment**, including desktop personal computers, printers, mobile phones, cordless phones, keyboards, routers, and consoles.

B. E-waste: An International Issue

E-waste is one of the fastest-growing waste streams. Globally, only 17 percent is officially collected and recycled, wasting valuable materials and causing damage to the environment [3].

EEE, including equipment used for information and communication technology services, offers great opportunities for the world's development, guaranteeing higher living standards and satisfying several needs. However, discarded equipment such as phones, laptops, sensors, TVs, washings machines, air conditioners, fridges, and many other items that contain harmful substances pose considerable risks to human health and the environment, especially when managed inadequately.

E-waste constitutes one of the fastest-growing streams of solid waste. *The Global E-waste Monitor* (2020) highlighted that a record 53.6 million metric tonnes (Mt) of e-waste were generated in 2019 – an increase of 21 percent since 2014 [3]. This increase is linked to the growing number of people using EEE worldwide as well as to a constant technological development and the phasing out of old technologies – i.e. shorter product lifecycle and designs that do not support repair or reuse. Only 17 percent is reportedly collected and recycled in an environmentally sound manner. The majority of e-waste that is not recycled or disposed of in an environmentally sound manner usually ends up in landfills, mixed with other waste streams. Consequently, valuable resources, such as precious metals and rare earth elements, are wasted, and hazardous substances are released into the environment in ways that pose risks to human health and the environment.



Source: The Global E-waste Monitor [3]

Managing e-waste requires specific legislation and collection infrastructure, but it typically is poorly regulated and enforced at the global level.

As a complex and relatively recent waste stream, countries need to introduce specific legislation to enforce sound environmental treatment and management of e-waste. In 2019, 78 countries (comprising 71 percent of the global population) were covered by a legislation, policy, or regulation on e-waste, which is a significant development from the 67 countries (66 percent of the population) that were identified in 2017. Nevertheless, in most cases, policies are neither legally binding nor appropriately supported financially, which has been found to be less compelling for ensuring their implementation and compliance. Also, most legislative instruments concentrate on improving e-waste management, but both the reduction of the volumes of e-waste generated and management practices, such as repair and reuse of EEE, have not yet been properly examined.

E-waste management is monitored in the United Nations' Sustainable Development Goals under SDG 12 on Sustainable Consumption and Production.

In 2015, the United Nations Member States adopted the 2030 Agenda for Sustainable Development. This included the 17 Sustainable Development Goals (SDGs) and 169 targets for ending poverty, protecting the planet, and ensuring prosperity for all people over a 15-year span. Increasing e-waste generation and adopting improper and unsafe treatment and disposal approaches pose significant challenges to human health and the environment, as well as to the achievement of the SDGs. E-waste management is closely related to many SDGs, such as SDG 8 on decent work and economic growth, SDG 3 on good health and well-being, SDG 6 on clean water and sanitation, and SDG 14 on life below water. Considering the high raw material demand for EEE production, e-waste also relates to the SDG indicators on the material footprint (SDGs 8.4.1 and 12.1.1) and the SDGs on the domestic material consumption (SDGs 8.4.2 and 12.2.2). Consequently, e-waste remains a global challenge, not only because of its increasing generation worldwide, but also because the proper treatment and the prevention of its overall generation requires active engagement of a diverse set of actors, sometimes going beyond national borders. As such, the management of e-waste is monitored in SDG 12 on responsible consumption and production, under indicator 12.5.1 (national recycling rate), and under indicator 12.4.2 on hazardous waste generation, which has a specific sub-indicator defined [3], [4].

ITU's Connect 2030 Agenda set targets of increasing the global e-waste recycling rate to 30 percent (Target 3.2) and raising the number of countries with e-waste legislation to 50 percent by 2023 (Target 3.3)[2].

[2] ITU's Connect 2030 Agenda (PP-18 Resolution 200, Rev. Dubai, 2018) https://www.itu.int/en/mediacentre/backgrounders/Pages/connect-2030-agenda.aspx.

C. Framework Conditions of the Commonwealth of Independent States (CIS) plus Georgia

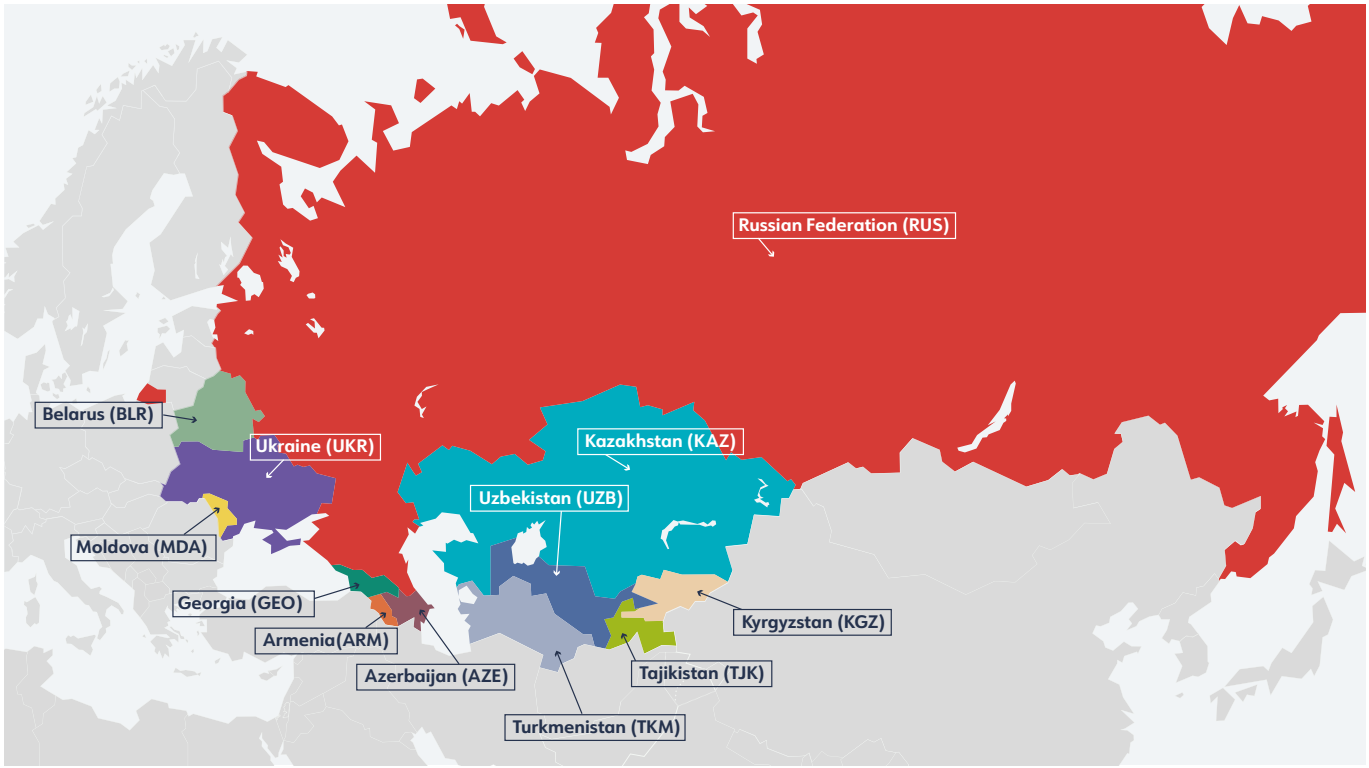
This report covers twelve countries that were formerly part of the Soviet Union. Eleven are members of the Commonwealth of Independent States (CIS), which is a regional intergovernmental organisation.

This Regional E-waste Monitor (REM) of the Commonwealth of Independent States (CIS) + Georgia, (REM CIS+) covers the following countries: Armenia (ARM), Azerbaijan (AZE), Belarus (BLR), Georgia (GEO), Kazakhstan (KAZ), Kyrgyzstan (KGZ), Moldova (MDA), Russia (RUS), Tajikistan (TJK), Turkmenistan (TKM), Ukraine (UKR), and Uzbekistan (UZB).

Azerbaijan, Armenia, Belarus, Kazakhstan, Kyrgyzstan, Moldova, Russia, Tajikistan, and Uzbekistan are currently active Member States of the CIS. The CIS coordinates its members' policies regarding their economies, foreign relations, defence, immigration policies, environmental protection, and law enforcement. It regulates the relationship and cooperation between the majority of states that were formerly part of Union of Soviet Socialist Republics (USSR). CIS is not a supranational entity; it operates on a voluntary basis.

Within the CIS, there is enhanced economic cooperation for five countries in the Eurasian Economic Union (EAEU).

Within the CIS, there is a greater economic cooperation between Armenia, Belarus, Kazakhstan, Kyrgyzstan, and Russia, which are Member States of the Eurasian Economic Union (EAEU). The EAEU is an international organisation of the regional economic integration with international legal personality and is established by the Treaty for the EAEU. The EAEU provides freedom of movement of goods, as well as services, capital, labour, and implementation of coordinated, uniform policy in economic sectors.

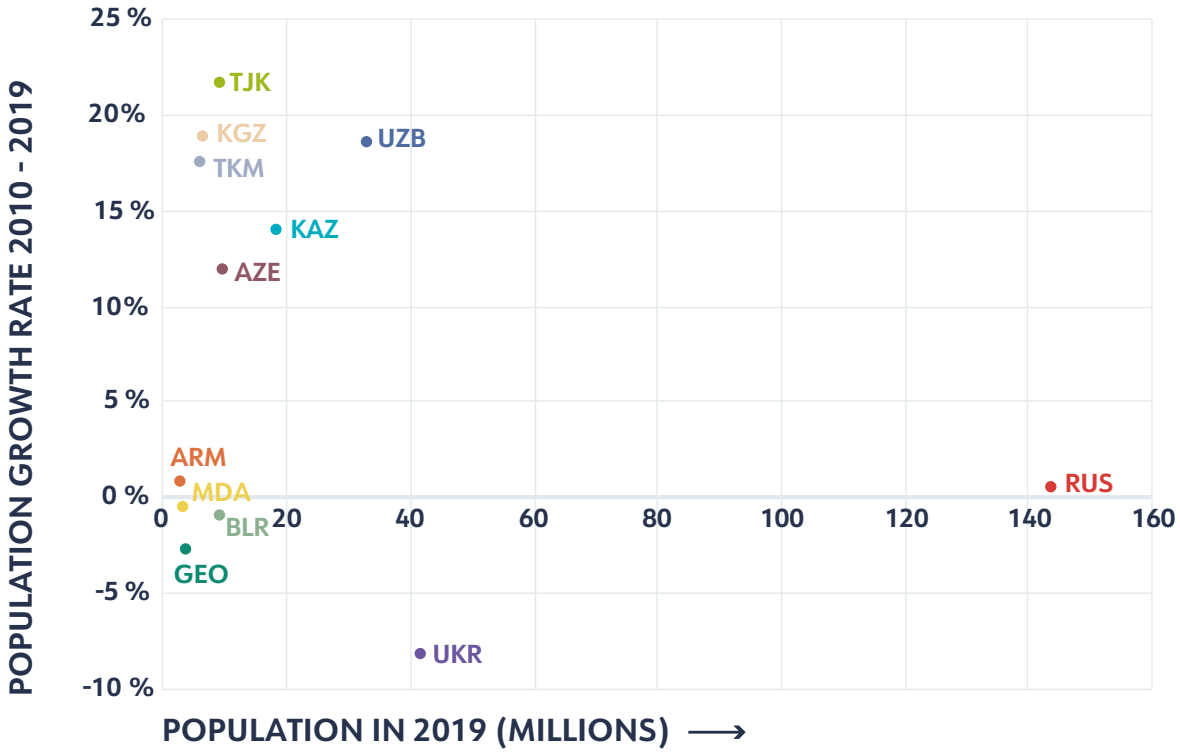


The CIS region has 289.2 million inhabitants. Russia is the most populous country in the region, while the countries in Central Asia have the highest population growth.

In term of demographics, the entire CIS region has 289.2 million inhabitants (inh) (2019). The most populous country is Russia, with 143.9 million inhabitants in 2019, followed by Ukraine (41.8 million) and Uzbekistan (33.2 million) (see Figure 1). The population growth rate between 2010 and 2019 averaged 4 percent. The Central Asian region (Kazakhstan, Kyrgyzstan, Tajikistan, Turkmenistan, and Uzbekistan) has the highest regional population growth rate, with each country averaging more than 14 percent. Belarus, Georgia, and Ukraine all have declining populations. The Ukrainian population has been declining since the 1990s, due to a high emigration rate, high death rates, and low birth rates. Meanwhile, demographics in Tajikistan are characterised by rapid growth and a young population.

The CIS+ region has 289.2 million inhabitants.

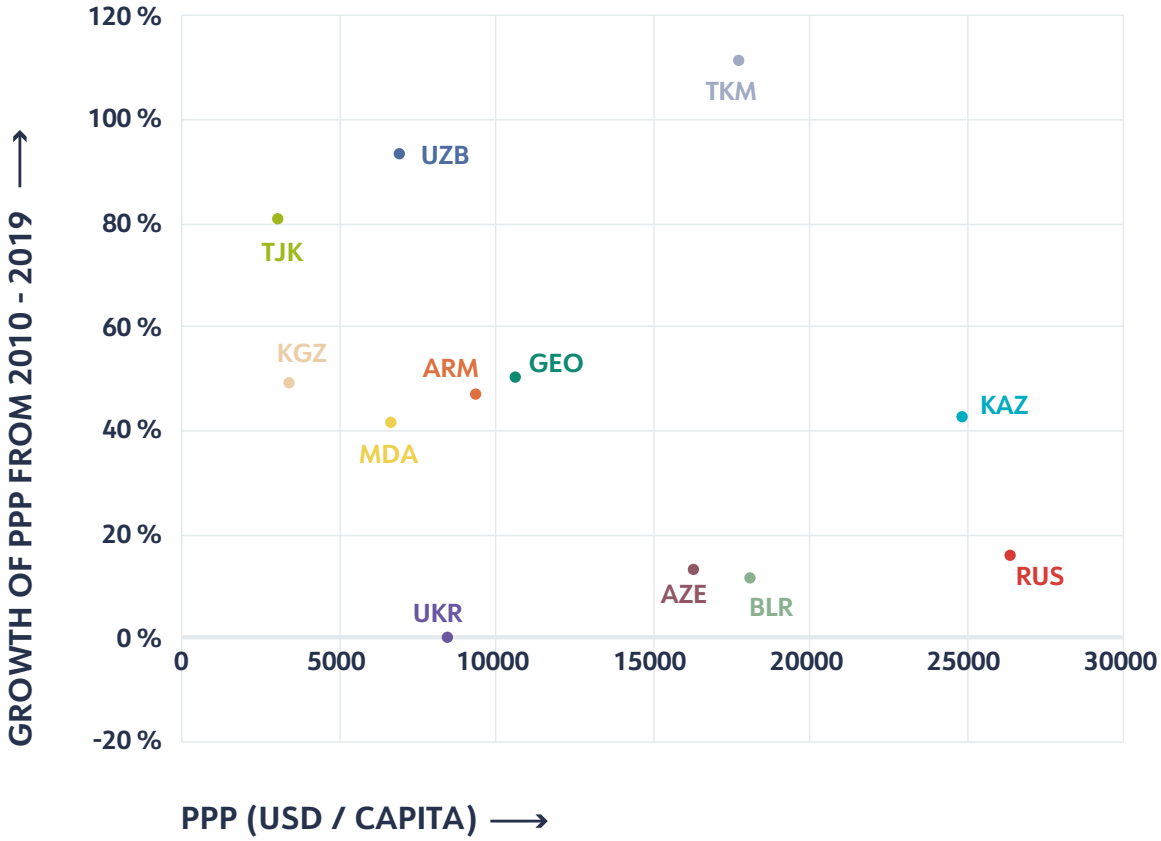
Figure 1. Demographic overview of the region



The difference in purchasing power per inhabitant is large among countries in the region, and a few countries have between 2 and 5 percent of their population below the poverty line. However, almost all of the population has access to electricity.

In terms of socioeconomic development, the region has a very wide range of product purchasing power parity (PPP)[3] , ranging from $3,000 USD/year in Tajikistan to $26,000 USD/year in Russia (see Figure 2)[4]. The entire region shows a growth of PPP. According to the World Bank classification, 7 countries are upper-middle income countries (Armenia, Azerbaijan, Belarus, Georgia, Kazakhstan, Russian, and Turkmenistan), 4 are lower-middle income countries (Kyrgyzstan, Moldova, Ukraine, and Uzbekistan), and 1 is a low income country (Tajikistan). Regarding poverty, available data for 2015 shows that just three countries – Armenia, Georgia, and Tajikistan – have between 2 and 5 percent of the population living below the poverty line and that they attained nearly 100 percent population access to electricity (not shown).

Figure 2. Economic overview of the region - showing the PPP in $1,000 USD/capita (2019) on the x-axis and the total PPP growth rate from 2010 to 2019 on the y-axis



[3] The purchasing power parity (PPP) is an economic indicator that allows researchers to compare economic productivity and standards of living between different countries and locations. It can be used to adjust the gross domestic product (GDP).
[4] UNDESA 2019.

D. Background to the Report

Although some assessments, projects, and initiatives on e-waste have taken place in recent years, a comprehensive overview and analysis of the e-waste situation in the region is still lacking. So, this report aims to fill the gap by presenting the past and current e-waste situation in the 12 countries under the scope of the project. This Regional E-waste Monitor in the Commonwealth and Independent States plus Georgia presents a summary of the regional e-waste status and has been prepared via collaboration with the governments, national statistical offices, and countries' independent experts. This summary allows for international comparisons and contributes to the development of more effective e-waste management systems in the region.

2. METHODOLOGY

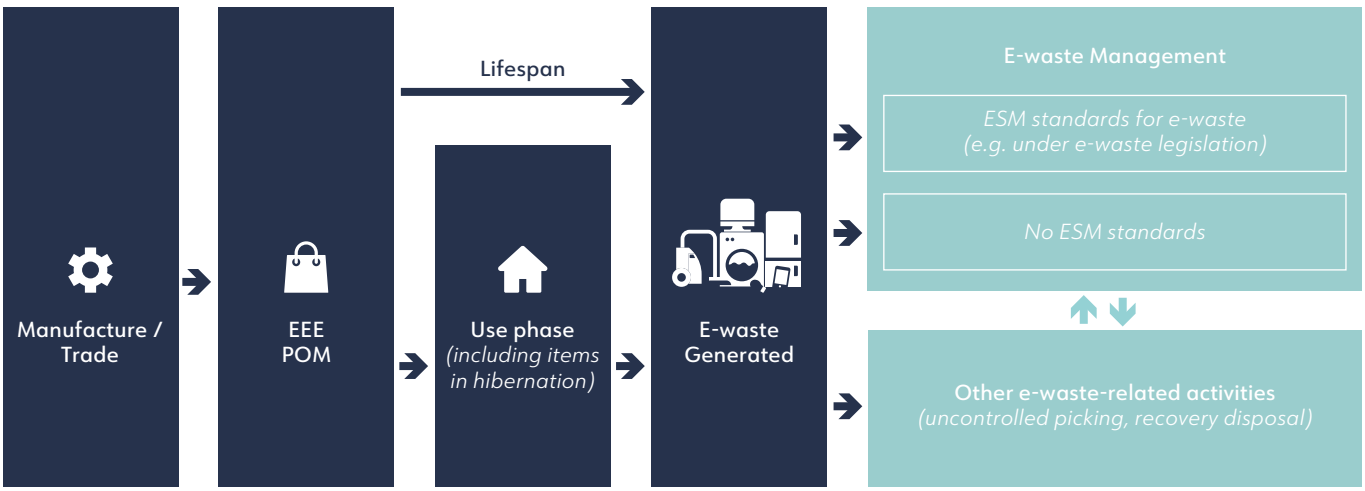
This report compares the e-waste statistics, legislation, and infrastructure in the region. The statistical methodology used follows the same principles as the internationally harmonised framework, which has been developed by the Partnership for Measuring ICT for Development as a joint effort by the United Nations University (UNU)/United Nations Institute for Training and Research (UNITAR), International Telecommunication Union (ITU), United Nations Environment Programme (UNEP), the Statistical Office of the European Union (Eurostat), and other United Nations (UN) agencies that have been described in 'E-waste Statistics Guidelines on Classification Reporting and Indicators' [2], [5]. For the assessment of e-waste legislation and management, a novel methodology has been developed. The key concepts of the statistical framework and of the e-waste legislation and management assessment are explained in more detail below.

A. E-waste Statistics

E-waste statistics follow a mass balance of the entire lifecycle of EEE and are calculated using a product-based classification, the UNU-KEYs.

The measurement framework of e-waste statistics follows a mass balance approach over the entire life cycle of EEE. This covers production, imports, placing on the market, e-waste generation, e-waste management, and other e-waste-related activities (Figure 3). In doing so, and as a first step, it quantifies the amount of EEE placed on market (EEE POM). The term EEE refers to any household or business item (excluding vehicles) with circuitry or electrical components and a power or battery supply [1]. EEE POM covers any product supplied to the national market for consumption and use by households, businesses, and public authorities. EEE POM has been calculated 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 A).

Figure 3. E-waste statistics framework



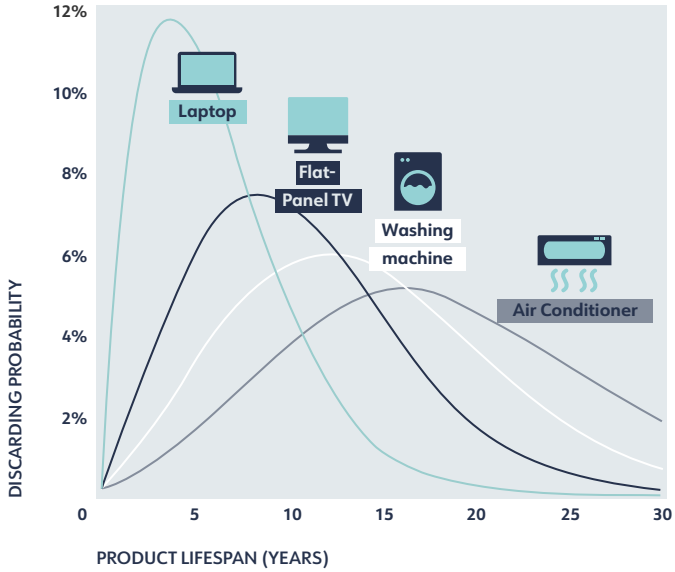
E-waste generation is calculated using the EEE POM and lifespans for each UNU-KEY. E-waste generated is the total mass of e-waste, prior to any e-waste management activity.
The EEE POM can be calculated from a variety of data sources. The most straightforward methodology is using the apparent consumption methodology, according to which EEE POM can be obtained with Eq. 1:

Equation 1:
POM=Import-Export + Domestic Production

The EEE POM is calculated for each UNU-KEY, preferably from 1980 to the present day, and includes imports of both new and used-EEE, as well as domestically produced EEE. Since trade statistics and domestic production data are usually expressed in units, a unit to weight conversion factor per each UNU-KEY is calculated and applied in order to obtain the amount of EEE POM in mass.

After a product has been POM, it stays in use – or at the household, business, or governmental institute – until it is discarded. The lifespan of a product is the period of time from when the product has been POM until it becomes e-waste. This includes the hibernation phase – such as the storing/stockpiling of the equipment until POM or 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 to the average lifespan for each UNU-KEY individually (Figure 4).

Figure 4. Examples of EEE product lifespans



The time series of EEE POM and lifespans are then used to calculate e-waste generated for each UNU-KEY. The mathematical description of 'E-waste Generated' is explained in ANNEX B. 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 export [6].

E-waste generation is the basis for conducting statistics on the e-waste flows. Assessment of the amount of e-waste that is treated using ESM approaches is crucial. Other e-waste flows are also considered, covering other e-waste management practices. In order to assess e-waste statistics, e waste import and export must be measured as well.

In general, waste management involves the collection, transportation, storage, and disposal of waste, including after-care of disposal sites. Waste management can be undertaken by an economic unit within a legal framework, but waste handling carried out by informal economic units (e.g. informal waste-picking) and illegal waste-handling also exist. In this context, 'waste management' and 'other waste related activities', as proposed by the UNECE's Waste Statistics Framework, are distinguished. In that framework, waste management is defined as the set of lawful activities carried out by economic units of the formal sector, both public and private, for the purpose of the collection, transportation, and treatment of waste, including final disposal and after-care of disposal sites [7]. The 'other waste-related activities' includes waste dumping, waste-picking, disposal, etc. and may include the informal sector[5].

It is of vital importance that e-waste undergoes depollution, that hazardous fractions 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, this flow is referred to as 'e-waste formally collected' in this report and in the e-waste statistics guidelines. 'E-waste formally collected' implicitly means that the e-waste is collected under the specific legislation for e-waste (or in a similar manner). In this report, such waste is also referred to as 'e-waste managed environmentally soundly'.

E-waste can also be managed by waste managers involved in various processes such as collection, dismantling, and metals recovery, using operations that do not guarantee environmentally sound management, and which, due to inferior quality, may then cause damage to the environment as result of the e-waste's hazardous substances not being treated. An example is e-waste being mixed in with residual waste that is not source-separated and which ends up in landfills. The e-waste can also be mixed in with other waste, such as metal scrap, and recycled together with it. Not all recyclable parts are recycled, and hazardous components of e-waste are left untreated. Thus, this waste management is not accounted for in the flow of e-waste environmentally soundly managed.

For e-waste, 'other waste-related activities' may involve the selective dismantling of the valuable parts, recovery of some metals, or dumping at uncontrolled landfills. The hazardous components of e-waste are untreated, and such treatment is typically performed by informal waste operators.

The activities performed by the informal sector usually do not imply minimum safety requirements, environmental standards, and depollution techniques. However, the informal sector can sometimes hand complete products of e-waste over to the formal sector. For instance, in an EPR-regulated system, quantities collected and recycled in an environmentally sound manner should be counted as e-waste for ESM. E-waste can also be disposed of in residual waste or bulk waste, going straight to landfills or to waste incineration facilities.

Importation and exportation can occur for used-EEE and e-waste. This is called transboundary movement (TBM). TBM of e-waste occurs both with whole products and with parts/components. It is important that it be made clear whether the exported e-waste is designated according to the ESM criteria in the national legislation (and thus managed by e-waste-certified recyclers in the receiving countries) or not. The amounts of exported e-waste must then be added to the e-waste managed using ESM; otherwise, it should be added to other e-waste

[5] ILO definition of informal sector: A group of production units comprised of unincorporated enterprises owned by households, including informal own-account enterprises and enterprises of informal employers (typically small and non-registered enterprises). See ILO (2017) section 4.5 on informal economy workers.

management. However, imports of e-waste do not have to be added to the national totals of e-waste managed using ESM; these should be recorded separately. For used-EEE, TBM is slightly different. Products are not waste yet, but this data is needed to complete the mass balance of EEE and e-waste. Imported used-EEE must be added to the EEE POM, whereas the exported used-EEE can be defined as a specific flow to be measured.

The e-waste data are harmonised according to international standards, as per SDG 12 on sustainable consumption and production.

International indicators for e-waste and the SDG 12 e-waste indicators are defined for EEE POM, e waste generated, e-waste formally collected (also referred to as e-waste managed in an environmentally sound manner), and the e-waste collection rate.

In order to capture the most important dynamics of e-waste, four indicators are defined for SDGs and international guidelines for [2], [4], [5]:

1. **Indicator 1:** EEE POM.
2. **Indicator 2:** E-waste generated.
3. **Indicator 3:** E-waste managed in an environmentally sound manner (also referred to as e-waste formally collected in the statistics guidelines) ESM standards for e-waste (e.g. under e-waste legislation).
4. **Indicator 4:** E-waste collection rate (indicator 3 divided by indicator 2).

The indicator 1 on EEE POM includes used-EEE imports. Indicator 2 includes the exports for ESM of e waste, but excludes imports. The unit of indicators 1 to 3 are kiloton (kt), and for international comparison, a normalisation into population is made, as expressed by kg/inh. The performance of the entire e-waste management is expressed using the e-waste collection rate, defined as Indicator 4, which is expressed as a percentage. The collection rate can be an indication of the progress made by the country toward achieving a proper management of the e-waste sector.

B. E-waste Management Assessment

Assessment of national e-waste policy coverage and e-waste infrastructure is done by distinguishing three development stages: A (advanced), B (in transition), and C (basic).

Countries or regions may define their own standards for sound treatment of hazardous waste, based on their national context [4], which gives rise to differences in interpretation and the standard of ESM of waste, including e-waste. Therefore, this report provides a novel methodology for further interpretation regarding the progress of e-waste toward ESM, in terms of developing legislation and development of e-waste management infrastructure, which allows a cross-country comparison.

In practice, the implementation of ESM of e-waste requires a comprehensive approach and can only be successful when taking into account many factors such as socioeconomic development, governance structures, geography, trade links, infrastructure, and consumer behaviors. The description of the stages is shown in Table 1, where A, B, and C can be roughly interpreted in A as advanced, in B as transition, and in C as basic.

Table 1. Features of the e-waste system matrix in various stages of development, adapted from [8-11]

Stages	Legal Framework	Infrastructure
A	E-waste legislation, including financing mechanisms, enforcement with efficient controls and monitoring; alternatively, strong voluntary system with governmental support and collaboration, legally mandated compulsory nationwide environmental health and safety (EHS) standards with internationally accepted for all facilities.	Widespread network of formal collection channels; e-waste collection is entirely formalised, with only legally authorised e-waste collection taking place, either through legally obligated take-back systems, voluntary initiatives, or the informal sector handing over e-waste to a formal collector. Depending on the country, high-efficiency and advanced industrial facilities (large and small scale) for recycling and recovery of functions and materials from e-waste, including precious metals, rare earths, etc.
B	E-waste-specific draft legislation under discussion or recently enacted; in the early stages of enforcement regime development; potentially limited scope of legislation; voluntary EHS standards with basic minimum thresholds; greater individual awareness about environmental and health risks.	Informal and formal collection channels coexist; formal collection channels operate within a legal framework, such as a licensing system; informal collectors still exist outside the legal system; voluntary take-back schemes/collection by private sector in operation. Semi-mechanized formal small and medium enterprise recycling facilities for e-waste treatment and recycling; dismantling and partial recovery facilities to segregate recyclable fractions; informal sector recyclers recover copper, gold, and other materials using rudimentary methods.
C	No e-waste specific legislation and financing mechanisms: e-waste management depends on ad-hoc local actors; limited or no awareness of EHS among e-waste processors, and therefore little protection from toxins and hazardous substances released during e-waste treatment and recycling.	Only informal collection and/or disposal with municipal waste. E-waste treatment/recycling on micro and small-scale often run individually by facilities in the informal sector using rudimentary and manual techniques for dismantling and repair, reuse, and recycling.


about by
slat-ər
legislation
action of

In the indicator framework developed, each indicator available for the legal framework and collection infrastructure is scored as A, B, or C.
The approach taken in this report is to develop a framework of indicators that is relevant for e-waste legislation and e-waste management. Each indicator would have to be measurable and meaningful for e-waste management. The adopted choice of indicators comes from a pragmatic compromise between the data available and the ideal situation, and it sometimes results in proxies. Each indicator will be scored in three stages: A, B, or C (see Table 2). If a score is not known, it is set to unknown.

In the legal framework, five indicators are distinguished that deal with national and international legislation (see Table 2). They cover the national e-waste legislation aspects, such as the treatment or proper management of products. This includes whether or not the legislation defines collection targets, and whether or not the law defines minimum standards for ESM of e-waste. Furthermore, it takes into account the obligations under international treaties, such as the:

- Basel Convention on the Control of Transboundary Movements of Hazardous Wastes and their Disposal.
- Rotterdam Convention on the Prior Informed Consent Procedure for Certain Hazardous Chemicals and Pesticides in International Trade.
- Stockholm Convention on Persistent Organic Pollutants.
- Minamata Convention on Mercury.

In the collection mechanism, two indicators are defined. One indicator addresses the e-waste collection points, whether all municipalities have e-waste collection points, whether only the main cities do, or whether collection points are absent in the country. The nature of the collection points varies largely worldwide due to e-waste collection schemes, which, in some countries, may be administered through municipalities, informal collectors, retailers, etc. In practice, e-waste collection depends on how the collectors are handing over e-waste to treatment and recycling infrastructure for ESM of e-waste. Collection points can be organised either through municipalities or through producer take-back schemes, both of which include pick-up and drop-off services. The second indicator is whether or not an e-waste management infrastructure exists in the country.

Table 2. Overview of indicators in the e-waste management system and minimum level for stages

	Number	Description of Indicator	Minimum Level for Stage C	Minimum Level for Stage B	Minimum Level for Stage A
Legislation	1.1	**Existence of e-waste specific legislation**	No	In development	Yes
	1.2	**Enforced products in national e-waste legislation** (percentage of mass of all UNU-KEYs in the e-waste generated)	At least 0%	At least 20%	At least 75%
	1.3	**Is there a national e-waste collection target?** (mandatory/voluntary/no)	No	Voluntary/in development	Yes
	1.4	**Are there standards of e-waste management?**	No	Voluntary/in development	Yes
	1.5	**Number of MEAs ratified or signed** (Basel, Minamata, Stockholm, Rotterdam)	1 Ratified or Signed	2 Ratified + 1 Signed	3 Ratified + 1 Signed
Infrastructure	2.1	**Are there e-waste collection points in each municipality?** (yes/in the main cities/no)	No	In the main cities	Yes
	2.2	**Are there management facilities in the country for ESM of e-waste?** (yes/no)	No	In process of being developed	Yes
Performance	3	**E-waste collection rate** (%)			
E-waste quantity	4	**E-waste generated** (in kg/inh and kt)			

The e-waste management in the countries is assessed by comparing the outcomes of the indicators on legislation and infrastructure with e-waste statistics indicators to determine the overall performance.
In practice, both the outcomes of the e-waste management matrix (i.e. legal development and the development of the e-waste management infrastructure) and the e-waste statistics indicators provide an overview of whether the countries are legislating and building an effective e waste management infrastructure that can collect e-waste – the indicator 'e-waste generation' (indicator 2). The 'e-waste collection rate' (indicator 4) indicates the effectiveness of the legislation and infrastructure. Together, they provide a dashboard at the country level.

C. Data Sources

Several data sources have been used and compared to quantify the main statistics indicators and to overcome challenges of data availability and comparability.

Statistical data on EEE POM and e-waste generated were obtained from the governments or national statistical offices that were part of the project. When data were not available, the datasets from UNU/UNITAR in *The Global E-waste Monitor 2020* [3] were used. Data for EEE POM and e-waste generated have been obtained from official national data for Armenia, Belarus, Kazakhstan, and Moldova. For Tajikistan, Turkmenistan, and Uzbekistan, there was no data in *The Global E-waste Monitor*, due to unavailable (or very limited) records on the UN Comtrade Database. The data has been estimated using countries in the region with a similar economic condition as a starting point and adjusted proportionally to the PPP. Data on e-waste formally collected have been obtained from national official databases and countries' authorities that were part of the study, or by direct consultation with private companies active in the field of e-waste collection.

To determine the amount of e-waste imported and exported per country, data have been extracted from the national reports of the Basel Convention 2016-2019. The analysis of whether TBM corresponded to e-waste or not has been performed using a combination of the codes in List A (hazardous waste) and List B (non-hazardous waste), as well as the Y codes of the Basel Convention (see ANNEX C). Additionally, all descriptions in the reporting were checked to ensure that wrong declarations were left out and not erroneously included.

The socioeconomic condition has been analysed through factors such as population and PPP, obtained from United Nations Department of Economic and Social Affairs (UNDESA), as well as the size of the informal sector, access to electricity and internet, and share of the population below the poverty line, which were obtained from the United Nations Statistics Division (UNSD) SDGs[6] database.

[6] UN SDGs https://unstats.un.org/sdgs/indicators/database/.

Information regarding the current status of the legislative framework and the overall e-waste management was acquired via questionnaires and direct interviews addressed to ministries and stakeholders of relevance for the e-waste sector. For countries having a national legislation defining e-waste or with the Extended Producer Responsibility (EPR) system in place, relevant legal acts were examined to determine the products in the scope, which were then converted to the UNU-KEYs classification in order to quantify the percentage of the total amount of e-waste generated in the countries covered by legislation (expressed as 'Legislation product coverage in UNU-KEYs' and 'Legislation product coverage in weight (%) on total and per category' in each country profile).

Data on the Parties and status of the signatories of the Basel, Rotterdam, Stockholm, and Minamata Conventions were obtained from their individual websites: Parties to the Basel Convention (basel.org), Parties to the Rotterdam Convention (pic.int), Parties to the Stockholm Convention (pops.int), and Parties to Minamata Convention (mercuryconvention.org).

Where firsthand information could not be retrieved, literature research, reviews of existing papers, and national studies for the countries of interest were conducted.

3. REGIONAL OVERVIEW OF THE E-WASTE LEGISLATION AND E-WASTE MANAGEMENT SYSTEM

A. Status of Legislation

All twelve countries in the region have well-developed legal and regulatory frameworks in the field of waste management, but six countries have no specific legislations or EPR systems focused on regulating e-waste (Table 3).

Five countries have EPR on e-waste established and functioning.
The frontrunners in the region have e-waste legislations in place or have an EPR related to e-waste integrated into their waste management law. Georgia, Moldova, and Ukraine have e-waste-specific legislation or regulation. 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, while Tajikistan and Uzbekistan do not have a comprehensive law for e-waste but have a specific focus only on lamps containing mercury. The EPR system has been established in five countries: Belarus, Georgia, Kazakhstan, Moldova, and Russia. These five countries apply the EPR to the waste streams arising from several products, such as packaging, batteries and accumulators, EEE, vehicles, and oils.

Table 3. Presence of e-waste-specific legislation, EPR, & EHS standards on e-waste management*

Country	Legislation/Regulation Specific on E-waste	EPR Relating to E-waste	Status of E-waste EHS
Armenia	✗	⚙	✗
Azerbaijan	✗	✗	✗
Belarus	✗	✓	✓
Georgia	✓	✓	✓
Kazakhstan	✗	✓	⚙
Kyrgyzstan	✗	✗	✗
Moldova	✓	✓	✓
Russia	✗	✓	✓
Tajikistan	✓ (lamps)	✗	✗
Turkmenistan	✗	✗	✗
Ukraine	✓	⚙	✓
Uzbekistan	✓ (lamps) ⚙ (other)	✗	✗

⚙ draft stage ✓ present ✗ absent

*Detailed information about the specific laws can be found in the respective country profiles (see also Chapter 9).

Three countries have draft legislations or the EPR system on e-waste in development.
Armenia and Ukraine are in a drafting process of the EPR for e-waste, and Uzbekistan has e waste draft legislation in development. Specifically, the State Committee of Uzbekistan on Ecology and Environmental Protection developed a draft provision for disposal of EEE, domestic, and other office equipment, and the provision is under review for approval.

Four countries neither have specific e-waste legislation in place nor have any legislation in development, meaning that their e-waste is managed through general waste laws.
Four countries in the region (Azerbaijan, Kyrgyzstan, Tajikistan, and Turkmenistan) do not have specific e-waste legislation in place. Thus, their e-waste is managed mostly through general waste laws or laws on hazardous waste management. These countries are progressing toward the establishment of an EPR system, but no related draft or legislation currently exists.

Half of the countries have e-waste management standards or are in the process of developing them.
Recently, six countries have adopted or are in the process of adopting specific e-waste management standards (Belarus, Georgia, Kazakhstan, Moldova, Ukraine, and Russia). The management of waste, including hazardous waste, is regulated by several national laws and rules in all countries in the region.

B. International Agreements

There are several international agreements that countries in the region have put in place or agreed to be bound by that relate to e-waste. These range from multilateral environmental agreements (MEAs) to agreements on restricting the use of hazardous substances in manufacturing to agreements promoting the circular economy. Table 4 provides a summary of all international agreements in the region and is described below.

All countries are Parties to the Basel Convention, but not the other MEAs.

Countries in the region have adhered to the three major MEAs relevant for e-waste issues (Basel, Rotterdam, and Stockholm) to different degrees. All twelve countries in the region are Parties to the Basel Convention on the Control of TBM of hazardous waste and its disposal. Seven countries are bound to the Rotterdam Convention on the Prior Informed Consent procedure for Certain Hazardous Chemicals and Pesticides in International Trade. Tajikistan signed the Convention in 1998, but has not ratified it, while Azerbaijan, Belarus, Turkmenistan, and Uzbekistan have not started the signature process yet. Eleven countries – i.e. all except Turkmenistan – are also Parties to the Stockholm Convention.

In 2017, Armenia and Moldova ratified the Minamata Convention on Mercury, while Belarus, Georgia and Russia have signed it, but the ratification process has not been so far completed (as of May 2021). The other countries have not started the signature process yet. Albeit new, the latter international convention is also relevant for e-waste issues. In fact, Part 1 of Annex A of the Minamata Convention prohibits production, import or export of a whole list of mercury-added products, including EEE.

The EAEU restricts the use of hazardous substances in EEE production.

Two important legal tools in the EEE and e-waste fields have also been adopted at regional level, by the EAEU and by the CIS.

One of the important steps taken in the EAEU targeted at health and environmental protection in the field of e-waste management is the adoption by the Resolution of the Eurasian Economic Commission Council, dated October 18, 2016 of the Technical regulation "On restriction of the use of hazardous substances in electrical and radio electronics products" - TR EAEU 037/2016, which entered into force on March 1, 2018. The regulation applies to all EAEU countries[7]. On March 1, 2020, the Eurasian Economic Union (EAEU) brought into scope the Limitation of the Use of Hazardous Substances in Electrical and Electronics Products (TR EAEU 041/2017). This regulation, based off of the European Union (EU) Restriction of Hazardous Substances (RoHS) Directive, puts restrictions on substances used in the manufacturing of electrotechnical and electronic products.

According to the requirements of TR EAEU 037/2016, EEE must be designed and manufactured in such a way that they do not contain lead, mercury, cadmium, hexavalent chromium, polybrominated biphenyls and polybrominated diphenyl ethers. In homogeneous materials used in manufacturing of equipment, the concentration of these substances "in weight percent should not exceed 0.1, and hexavalent chromium – 0.01".

The Dushanbe Agreement was adopted to promote circular economy within seven of the CIS members.

[7] The Member States of the Eurasian Economic Union are Armenia, Belarus, Kazakhstan, Kyrgyzstan, and Russia, See: http://www.eaeunion.org/?lang=en.

Dushanbe Agreement was adopted to promote circular economy within seven of the CIS members.

On June 1, 2018, CIS State Leaders signed the Agreement on CIS Member States cooperation in the field of management of e-waste in Dushanbe, Tajikistan. The so-called Dushanbe Agreement was adopted within seven of the CIS Member States, and was signed by Armenia, Belarus, Kazakhstan, Kyrgyzstan, Russia, Tajikistan, and Uzbekistan.

The purpose of this Agreement is to promote the creation of a regional system for e-waste management to maximize the use of such wastes as secondary materials resources through the application of the best available technologies (BAT). Cooperation in improving the relevant legal and regulatory framework, through the adoption of common classification systems of such waste and through the harmonization of e-waste management standards are also set forth by the Agreement.

In addition, possible joint programs and projects for the use of secondary material resources are also envisaged. The coordinator of cooperation initiatives in charge of implementing this Agreement is the CIS Inter-State Council on Industrial Safety[8].

The Action Plan for the implementation of the Dushanbe Agreement was approved on November 2, 2018 in Minsk, Belarus by a Resolution of the Council of CIS State Leaders. This plan aims to provide integrated and agreed upon strategy for:

- ESM of e-waste.
- E-waste environmental impact minimization.
- Recycling processes.
- Recycling of e-waste into secondary raw materials that can be used in production.

Table 4. Overview of status of ratifications of international agreements

	ARM	AZE	BLR	GEO	KAZ	KGZ	MDA	RUS	TJK	TKM	UKR	UZB
Basel Convention	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Rotterdam Convention	✓	✗	✗	✓	✓	✓	✓	✓	⚙	✗	✓	✗
Stockholm Convention	✓	✓	✓	✓	✓	✓	✓	✓	✓	✗	✓	✓
Minamata Convention	✓	✗	⚙	⚙	✗	✗	✓	⚙	✗	✗	✗	✗
Restriction of hazardous substances*	✓		✓		✓	✓		✓				
Dushanbe Agreement[9]	⚙	✗	⚙	✗	⚙	⚙	✗	⚙	⚙	✗	✗	⚙

✓ party ⚙ signatory ✗ not party; not signatory *Only valid in the EAEU

[8] https://unece.org/environmental-policy/events/cis-inter-state-council-industrial-safety-0.
[9] Agreement on the creation of a regional system to manage e-waste promoting circular economy through the cooperation of the CIS Member States.

C. Mapping of Key Stakeholders

The authorities in charge of e-waste and waste management in the CIS+ are the government ministries/agencies, at both the central and local levels. Other relevant stakeholders are the EPR organisations and implementing bodies, importers and exporters, producers and distributors, consumers, and treatment/recycling companies. Among such stakeholders are several private/civil society organisations and non-governmental organisations (NGOs), most of which are active in awareness creation. The stakeholders are described in more detail below.

In most countries, the Ministry of Environment is the custodian government entity for legislating e-waste.
In nine of the twelve countries – Armenia, Azerbaijan, Belarus, Georgia, Kazakhstan, Moldova, Tajikistan, Turkmenistan, and Ukraine – the government body responsible for e-waste is the Ministry of Environment. In the other three countries, the Ministries of Communication and Natural Resources and Ecology, as well as the Environmental Protection Agency, retain directorial control. In most countries, the National Statistics Office and the Customs keep the records of EEE importing/exporting, and the former is more active in the collection and compilation of official data on waste.

Responsibilities of the Ministries vary from licencing and policy formulation to preparing legislation and regulatory acts. In Azerbaijan, the Ministry of Ecology and Natural Resources is in charge of development and preparation for approval of legislative and regulatory acts in the field of waste management, while the Ministry of Economic Development issues licences for the treatment/recycling and disposal of hazardous waste. In Georgia, the Ministry of Economy and Sustainable Development develops and proposes draft decrees relating to EPR. In Moldova, the Environmental Protection Agency monitors e-waste management, keeping records on e-waste collection and treatment/recycling, while the Environmental Inspectorate ensures compliance with e-waste legislation.

Municipalities and other waste management authorities, as well as state-owned private companies, collect e-waste for further management, mostly landfilling.
Municipal authorities at the national, state, and local levels are also major stakeholders in e-waste management. They collect e-waste through their regular municipal solid waste collections points. The Kazakhstan Waste Management Association, 'KazWaste', supports the creation of waste treatment and recycling industries and implements new projects to improve and optimise business processes in the field of waste management. In Kyrgyzstan, as in many other countries, the local authorities are responsible for organising a rational waste collection system and for providing for the separate collection of components, storage, regular removal, and/or waste disposal. For countries such as Turkmenistan that are just beginning to embark on developing their e-waste management strategies, it is reasonable to assume that reasonable quantities of e-waste generated are partly mixed in with residual waste and destined for landfills.

Producers/importers are also collectors of e-waste under the EPR.
With their respective EPR compliance schemes, EEE producers/importers contribute toward proper e-waste management through the EPR system. The general responsibilities of the producers that are placing EEE on the market (and importers, which are often defined as producers in the legislation) are to create an infrastructure for the collection and treatment/recycling of waste, and the producers usually have legally imposed financing mechanisms in place to ensure that they are ultimately covering the costs needed to depollute and recycle. The legislation envisions that targets will be achieved in several countries (Belarus, Georgia, Kazakhstan, Moldova, and Russia) and provides alternative measures in the form of an environmental fee for non-compliance

for producers and importers who do not have their own collection and processing system (e.g. Russia has already implemented such a measure, and such a measure is under development in Kazakhstan). Nonetheless, available information indicates that collection points sufficient to cover the entire population for e-waste are only available in Belarus. Consequently, the e-waste recycling capacity for the entire region is insufficient for managing all generated e-waste in an environmental sound manner.

Consumers generate most e-waste and make the choice on where to discard it.

Consumers – both bulk (commercial and public sector) and individuals (households) – are major stakeholders, as they generate the e-waste and also determine where the discarded e-waste is handed over or repaired. In Kazakhstan, consumers and legal entities that generate waste are required to provide measures for their safe handling in order to comply with environmental requirements and take measures for their recycling and safe disposal. On the other hand, in Belarus and Ukraine, consumers pay for the collection and treatment/ recycling of e-waste and batteries when purchasing new equipment and batteries; the cost of these services is included in the price of goods by the producers and is not visible to them. Consumers often choose, or are driven to, deal with informal collectors, especially those that travel from household to household, collecting e-waste. Some consumers also deliver e-waste to the informal collection points. Savings in cost in not delivering e-waste to formal collectors and cash incentives from informal collectors drive the flows of e-waste into the informal sector, thereby reinforcing informal recycling of e-waste, which may be laborious and hazardous, resulting in adverse effects for the environment and human exposure to hazardous chemicals.

Key stakeholders in e-waste management are the central governments (mostly ministries of environment), municipalities, producers and importers, consumers, civil society, industrial recyclers, and informal operators.

There are industrial recyclers of e-waste in the region.

Industry recyclers, both medium- and small-scale, are present in the region. Some accept recycling in any categories of e-waste, while others are specific. Some industry recyclers accept only some fractions of e-waste. In Moldova, treatment companies (E-Reciclare and MoldRec) are active in the sorting, dismantling, and primary treatment/recycling of e-waste before exportation abroad (e.g. Germany, Romania) for further treatment. In Belarus, there are 10 e-waste treatment companies that are able to process all types of e-waste, where they are disassembled to the maximum extent possible; as well, all the materials obtained are processed compliantly with the legislation, though precious parts are sometimes sent to Russia or the EU for treatment. In Ukraine, there are approximately 115 organisations licenced for e-waste management, with about 80 percent having licences for e-waste recycling. This presents a picture of infrastructure adequacy in the country, but reliable information is not available on the ability of the licenced entities to embark on e-waste recycling or their performance. Though there are recycling facilities for e-waste in the region, there are no sufficient collection and treatment data for providing a complete overview. Treatment/recycling enterprises are major stakeholders active in e-waste collection, sorting, extraction, and refining. The recyclers also keep reliable records on collected and treated e-waste, even by categories.

To date, discarded printed circuit boards are collected in most CIS countries, including: Armenia, Belarus, Armenia, Kazakhstan, Kyrgyzstan, Moldova, Russia, and Uzbekistan. Treatment/recycling is carried out in Russia, where a processing plant was launched in summer 2020[10]. Also, printed circuit boards are accepted for official treatment/recycling in Belarus.

Informal operators of e-waste exist in the region and focus on valuable parts.

In most of the countries, the informal sector[11] is active, but there is little or no quantitative information about their role and involvement. In fact, the informal operators often work behind the scenes and participate in the collection and pre-processing of e-waste. When not regulated, the activities of the informal operators contribute to the observable adverse effects of unsafe e-waste management on the environment and human health. The informal sector mostly focuses on the scavenging of valuable parts and the sale of them to other recyclers. In some countries, this can also involve open burning and acid baths at landfill sites. Only some of the e-waste is collected by the informal sector, and it is often subjected to substandard treatments as well as to the subsequent improper dumping of non-valuable and hazardous components. Conversely, for Belarus and Uzbekistan, the share of the informal sector is likely small, since the national legislation prohibits the collection of scrap and non-ferrous metal waste by individuals.

The civil society (i.e. non-governmental organisations, academia, associations, etc.) operate in all countries.

In all CIS+ countries, public organisations and NGOs exist and are involved in educational and public awareness activities. Periodically, they conduct research and events to raise public awareness in the field of waste management, including e-waste. For instance, the 'FSCI, Dastgiri Center' in Tajikistan and the 'Environmental Solutions Center' in Belarus have initiated a number of activities to raise awareness about proper management of e-waste, including actions to stimulate the collection and recycling of e-waste. Other active NGOs include Georgia's Environmental Outlook, which has participated in a project that supports EPR implementation and another project aimed at 'Supporting E-Waste Management Capacity Development in Georgia'.

[10] https://recyclemag.ru/news/otkrivaetsya-edinstvennii-rossii-kompleks-zavodov-pererabotke-elektronnih-othodov.

[11] ILO definition of informal sector: A group of production units comprised of unincorporated enterprises owned by households, including informal own-account enterprises and enterprises of informal employers (typically small and non-registered enterprises). See ILO (2017) section 4.5 on informal economy workers.

D. Projects and Campaigns for E-waste Collection and Recycling

Countries in the region have adopted several initiatives and campaign strategies to create awareness on e-waste collection and recycling with active participation from both the public and private sectors. In some CIS+ countries, the projects and initiatives are conceived and driven by NGOs' foreign donor funds. These projects that were mapped do not comprise a complete overview in the region, but nonetheless focus on:

- the establishment of legal measures [12];
- national studies to map the e-waste situation [13-14];
- initiatives to increase the number of e-waste collection points[12][13];
- initiatives to export e-waste for ESM[14];
- awareness raising campaigns [15][15][16][17].

[12] https://www.kz.undp.org/content/kazakhstan/en/home/ourwork/our_stories/E-waste-is-the-flip-side.html.
[13] https://technology.risiinfo.com/environment/europe/georgia-introduce-epr-scheme-specific-waste-streams.
[14] https://www.azernews.az/business/57038.html.
[15] €90m World Bank Backing for Solid Waste & Water Projects in Belarus
https://waste-management-world.com/a/90m-world-bank-backing-for-solid-waste-water-projects-in-belarus.
[16] U.S. Embassy in Tajikistan announces Environmental Awareness and Action Campaign
https://www2.fundsforngos.org/latest-funds-for-ngos/u-s-embassy-in-tajikistan-announces-environmental-awareness-and-action-campaign/.
[17] EPR in Georgia – Trends and Challenges
https://www.ge.undp.org/content/georgia/en/home/presscenter/pressreleases/2018/extended-producer-responsibility--epr--in-georgia---trends-and-c.html.

4. OVERVIEW OF E-WASTE STATISTICS

This chapter will provide the main figures on the four indicators introduced in Chapter 2. Methodology for all the countries in the scope of the project:

- Indicator 1: EEE POM.
- Indicator 2: E-waste generated.
- Indicator 3: E-waste managed in an environmentally sound manner (also referred to as e-waste formally collected in the statistics guidelines) according to ESM standards for e-waste (e.g. under e-waste legislation).
- Indicator 4: E-waste collection rate (indicator 3 divided by indicator 2).

A. EEE POM and E-waste Generated

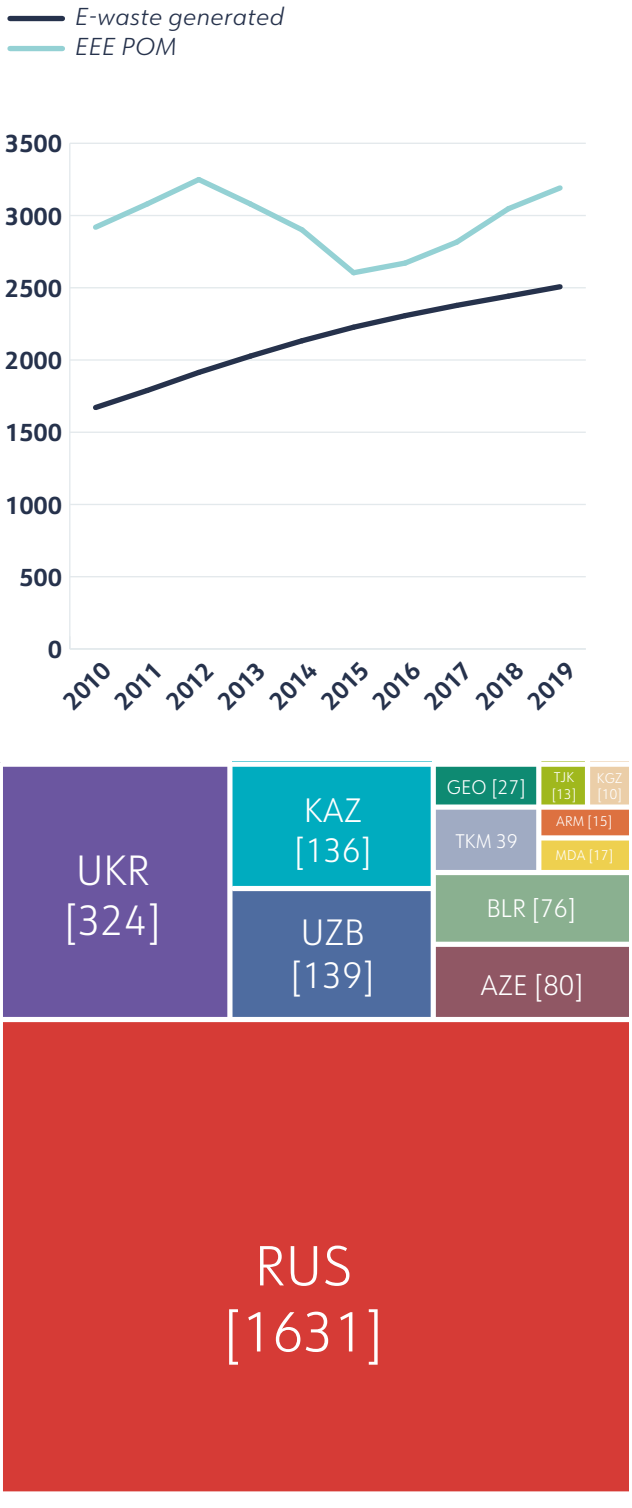
The Regional EEE POM increased by 10 percent from 2.9 Mt (10.4 kg/inh) in 2010 to 3.2 Mt (11.0 kg/inh) in 2019. Belarus and Russia have a large domestic production of EEE, while the other 10 countries mostly import EEE. E-waste generation in the region increased by 50 percent to 2.5 Mt (8.7 kg/inh) in 2019.

The total EEE POM shows fluctuations between 2010 and 2019. It peaked in 2012 with 3.3 Mt (11.5 kg/inh) and decreased thereafter, due to the financial crisis, to 2.6 Mt (9.2 kg/inh) in 2015. Subsequently, the total EEE POM recovered steadily to 3.2 Mt (11.0 kg/inh) in 2019 (Figure 5). Belarus and Russia are two countries in the region that manufacture EEE. Belarus manufactured 131 kt of EEE, and Russia produced 2 Mt in 2019; both countries also export EEE. Other countries in the region have limited domestic manufacturing of EEE and rely on imports.

The amount of e-waste generation shows a steady increase from 1.7 Mt (6.0 kg/inh) in 2010 to 2.5 Mt (8.7 kg/inh) in 2019, an average increase per annum of 80 kt. All data per country is shown in ANNEX D.

The CIS+ region generated 2.5 Mt of e-waste in 2019, representing a growth rate of 50% since 2010.

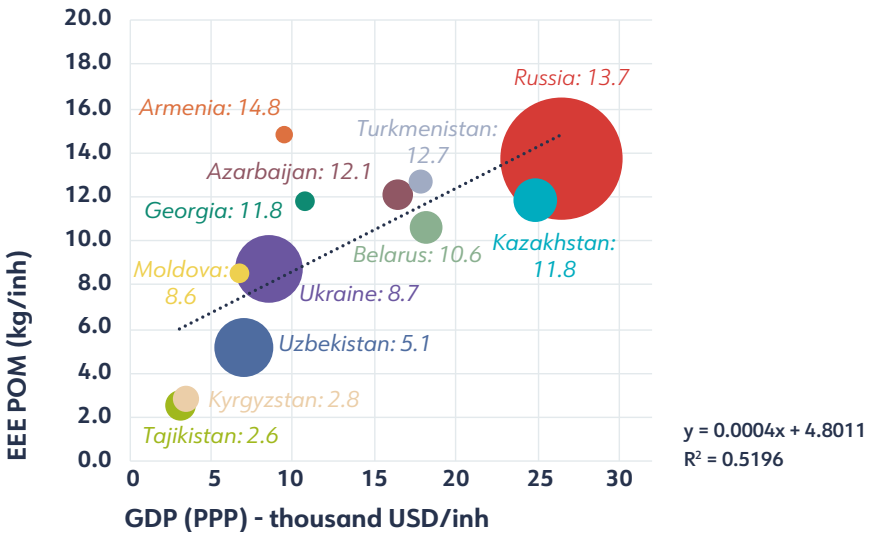
Figure 5. EEE POM and e-waste generated in the region (kt) for 2010-2019 (top), and the absolute amounts on e-waste generated in 2019 (bottom)

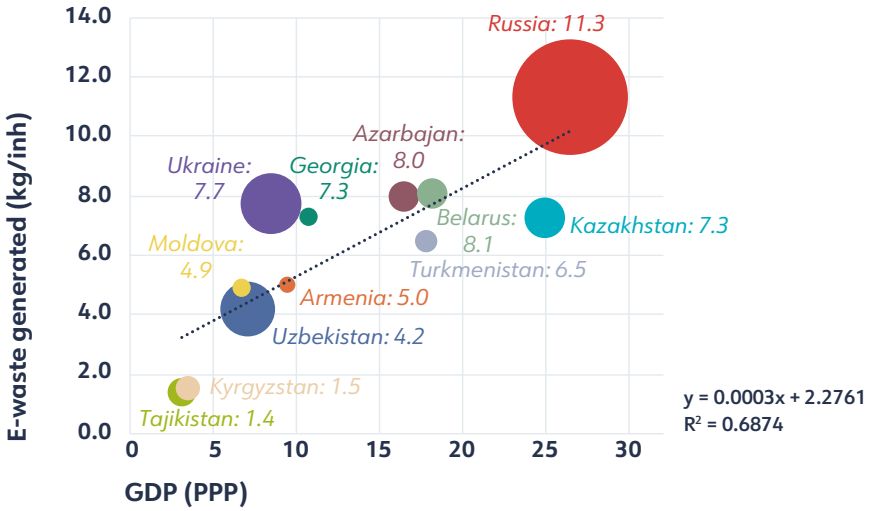


E-waste generation and EEE POM show a positive correlation with the PPP. Both the absolute and per inhabitant amount of e-waste generation is highest in Russia.

The EEE POM in the region varied from 2.6 kg/inh for Tajikistan to 18.4 kg/inh for Armenia (Figure 6). There is a weak correlation (R^2 = 0.52) between EEE POM in kg/inh and the purchasing power parity per inhabitant (PPP) of the countries, indicating that the EEE POM increases when the PPP increases. Similar variations and trends were observed for e-waste generation. The amount of e-waste generated per inhabitant (Figure 6) was highest in Russia (11.3 kg/inh) and lowest in Tajikistan (1.4kg/inh), and it showed a strong positive correlation (R^2 = 0.68) with PPP. The largest generator of e-waste is Russia, generating 2.0 Mt of e-waste in 2019, followed by Ukraine (366 kt) and Kazakhstan (222 kt).

Figure 6. EEE POM (top) and e-waste generated (bottom) in the region (USD/inh) for 2019. The bubble's size is indicative of the number of inhabitants





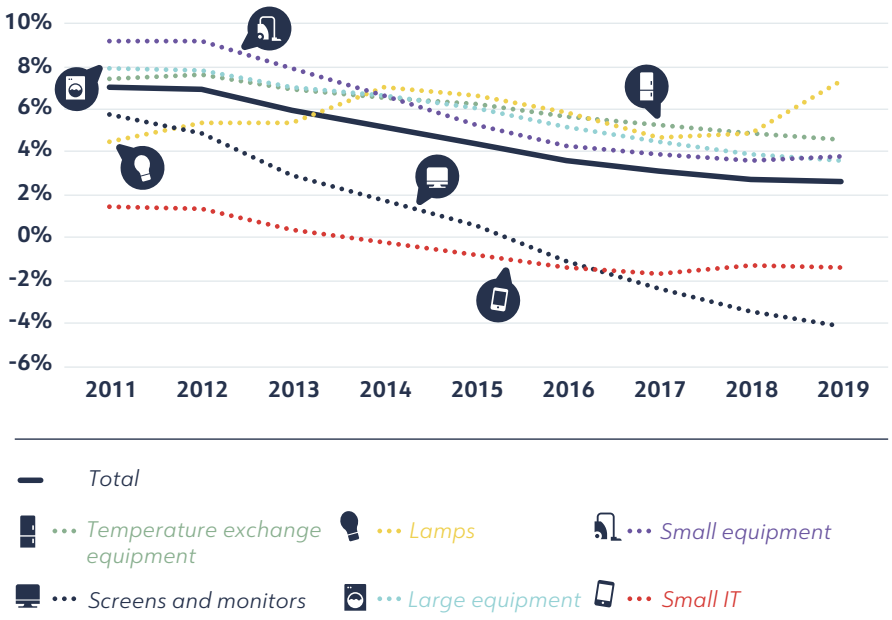
B. E-waste Categories

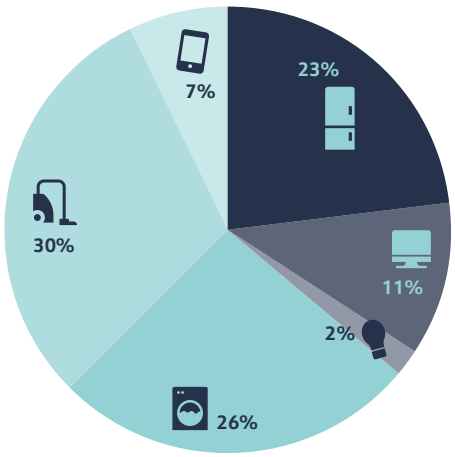
Temperature exchange (Cat. I) and large and small equipment (Cat. IV and V) have the highest share of e-waste generation at 77 percent. The annual growth rate declines for nearly all categories, but stays positive – except for screens and monitors and small IT equipment, which show negative growth rates.

When disaggregating the e-waste generated quantities into the six e-waste categories, the largest category (Cat.) is small equipment (30 percent), followed by large equipment (29 percent) and temperature exchange equipment (23 percent). The large equipment and temperature exchange equipment categories are comprised of large and bulky appliances with a relatively high unit weight and long lifespans that are commonly used, but both categories are characterised by a possession rate of no more than 1-2 appliances per household. By contrast, small equipment has a relatively smaller unit weight. Such items are sold in higher numbers and have shorter lifespans, and so are more frequently discarded. The smallest category in terms of e-waste generation is lamps (2 percent), which are used in every household, but which have a very small unit weight.

All annual growth rates (for EEE) are positive, except for the categories for screens and monitors and small IT. These categories are decreasing in EEE POM in mass because the past decade has witnessed a technological change in computer and television screens, with nearly all applications of cathode ray tube (CRT) screens having been replaced with flat panel displays. The decrease of small IT equipment can be explained by miniaturisation, which is the trend of manufacturing smaller electrical and electronic products and devices. Though most growth rates are positive, a declining trend has been observed; the pace of increase slows down over time (Figure 7) for most products.

Figure 7. Year-to-year e-waste growth rate (top) and e-waste generated disaggregated per category (bottom) in the region





SIX CATEGORIES OF E-WASTE GENERATED IN 2019 (%)

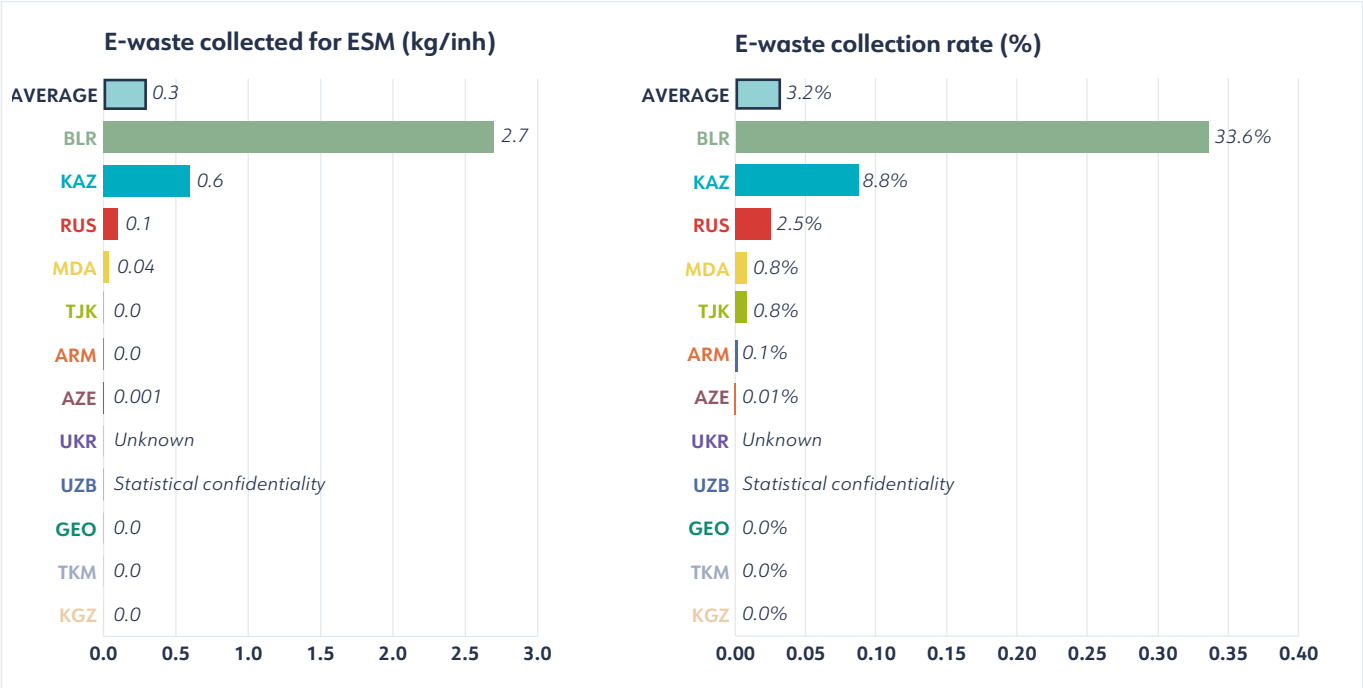
C. Environmentally Sound Management of E-waste

The CIS+ countries collected and managed a total of 79 kt (0.3 kg/inh) of e-waste in 2019. This is a collection rate of 3.2 percent as compared to e-waste generated. E-waste collection for ESM takes place in Belarus, Kazakhstan, Russia, and Ukraine. There are also countries with no collection (e.g. Georgia, Kyrgyzstan) due to lack of an organised separate collection infrastructure for e-waste and/or absence of official data. Belarus has the highest e-waste collection rate of 33.6 percent and collection per inhabitant of 2.7 kg/inh, followed by Kazakhstan (8.8 percent; 0.6 kg/inh).

The collection rate of e-waste was 3.2 percent in 2019.

The total e-waste managed in an environmentally sound manner in the region is 79 kt (0.3 kg/inh) (Figure 8). Most of this e-waste is collected in Belarus (25 kt), Kazakhstan (12 kt), and Russia (41 kt). Per inhabitant, collection is highest in Belarus, which collects 2.7 kg/inh of e-waste. In relation to the amount of e-waste generated in the country, i.e. the e-waste collection rate, Belarus collects 31.6 percent of the e-waste for environmental sound treatment. This is the highest achieved recycling rate in the CIS+ region and indicates that Belarus has a well-functioning e-waste collection and management system in relation to other countries in the region. Kazakhstan collects 8.8 percent of e waste, and Russia 2.5 percent. These percentages indicate that infrastructures are in place, but are not covering the entire population of the country. Other countries are either not collecting e-waste on a large scale or could not supply data, due to classifications incompatible with the ones used in this report. There was no statistically relevant correlation observed between PPP of countries and their e waste collection, so it is not shown.

Figure 8. E-waste collected for ESM (kg/inh) (left) and e-waste collection rate (right) for 2019



5. TRANSBOUNDARY MOVEMENT OF E-WASTE

Several regulations at the national, regional, and international levels have been developed for monitoring and controlling TBM of e-waste. At the international level, the Basel Convention[18] on the Control of Transboundary Movements of Hazardous Wastes and their Disposal (commonly referred to as the Basel Convention) is the only global treaty on hazardous and other wastes that encompasses e waste [16]. The Convention was adopted on 22 March 1989 and entered into force on 5 May 1992. In 2006, Parties adopted the Nairobi Declaration on the Environmentally Sound Management of Electrical and Electronic waste [17], and in 2011 Parties adopted the Cartagena Declaration on the Prevention, Minimization and Recovery of Hazardous Wastes and Other Wastes [18]; these declarations promoted the ESM of hazardous waste, including e-waste, its prevention, minimization, and environmentally sound recycling, recovery, and final disposal.

The Basel Convention defines the 'hazardousness' of waste on the basis of the substances present in the waste materials, and it classifies the waste as either hazardous or non-hazardous depending on the chemical properties. The Basel Convention sets out a detailed Prior Informed Consent procedure with strict requirements for TBM of hazardous wastes. TBM of hazardous waste and e-waste is subject to such procedure when an importing and/or exporting Party identifies hazardousness in e-waste, as determined under the provisions of the national law. The Basel Convention identifies hazardous wastes that are subject to TBM under the Convention as follows:

- Wastes that belong to any category contained in Annex I, unless they do not possess any of the characteristics contained in Annex III.
- Wastes not covered under the previous group but which are considered to be hazardous waste by the domestic legislation of the Party of export, import, or transit.

It is important to note that national guidelines concerning the definition of waste may differ, and the same material regarded as waste in one country may be non-waste in another. Furthermore, besides the provisions set by the Basel Convention, some Parties set national threshold values to distinguish between hazardous and non-hazardous waste, including e-waste.

[18] http://www.basel.int/TheConvention/Overview/TextoftheConvention/tabid/1275/Default.aspx.

A. Overview of E-waste Import and Export Legislation/ Policies

The Basel Convention controls the TBM of e-waste, and all CIS+ countries have ratified the Convention. The EAEU have implemented these regulations in a Resolution.

All countries in the region have ratified the Basel Convention. Additionally, at the regional level, the import and export of hazardous waste in the territory of the EAEU (Armenia, Belarus, Kazakhstan, Kyrgyzstan, and Russia) are regulated in accordance with the requirements of the Basel Convention and based on the Resolution of the Board of the Eurasian Economic Commission No. 30, dated April 21, 2015, 'On measures of non-tariff regulation'.

All countries have ratified the Basel Convention, and 14 t of e-waste was reported as exported.

Specific national bans on e-waste imports are enforced in Armenia, Georgia, Moldova, and Tajikistan. As well, Tajikistan restricts the importation of used-EEE. Countries do not have export bans unless the exports are non-compliant with the Basel Convention.

As mentioned, as all countries are a Party to the Basel Convention, imports of e-waste are prohibited if the e-waste is not managed in an environmentally sound manner. As well, three countries have introduced additional e-waste import bans. For instance, there is a general import ban of e-waste for landfilling in Tajikistan and an import ban of e-waste for Georgia and Moldova. In Armenia, the import and/or export of EEE scrap – which included batteries, mercury switches, and glass from CRTs – is allowed under specific licencing conditions (as hazardous waste), but such is not the case with mercury lamps and fluorescent tubes (UNU-KEYs 0502, 0503, 0504).

Tajikistan has additional legislation on imports of used-EEE. In Tajikistan, the import of used EEE has been limited in recent years through higher tariffs and legal bans: a higher tariff is applied on imports of used-EEE, and used-EEE older than a certain number of years cannot be imported.

The countries in the region do not have specific export bans of e-waste unless they are for recycling purposes and under compliance with the Basel Convention.

B. Overview of E-waste Import and Export Quantities

The outcomes from the analysis of the TBM of e-waste in the CIS+ region are presented in Table 5.

Eight of the twelve countries in the region report statistics to the Basel Convention, though this likely does not provide a complete picture of TBM of e-waste. All twelve countries in the region transmitted national reports to the Basel Convention between 2016 and 2019, but only nine reported in 2018 or 2019. For Ukraine and Georgia, the latest report available is from 2017, and for Kazakhstan the latest is from 2016.

Despite providing annual reports to the Basel Convention, not all the countries showed data available on import and export flows of hazardous waste. Specifically, statistics were available only for eight countries: Armenia, Azerbaijan, Belarus, Georgia, Moldova, Russia, Ukraine, and Uzbekistan. Kazakhstan, Kyrgyzstan, Tajikistan, and Turkmenistan indicated that no importation and exportation of hazardous waste is occurring. The observation that four countries do not report statistics to the Basel Convention, combined with the fact that a reporting obligation exists only for hazardous waste, but not for non-hazardous waste or non-hazardous fractions of e-waste, illustrates that the reported quantities cannot be considered comprehensive for all import and export flows of e-waste occurring in the region.

Belarus is the only exporter of e-waste and has exported 14 tonnes of e-waste over two years (2018-2019) for the resources of recovery and recycling. Via analysis described in the methodology chapter (Ch. 2), it has been possible to estimate the TBM attributed to e-waste-related codes, using the codes of the annexes to the Basel Convention. The only country that reported TBM of e-waste was Belarus (Table 5), which exported 0.001 kg/inh (10.7 tonnes) of metal waste and e-waste scrap to Germany in 2018. The 2019 reporting shows that Belarus exported 0.0003 kg/inh (3 tonnes) of e-waste to Lithuania that were then accumulated for further recycling and reclamation (i.e. operation R5, according to the disposal operations in Annex IV of the Basel Convention). Among the wastes involved are e-waste and metal waste, even such waste containing precious metals, antimony, and mercury compounds.

No e-waste imports have been reported within national reports submitted to the Basel Convention by the CIS+ countries.

By contrast, no country reported importation of e-waste. It is worth underlining that the reporting to the Basel convention comprises only the regulated and documented transboundary e-waste flows and does not include illegal e-waste or used-EEE flows.

Table 5. Overview of the TBM of E-waste in the Region

Country	National Report Available 2016-2019	Statistics Available	Estimate on E-waste Reported Under Basel Convention (2018 and 2019)[19]	
			Import (t)	Export (t)
Armenia	Yes	Yes	-	-
Azerbaijan	Yes	Yes	-	-
Belarus	Yes	Yes	-	14
Georgia	Yes	Yes	-	-
Kazakhstan	Yes	No		
Kyrgyzstan	Yes	No		
Moldova	Yes	Yes	-	-
Russia	Yes	Yes	-	-
Tajikistan	Yes	No		
Turkmenistan	Yes	No		
Ukraine	Yes	Yes	-	-
Uzbekistan	Yes	Yes	-	-
Total	12 of 12	8 of 12	-	14

[19] Please note that these values represent only ones declared to the Basel Convention and not the full picture of e-waste imports and exports.

C. Issues and Impact of Imports/Exports of E-waste

Low quality of data and control of TBM of e-waste through the Basel Convention poses a threat to the ESM of e-waste and illegal movements.
Despite the formal steps undertaken through the ratification of the Basel Convention and through the national legal framework and bans, enforcement of these measures remains a significant challenge in all countries in the region, and reporting is still limited. Consequently, TBM of e-waste cannot easily be mapped and monitored. Official data on e-waste import and export is available for Belarus, but not for the other 11 CIS+ countries. However, our interviews concluded that there is TBM of specific fractions of e-waste, such as printed circuit boards, but this TBM is not reflected in the reporting to the Basel Convention. The implication of the non-reporting is that e-waste can be moved from points where ESM cannot be assured to states where value recovery using best-available technology is guaranteed. Thus, the TBM can give rise to illegal shipments of e-waste.

Used-EEE imports result in more e-waste in the receiving countries and place burdens on existing e waste management. Meanwhile, the functionality of imported used-EEE or EEE mixed with e waste, as well as their quantities, are still unknown.
Not much information on used-EEE imports is available for the twelve countries. The importation of used-EEE that are actually functional is not problematic, as the local population will reuse the items. However, after some time, the EEE will be discarded, and usually, no fees for collection and recycling are paid upon the import, thus placing an additional burden on the EPRs in countries that have such a system in place.

Furthermore, it is unknown whether the used-EEE imports are entirely, as opposed to partially, functional. If they are partly functional, they should be considered e-waste upon arrival, as is the case for 30 percent in Western Africa [19]. In this case, used-EEE are interlinked with illegal e-waste imports.


EXIT

6. E-WASTE MANAGEMENT ASSESSMENT

In general, the combination of a developed e-waste policy framework and infrastructure leads to more collection of e-waste.

The e-waste management systems of the countries have been assessed and categorised as either advanced (A), in transition (B), or basic (C). All scores for each country can be found in ANNEX D. The outcomes are summarised in Table 6, showing a dashboard of the number of indicators scoring an A in legislation, the number of indicators scoring an A in collection and infrastructure, the collection rate, and e-waste generation.

Table 6. Dashboard of e-waste management system and performance. All reference years are 2019, except that Ukraine is 2017, Armenia is 2014, Uzbekistan is 2015, and EU-27 is 2018

Country / Region	Legislation (5 indicators)	Infrastructure (2 indicators)	Collection Rate	E-waste Generated
EU-27	●●●●●	●●	●●●●●	●●●●●●●●
CIS +	●●○○	●○	◐	●●●●◐
Georgia	●●●●●	○○	○	●●●◐
Moldova	●●●●●	●○	○	●●
Russia	●●●●○	●●	◐	●●●●●◐
Belarus	●●●●○	●●	●●●◐	●●●●◐
Kazakhstan	●●○○○	●●	●	●●●◐
Ukraine	●●○○○	●●	*	●●●◐
Tajikistan	●●○○○	●●	○	◐
Armenia	●●○○○	○○	○	●◐
Uzbekistan	●○○○○	●●	○	●◐
Azerbaijan	○○○○○	●○	○	●●●◐
Kyrgyzstan	○○○○○	○○	○	◐
Turkmenistan	○○○○○	○○	○	●●●◐

For Legislation and Infrastructure: ● indicates advanced , ● transitional, ○ basic, and ● unknown.
For Collection Rate: ● indicates 10%, ◐ 7.5%, ◐ 5%, ◐ 2.5%, ○ less than 1%, and * unknown.
For E-waste Generated: ● indicates 2 kg/inh, ◐ 1.5 kg/inh, ◐ 1 kg/inh, ◐ 0.5 kg/inh.

Compared to the European Union (EU), the CIS+ has a less developed policy framework, e-waste collection, and treatment infrastructure. Hence, the region also collects less e-waste and subsequently has a lower collection rate, and the majority of e-waste is unmanaged.

Three countries have a well-established legislation framework: Georgia, Moldova, and Russia. These countries have only recently begun to legislate e-waste and do not yet have the necessary e-waste management infrastructure in place, which explains why the e-waste collection rates are below 2.5 percent. For these countries, the amount of e-waste generated per inhabitant is all close to or above the regional average, and Russia, especially, is a large generator of e-waste (in terms of total quantity).

The highest e-waste collection rates are found in Belarus (33.6 percent) and Kazakhstan (8.8 percent). These high e-waste collection rates can be attributed to the relatively well-developed e-waste management infrastructure and legislation in comparison to the rest of the region. Both Belarus and Kazakhstan generate around the average volume of e-waste per inhabitant.

The highest e-waste collection rates are found in Belarus and Kazakhstan; these rates are attributed to the relatively well-developed e-waste management infrastructure and legislation.

All other countries have relatively less developed e-waste legislations and management infrastructures in place. The absence of legislation, collection, and treatment infrastructure contributes to the e-waste collection rate being lower than 1 percent. Most countries generate considerably less e-waste than the regional average, except for Azerbaijan and Turkmenistan.

7. COMMON ISSUES AND CHALLENGES

Over 95 percent of e-waste in the region is not collected or sent to ESM facilities for proper management. Most e-waste ends up in landfills, with the informal sector cherry-picking valuable components. The exception is Belarus, which has collected and recycled 33.6 percent of its e-waste.

The results of the study are that the countries in the region collect and process 3.2 percent of the region's e-waste under ESM conditions. The remaining 96.8 percent is neither collected nor sent to environmentally sound e-waste management facilities. Among the main hindrances to the e-waste recycling industry in the region are the low level of e-waste collection by municipalities and the lack of take-back schemes set up by producers under an EPR or other e-waste collectors that hand over the e-waste for ESM. Most e-waste ends up being disposed of alongside municipal waste before any separate collection for ESM is initiated, since mandatory disposal to licenced collectors and processors is lacking. The situation is further complicated by the fact that there is a significant amount of e-waste that ends up being handled by the informal sector. The activity in the informal sector is limited to e waste dismantling and retrieval of the most valuable components, while the rest are disposed of in municipal waste landfills.

Belarus manages to collect and process 31.6 percent of its e-waste. The e-waste collection rate in Belarus is very high as compared to the regional average and is also close to current collection rates in the European Union (such as Romania) [20], or even advanced EU Member States such as France, Belgium, or the Netherlands had similar collection rates a decade ago [21-24].

FIVE DRIVING REASONS HAVE BEEN IDENTIFIED AS TO WHY E-WASTE COLLECTION RATES ARE LOW IN THE REGION:

Reason 1: Increasing Volumes of E-waste

The amount of e-waste grew by 50 percent from 2010 to 2019 – close to the global average.

The amount of e-waste in the region grow from 1.7 Mt (6.0 kg/inh) in 2010 to 2.5 Mt (8.7 kg/inh) in 2019, equating to an e-waste growth rate of 50 percent. At the global level, the growth rate is 52 percent. The region's e-waste collection rate was 3.2 percent in 2019. The e-waste generated is expected to further grow in the upcoming decades, concurrently with expected further development of the region. If the collection rates do not substantially improve, then the absolute quantity of unmanaged e-waste will increase further.

Reason 2: Absence of Specific Legislation

Few countries have prerequisites implemented and enforcements for ESM of e-waste.

In a mere few of the countries, prerequisites for ESM of e-waste exist – including e-waste-specific legislation/ EPR, EHS standards, collection mechanism, and recycling infrastructure – but insufficient collection of e-waste is still a challenge. Even when these prerequisites are present, their applications and enforcement are, in some countries, weak (e.g. Georgia and Moldova). In other countries (e.g. Azerbaijan, Tajikistan), adequate policy and legislation are lacking, making it difficult to drive ESM of e-waste, even though some major stakeholders may have initiated voluntary takeback with treatment

infrastructure. If there are no appropriate legal instruments in place, or if they are not properly enforced, e-waste collection and its financing will be limited.

Reason 3: Limitations of the Infrastructure

Except for Belarus, the countries have insufficient e-waste collection and drop-off points for separately collecting all e-waste generated.

In most countries, there are either insufficient e-waste collection points in the main cities and municipalities or no collection points at all. The exception is Belarus, which has nationwide coverage of e-waste collection points, as well as collection services on demand (by telephone). In some large countries, the size of the countries poses a challenge for establishing collection points across the territory. For example, in Kazakhstan, the number of treatment and recycling enterprises (about 30 in urban areas) does not sufficiently cover the whole country. In other countries, the system of waste collection, including e-waste, is not yet well-organised. No official system of e-waste collection and treatment exists in countries such as Azerbaijan, Armenia, Kyrgyzstan, Tajikistan, and Turkmenistan.

Domestic treatment and recycling infrastructure is not sufficient for managing all e-waste generated, and only a small fraction of collected e-waste is likely exported for recycling.

In terms of treatment of specific-waste components, the majority of operators are active in preliminary processing of e-waste and are restricted to dismantling and selling the more commercially attractive fractions. Few of the entities registered as 'e-waste recycling' companies delve into deep treatment with extraction of precious metals and other useful fractions.

In Moldova and Belarus, for example, collected e-waste is transferred to European Union countries for treatment and recycling. These two countries also have few e-waste treatment and recycling facilities, and their activities are also restricted to dismantling and sorting. In the case of Azerbaijan, for example, such recovered materials are transferred to Turkey for treatment/recycling.

Reason 4: Competition Between Formal and Informal Sectors for Valuable Components of E-waste

The informal sector focuses on valuable components of e-waste.

Illegal treatment/recycling of e-waste is common in nearly all countries studied, due to the fact that it is a financially beneficial activity associated with generally low operational costs as compared to the official processors. Formal operators are more economically disadvantaged than the informal sector because of the need to abide by a number of bureaucratic procedures relating to legal operations and because of the financial investments required. Additionally, in many of the region's countries, there is no legal or regulatory framework stipulating the development and enhancement of formal operators. Consequently, the informal sector appears to thrive more, receiving more materials than formal recyclers. As well, informal collectors are more efficient in collecting e-waste door-to-door, which are then routed toward the informal sector for treatment/recycling.

Reason 5: Collection of E-Waste Data Has Only Recently Been Initiated

E-waste statistics have only just begun being collected in the region, and statistics are available on EEE POM, e-waste generated, and e-waste formal collection. Statistics on the other e-waste management routes are absent.

Most countries were successful in the compilation of the core e-waste data, such as quantities of EEE POM, e-waste generated, and formal collection of e-waste. One of the main challenges of this study is the significant gap between e-waste generated and e-waste collection. Statistics remain unquantified on other flows, e-waste entering landfills, activities of the informal sector, the mixing of e-waste with other recyclable wastes (such as metal scrap), and imports/exports of e-waste, as well as, likely, on the remainder of what is happening with the e-waste.

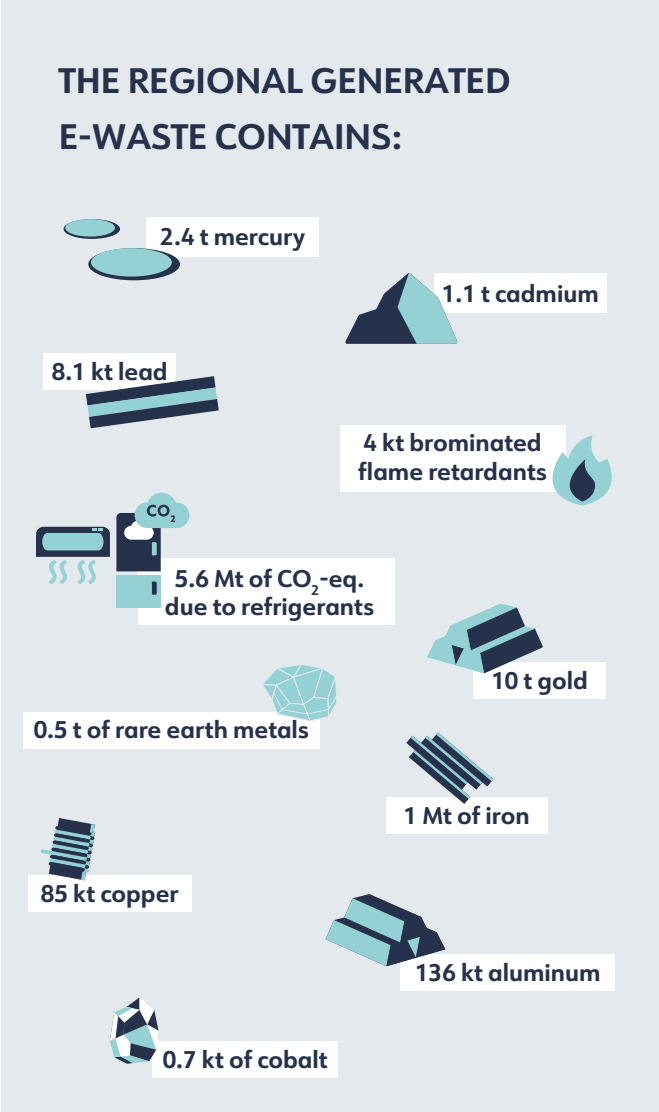
The lack of e-waste data makes it hard both to design fact-based interventions for collecting more e-waste and to assess environmental impact and losses of secondary resources due to mismanagement.

Data is mostly lacking on the majority of e-waste and thereby constitutes a missed opportunity for understanding both the whereabouts of the majority of e-waste and the markets, financial incentives, and behavioural aspects of consumers and e-waste stakeholders. This lack of information limits the ability to design fact-based interventions for increasing e-waste collection and recycling, the ability to get more secondary raw materials back into the economies, and the potential for associated environmental and societal gains.

FURTHERMORE, IMPACTS ON THE ENVIRONMENT AND ON OCCUPATIONAL HEALTH AND RESOURCES MANAGEMENT ARE ALSO DISCUSSED AS FOLLOWS:

Impact 1: On the Environment and Resources Management

The majority of e-waste ends up in landfills, causing damage to the environment due to the waste's hazardous substances. Waste recycling by the informal sector could mean that the hazardous fractions re-enter production.



As a consequence of the lapses observed in the region, there is a strong likelihood of some e-waste fractions being transported to landfills and/or managed through some other informal routes that could present immediate and long-term harm to the population and environment. The informal recycling activities of e-waste that can take place before or at landfills could mean that hazardous waste fractions are again entering recycling loops, instead of being disposed of in an environmentally sound way.

As e-waste contains hazardous substances such as cadmium, lead, mercury, and brominated flame retardants, these can leak into the environment. Also, refrigerants in temperature exchange equipment are directly emitted to the environment, contributing to the emissions of greenhouse gasses.

The generated e-waste in the region contains 200 billion rubles of valuable materials, equivalent to $2.6 billion USD. The unmanaged e-waste also could resemble a loss of potential resources.

Lastly, the generated e-waste also contains valuable materials such as platinum group metals, rare earth metals, and other base metals. If such metals are landfilled, they cannot be recycled and used as a secondary resource. When monetized using the prices from refined metals, the generated e-waste had a value of 200 billion Russian rubles ($2.6 billion USD) in 2019.

Impact 2: On Occupational and Community Health

Informal management of e-waste negatively impacts occupational and community health.

In some countries in the region, informal collection and treatment/recycling of e-waste exist, including the labor-intensive and very often insecure manual dismantling of equipment using simple tools for quick extraction of materials. It is mainly limited to extraction of the most valuable and accessible components, which are sorted and sold to merchants/recyclers. The remaining less-valuable components are transported to domestic waste landfills.

The dangerous practice of e-waste handling performed by the illegal processors includes open burning, direct plastics melting, toner extraction, and the burial/dumping of less valuable fractions – especially those containing hazardous components such as lead and polychlorinated biphenyls (which directly affect the air or soil or contaminate water sources), as well as chlorofluorocarbons (which contribute to ozone depletion and climate change). Such practices represent direct threat to the health of workers, nearby communities, and the environment. Notably, workers in the field of such production are frequently poor and the most vulnerable groups of the population, yet they hardly use personal protective equipment.

8. RECOMMENDATIONS

The above assessment of e-waste management, statistics, and legislation, and on the related challenges, shows that it is evident that changes for the improvement of the thus far applied e-waste management systems would also vary from country to country in the region. The countries will need to either introduce and enforce a) a robust legal and policy framework aimed at an ESM of e-waste, or b) monitor and reinforce existing systems to make them more efficient and effective. Adequate financing of the systems as well as the monitoring and cooperation of all stakeholders are essential for ensuring that the policies setup for e-waste management is sustained. Seven general recommendations can be drawn from the analysis presented above, and an all-encompassing approach, involving all actors and stakeholders in each country, would be needed in order to implement them. A strengthened transnational cooperation is necessary in order to reduce the burden of large investments and secure the necessary turn-around.

- 1. Prevent More
- 2. Be More Aware
- 3. Collect More
- 4. Treat Better, Pollute Less
- 5. Pay Adequately
- 6. Work More Safely
- 7. Train More

1. Prevent More

The 'waste hierarchy', where prevention is given primacy over other treatment options, is well-known. For example, the European Waste Framework Directive 2008/98/EC on waste management clearly states that 'waste prevention should be the first priority of waste management'. This is done 'with a view to breaking the link between growth and waste generation'. But most industrial groups and public policies currently are primarily focused on recycling and the safe disposal of e-waste rather than on reuse of EEE[20]. Still, prevention and reuse are on top of the waste hierarchy because they are 'environmentally preferable to recycling due to energy savings in the production phase and raw material usage, except where inefficient products remain in service'.

The principle, 'the best e-waste is the one that does not exist', applies to all countries globally, not just to CIS+ countries. Therefore, more attempts are required to successfully minimise e-waste generation. But the decreasing longevity of products is driven by production and consumption patterns where consumers are fascinated by the modernity of EEE, low prices for new technology, and new models and innovations that are frequently launched on the market[21]. This is understandable but is also fuelling the ever-growing e-waste mountain. So, more attempts should

[20] https://step-initiative.org/files/_documents/green_papers/Step%20Green%20Paper_Prevention%26Take-backy%20System.pdf.
[21] https://step-initiative.org/files/_documents/green_papers/Step%20Green%20Paper_Prevention%26Take-backy%20System.pdf.

be made in the CIS+ region for making consumers aware of the implications of EEE production and that usage and final disposal have steering for behavioural changes – where, e.g., 1) reuse and refurbishment are favoured over recycling, 2) services to repair become an important indicator in procurement and purchasing decisions, and 3) instead of purchasing product, more and more people purchase only the service that products provide. Here, ownership stays with the producer and service provider and in having an interest in easy collection, maximum reuse of materials and components, and supporting technological innovations.

Reusing a product to extend its lifetime is a much more effective, environmentally sound option than discarding it.

2. Be More Aware

The e-waste problem is perceived very differently around the world, but mainly as an issue for the global South due to informal, partly primitive recycling practices with environmental and health consequences. This perception also applies widely to the CIS+. And though the low collection rates and the insufficient financing for e-waste management systems and missing infrastructure for appropriate recycling procedures are well-known among the countries' experts, awareness of the wider public is limited that the origin and source of the problem and its resulting consequences lie directly with the manufacturers and consumers, and not at a distance. There is a common desire for the latest gadgets, whose production have enormous environmental footprints such that their lifetime should be increased, not decreased. It is the lack of awareness of how to appropriately dispose of EEE at its end-of-life, thus returning it as soon as possible to state-of-art treatment facilities. There is also a lack of awareness that low levels of collection and recycling result in a loss of resources vital for the manufacturing of EEE. Therefore, at the absence of appropriate substitutes, we are even running a risk for certain production chains.

A substantially increased awareness of the e-waste challenge might also lead to changed consumer behaviour, especially considering the environmental aspects during purchasing and in comparing aspects between different brands and products. Consequently, increased awareness could also result in an enhanced competition among manufacturers with respect to their environmental performance as we can see it nowadays in conjunction with climate change.

The necessary increase of awareness must come through consumer campaigns in social media, TV, cinemas, radios, and newspapers, as well as in informational brochures coupled with initiatives such as door-to-door collections, placement of collection containers, and green procuring of municipalities and governments. The potential of children as ambassadors for change should also be seriously considered.

3. Collect More

The establishment of an adequate number of easily accessible e-waste collection points, accompanied by an increased awareness among end users, would prevent landfilling and leakages.

The number of collection points for separate collection of e-waste should be increased, including their territorial density, and made easily accessible and more visible. It should encompass collection through municipal collection points, on-demand pickup services, collection of smaller e-waste at supermarkets, etc. The engagement of informal sector actors in e-waste collection should also be integrated with the formal systems. Improved security at collection points should be ensured as a way of preventing theft of valuable components. There is an information deficit for consumers, many of whom may not be aware of the policy and legal framework. This deficit should be reduced to prevent bad practices in discarding e-waste, and ensure collection through registered collectors.

E-waste collection rates need to increase across countries in the region, just as they need to increase elsewhere across the world. This improvement can be realised through mandatory handover of e-waste to licenced facilities.

In the CIS+ region, more than 95 percent of e-waste is not collected and handed over to licenced e-waste facilities. Legislation is needed, with financial incentives, for mandating that consumers and informal collectors handover e-waste to licenced collectors; the legislation should require that collectors in turn transfer collected e-waste to licenced processors to redirect e-waste from dumpsites and ensure ESM. This increased collection infrastructure should be supplemented by progressive target rates for collection of e-waste as defined in all countries in the region.

Establish mandatory reporting obligations for all actors collecting e-waste.

Effective e-waste legislation should enlist a clear definition of 'electric and electronic wastes' and a classification for ease of identification and monitoring. To monitor collection, CIS+ countries should introduce a legal obligation on collectors and pre-processors to report and record the amounts and destinations of all types of input and output fractions. Several targets and indicators are defined or are currently in the process of being developed as part of monitoring the progress in the region. The enforcement should accompany the monitoring through targeted inspections, intelligence-led risk assessments, and annual enforcement plans involving different actors in the compliance and enforcement chain. Sufficient and trained personnel should be provided to the respective authorities for fulfilling these enforcement targets because in many parts of the world, including the CIS+, attaining sufficient, trained personnel is a major stumbling block.

Improve collection of annual statistics in a comparable format for easy appraisal of the system performance, as well as completion of an assessment of unmanaged flows every five years. CIS+ countries should integrate mandatory data reporting and monitoring into the national/regional e-waste systems covering all e-waste categories for ease of comparison both within the region and at the global level. The monitoring system should cover annual statistics on EEE POM and e-waste generation, based on the UNU-KEYs, as well as collection and treatment, preferably based on the UNU-KEYS or on the six e-waste categories. Furthermore, import and export statistics of EEE and e-waste will need to be compiled. Every five years, there should be a provision of mapping unmanaged flows and lifespan revisions to allow for targeted and fact-based interventions as a means for improving e-waste collection.

Measuring e-waste is important as a means for identifying where policy interventions are required to initiate the necessary policy formulations. It is also important to measure progress in the sector nationally and regionally, as well as whether or not the countermeasures taken have the intended effect. Reliable statistics are essential tools for initiating policies toward minimizing e-waste generation, preventing illegal dumping and emissions, promoting recycling, and creating jobs in the reuse, refurbishment, and recycling sectors. Also, progress toward attaining the SDGs and their 169 indicators is measured by indicators and official statistics. Performance of the system and accurate mass balance calculations (for determining progress toward meeting established targets or the amounts of e-waste that end up in the informal sector) depend on collection and storage of quantitative data.

4. Treat Better, Pollute Less

Implement and enforce the prerequisites for environmentally sound management of e-waste. It is imperative that CIS+ countries introduce e-waste policies and legislative instruments that are clear and tailored to the national context but which focus on harmonisation at the regional level, especially with regard to product classification, e-waste management responsibilities, and penalty systems. Such a balance will help to avoid transitional shipments to countries with more lax systems in place.

Few CIS+ countries currently meet the prerequisites for ESM of e-waste, including e-waste-specific legislation, collection mechanisms, and recycling infrastructure with appropriate EHS standards. Unclear definitions and misinterpretation of concepts (e.g. understandings of what e-waste is, what the EPR requirements are, etc.) complicate the implementation of existing legal and regulatory frameworks. In certain CIS+ countries, additional legislative instruments that have not yet been enacted will coordinate the responsibilities of other e-waste actors, such as the monitoring of the entire e-waste system. Specific responsibilities should be clearly assigned to each stakeholder, and

the regular training of authorities is essential in order to achieve the desired system efficiency, accompanied by consistent guidelines.

Government and private-driven funding systems are required for financing adequate e-waste management.

Considering that the CIS+ countries have varying cost and revenue dynamics as well as varying societal systems, there is no single financial model suitable for all twelve countries. However, the majority of operators are only active in the preliminary processing of e-waste and are restricted to dismantling and selling the more commercially attractive fractions. The fragile economics behind e-waste management systems across countries in the region also contribute to the situation. Considering both the environmental and societal impacts of e-waste, the government can initiate a system that can be either fully or partly financed by taxpayers; this would require dedicating a fraction of tax revenues to mitigating the costs associated with an e-waste take-back system. But the caveat of such a ring-fencing of tax for e-waste management is often decided by the arm of the government that manages the financing – not environmental issues – and, so, ring-fencing is not always done in favour of e-waste environmentally sound e-waste management.

The adoption of an extended producer responsibility (EPR) system – where the consumer pays for EoL management of the products via either an advanced recycling fee (ARF) on purchases or a recycling/ disposal fee – presents an effective approach to e-waste management. The product's producer or manufacturer has the legal obligation to take back their products at their end-of-life stage for proper disposal. In absence of such a system with formal financial flows, cherry-picking is rampant, and only the valuable material is selected for treatment, with the rest, especially the hazardous fractions, being dumped. In a formal system, the fees generated for e-waste management through EPR cover most of the hazardous/non-value fractions.

Engage the informal sector actors through incentives for collection and handover to licenced facilities.

Where informal collection systems exist, countries should engage them to collect e-waste, protect themselves with adequate personal protection equipment, and ensure that e-waste is sent to licenced recyclers. As well, a certain formalisation of the informal sector could be secured by providing recyclers with a fair share of the monetary value generated throughout the entire recycling chain.

Non-formal recycling activities of e-waste and landfills could mean that hazardous waste fractions are disposed of in a non-environmentally sound way and processed with a low degree of efficiency and effectiveness. Such ineffectiveness leads to both pollution of the environment and workers and to loss of resources. Illegal processors include open burning, direct plastics melting, toner extraction, and burial or dumping of less valuable fractions, especially those containing such hazardous components as lead, polychlorinated biphenyls, and chlorofluorocarbons that directly affect the soil or contaminate water sources.

5. Pay Adequately

Integrate the informal sector actors.

CIS+ could also benefit from integrating their informal sector into formal e-waste management. One way could be that pre-processing (i.e. separation at the source, collection, and dismantling of non-hazardous fractions of e-waste) is the informal sector's responsibility, as long as it is not satisfactorily formalised. Both end-processing (i.e. the technical steps that follow dismantling, such as recycling and disposal) and some operations linked to pre-processing of hazardous components (CRTs, mercury, phosphor) and the recovery of complex but valuable parts (such as Printed Circuit Boards [PCB]) should be left to the formal sector. In so doing, labor-intensive manual dismantling could be implemented locally, providing job opportunities via low-tech investments. Manual dismantling is more environmentally and economically efficient than mechanical dismantling because mechanical dismantling requires advanced technology, high-energy consumption, and high investment costs and has both a lower yield of material liberation and pure fraction separation potential. CIS+ countries could enable shipments of recovered materials to expert end-processor facilities in the region or elsewhere, where the overall detoxification and recovery of valuable materials is most efficient and state-of-the-art. This approach regards utilising the existing end-processing infrastructures regionally and globally as attractive to countries in terms of providing economies of scale technology and infrastructure and being the most economically viable for the country's value recovery stream. This 'best of both worlds' approach builds on an adequate and fair payment of all players involved in the reverse supply chain.

Illegal treatment and recycling of e-waste is common in all CIS+ countries, as it offers lower operational costs than official processors can. When considering all types of waste management, the informal sector saves public authorities and taxpayers large sums of money, mostly due to avoidance of collection and disposal costs. This is also recognised by assigning the informal sector a role in the formal reverse supply chain and initiating a close cooperation. Otherwise, the formal operators are more economically disadvantaged than those in the informal sector, and there is no legal or regulatory framework stimulating the development and enhancement of formal operators. The establishment of a properly financed EPR system would also address this challenge.

6. Work More Safely

E-waste management standards should be introduced and enforced in all countries in the region.

Currently, six countries have adopted or are in the process of adopting specific e-waste management standards. ILO, WHO, ITU, BRS and others have developed such standards[22]. The management of waste, including hazardous waste, is regulated by several national laws and rules in all countries in the region. EHS standards, in line with regional and international best practices, should be introduced by law in each country in the region.

Countries with existing e-waste legislation may require reforms that implements mandatory e-waste EHS standards while increasing awareness and compliance among all involved actors.

The study observed that even in some of the countries with existing legislation and EPR schemes, there are implementation challenges – often linked to the absence of mandatory EHS standards – ensuring environmental health and the safety of workers. Such standards should detail the methodology for the organisation of collection, transportation, processing, depollution/ decontamination, treatment, and disposal of residual fractions and should be accompanied by relevant training of all involved personnel.

7. Train More

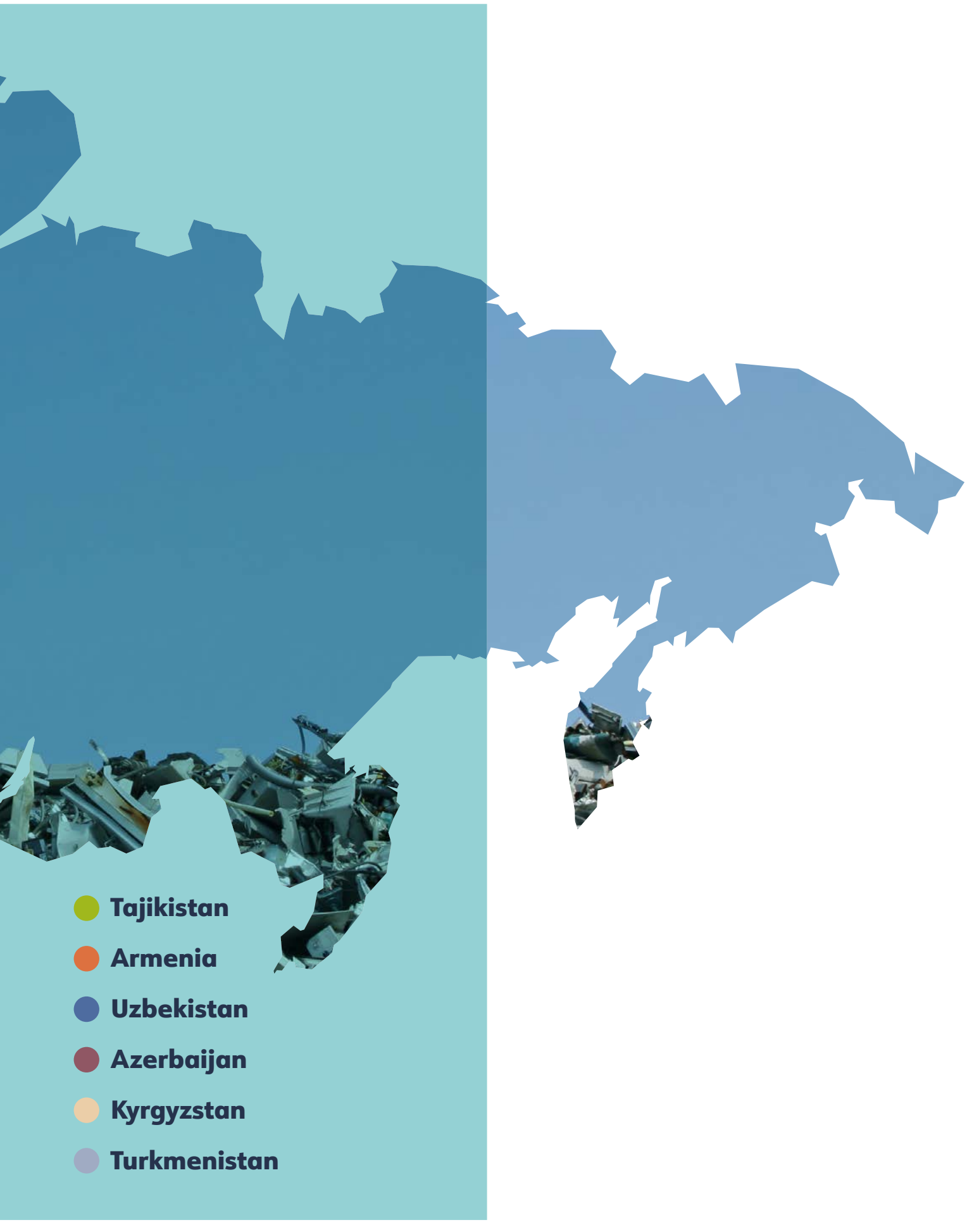
EEE and resulting e-waste raise concerns about resource efficiency and the immediate concerns of the dangers to humans and the environment once all these products become waste. There is a long and sometimes complicated chain of events in the e-waste problem, beginning with the idea that someone has for a new product and through the item's production, ending in its purchase and eventual disposal by the end user. But there is limited capacity for understanding and managing this complex waste stream, whether in the CIS+ region or elsewhere. The E-waste Academies developed by UNU/UNITAR SCYCLE provide tailored and targeted training for different stakeholder groups. A strong emphasis on diversity in these trainings helps professionals to inform and learn from each other – among disciplines, stakeholders, and countries. These academies and other trainings provide a platform to access experts and network. The more trainings CIS+ representatives receive, the more access they have to modals tailor-made for their specific needs in developing their own systems in their own countries. And a global network of alumni is an important reference resource.

[22] https://www.ilo.org/sector/activities/sectoral-meetings/WCMS_673662/lang--en/index.htm, https://www.who.int/teams/environment-climate-change-and-health/settings-populations/children/e-waste, or https://www.itu.int/en/ITU-T/about/groups/Pages/sg05.aspx, and http://www.basel.int/Implementation/Publications/TechnicalGuidelines/tabid/2362/Default.aspx.

9. COUNTRY PROFILES

The order of the country profiles reflects the outcomes of the e-waste management assessment described in Chapter 6 and is based on the number of indicators scoring A for each country. Countries scoring an equal grade have been listed in alphabetical order.

Georgia
Moldova
Belarus
Russia
Kazakhstan
Ukraine


Tajikistan
Armenia
Uzbekistan
Azerbaijan
Kyrgyzstan
Turkmenistan

Country:

Georgia

3.7 million inhabitants
69,700 km²
Borders: Russia, Azerbaijan, Armenia, Turkey, and the Black Sea
GDP per capita PPP: $10,727 USD
Average household size: 3.3 members

Legislation: ●●●●●
Infrastructure: ●●
Collection Rate: 0 %

Legend:
- ● Advanced
- ● Transition
- ● Basic

National legislation on e-waste:

Extended Producer Responsibility:	✔ Introduced in September 2020
National e-waste standards:	✔ In Technical Regulation No. 326 starting in 2020
E-waste collection target:	✔ 20% by 2020, 50% by 2025, and 80% by 2030
Legislation product coverage in UNU-KEYs:	54 of 54
Legislation product coverage in weight (%) on total and per category:	Total: 100% of the e-waste generated in 2019

100% 100% 100% 100% 100% 100%

International Conventions:

	Signature	Ratification/Accession	Entry into force
Basel Convention		20/05/1999 (a)	18/08/1999
Rotterdam Convention		27/02/2007 (a)	28/05/2007
Stockholm Convention		27/02/2007 (a)	28/05/2007
Minamata Convention	10/10/2013	-	-

EEE POM (2019):	E-waste generated (2019):	E-waste managed environmentally soundly (2019):
43.5 kt. 11.8 kg/inh.	26.9 kt. 7.3 kg/inh.	Unknown

(Source: UNU / UNITAR)

Formal/environmentally sound e-waste management system in place:

✖ No companies officially engaged in e-waste collection and recycling.

National Legal Framework

In Georgia, the e-waste is legislated as a specific waste stream under the Waste Management Code of 2015. A number of bylaws are still pending and need to be enacted before the Code can be fully implemented.

Waste management in Georgia is regulated by the Waste Management Code, adopted on December 26, 2014 and entered into force in January 2015[23]. WEEE is included under the category of "specific waste", which is defined by Article 3 as follows: "specific waste – waste generated from a product, due to its characteristics and wide distribution, requiring specific measures management and special care and maintenance after being turned into waste (packaging, oil, tires, motor vehicles, batteries, accumulators, EEE, etc.)". The Waste Management Code is based on relevant EC directives and regulations' requirements as stipulated by the Association Agreement between the EU and Georgia, as well as on international best practices. However, some bylaws still need to be adopted before the Code can be fully implemented.

In addition to the Waste Management Code (last amended on July 13, 2020), other relevant legal instruments in the field of waste characterization, transport, and handling are as follows:

- Governmental Decree on Special Requirements for Collection and Treatment of Hazardous Waste No. 145 of March 26, 2016, [25] which introduced information sheets and transportation forms for hazardous waste such as asbestos for their collection and disposal.
- Law On Import, Export, And Transit Of Waste No. 4952 of 13 April 2016[24].
- Georgian Government Decree on Rules for Collection and Treatment of Municipal Waste No. 159 of April 2016.
- Georgian Government Decree on Identification of Waste List and Classification of Waste According to Types and Characteristics of the Waste No. 426 of 2015 [26].
- Georgian Government Decree No. 421 on Arrangement, Operation, Closure, and Post-care of Landfill of August 11, 2015 [27], which establishes technical requirements, measures and procedures for types of landfills (nonhazardous, hazardous, and inert), along with the acceptance criteria for non-hazardous, hazardous, and inert waste contents (part II).
- Law of Georgia on Environmental Protection No. 519 of 1996 [28].

An EPR system for e-waste was established in Georgia in September 2020 that needs further development before it can be fully implemented.

In Georgia, provisions to introduce the EPR in December 2019 are in place since the Code was adopted in 2014 with regards to the following specific waste streams: packaging waste, e-waste, worn tires, end-of-life vehicles, waste oils, used batteries, and accumulators. However, the introduction of the EPR required preparation and adoption of a specific regulation, which was adopted with some delay in May 2020 and entered into force beginning on 1 September 2020. According to Art. 9 of the Waste Management Code, which regulates EPR, manufacturers of products that will subsequently become specific waste, as well as the individuals placing the specified products on the market, must take care of providing a form, design, and characteristics of the products that will ensure the:

a) reduction of negative impacts on the environment, as well as of the generation of waste in the production process and as a result of the further use of the products;
b) proper recovery and disposal of waste generated from the products.

The above obligations are fulfilled by creating, producing, and placing on the market reusable and technically durable products, so that the resulting waste is suitable for recovery and safe for disposal in the environment. The producer or importer of a product that subsequently becomes waste is required to ensure the separated collection, transportation, recovery (including recycling), and environmentally friendly disposal of the waste generated from the product. These obligations can be fulfilled individually or collectively – by associations of producers [29] (and especially importers, since the majority of the EEE products is imported in Georgia).

[23] https://matsne.gov.ge/document/view/2676416?publication=9 and https://matsne.gov.ge/ru/document/view/2676416?publication=11.
[24] https://matsne.gov.ge/en/document/view/28456?publication=10.

In 2020, technical regulations have been adopted regarding management of e-waste.

The Technical Regulation on Management of WEEE was approved by the Government of Georgia with Resolution No. 326 of May 25, 2020. The regulation aims to:

a) establish rules for the management of e-waste in accordance with the provisions related to EPR (Art. 9 of the Waste Management Code);
b) prevent the production of e-waste and ensure reuse, recycling, or other forms of recovery and reduction of their disposal.

According to the regulation on e-waste, the Ministry of Environmental Protection and Agriculture is in charge of controlling the implementation. Specifically, environmental enforcement is the responsibility of the sub-agency under the ministry – known as the Department of Environmental Supervision – which conducts environmental supervision with its central and regional offices throughout Georgia. In accordance with Resolution No. 326 from May 25, 2020 "On the approval of the technical regulation on waste management of EEE", Appendix I[25] specifies the categories of EEE within the scope of the technical regulation as follows:

1. Temperature exchange equipment.
2. Screen monitors, equipment containing screens with an area of more than 100 cm^2.
3. Lamps.
4. Large equipment (external size more than 50 cm^2) – this category does not include devices in categories 1, 2, and 3.
5. Small equipment (external size less than 50 cm^2) – this category does not include devices in categories 1, 2, 3, and 6.
6. Small information and telecommunication equipment (external size less than 50 cm^2).

The categories of EEE subjected to the EPR system are harmonised with the European Union and global classifications of e-waste and ensure full coverage of all e-waste generated in the country.

Furthermore, Georgia has also adopted a Technical Regulation on used tyres, oils, batteries, and battery waste management based on the EU Battery Directive, which entered into force on September 1, 2020[26].

[25] https://www.matsne.gov.ge/ka/document/view/4877952?publication=0.
[26] https://www.sgs.com/en/news/2020/07/safeguards-09820-georgia-announces-technical-regulation-on-batteries-and-battery-waste-management.

The Georgian government adopted a National Strategy 2016-2030 and a National Action Plan 2016-2020, setting targets for the collection and recycling of e-waste.

The National Waste Management Strategy 2016-2030[27] aims to make the waste management industry fully self-sufficient by 2030, creating a system in which the population and private sector will fully cover the costs. The system was planned to be gradually introduced starting in 2020. In this respect, one of the important tasks (task 7) of the National Strategy is to promote and implement EPR. Within the framework of this task, the achievement of minimum values for various types of waste management (task 7.2) was determined, along with specification of which values for the management of e waste are indicated as 20 percent by 2020, 50 percent by 2025, and 80 percent by 2030. The Strategy did not clarify how the target had to be calculated, but the regulation specified that the target is determined based on the amount of POM, and the regulation further defined the targets as well. In fact, in accordance with the WEEE technical regulation, Appendix IV establishes "Minimum target rates for separate collection of EEE POM by categories and years" (Table 7).

Specifically, category-specific targets are summarised in the following Table 7:

Table 7. Category-specific minimum target rates for collection of e-waste (% of EEE POM)

Categories	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031
1. Temperature exchange equipment	20	25	30	45	50	53	55	57	58	60
2. Screens, monitors, and equipment containing screens with an area of more than 100 cm^2	5	6	7	8	9	10	12	15	18	20
3. Lamps	20	25	30	35	40	45	50	60	70	80
4. Large equipment (outer size more than 50 cm^2)	25	30	40	55	65	70	75	80	82	85
5. Small equipment (external size less than 50 cm^2)	5	6	7	8	9	10	12	15	18	20
6. Small information and telecommunication equipment (external size less than 50 cm^2)	5	6	7	8	9	10	12	15	18	19

[27] https://matsne.gov.ge/ka/document/view/3242506?publication=0.

More detailed targets – for recovery and preparation for reuse and recycling (Table 8) of collected e-waste, by categories and by years – are also mentioned in the regulation Annex V:

Table 8. Category-specific minimum target rates for recovery and preparation for reuse and recycling of collected e-waste (%)

Categories		2022	2023	2024	2025	2026	2027	2028	2029	2030	2031
	Recovery	51	56	61	66	72	76	80	83	85	87
	Preparation for reuse and recycling	50	55	60	65	70	72	74	76	78	80
	Recovery	12	20	25	30	35	45	55	65	75	80
	Preparation for reuse and recycling	10	15	20	25	30	40	50	60	65	70
	Preparation for reuse and recycling	80	80	80	80	80	80	80	80	80	80
	Recovery	58	62	67	72	75	78	80	82	84	85
	Preparation for reuse and recycling	55	60	65	70	72	74	76	78	79	80
	Recovery	15	20	25	30	35	40	45	55	65	75
	Preparation for reuse and recycling	10	15	20	25	30	35	40	45	50	55
	Recovery	15	20	25	30	35	40	45	55	65	75
	Preparation for reuse and recycling	10	15	20	25	30	35	40	45	50	55

Both the Strategy and the Action Plan are under revisions and will be updated this year.

Georgia is Party to the main MEAs related to waste management and has committed to align the national legal framework on this issue with relevant EU Directives.

Georgia ratified the Basel and Stockholm Conventions and signed the Minamata Convention on Mercury in 2013, though the ratification of the Minimata Convention has not yet been finalised. Also, the Association Agreement between Georgia and European Union (EU), ratified by the Parliament of Georgia in 2014, requires the harmonisation of Georgian Legislation with selected EU Directives, namely 2008/98/EC on waste and 1999/31/EC on the landfill of waste [30].

Georgia has achieved a comprehensive legislative framework regarding e-waste and its management standards that assists in developing an e-waste management infrastructure.

The Georgian Decree No. 426 of 2015 classifies waste according to its hazardous properties.

Decree No. 426 of 2015 defines rules for the classification of waste and identifying its hazardous properties. The Decree contains the List of Waste Groups (Annex I) and the List of Hazardous Wastes (Annex II), which are indicated with six-digit codes.

National standards for e-waste management are introduced in Technical Regulation No. 326.

Environmental e-waste management standards are included in Annex II of the e-waste Regulation No. 326; they concern standards for collection, storage, and treatment (as well as for selected materials and components). Landfill disposal standards are defined by the bylaw on landfills (Governmental Decree No. 421), which states that hazardous waste cannot be disposed of in landfills.

The Georgian Decree No. 426 of 2015 provides waste producers with an official form for realizing waste inventories.

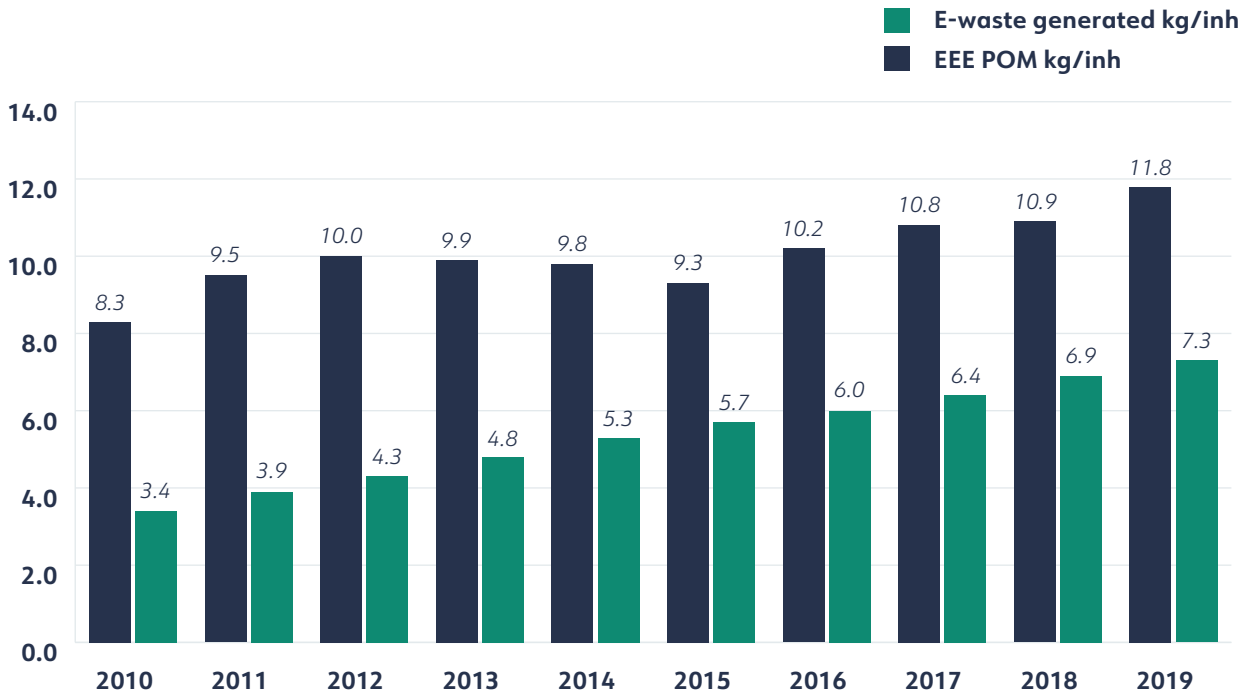
Annex III of Decree No. 426 introduces the official form for the inventory of waste to be conducted by the waste producer (Article 7). It is the responsibility of the Ministry of Environmental Protection and Agriculture to verify the reliability of the data and the further treatment/recycling of it.

National Statistics on E-waste

Official e-waste statistics are not compiled at national level.

Since no official statistics on EEE POM and e-waste generated were retrieved from authorities, UNU/UNITAR internal data has been used to estimate the main indicators for Georgia (Figure 9).

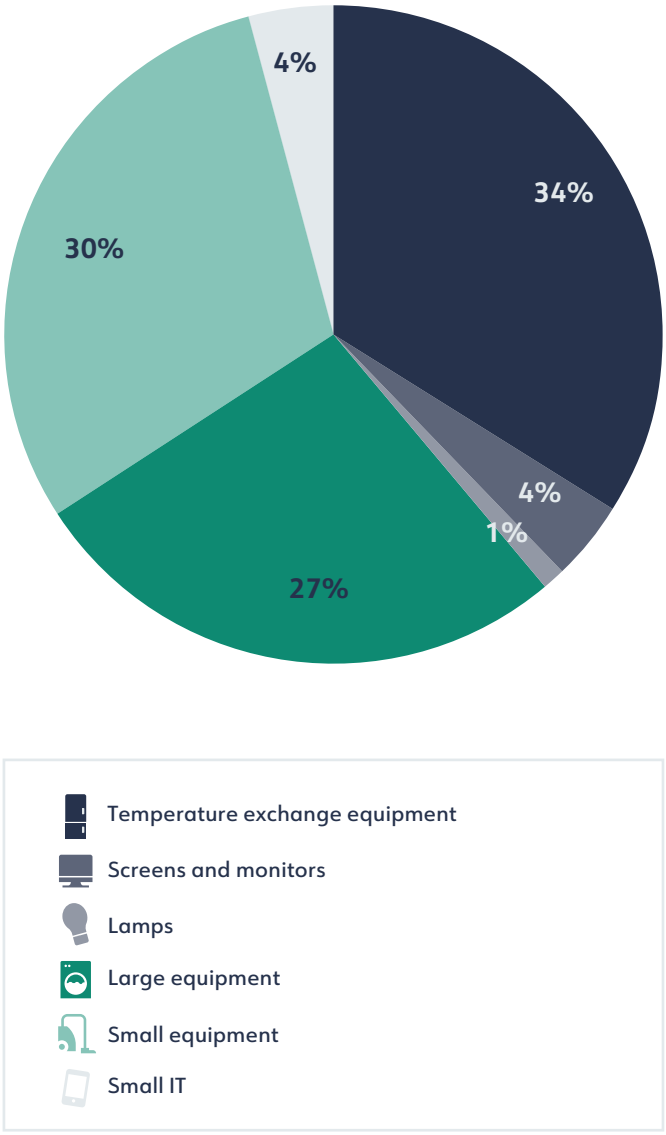
Figure 9. EEE POM and e-waste generated in Georgia



The amount of EEE POM in Georgia increased from 8.3 kg/inh in 2010 to 11.8 kg/inh in 2019.

During the past decade, the EEE POM in Georgia showed an overall increasing trend, increasing from 8.3 kg/inh (31.5 kt) to 11.8 kg/inh (43.5 kt) in 2019. The total EEE POM decreased only from 2013 to 2015, and only marginally.

Figure 10. Share of categories in EEE POM (2019)



Considering the share of EEE per category (Figure 10), it is clear that the largest categories represented are temperature exchange equipment (Cat. I) with 4.0 kg/inh, equivalent to 34 percent of the total EEE POM per inhabitant, and small equipment (Cat. V), with 3.6 kg/inh, equivalent to 30 percent of the total. Conversely, the smallest share is lamps (Cat. III), with 0.2 kg/inh (1 percent), whereas screens and monitors (Cat. II) and small IT register a similar share, with 4 percent of the total.

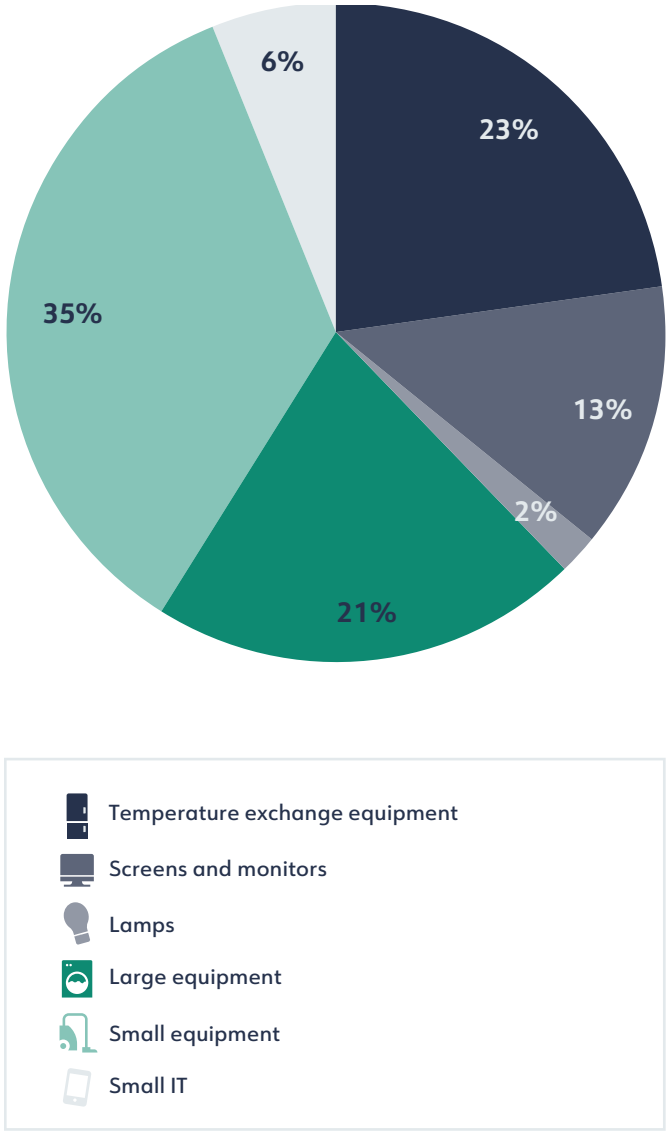
There are only few EEE producers in Georgia, and just 1 percent of the EEE POM is assembled within the country.

The great majority of EEE (approximately 99 percent) is imported in Georgia, so quantities internally produced are very limited. According to a study conducted by the Georgian Environmental Outlook (GEO) in 2017, only 1 percent of EEE is produced in Georgia (i.e. EEE assembled there). However, the data showing that the vast majority of EEE is imported is based on outcomes of the study conducted four years ago, which could be missing more recent developments. There is only one producer of white household goods – Fresh Georgia, a Kutaisi-based plant assembling ovens, microwaves, fridges, washing machines, and TVs. Another producer of telecom appliances is AG Microelectronics, whereas a Rustavi-based plant is assembling TVs and WiFi receivers. Besides household goods, there are numerous small assembly lines producing portable and desktop computers, with an average amount of 10,000 devices annually.

The amount of e-waste generated in Georgia more than doubled in the past decade, from 3.4 kg/inh (13.0 kt) in 2010 to 7.3 kg/inh (26.9 kt) in 2019.

In 2019, the amount of e-waste generated in Georgia was equal to 26.9 kt, of which 6.2 kt was temperature exchange equipment, 3.6 kt was screens and monitors, 0.4 kt was lamps, 5.6 kt was large equipment, 9.3 kt was small equipment, and 1.6 kt was small IT.

Figure 11. Share of categories in e-waste generated (2019)



Small equipment (Cat. V) with 2.5 kg/inh (35 percent) and temperature exchange equipment (Cat. I) with 1.7 kg/inh (23 percent) represent the largest share of e-waste generated in Georgia for 2019. The smallest category was lamps (Cat. III), with 0.1 kg/inh (2 percent) (Figure 11).

No data could be obtained regarding e-waste collected and treated using ESM.

The basis for formal, environmentally sound e-waste management is present in Georgia, and e-waste collection systems are supposed to be administered by producers and importers. The regulation entered into force very recently, in September 2020, so data is not yet available. According to the regulation, companies should establish PROs by June 1, 2021. So far, no Producer Responsibility Organisation has been established, so no official collection is occurring and no official figure is available. Also, due to the sector's recent formalisation, it is expected that the largest share of e waste is mixed with other waste streams, ending up in landfills or managed by the informal sector, which dismantles it and treats it with other metals without environmental standards. A study conducted by the Georgian Environmental Outlook in 2019, where around 300 informal collection points were interviewed, highlighted that a rough estimate of 0.03 kt of e-waste, as well as other metal containing e-waste, is informally collected annually at each informal collection point, which would result in a total of 9 kt.

Average lifespans of most EEE in Georgia are shorter than the ones in the EU, which results in increasing consumption and discharge rates.

In Georgia, there is a flourishing market for cheap, unbranded products. Such products do not have a warranty and are easily damaged. Accordingly, the average lifespan for some of them in Georgia is shorter than in the EU. According to the forecasts based on economic development, technical innovation and product availability, the purchase and use of electronic equipment in Georgia will reach 52 kt by 2027[28].

E-waste Management System

Despite the introduction of a National Waste Management Strategy and an Action Plan aimed at both the adoption of waste prevention measures and the separate collection of recyclable wastes, the actual implementation still remains a challenge.

According to the National Waste Strategy for 2016-2030, companies should take preventive measures against waste generation by 2020. By 2025, businesses should be created to generate energy from waste that has not been reused or recycled. In accordance with the requirements of the

[28] https://geoecohub.wordpress.com/2018/03/02/%D1%80%D0%B0%D1%81%D1%88%D0%B8%D1%80%D0%B5%D0%BD%D0%BD%D1%8B%D0%B5-%D0%BE%D0%B1%D1%8F%D0%B7%D0%B0%D1%82%D0%B5%D0%BB%D1%8C%D1%81%D1%82%D0%B2%D0%B0-%D0%BF%D1%80%D0%BE%D0%B8%D0%B7%D0%B2%D0%BE%D0%B4%D0%B8/.

Association Agreement between the EU and Georgia, the municipalities of Georgia were asked to begin separate collection of recyclable waste in 2019. As such, based on the Waste Management Code, municipalities were supposed to develop 5-year municipal waste management plans before December 31, 2017, which was achieved. Waste management is mostly funded by state budgets. However, some small amounts are generated from waste fees: for instance, the waste fee collected in Tbilisi plays a relevant role and it is quite high. Some additional subsidy is still needed in Tbilisi's case, but the amount is small. The situation is very different in other municipalities, where the collected fee is very little and it has to be substantially subsidised from the central budget. The national Strategy aims to make the waste management industry fully self-sufficient by 2030, creating a system in which the population and private sector will fully cover the costs. The system was planned to be introduced gradually starting in 2020, and the Action Plan should be revised in 2021. However, actual implementation of the Strategy remains a challenge.

A large percentage of waste ends up in landfills, and e-waste is susceptible to the same end destination. To limit this outcome, the Georgian government is considering introduction of a 'landfill fee', which might reduce e-waste of little value that enters landfills.

About 900 kt of waste is produced every year in Georgia, and, per expert estimates, more than 75 percent ends up in controlled or uncontrolled landfills[29]. The same fate is likely to apply to e waste streams as well. In fact, in Georgia, the waste management component is decentralised, and municipalities are obliged to independently take care of the waste generated within their territory. However, they are currently not sufficiently motivated to generate as little waste as possible, since there is no payment for waste disposal in landfills. To reduce the amount of waste disposed of in landfills, Georgia is considering the possibility of introducing a 'landfill fee', i.e. a fee to be paid upon entering landfill for the disposal of waste. The fee would be charged to municipalities, depending on the amount of waste disposed. The application of such a fee could also impact the e-waste that ends up in landfills, as it is expected to reduce the dumping of e-waste parts with little value on those landfills as well[30].

The EPR for e-waste is at the initial stage of being implemented.

EPR principles have only recently been introduced in the country, and their effects on the management system for several waste streams have not yet materialised. The specific regulation[31] on the EPR Registry and how it should be operated was adopted in September 2020, and the related software[32] was also developed and launched. Though the regulation is currently only available in Georgian, plans are for it to be translated into English soon. Obligations of keeping records of waste and reporting the records are imposed on individual s(natural persons) and legal entities within three years (Waste Code, chapter IX, article 29) – excepting landfill operators, who are obliged to keep records during the whole life-cycle of landfill operations. No specific provision has been established about monitoring: the only reference is to individual and collective PROs, which should create a mechanism of self-monitoring.

Within the EPR, an official registration system has been developed for the enterprises dealing with waste collection and treatment/recycling, with the goal of reducing e-waste management by the informal sector.

A registration system of enterprises collecting various types of waste was launched in 2018. Before its launch, anyone could collect waste without any registration. The database for registration of collectors of various types of waste is the responsibility of the Ministry of Environment Protection and Agriculture of Georgia. There are currently 20 companies in the country that sort or process waste. According to the Department of Waste and Chemicals Management of the Ministry of Environment of Georgia, there is an increasing interest in the treatment/recycling business by the private sector, though there are no large investors on the market so far. According to the Department of Waste Management, in 2020, roughly 100 additional enterprises have applied and received a permission to begin the activities and process various types of waste. The number of permits released by the authority shows a certain degree of interest from the private sector in undertaking this sort of activity, though a full assumption of the related responsibility still needs to materialise. However, no companies, currently, are officially involved in e-waste collection and recycling in Georgia, so e-waste is mainly taken care of by the informal sector. In this regard, one

[29] https://www.euneighbours.eu/ru/east/eu-in-action/stories/kak-gruzia-menaet-svoi-podhod-k-utilizacii-othodov-pri-podderzke-es.
[30] https://nor.ge/?p=122508. [31] https://matsne.gov.ge/ka/document/view/4979053?publication=0.
[32] https://my.mepa.gov.ge/LogOn.

strength of the Technical Regulation on e-waste No. 326 is that the 'informal collection' is envisioned as one of the e-waste collection possibilities, and the Regulation defines minimum standards and technical requirements for e-waste collection and treatment to be met by informal actors as well.

Georgia does not currently have e-waste treatment capacity related to the formal sector, though several informal actors are collecting and partially treating e-waste.

No formal and officially registered e-waste collection points or treatment facilities exist in Georgia, so the country does not currently have any treatment capacity. A number of companies do collect and dismantle e-waste, but since they are not registered in the ministry's registry (and typically do not have the required infrastructure for pre-treatment and treatment of e-waste), they can be considered part of the informal sector. Given that the e-waste regulation permits collection of e waste by any company that meets requirements and is officially allowed to collect the waste (i.e. the company is registered in the ministry's registry), the companies could play a significant role in the formal system if they would register and satisfy some basic infrastructures at their collection sites (e.g. specify places for hazardous waste).

No quantitative information exists on the informal sector in Georgia, but it is likely to be the predominant actor in the e-waste field, especially in areas without waste management services.

There are many illegal landfills throughout the country, partly due to the fact that in some regions there are no waste management services at all. Indeed, the most common practice is for e-waste to be mixed with other metal containing waste and then to be collected by informal actors. Usually, people are paid to bring e-waste and other metal containing waste to specific disposal sites or to give it to door-to-door collectors. The e-waste that ends up being managed informally is typically dismantled and only partially recycled (metals only) without holding to any minimum standards, whereas the rest of the waste is disposed of in landfills. The Georgian Environmental Outlook (GEO), an NGO, created an inventory [31] of 300 scrap collection points across Georgia, located all over the country, that collect and transport metal and metal-containing equipment including some e-waste (e.g. refrigerators, conditioners, ovens, etc). However, it appears that the number of these collection points is likely to be much greater. Given the fact that the e-waste collectors are in the informal sector, state agencies lack information on their capacity. Due to the shortage or lack of technical means, e-waste collectors operate mainly without proper machinery and equipment, thus increasing the risk of injury. Moreover, e-waste collectors often have to deal with hazardous substances. Often, they either do not have information about these risks or the information is insufficient. Even their understanding of the damage to the environment caused by their activities is limited. The goal of the assessment conducted by the Georgian Environmental Outlook was to determine the conditions and needs of the informal sector, as well as to support its registration in the formal waste management database and its transition to more environmentally sound activities through practical recommendations, informative booklets, and safety rules [32].

Repair and reuse are common practices in Georgia.

There are many technology repair centres in Georgia, and people frequently use such services, due to the fact that most of the imported EEE is of low quality, and costs to repair such items are relatively low [33].

An inadequate infrastructure, a scarce awareness of the population, and a poor enforcement of the legal acts available are some of the challenges for e-waste in Georgia.

Among the challenges Georgia is facing are the absence of an adequate infrastructure, which in some areas does not ensure the minimum waste management service and a private sector which is still reluctant to start implementing its own responsibilities. Additionally, awareness among the general public of the hazardous nature of e-waste is low. E-waste regulation has only recently been implemented and is still yet to be enforced, but it is currently also missing incentivising mechanisms for reuse and recycling.

Georgia should invest not only in recycling facilities but should also ensure that they can have access to enough quantities of e-waste and minimise the logistical costs related to the material's transport.

According to a study conducted in 2017 [34] by the Georgian Environmental Outlook, United Nations Development Program (UNDP), the Ministry of Environmental Protection and Agriculture of Georgia

and Adelphi, an advanced e-waste recycling facility with high fixed costs won't be the most suitable option for Georgia because of the limited amount of e-waste that can be intercepted in the country. Instead, a lower-tech facility able to begin generating profits with smaller amounts of e-waste would be more beneficial. Additionally, specialising the operations on selected parts appeared necessary to ensure that enough material can be provided. As well, it was recommended that the facility be located where it can have easy access to higher amounts of e-waste (so, possibly Tbilisi, the capital), while minimizing the distance to the harbour in order to limit the logistical costs related to exports of the material as well.

Financing mechanisms have not yet been established in Georgia, but will soon be implemented through the EPR.
It is planned and expected that the EPR system will establish a financial mechanism for e-waste management. Once it is fully established, the costs for e-waste collection and treatment will be incorporated into the EEE price, and producers/importers will pay the treatment and recycling fee to Producer Responsibility Organisation in advance; the fee will then be used for collection, transportation, dismantling, recycling, etc. of the e-waste. Through the fees, which will be collected for waste management purposes by the municipalities, some e-waste parts might be collected as well, but they are marginal amounts and mixed with other household waste, so it is not possible to say that a financing mechanism is already in place in Georgia for e-waste collection and management.

Import and Export of E-waste

The import, export, and TBM of waste are regulated by the law 'On import, export and transit of wastes' of 2016, reflecting the provisions of the Basel Convention.
Georgia has been Party to the Basel Convention since 1999. According to the national Law On Import, Export And Transit Of Waste No. 4952 of 13 April 2016, the following are prohibited:

a) Import and transit of hazardous waste.
b) Import of non-hazardous waste for the purpose of their disposal.
c) Export of hazardous waste if the state to which the hazardous waste is exported is not a member of the Basel Convention or officially prohibits the import of such waste, or in the case of absence of a written consent of the competent authority of the state(s) of import and transit.

Importation of non-hazardous waste for the purpose of their further recovery is allowed, as well as the export and transit of non-hazardous waste. The export of hazardous waste is allowed, provided that the consent of the competent authority of the state(s) involved in the TBM of hazardous waste has been obtained and that the exportation abides by the requirements and procedures of the Basel Convention. The list of waste allowed to be imported, exported, and transported shall be approved by the Government Resolution of Georgia.

No data on importation and exportation of e-waste is available.
Unfortunately, no import or export data on e-waste in Georgia is available, and there is no data on importation or exportation of hazardous waste in the latest report for the Basel Convention (year 2018) [35].

No data on used EEE imported in Georgia could be quantified.
Second-hand EEE is probably imported into Georgia, based on internal knowledge of the Georgian Environmental Outlook, but no information on the quantity or modality is available.

Stakeholders Mapping

The five governmental authorities holding the responsibility of waste management in Georgia are the Ministry of Environmental Protection and Agriculture, the Ministry of Regional Development and Infrastructure, the Ministry of Finance, the Ministry of Economy and Sustainable Development, and the National Statistics Office. Other stakeholders involved are companies acting in the field of solid waste management and the non-profit legal entity, Georgian Environmental Outlook.

Stakeholder	Responsibility
Ministry of Environmental Protection and Agriculture Website	Develops and implements unified state policy on waste management. The Waste and Chemical Management Department is responsible for keeping records, maintaining database on waste, developing a national waste management strategy, and coordinating and reporting implementation of a national waste management action plan description.
Ministry of Regional Development and Infrastructure	Through its Solid Waste Management Company, the Ministry is responsible for the construction, operation, closure, and after-care of non-hazardous landfills and transfer stations in the country's regions.
Ministry of Finance (MoF) Website	Along with the MoEPA, the MoF regulates transboundary shipment of hazardous waste and its disposal. Revenue Service Legal Entity of Public Law (LEPL) of the MoF of Georgia regulates taxation and transboundary shipment of goods through the Customs Department. The LEPL Service Agency of the MoF, along with other obligations, supports transparency on disposal of movable property (including outdated EEE) owned by the state through electronic auctions.
Custom's Department Under the Ministry of Finance Website	Formulation of priority directions of customs policy. Elaboration of proposals to ensure harmonisation of existing regulations with EU legislation and World Trade Organisation (WTO) requirements.
Ministry of Economy and Sustainable Development (MoESD) Website	In collaboration with the MoEPA and other agencies, the MoESD develops and proposes to the Government of Georgia draft decrees for adoption that define the detailed obligations in relation to the EPR. MoESD is also responsible for issuing admission certificates for the means of transportation of hazardous waste. The MoESD is responsible for submitting draft secondary legislation, determining the requirements related to the transportation of waste, to the Government of Georgia for approval.
National Statistics Office of Georgia (GeoStat) Website	GeoStat is the legal entity of public law and carries out its activities independently. It is an institution established to produce the statistics and disseminate the statistical information according to the Georgian legislation.
LTD Solid Waste Management Company of Georgia (SWMCG) under the Ministry of Regional Development and Infrastructure Website	The LTD Solid Waste Management Company of Georgia is a state-owned company under the Ministry of regional Development and Infrastructure (MRDI). The company is responsible for operating Georgia's landfills – excepting landfills in the Tbilisi and Adjara vicinities. SWMCG is also responsible for closure of old landfills and construction of new regional landfills throughout Georgia (except for ones in Tbilisi and Adjara).
Georgia's Environmental Outlook (GEO) Website	GEO is a non-profit legal entity focused on promoting effective environmental governance and inclusive sustainable development, as well as fostering introduction of best practices as a response to Georgia's emerging environmental challenges. The organisation has implemented various projects in the field of waste management in Georgia, such as the projects 'Supporting the implementation of the principle of EPR in accordance with the requirements of the Waste Management Code' and 'Supporting E-Waste Management Capacity Development in Georgia'. These projects were initiated by the Ministry of Environment Protection and Agriculture of Georgia with the support of UNDP and SIDA (Swedish International Development Cooperation Agency).

Country:

Moldova

3.5 million inhabitants
33,846 km²
Borders: Romania and Ukraine
GDP per capita PPP: $6,725 USD
Average household size: 2.8 members

Legislation:
●●●●●
Infrastructure:
●●
Collection Rate:
0.8 %

Legend:
- ● Advanced
- ● Transition
- ● Basic

National legislation on e-waste:

Extended Producer Responsibility: ✔ Introduced in 2016
National e-waste standards: ✔ Since 2018 on e-waste collection and materials treatment and recycling
E-waste collection target: ✔ 10% of EEE POM in 2021, to be increased annually by 5% until 30% in 2025

Legislation product coverage in UNU-KEYs: 49 of 54
Legislation product coverage in weight (%) on total and per category: Total: 99% of the e-waste generated in 2019

100% | 100% | 22% | 100% | 100% | 100%

International Conventions:

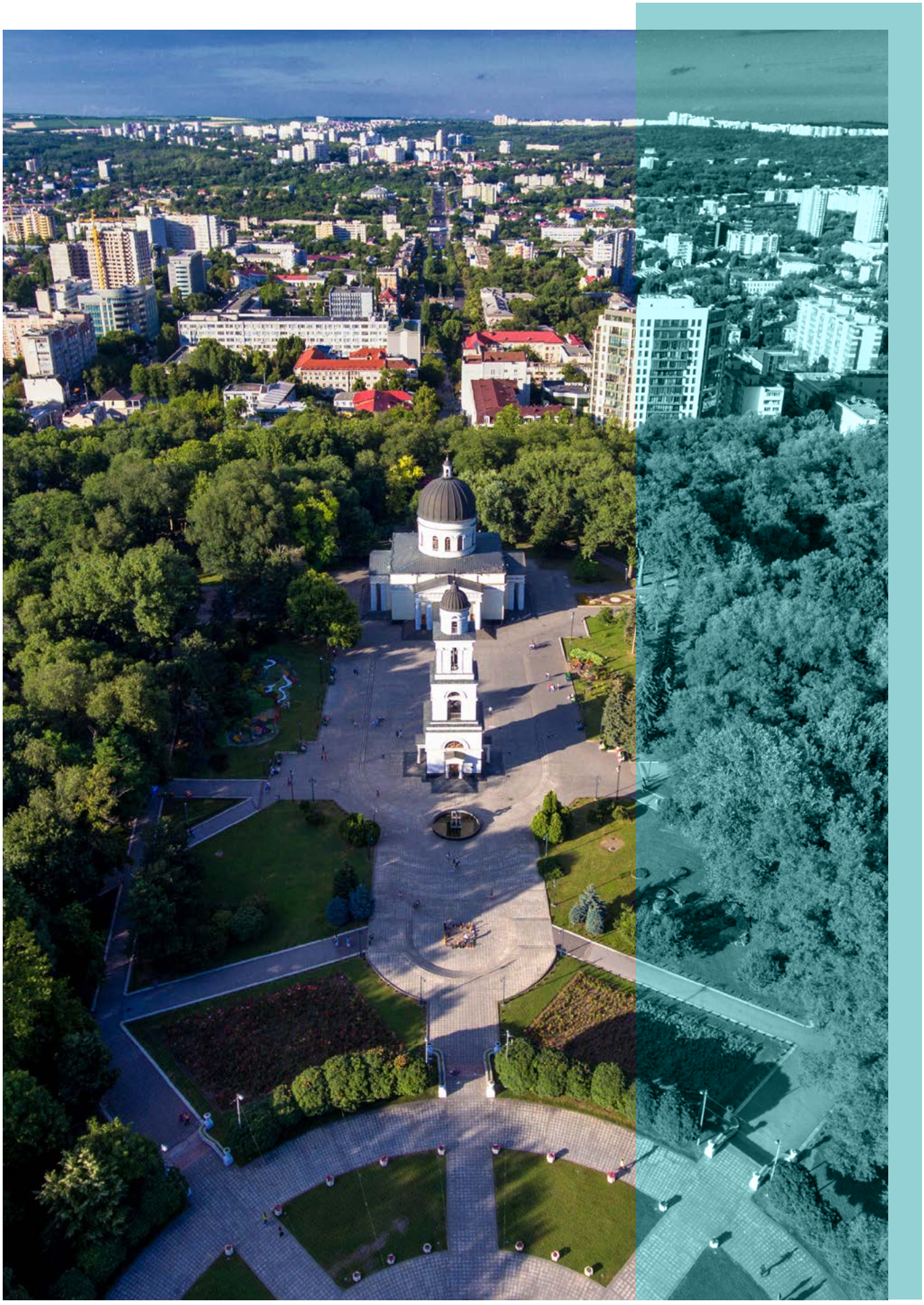
	Signature	Ratification/Accession	Entry into force
Basel Convention	-	02/07/1998 (a)	30/09/1998
Rotterdam Convention	-	27/01/2005 (a)	27/04/2005
Stockholm Convention	23/05/2001	07/04/2004	06/07/2004
Minamata Convention	10/10/2013	20/06/2017	

EEE POM (2019):	E-waste generated (2019):	E-waste managed environmentally soundly (2019):
 30.3 kt. 8.6 kg/inh.	 17.4 kt. 4.9 kg/inh.	 0.14 kt. 0.04 kg/inh.

(Source: Ministry of Agriculture, Regional Development and Environment)

Formal/environmentally sound e-waste management system in place:

✔ 2 private companies dealing with e-waste handling.



National Legal Framework

Moldova has established a legal and regulatory framework related to e-waste.

A regulation of e-waste has been implemented in accordance with the requirements of Law 'On waste' No. 209, dated July 29, 2016 and the 'Provisions on WEEE' approved by the Government Resolution No. 212, in March 2018. As well, other legal instruments related to waste management are also relevant for e-waste.

The national legal framework around e-waste comprises the following main tools:

- Government Decision No. 212 of March 7, 2018 'Provisions on WEEE' – WEEE Regulation [36].
- Government Decision No. 501 of May 29, 2018 'Instructions for accounting and reporting data and information on wastes and their management' [37].
- Government Decision No. 99 of January 30, 2018 on 'the Approval of the list of waste' [38].
- Law of No. 209 of July 29, 2016 'On waste' [39].
- The Government Decision No. 637 of May 27, 2003 on 'the control of TBM of waste and its disposal' [40].
- The National Waste Management Strategy of Moldova 2013-2027.

Specifically, e-waste management is regulated by the 'Provisions on WEEE', which have been developed based on the Directive 2012/19/EU of the European Parliament and on the Council of 4 July 2012 on WEEE [41]. The Provisions establish the requirements for the actors of the electrical equipment 'life cycle' – producers, importers, exporters, distributors, and consumers – to reduce adverse impacts on human health, reduce influence of substances contained in the waste on the environment, and promote and ensure safe recycling and reuse. The Provisions include requirements for creation and improvement of an e-waste management system, setting up legally binding instruments for the e-waste collection. The document sets forth the separate collection of e-waste, e-waste market operators' responsibilities, and the minimal plan for waste collection that they implement. The producers and importers of such equipment incur expenditures for e-waste collection, transportation, recycling, and storage.

Moldova has recently introduced an EPR system regarding e-waste.

The law 'On waste' No. 209 of 2016 establishes the basic requirements for waste management throughout life, introducing the principle of EPR for packages, batteries, accumulators, EEE, vehicles, and oils. In accordance with Article 12 for consolidating reuse and waste recycling, the legal entities or physical persons that develop, produce, recycle, treat, sell, and/or import EEE fall within the scope of EPR. The law 'On waste' and provisions set forth requirements for registration of producers or authorised representatives falling within the scope of EPR system, procedures of accounting and reporting on EEE, and e-waste data.

Ten e-waste categories are covered by the EPR scheme as follows:

1. Large Household Appliances.
2. Small Household Appliances.
3. IT and Telecommunications equipment.
4. Consumer Equipment.
5. Lighting Equipment.
6. Electrical and Electronic Tools.
7. Toys, Leisure, and Sports equipment.
8. Medical Devices.
9. Monitoring and Control Instruments.
10. Automatic Dispensers.

Moldova has recently implemented the EPR and is still developing an e-waste management system, with only a few companies currently active in the territory. Within the next few years, Moldova plans to achieve the collection targets set by the legislation.

During the development phase of the provisions regarding e-waste and the EPR principle, it was decided that 10 categories, per the old EU WEEE Directive, will be used. The transition to six categories (as in the current EU directive) is expected, but no definitive plan for the transition is yet in place. The scope of the EPR established in Moldova corresponds to 49 UNU-Keys, and it theoretically allows for 99 percent of the total e-waste mass generated in the country in 2019 to be covered, based on official data produced by the Ministry of Agriculture, Regional Development, and Environment.

The EPR introduces precise responsibilities for both EEE producers and distributors.

Producers under the EPR rules shall:

- ensure product labelling and marking with symbols indicating that the product is subjected to separate collection (the removal of such labelling is prohibited);
- ensure organisation and functioning of individual and collective management systems for relevant waste streams;
- be registered in the Automated Waste Management System ('AIS WM');
- ensure accounting of products POM during the last five years with annual reporting to the Environment Agency about the number of products in case of personal adherence of EPR by the producer. Upon provision of evidence, that producer is the member of a collective system, which shall undertake the responsibility;
- provide evidence of an individual system or confirm membership in the collective system of collection, treatment, recycling, or removal of products that become waste;
- carry out educational programs and awareness campaigns about the collection and treatment of products that become waste;
- ensure implementation of the established indicators of collection and recycling of products that become waste.

Product distributors under the EPR rules shall:

- be registered in the list of product manufacturers (which fall within the scope of EPR) that is under the jurisdiction of the Environment Agency;
- ensure accounting of products distributed on the market for the last five years with annual reporting to the Environment Agency about the number of products available on the market;
- ensure that acceptance of e-waste is free of charge;
- deliver e-waste to the producer or recycler.

The national waste list mirrors the European Waste List.

The list of waste used officially at the national level in Moldova and established by Decision No. 99 of 2018 is identical to the European Waste List.

Since January 2020, minimum e-waste collection targets have been introduced in Moldova.
According to the 'Provisions on WEEE' approved by Government Decision No. 212 of March 2018 [42], EEE producers have been required, since January 1, 2020, to achieve minimal targets on collection that has been calculated as a percentage ratio between the total mass of e-waste collected for the related year and the average mass of total EEE POM for the three previous years. The annual minimal collection targets to be achieved by the EEE producers are as follows (Table 9):

Table 9. Annual collection targets for producers

Annual collection rate	(in %)
for 2020	5
for 2021	10
for 2022	15
for 2023	20
for 2024	25
for 2025	30

To ensure the achievement rate of the minimal target collection indicators, the individual producers or collective systems and authorised economic agents implementing their activity in the field of e-waste collection and treatment submit information on separately collected e-waste to the central body of public environment administration. E-waste treatment shall include at least removal of all liquid agents as well as material-selective treatment in accordance with the legislation requirements. The e-waste transferred to the authorised treatment facilities, either by producers or by their collective systems, will be treated or recycled, except for in cases when the e-waste is completely reused as used products. Reporting in accordance with the WEEE Regulation regarding the goals set for the collection of e-waste (5 percent in 2020) must be submitted by April 30. The reports will have to be provided by the representatives of the collective waste collection systems, which were registered in 2020.

Activities in the field of e-waste management and treatment must be licenced and proven to be compliant with the national legislation.
According to the provisions on e-waste and the law 'On waste', companies implementing operations with e-waste treatment must have the environmental permit for waste management with clear indication of the e-waste types being treated, as well as indication of the treatment and disposal operations that can be applied to the e-waste in accordance with the law 'On waste'. The individual producers and collective systems have the right to implement activities only upon availability of an operational plan developed in accordance with the requirements of the national legislation and approved by the central body of the public environment protection administration.

Besides the e-waste collection target, more category-specific targets have been introducing regarding recovery, recycling, and reuse.

The producers and collective systems acting on behalf of the producers and economic agents are obliged to ensure the achievement of some minimal targets that are specific per e-waste category:

1. For e-waste falling under categories 1 and 10:
    a. the rate of recovery shall be increased to at least 80 percent by an average weight per appliance, and;
    b. component, material, and substance reuse and recycling shall be increased to at least 75 percent by an average weight per appliance.
2. For e-waste falling under categories 3 and 4[33]:
    a. the rate of recovery shall be increased to at least 75 percent by an average weight per appliance;
    b. component, material, and substance reuse and recycling shall be increased to at least 65 percent by an average weight per appliance.
3. For e-waste falling under categories 2, 5, 6, 7, and 9[34]:
    a. the rate of recovery shall be increased to at least 70 percent by an average weight per appliance;
    b. component, material, and substance reuse and recycling shall be increased to at least 50 percent by an average weight per appliance;
    c. for gas discharge lamps, the rate of component, material, and substance reuse and recycling shall reach at least 80 percent by weight of the lamps.

Moldova has adopted specific e-waste EHS standards.

EHS standards have been introduced by the provisions on WEEE, enacted in May 2018.

- Appendix No. 3 to the 'Provisions on WEEE' includes special measures for the collection of e-waste representing risks to the safety and health of personnel associated with infection at collection points.
- Appendix No. 6 to the 'Provisions on WEEE' introduces requirements regarding the selective treatment/recycling of materials and components of e-waste.

Data accounting and reporting in Moldova is based on the 'Automated Waste Management System' (AIS 'WM'), established in 2020.

The 'Automated Waste Management System' (AIS 'WM') is the national software and database used for the collection, storage, and processing of information about waste import and export, waste producers, and entities authorised in the field, as well as the turnover of waste-related activities for the public authorities, legal entities, and physical persons involved. It is the official institutional portal.

Some of the main features of the AIS 'WM' are:

- information on the implementation of measures toward the introduction of EPR for products such as batteries and accumulators, EEE;
- data on quantity of products represented at the market, indicated in tons and number of units;
- information on quantity and categories of collected and treated waste.

[33] 3. Electronic information technology and communication equipment / 4. Consumer equipment and photovoltaic panels.
[34] 2. Small household appliances / 5. Lighting equipment / 6. Electrical and electronic tools (with the exception of large-scale stationary industrial tools) / 7. Toys, leisure, and sports equipment / 9. Monitoring and control instruments.

Waste data is transferred to the AIS 'WM' by:

- operators of the municipal waste management sector, including transportation operators;
- producers of hazardous waste;
- operators of hazardous waste collection and/or hazardous waste transportation;
- dealers and brokers of products turning into hazardous waste;
- individual and collective waste collection systems;
- waste recycling enterprisers under EPR.

Waste data are compiled and submitted to the Environment Protection Agency in accordance with the requirements of following normative legal documents:

- 'Waste list' approved by the Moldova Government Resolution No. 99, dated January 30, 2018. The present document represents the reference for the waste classifier, including hazardous waste.
- 'Instruction on accounting, and submission of data and information about waste and its management', approved by the Government Resolution No. 501, dated May 29, 2018. This document sets forth the procedure of waste accounting and waste data submission.

The reporting system introduced includes all stages of waste management, but it will take some time to assess the real situation in the country since the system is so new.

Nevertheless, the introduction of the AIS 'WM' only recently started (in 2020) and has yet to be fully established. The Environment Protection Agency accepts, evaluates, and examines the reports and data received, processes the information, and publishes it on the official website. The first report was published at the end of 2020. For the first time, the Environment Agency has summarised and presented statistical information on waste management for the reporting year 2019, based on data collected and processed using the AIS Waste Management system. The reporting specifics included all stages of waste management, from the stage of waste generation – determined in accordance with the category and type of waste, according to the Waste List, harmonised with the European Waste List – to the stage of treatment/recycling, indicating also the code of the processing operation. The data obtained are not representative for assessing the real situation throughout the country, since not all economic agents are reported (approximately only half of their number). The last year, 2020, can be considered the year of testing the system and familiarising economic agents with the specifics of reporting through the AIS 'WM'. The data obtained through the AIS 'WM' can be found on the official website of the Environmental Agency[35].

[35] http://www.mediu.gov.md/ro/node/600.

National Statistics on E-waste

Official e-waste statistics are currently being established in Moldova via introduction of a national 'E-waste Roster'.

Moldova is in the first stage of developing an e-waste infrastructure, and an EPR system has recently been introduced. Therefore, authorities still have to implement a regular e-waste data accounting process. Nevertheless, the Environment Protection Agency is already keeping records of EEE producers and products as part of the list of products falling under EPR rules. It is expected that, in upcoming years, a National Roster will be developed in Moldova that will include the exact number of imported equipment on the market, and a separate 'E-waste Roster' is expected as well. The Roster will be integrated into the state information system 'Automated Waste Management System'[36].

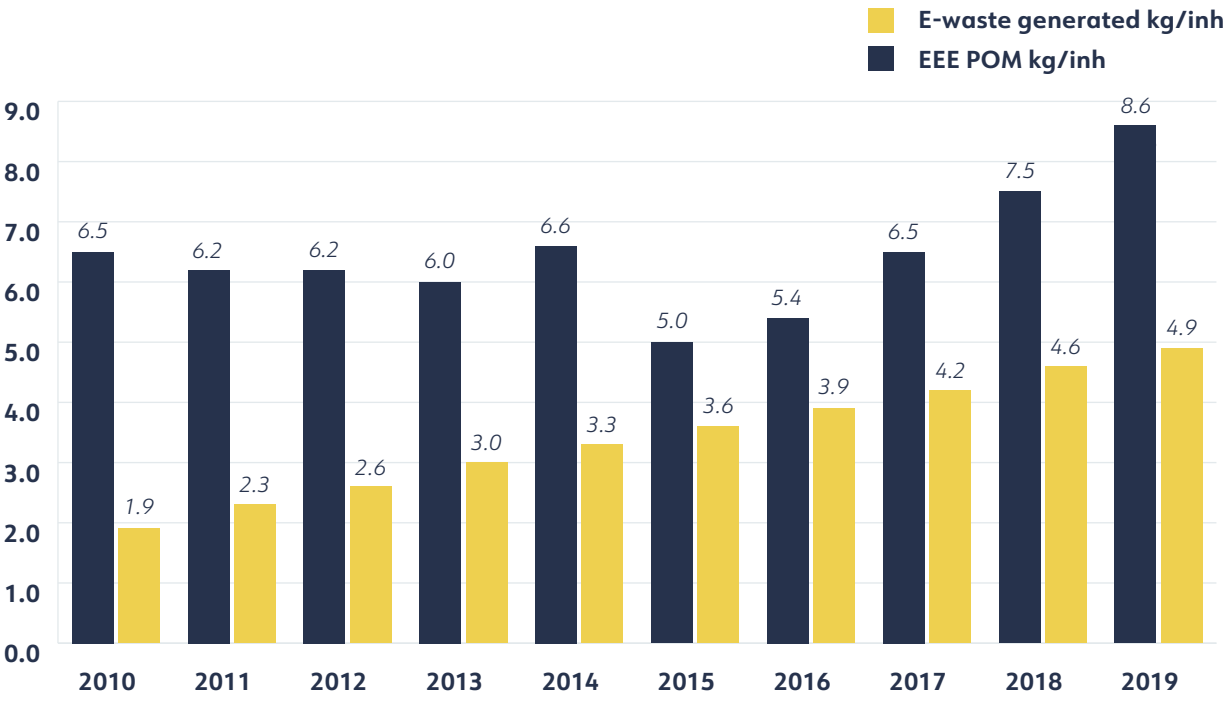
Data on EEE POM and e-waste generated was developed by the country following the methodology developed by UNU/UNITAR.

In the framework of the REM of the CIS+, the State Institution 'Subdivision for the Implementation of Environmental Projects', part of the Ministry of Agriculture, Regional Development and Environment of Moldova has applied the methodology developed by UNU/UNITAR to quantify the main e-waste statistics indicators. The data on EEE importation and exportation used is from the United Nations International Trade Statistics Database (UN Comtrade) Database for the period of 1994-2019, after a process of validation through the data of a national register. Currently export and import data on EEE are not publicly available, but such data can be requested from a customs service. The Harmonised Commodity Classification System is used for the national classification. As part of the work conducted, the Ministry could also include data on EEE domestic production. Specifically, information on the domestic production of EEE in Moldova, including the name of the product produced and quantity per year, is available on the official website of the National Bureau of Statistics[37].

[36] www.siamd.gov.md.

[37] https://statbank.statistica.md/PxWeb/pxweb/ro/40%20Statistica%20economica/40%20Statistica%20economica__14%20IND__IND020/IND020100.px/?rxid=9a62a0d7-86c4-45da-b7e4-fecc.

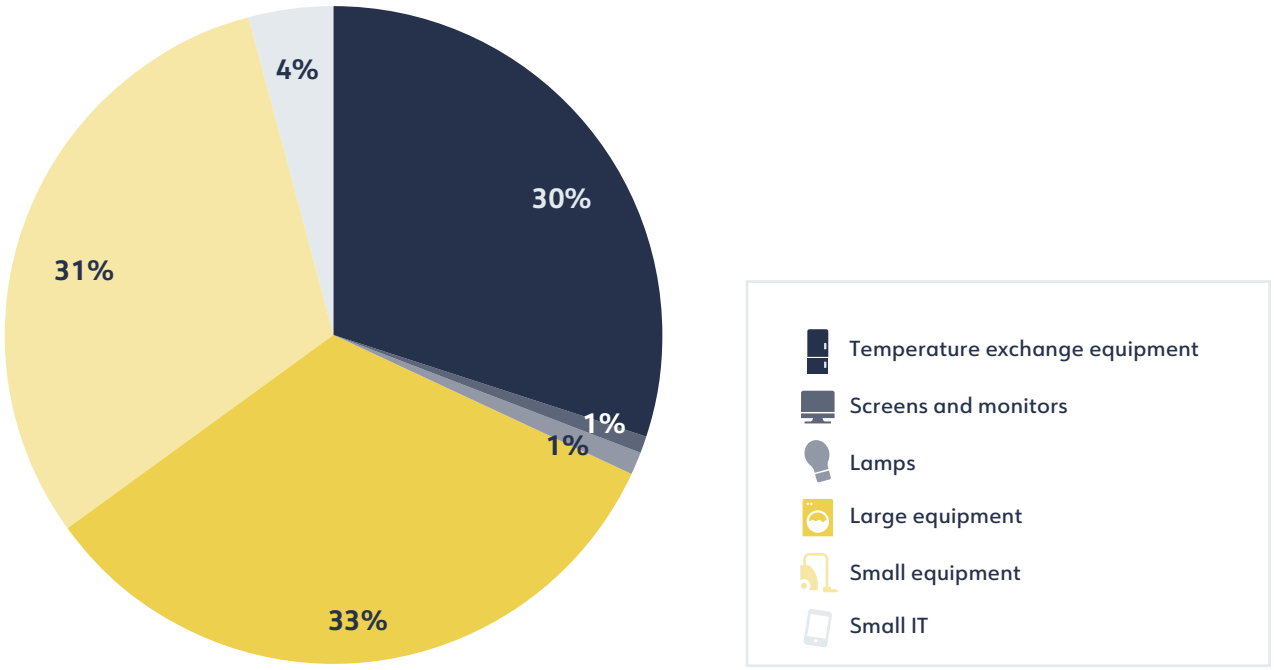
Figure 12. EEE POM and e-waste generated in Moldova



EEE POM in Moldova has rapidly increased in recent years, from 6.5 kg/inh in 2010 to 8.6 kg/inh in 2019.

The amount of EEE POM in Moldova (Figure 12) increased from 6.5 kg/inh (23.0 kt) in 2010 to 6.6 kg/inh in 2014. The amount declined to 5.0 kg/inh (17.8 kt) in 2015, then grew to 8.6 kg/inh (30.3 kt) in 2019, which is still below the CIS+ average of 11.0 kg/inh.

Figure 13. Share of categories in the EEE POM (2019)

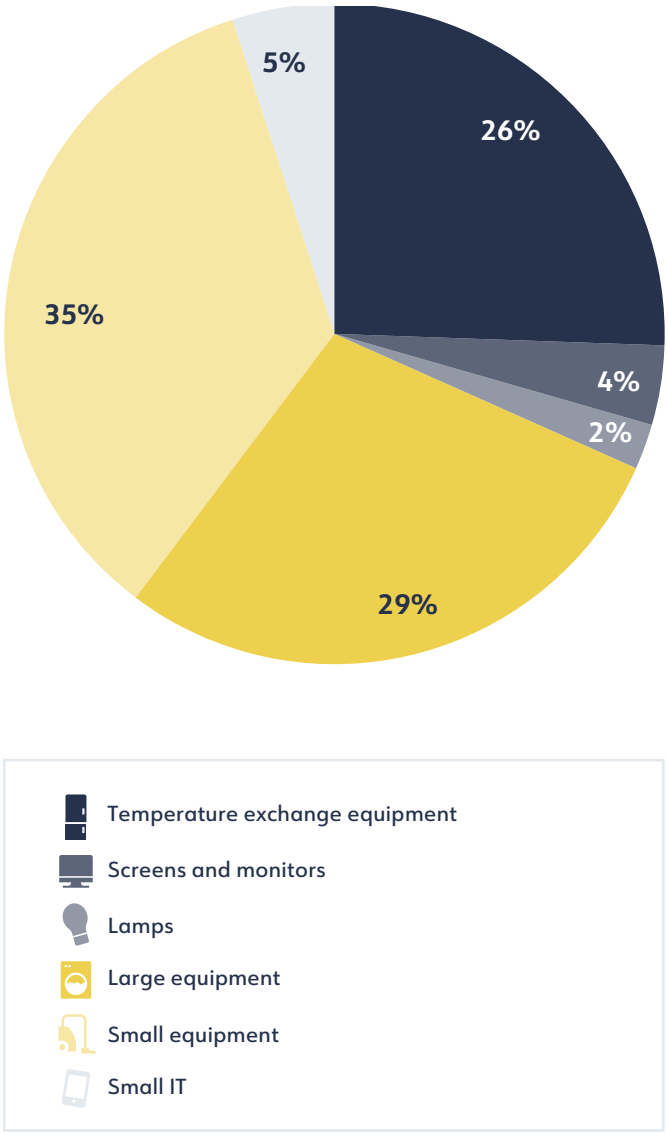


Temperature exchange equipment (Cat. I), large equipment (Cat. IV), and small equipment (Cat. V) have very similar shares – respectively, 2.6 kg/inh (30 percent), 2.8 kg/inh (33 percent), and 2.6 kg/inh (31 percent) for products POM (Figure 13). By contrast, lamps (Cat. III) and screens and monitors (Cat. II) have the lowest share with 0.1 kg/inh each, corresponding to 1 percent of the total amount of EEE POM.

The domestic production of EEE in Moldova was 0.01 kg/inh in 2019.
According to the Ministry-provided data, Moldova registered a very limited amount of domestically produced EEE, equal to 0.05 kt (0.01 kg/inh) in 2018 and 0.04 kt (0.01 kg/inh) in 2019 – mainly related to UNU-KEYs 0902 (i.e. professional monitoring and control equipment). Considering the time series, Moldova produced 1.1 kt of EEE (averaging 0.03 kg/inh annually) from 2009 to 2019, pertaining to the UNU-KEYs 0101 (professional heating and ventilation), 0105 (dryers), 0304 (printers), 0306 (mobile phones), 0408 (flat-panel TVs), 0601 (household tools), 0901 (household monitoring and control equipment), and 0902 (professional monitoring and control equipment).

Moldova's e-waste generated tripled over the last decade, from 1.9 kg/inh in 2010 to 4.9 kg/inh in 2019.
Based on the data compiled by the Ministry, the amount of e-waste generated in Moldova rose from 1.9 kg/inh (6.9 kt) in 2010 to 4.9 kg/inh (17.4 kt) in 2019. The e-waste generated is below the regional average of 8.7 kg/inh in 2019.

Figure 14. Share of categories of e-waste generated (2019)



When looking at the share of the six e-waste categories, the largest two categories in terms of e-waste generated for 2019 are small equipment (Cat. V) with 1.7 kg/inh (35 percent) and large equipment (Cat. IV) with 1.4 kg/inh (29 percent) (Figure 14).

The amount of e-waste collected and treated using ESM in Moldova in 2019 was equal to 0.14 kt, according to official reporting.

Data on e-waste formally collected and recycled is available and recorded in accordance with the Basel Convention provisions and with the establishment of the AIS 'WM', which is published on the official website of the Environmental Agency[38]. For 2019, 0.14 kt (0.04 kg/inh) of e-waste and 2.7 kt (0.8 kg/inh) of batteries and accumulators were collected. Of those, 0.014 kt related to fluorescent tubes and other mercury-containing waste. Moldova has a recently developed infrastructure, with two private companies taking care of the ESM of e-waste at the national level. As such, the amount of e-waste formally recycled and collected is still limited. Furthermore, the reporting system has only recently been implemented and is still incomplete. So, it is still too early to assess the real situation of e-waste collection in Moldova.

Morphological analysis of waste in garbage containers is performed periodically.

Historical data on the composition of municipal and similar waste at the national level were collected from various bibliographic sources for the period of 1986-2001. Since 2003, several studies on the morphological composition were carried out in agreement with several sanitation operators in the process of estimating greenhouse gas emissions under the Climate Change Convention.

[38] http://am.gov.md/ro/node/672.

E-waste Management System

A formal waste and e-waste collection system has recently been realised, and Moldova's waste sorting is also limited, though the establishment of a state enterprise for hazardous waste management is planned.

There is no proper official system of waste collection and sorting in Moldova. Only 30 percent of the population has access to the authorised waste collection, while the remaining 70 percent discards waste to unauthorised dumping sites (in the majority of Moldavian villages, garbage is disposed of into unauthorised dumping sites, of which there are more than 5,000 nationwide). All household solid waste is mainly disposed of in landfills. In accordance with the Waste Management Strategy, the state is responsible for the separate waste collection, and private companies are responsible for waste disposal. Some separate collection is also available for specific waste streams, mainly in cities (i.e. plastic packaging, paper, and glass). E-waste is collected mostly through organised programs or projects or at designated collection points. A plan to establish a state enterprise for hazardous waste management in Moldova is in place. The mandate of the enterprise will include logistics, packaging of hazardous agents, and their delivery to other countries for disposal.

E-waste management in Moldova has been implemented in accordance with the EPR system established in 2016.

An e-waste management system in the country is in the very early stages of development. E-waste is collected and sorted in three cities: Kishinev, Cahul, and Balti. The responsibility for the collection and separate sorting of e-waste lies with the producers who distribute EEE. The producers or collective systems acting on their behalf are required to ensure collection and transfer for recycling of separately collected e-waste. Separate collection is implemented individually by the producer or is based on the agreement with the collective system. In case of individual adherence of EPR, acceptance of e-waste generated in private households is implemented by their own e-waste collection points. Instead, producers adhering to EPR collective systems – upon common agreement with the local public authorities of administrative-territorial units – shall arrange, control, and coordinate separate e-waste collection from private households and its transportation to the stationary and mobile collection points with assistance of a sanitary cleaning service. The Government does not see a need for the introduction of e-waste recycling technology, since the country is not a big consumer of electronic equipment and the volumes of e-waste would not allow companies to work at full capacity.

E-waste is sorted in some main cities in the countries where collection containers are located near EEE distributors or retail shops.

The e-wastes are sorted in the cities of Kishinev, Cahul, and Balti. Upon request of the collective system, the local public administration provides space for establishment of e-waste collection points free of charge. The EEE distributors in the trade area (which exceeds 200 m2) ensure free-of-charge acceptance of small-size e-waste (outside dimensions not more than 25 cm2) without obligation to buy similar EEE. For this purpose, EEE producers shall provide containers for collection. The containers for collection of small e-waste items are installed in Kishinev. The container for collection of small household appliances and batteries in Balti is located in the 'Metro' Hypermarket, while the container for collection of non-large e-waste items in Cahul is located in the 'Orange' mobile operator.

Despite the presence of two e-waste collection companies, the e-waste treatment/recycling system in the country is not developed.

Moldova does not yet have a developed e-waste treatment/recycling system. E-waste treatment is partially carried out in Moldova mostly by disassembling computer equipment, with subsequent export for treatment/recycling to the EU under code 16 02 16. Also, e-waste under code 16 02 14 is exported for treatment/recycling to Romania.

- 16 02 14 discarded equipment other than those mentioned in codes 16 02 09 to 16 02 13.
- 16 02 16 components removed from discarded equipment other than those mentioned in 16 02 15.

Two companies collect e-waste: E-Reciclare[39] and MoldRec[40]. Both of these enterprises primarily specialise in sorting and dismantling e-waste and sending it abroad to treatment/recycling companies in Germany and Romania. E-Reciclare has dealt with e-waste collection since 2015. It accepts inoperative equipment and appliances from the population and from enterprisers, upon the submission of an application on the company's website. Large e-stores and service centres have E-Reciclare containers for collection of e-waste. Volunteers collaborate with company officials to collect old EEE. In 2016, they collected 0.8 kt of such types of waste, and in 2019 the data was equal to 0.3 kt, of which 0.1 kt was exported to Romania. The company then disassembles and sorts such equipment, and e-waste is shipped to Germany for recycling. The second company, MoldRec, collects electronic, plastic, and paper waste, as well as lamps and metals. For collection of e-waste, containers have been installed at fuel stations and supermarkets. Large household appliances are collected by the company from home. All waste is disassembled and sorted. When a truck with a 7-ton capacity is filled with one type of waste, the waste is delivered to the recycling abroad, e.g. to Romania.

The informal sector is involved in the informal collection and dismantling e-waste, but there are no estimates on their involvement.

There is informal collection of e-waste and dismantling in Moldova in order to extract valuable components. The role of the informal sector has not officially been assessed, but as there are about 50 scrap metal collection points in the country, extractable parts of the e-waste are often handed over to them.

Import and Export of E-waste

Moldova is Party to the main MEAs on hazardous waste, persistent organic pollutants (POPs), chemicals, and mercury.

Moldova accessed the Basel Convention in 1998 and is also Party to the Rotterdam, Stockholm, and Minamata Convention. The Regulation on the control of TBM of waste and its disposal, approved by Government Decision No. 637 in May 2003, regulates the requirements for TBM of hazardous waste in accordance with the provisions of the Basel Convention.

The export of e-waste from Moldova is not prohibited, while importation of e-waste is prohibited by the national legislation.

Moldova can export e-waste for treatment, provided that e-waste carriers meet the requirements of the 'Provisions on control of TBM of wastes and their disposal' approved by the Government Resolution No. 637, dated May 27, 2003, in accordance with the requirements of the Basel Convention – which requires written confirmation that treatment and recuperation have been made under conditions stipulated by the legislation. According to the Art. 63 of the law 'On waste' No. 209 of 2016, the import into Moldova of waste and residues of any kind for temporary landfilling (whether raw or processed), recovery, or disposal (by any method) shall be prohibited, except for the categories of waste listed in Annex 7, intended for use as secondary raw material in local undertakings.

No data on the import and export of e-waste could be retrieved from official reports.

Moldova regularly reports to the Basel Convention, but no data on importation and exportation of e-waste was reported in 2018 and 2019.

Used EEE is imported into Moldova, partly without any official declaration.

Moldova imports used EEE from abroad. Part of it is likely to be included in the official import statistics, while for other cases it could be simply brought by individuals when entering the country without any formal declaration.

[39] http://e-reciclare.md/ru.
[40] https://moldrec.md/.

Stakeholder Mapping

In Moldova, six authorities have responsibility in the field of e-waste management: the Ministry of Agriculture, Regional Development and the Environment, the Environmental Protection Agency, the Environmental Inspectorate, the Customs Service, and the National Bureau of Statistics. Other actors involved in the field are producers and importers, as well as distributors and operators of the treatment/recycling system.

Stakeholder	Responsibility
Ministry of Agriculture, Regional Development and the Environment Website	• Initiates and ensures the development, preparation for approval of legislative and regulatory acts of the Government in the field of waste management. • Responsible for monitoring the management of e-waste.
Environmental Protection Agency Website	• Participates in the implementation of state policy in the field of waste management and ensures the implementation of an integrated waste management system. Responsible for monitoring the management of e-waste. • Keeps records of data on manufacturers of EEE. • Accounting of data on the collection and treatment/recycling of e-waste.
Environmental Inspectorate Website	Responsible for ensuring compliance with e-waste legislation.
Customs Service Website	Exercises control of: • Import and export of new EEE. • Import and export of used EEE. • Export of e-waste.
National Bureau of Statistics Website	Data processing of statistical reporting forms.
Producers, Importers	• Registration in the list of producers. • Provide product labelling with symbols indicating that the product is subjected to separate collection (and its removal is prohibited). • Ensure the organisation and functioning of individual or collective systems for managing the respective waste streams. • Registration in the Automated Waste Management System. • Provide waste data to the Environmental Protection Agency.
Distributors	• Shall register in the List of Producers of Products subjected to the EPR Rules, which is managed by the Environmental Agency. • Ensure accounting of products POM for the previous five years, and for the annual reporting to the Environmental Agency on the number of products POM. • Ensure free-of-charge acceptance of e-waste. • Deliver e-waste to the producers or processors.
Treatment/Recycling Companies **E-Reciclare** Website **MoldRec** Website	Sorting, dismantling and primary treatment/recycling of e-waste. Export of the waste abroad for further treatment.

Country:

Belarus

9.4 million inhabitants
207,595 km²
Borders: Lithuania, Latvia, Russia, Ukraine, Poland
GDP per capita PPP: $18,184 USD
Average household size: 2.4 members

Legislation: ●●●●○
Infrastructure: ●●
Collection Rate: ●●●● 33.6 %

Legend:
- ● Advanced
- ● Transition
- ● Basic

National legislation on e-waste:

Extended Producer Responsibility:	✔ Introduced in 2012
National e-waste standards:	✔ 11 standards, covering all activities in the field of e-waste management
E-waste collection target:	✔ Min. 30% of weight EEE POM
Legislation product coverage in UNU-KEYs:	53 of 54
Legislation product coverage in weight (%) on total and per category:	Total: 100% of the e-waste generated in 2019

100% **100%** **100%** **100%** **100%** **99%**

International Conventions:

	Signature	Ratification/Accession	Entry into force
Basel Convention		10/12/1999 (a)	09/03/2000
Rotterdam Convention	-	-	-
Stockholm Convention		03/02/2004 (a)	17/05/2004
Minamata Convention	23/09/2014	-	-

EEE POM (2019):	E-waste generated (2019):	E-waste managed environmentally soundly (2019):
 99.6 kt. 10.6 kg/inh.	 75.9 kt. 8.1 kg/inh.	 25.5 kt. 2.7 kg/inh.

(Source: Belstat / Ministry of Housing and Utilities)

Formal/environmentally sound e-waste management system in place:

✔ 441 organisations collecting waste.
✔ 10 e-waste treatment companies.

National Legal Framework

Belarus regulates e-waste under e-waste treatment as part of hazardous waste, using the EPR principles.

Belarus regulates the management of e-waste as part of the hazardous waste category. The legal and regulatory framework concerning the management of e-waste in Belarus comprises the following:

- The Law of Belarus of July 20, 2007 No. 271-3 'On waste management' (last amended in 2019).
- Resolution of the Ministry of Natural Resources and Environmental Protection of Belarus of September 9, N 3-T 'On approval, introduction into force of the National classifier of Belarus' (on the Classifier of waste accruing in Belarus).
- Decree of the President of Belarus dated September 1, 2010 No. 450 'On licencing of certain types of activities'.
- Various legal acts governing the handling of scrap and waste of ferrous and non-ferrous metals (i.e. Law of Belarus of June 21, 2002 No. 110-Z 'On precious metals and precious stones', Decree of the President of Belarus dated May 5, 1995 No. 179 'On measures to strengthen the fight against theft of precious, ferrous and non-ferrous metals, their scrap and waste, precious stones', Resolution of the Ministry of Economy of Belarus, the Ministry of Architecture and Construction of Belarus, the Ministry of Industry of Belarus of June 15, 2006 No. 98/12/10 'On approval of the Instruction on the procedure for accounting, storage, use and sale of ferrous and non-ferrous metals, their scrap and waste', and Resolution of the Ministry of Finance of Belarus dated May 31, 2004 No. 87 'On approval of the Instruction on the procedure for the delivery and acceptance of scrap and waste containing precious metals').
- Decree of the President of Belarus of January 17, 2020 N 16 'On improving the procedure for handling waste of goods and packaging'.
- Resolution of the Council of Ministers of Belarus of June 30, 2020 N 388 'On the implementation of the Decree of the President of Belarus of January 17, 2020 N 16'. This decree establishes, among other things, the procedure for ensuring the collection from individuals of goods that have lost their consumer properties and packaging waste by organisations engaged in retail trade, in the places of their sale (repair, maintenance).

The Law 'On waste management', specifically, introduces modern principles of waste management, including the prevention of waste, the importance of recycling, and the reduction of the negative impact of waste on human health and the environment. The principle of the Extend Producer Responsibility is introduced by the Decree of the President of Belarus of January 17, 2020 N. 16. The extent of danger and the hazard class of waste generated are based on the Resolution of September 9, N 3-T 'On approval, introduction into force of the National classifier of Belarus' (on the Classifier of waste accruing in Belarus).

A State Program has been adopted for 2021-2025 to incentivize the separate collection of waste and the recycling of secondary raw materials.

To minimise the volume of burial of municipal waste and increase the share of their recovery, the Government for 2021-2025 adopted the State Programme 'Comfortable Housing and Favourable Environment', which includes subprogram 6, 'Target 99'. The 'Target 99' movement was launched in January 2015 as a unified information campaign for four notable reasons: to develop a responsible attitude to consumption waste among the residents of Belarus, popularize the use and separate collection of waste, strive to sort the maximum waste, and bringing the collection of secondary raw materials and their recycling to 99 percent of their generation. The sub-programme 6 'Target 99' will continue the work on improving the infrastructure for the management of solid household waste and secondary raw materials, including e-waste. By 2025, the plan aims to achieve the share of recovery of municipal waste of at least 64 percent of the volume of their generation (in 2020, the figure was set to 25 percent).

Belarus classifies e-waste in three groups.

E-waste is divided into 3 groups in Belarus:

- Large-sized e-waste (including refrigerators, freezers, washing machines, dishwashers and dryers, gas and electrical stoves, and other equipment whose dimensions exceed 160 centimetres in three dimensions).
- Medium-sized e-waste (including TVs, monitors, system units of computers, printers, copiers, scanners, laptops, sound recording or sound reproducing, video recording or video reproducing equipment, air conditioners, fans, microwave ovens, heaters, electric storage water heaters, vacuum cleaners, writing machines, sewing machines, and other equipment whose dimensions range from 80 to 160 centimetres in three dimensions).
- Small-sized e-waste (including e-waste not belonging to the other two categories, whose dimensions sum less than 80 centimetres in three dimensions).

An EPR system covering 53 UNU-KEYs and 100 percent of the total mass of e-waste has been in place in Belarus since 2012.

In Belarus, the EPR principles have been in effect since 2012. Since 2020, the implementation of the EPR has been regulated by the Decree of the President of Belarus of January 17, 2020 No. 16 'On improving the procedure for handling waste of goods and packaging', in which certain adjustments have been made, taking into account the practice of applying legislative norms. In addition to Decree No. 16, the Government adopted Resolution No. 388 of June 30, 2020 'On the Implementation of the Decree of the President of Belarus No. 16 of January 17, 2020', which defines:

- a list of goods and packaging to which the EPR applies (including: plastic, glass, and paper packaging, complex household appliances, batteries, lighting equipment, lubricants, and other goods);
- legal grounds for exemption from EPR;
- targets for collection of household waste goods and packaging, etc.

Resolution No. 388 establishes for manufacturers and importers the amount of fees for organising the collection, depollution, and/or recovery of waste goods and packaging. Manufacturers and suppliers must submit quarterly departmental reports on the fulfilment of the EPR obligation.

The list of products included under the EPR system for the e-waste sector has been analysed in relation to the UNU-KEYs and the six categories. Specifically, based on the information provided by Belstat, the EPR in Belarus covers 53 UNU-KEYs (except UNU-KEY 0701), corresponding to 100 percent of the e-waste generated in the country in 2019. The figures have been obtained by calculating the e-waste generated by all 54 UNU-KEYs, and the share by weight of those covered by Belarus legislation.

Belarus has defined a 30 percent EEE POM collection target for e-waste from 2020 forward.

In detail, the following collection targets on e-waste are established by law:

- Starting in 2017, at least 20 percent of the e-waste derived from the EEE POM in the territory of Belarus should be collected and processed.
- From 2020 forward, at least 30 percent of the e-waste of the EEE POM of the same year in the territory of Belarus should be collected and processed.

Several national standards are currently being developed to improve e-waste management in Belarus. With regard to EHS standards, by the end of the year 2020, 11 state standards covering all activities in the field of e-waste management have been revised, based on European standards developed in the context of the European WEEE Directive (Mandate M/518). Currently, they have already been approved with all the interested parties and are currently submitted for approval to the State Committee for Standardisation in Belarus. They should likely be adopted within the first half of 2021 and are:

1. STB EN 50625-1 'Requirements for collection, logistics and recycling of WEEE. Part 1. General requirements for processing';
2. STB EN 50625-2-1 'Requirements for collection, logistics and recycling of WEEE. Part 2-1. Requirements for handling lamps';
3. STB EN 50625-2-2 'Requirements for collection, logistics and recycling of WEEE. Part 2-2. WEEE recycling requirements containing CRTs and flat panel displays';
4. STB EN 50625-2-3 'Requirements for collection, logistics and recycling of WEEE. Part 2-3. Requirements for the recycling of heat exchange equipment and other WEEE containing volatile fluorocarbons (VFC) and / or volatile hydrocarbons (VHC)';
5. STB CLC / TS 50625-3-1 'Requirements for collection, logistics and recycling of WEEE. Part 3-1. Technical requirements for the elimination of environmental pollution. General Provisions';
6. STB CLC / TS 50625-3-2 'Requirements for collection, logistics and recycling of WEEE. Part 3-2. Technical requirements for the elimination of environmental pollution. Lamps';
7. STB CLC / TS 50625-3-3 'Requirements for collection, logistics and recycling of WEEE. Part 3-3. Technical requirements for the elimination of environmental pollution. WEEE containing CRTs and flat panel displays';
8. STB CLC / TS 50625-3-4 'Requirements for collection, logistics and recycling of WEEE. Part 3-4. Technical requirements for the elimination of environmental pollution. Heat exchange equipment';
9. STB CLC / TS 50625-4 'Requirements for collection, logistics and recycling of WEEE. Part 4. Technical requirements for collection and logistics related to WEEE';
10. STB CLC / TS 50625-5 'Requirements for the collection, logistics and recycling of WEEE. Part 5. Specification for the finishing of WEEE fractions. Copper and precious metals';
11. STB CLC / TR 50625-6 'Requirements for the collection, logistics and recycling of WEEE. Part 6. Report on compliance with Directive 2012/19 / EU, documents of the EN 50625 series and standard EN 50614'.

Concerning the e-waste reporting system and accounting, Belarus is planning to revise all the available departmental data collection forms and implement compositional studies on solid waste.
At the national level, there is no unified form for statistical reporting that allows quantification of waste generation by all sources. Currently, improvement of departmental data collection forms in the field of e-waste handling is ongoing.

Thus, in accordance with the Resolution of the Council of Ministers of Belarus of June 30, 2020 N 388 (Annex 3), the 'Form for submitting information on the fulfillment of the obligation to ensure the collection, disposal and/or use of waste goods and packaging' [43] was approved and began being used on July 1, 2020 for administrative data collection.

Besides the abovementioned, with the purpose of obtaining additional data on volumes of e-waste generated, in 2020, the Ministry of Housing and Utilities developed a methodology for determining mixed residual waste morphological composition. Within the framework of compositional studies in Belarus, it is allowed to determine:

- scope of study for obtainment of reliable data on mixed residual waste's morphological composition;
- procedure of morphological composition study;
- list of components (parts) of mixed residual waste subjected to mandatory identification.

Some practical applications regarding e-waste generation in Belarus that are planned for the indicators calculated at the national level include:

- formation of the State Programme on collection, storage, recycling of the secondary material resources;
- definition of justified tasks for the State Programme

customers on collection of e-waste in mass or percentage (%) of calculated amount of e-waste generation;
- determination of financial volumes for e-waste collection system development.

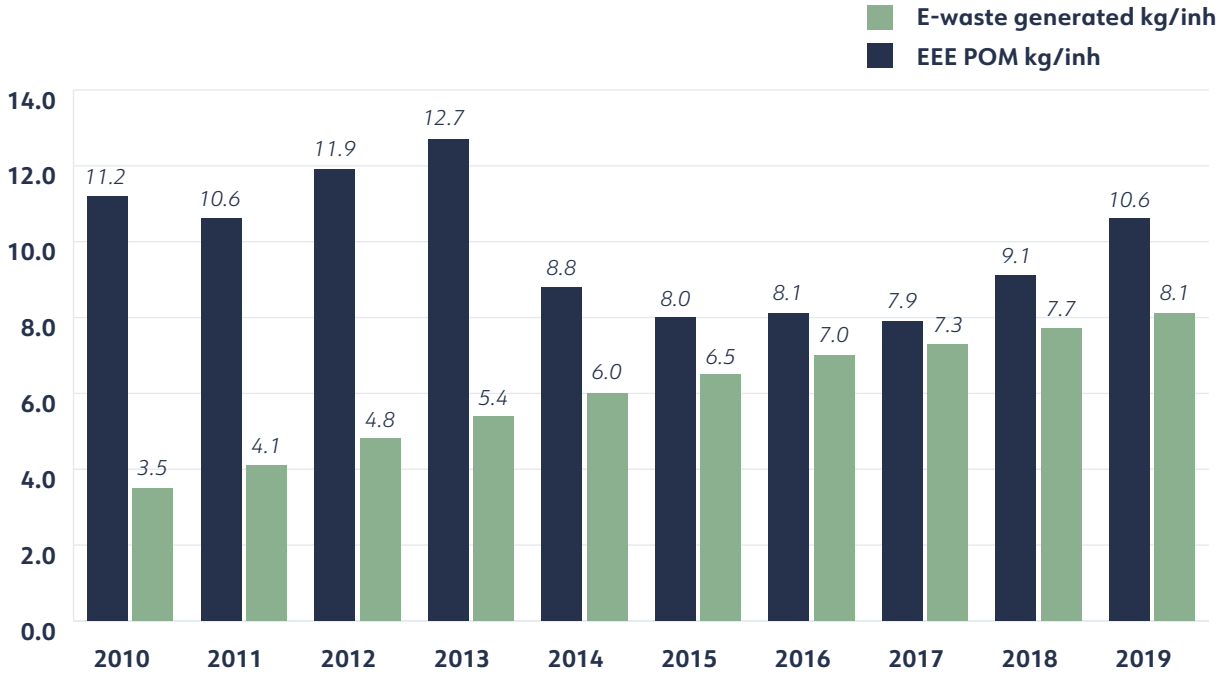
National Statistics on E-waste

Several authorities are responsible for waste statistics and data reporting in Belarus.
In Belarus, waste statistics are produced by the Ministry of Natural Resources and Environment Protection (industrial waste) and the Ministry of Housing and Utilities (municipal waste and secondary raw materials, including e-waste). The information collected distinguishes hazardous waste from non-hazardous waste and is harmonised with the international waste codes under the Basel Convention.

The National Statistical Committee (Belstat) coordinates the statistical activity in the country, including production of indicators and dissemination of information, which is made through the publication of the statistical annual reviews and through specific indicators (e.g. green growth, showing the intensity of waste production according to the GDP). Belstat is also responsible for the national platform for reporting SDG indicators and achievements. Work is ongoing to improve both the collection of such statistics as well as a digitization process.

The main statistics indicators could be determined at the national level, and Belstat has assessed the e-waste generated data through the use of UNU/ UNITAR methodology.
Based on the methodology developed by UNU/ UNITAR, Belstat compiled e-waste statistics indicators using the data on Foreign Trade Statistics for the years 1998-2019 and on domestic production for 1999-2019. In 2021, Belstat is planning to develop a national methodology for calculating e-waste generated, and its approval is envisioned for December 2021 in accordance with paragraph no. 21 of the plan of scientific and methodological work of Belstat for this year [44].

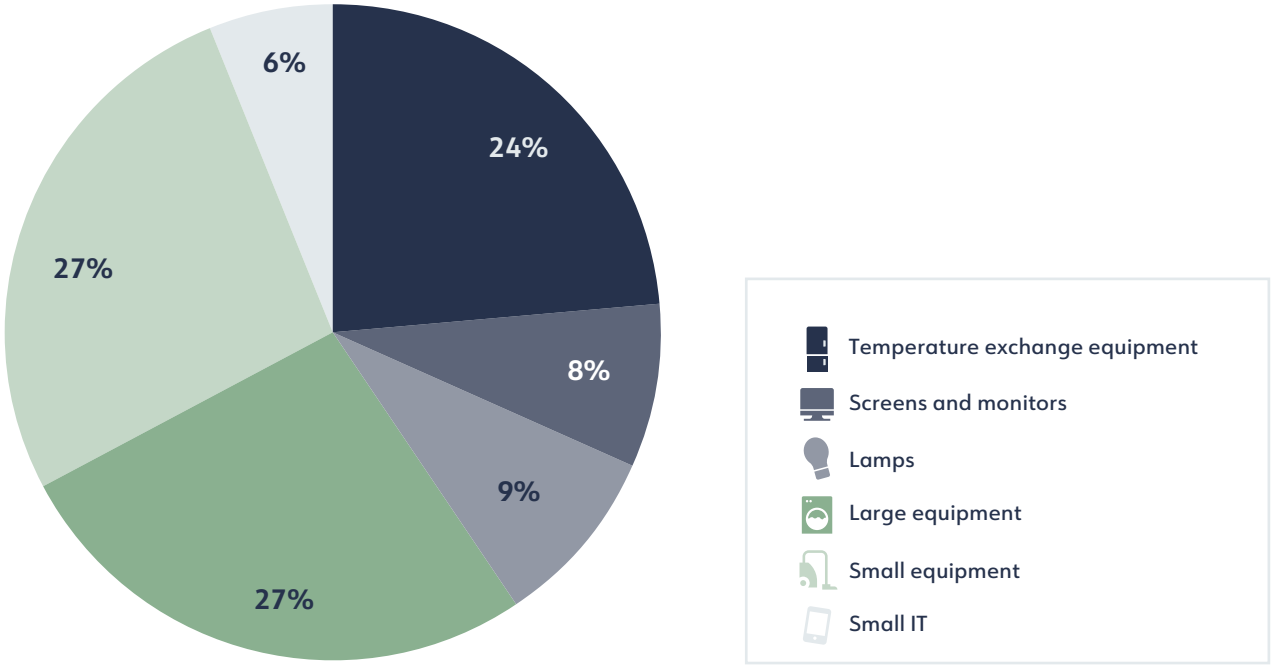
Figure 15. EEE POM and e-waste generated in Belarus



The amount of EEE POM in Belarus fluctuated but showed an upward trend, from 11.2 kg/inh in 2010 to 10.6 kg/inh in 2019.

In the last decade, Belarus EEE POM increased substantially from 11.2 kg/inh (106.2 kt) in 2010 to 12.7 kg/inh (119.9 kt) in 2013; it then decreased to 8.0 kg/inh (75.9 kt) in 2015 before beginning a new increasing trend up to 10.6 (113.6 kt) in 2019 (Figure 15).

Figure 16. Share of categories in the EEE POM (2019)



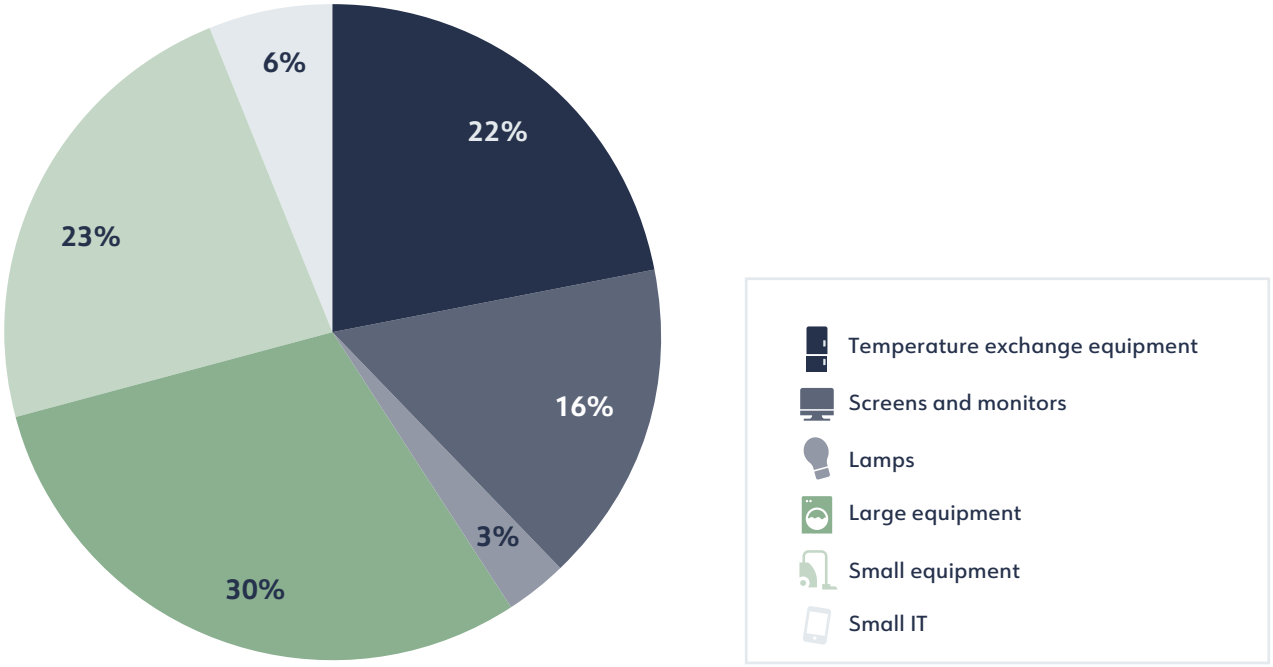
The largest shares of EEE POM are large equipment (Cat. IV) with 2.8 kg/inh and small equipment (Cat. V) with 2.9 kg/inh, both of which are equivalent to 27 percent of the total EEE POM. The smallest share is small IT (Cat VI), equal to 0.6 kg/inh (6 percent) (Figure 16).

Domestic production of EEE in Belarus is a vast sector.

The production of EEE was equal to 131.2 kt in 2019; part of this EEE was POM in the country, while the rest was exported. Belstat regularly produces and publishes this data on domestic production for the country[41]. When assessing the mass of EEE produced in Belarus, the products manufactured in the country were taken into account according to the codes of the OKRB 007-2012 classifier 'Product Classifier by Economic Activity' (OKP RB), harmonised with the Statistical Classification of Products by Economic Activity of the European Economic Community, version 2008 (CPA-2008), at the six-digit code level.

[41] https://www.belstat.gov.by/upload-belstat/upload-belstat excel/Oficial_statistika/Godovwe/prom_product(uslug)_19g.XLS
https://www.belstat.gov.by/ofitsialnaya-statistika/realny-sector-ekonomiki/promyshlennost/
https://www.belstat.gov.by/en/ofitsialnaya-statistika/real-sector-of-the-economy/promyshlennost/.

Figure 17. Share of categories of e-waste generated (2019)



The amount of e-waste generated in Belarus nearly tripled in the past decade, from 3.5 kg/inh (33.5 kt) in 2010 to 8.1 kg/inh (75.9 kt) in 2019.

The highest share of e-waste generated for 2019 in Belarus is that of large equipment (Cat. IV), with 2.4 kg/inh (30 percent). Then follow temperature exchange equipment (Cat. I) and small equipment (Cat. V), with 22 and 23 percent, respectively, equal to 1.8 kg/inh and 1.9 kg/inh. The smallest shares are lamps (Cat. III) with 0.2 kg/inh (3 percent) and small IT (Cat. VI) with 0.5 kg/inh (6 percent) (Figure 17).

In 2020, the amount of e-waste managed in an environmentally sound manner in Belarus was equal to 3.1 kg/inh and was 2.7 kg/inh in 2019; as such, Belarus is highest in the region.

According to the Ministry of Housing and Utilities of Belarus, the collection of e-waste amounted to 29.13 kt in 2020, or 3.1 kg/inh, illustrating that the target of collecting and recycling 30 percent e-waste in 2020 was reached. In 2019, the e-waste formally collected was equal to 2.7 kg/inh (25.5 kt). The amount of e-waste treated using ESM corresponds to 33.6 percent of the total e-waste generated in 2019. This is the highest recycling rate achieved in the CIS+ region, indicating that Belarus has the most advanced and established e-waste collection and management system in the CIS+ region. Given the fact that the country currently reaches a collection rate of more than 33.6 percent, it can be assumed that the remaining portion of e-waste is either mixed in with the residual waste and disposed of or managed by the informal sector. Unfortunately, no official information on these complementary e-waste flows, household behaviours, or the role of the informal sector in the country could be obtained.

Belstat expects to work on EEE and develop a national methodology.

Based on the work already begun, Belstat and the state organisation 'Secondary Material Resources Operator' under the Ministry of Housing and Utilities have started to analyse the average weights of EEE and expect to analyse its life cycle. In 2021, Belstat is planning to develop a national methodology for calculating e-waste generated, which is expected to be approved in December 2021 in accordance with paragraph no. 21 of the plan of scientific and methodological work of Belstat for this year [45].

E-waste Management System

A formal e-waste management system is in place in Belarus and managed to collect and recycle 2.7 kg/inh (25.5 kt) of e-waste in 2019 and 3.1 kg/inh (29.13 kt) in 2020, which puts Belarus as the most advanced in the CIS+ region.

The responsibility for e-waste management is placed on legal entities and on the local executive authorities involved in household waste collection.

The most common e-waste collection modalities in Belarus can be either state-owned or private and consist of the following:

- At retail shops.
- In repair and service centres.
- In complex reception centres.
- Collection from apartments and households on request ('ecological taxi').
- Together with collection of bulky waste at container sites, etc.

On average, there is a good number of collection points in Belarus, and there are several modalities for proper e-waste collection. Similarly, when comparing the development of e-waste management in the regions of Belarus (six regions and the city of Minsk), the best situation in terms of collection and recycling is in the city and surrounding region of Minsk. One region that needs further development with respect to e-waste management is the Grodno region.

There are 441 organisations that collect waste and, potentially, secondary material resources in Belarus.

Manufacturers and suppliers can either use their own waste collection systems or conclude an agreement with the 'Secondary Material Resources Operator' established as national entity responsible for the management of such materials as part of the EPR system. The 'Secondary Material Resources Operator' collects the fees, paid by producers and providers, which are then invested in the implementation of the state programmes in this field. The obligation arises for importation of goods and packages to the territory of Belarus for the selling of nationally produced goods. The producers and providers of consumer goods can use their own systems of waste collection and can conclude contracts for such purposes with the 'Secondary Material Resources Operator'. The fees paid to the 'Secondary Material Resources Operator' are based on the number of items produced and sold on the territory of Belarus and/or exported goods indicated in the Annex to the Decree. The 'Secondary Material Resources Operator' has maintained a list of waste goods and packaging waste that collects, sorts, and prepares for neutralisation and/or use since October 2015. Non-compliance with prescribed obligations by the producers and providers, as well as illegal or inappropriate use of funds by the 'Secondary Material Resources Operator' or by fund receivers, constitutes an administrative offence, sanctioned by a penalty. Specifically, according to the Article 16.44 on the 'Violation of legislation on waste management' in the Code of Belarus on Administrative of January 6, 2021 No. 91-3, the failure to comply with the obligation established by the legislation on waste management shall entail the imposition of a fine of up to 100 percent of the fee for organising the collection, neutralization, and/or recovery of waste goods and packaging.

Retail organisations ensure collection of e-waste from individual consumers.

Organisations engaged in retail trade are required to ensure collection, from individuals, certain goods that have lost their consumer properties, including e-waste, waste lamps, and waste batteries. All legal entities and individual entrepreneurs receive funds from 'Secondary Material Resources Operator' for each ton of waste collected and delivered to the national treatment and recycling companies.

In Belarus, 10 organisations are declared as recycling companies, including:

1. 'BelVTI' OJSC and its regional branches (state enterprise) – which currently has the main relative share of collection and manual treatment;
2. 'Unidragmet BGU' unitary enterprise (state enterprise);
3. 'BelVtorOtkhody' LLC (private);
4. and other organizations.

These organisations have the objective of processing and recycling e-waste, which is registered in the "register of objects for use of waste" (maintained by the Ministry of Natural Resources and Environmental Protection), to obtain secondary raw materials. Manual separation of e-waste components is the current practice followed in

the country. As reported by a representative of BelVTI, everything is collected and disassembled to the maximum extent possible in the country, and all materials obtained are processed compliantly with the legislation.

The recycling capacity of the active facilities in Belarus covers all e-waste types.

Based on the data received by BelVTI in 2021, the state enterprise is able to process and recycle all e-waste categories. Specifically, for 2020, the total recycling capacity was equal to 4.1 kt, broken down per category as:

1. Temperature exchange equipment: 1.3 kt.
2. Screens and monitors: 1.2 kt.
3. Lamps: 0.03 kt.
4. Large equipment: 1.5 kt.
5. Small equipment : 0.1 kt.
6. Small IT and Telecommunication equipment: 0.02 kt.

The majority of e-waste collected in Belarus is recycled, but valuable and desired parts are exported for treatment in the EU or Russia.

Only the components containing valuable metals, after dismantling of the e-waste, are sent to refineries in the EU and Russia. The rest is sent for recycling or neutralisation on the territory of Belarus (plastic, metal, etc.).

An unofficial e-waste collection and recycling sector also exists in Belarus, but it is not quantified.

According to the information collected for this report, owners of e-waste bring such waste to unofficial collection points by themselves. Nonetheless, no attempts have been made to quantify the informal sector, as this sector is not considered to be especially relevant, considering the high degree of state control.

Repair and reuse culture are fairly widespread in Belarus.

Many consumers prefer repairing and reusing their appliances to buying new ones, though it depends on the consumer and on the type of appliance. The second-hand market is well-developed, so it is easy to find repair parts, and there are many repair shops across the country. The importation of second-hand equipment was common in past decades, but now it occurs less frequently.

Despite the fact that Belarus has a well-established e-waste management system, it still faces obstacles, such as public awareness and the availability of technology and incentives.

Key shortfalls in the field of e-waste-handling in Belarus currently include:

- deficiency of proper incentives for development and production of less hazardous and easier-to-recycle products are needed;
- limited incentive measures for reuse (which is nevertheless very common in the country, due to cultural and financial possibilities);
- absence of development of environmentally friendly technology of e-waste recycling;
- scarce awareness among the population (based on information from IPO Ecopartnership, roughly half of the population was unaware of the EPR system as recently as two years ago);
- limited public understanding of the e-waste problem and modalities of collection.

Belarus has the highest e-waste collection rate in the region – due to the EPR system, several management standards in place, and a well-developed infrastructure throughout the territory.

Import and Export of E-waste

The import and export of hazardous waste and e-waste in Belarus are regulated in accordance with the requirements of the Basel Convention and the Eurasian Economic Commission Decision No. 30 of 2015 'On measures of non-tariff regulation'.

Belarus has been party to the Basel Convention since 2000 and is also a member of the EAEU and a signatory of the Dushanbe Declaration for developing a regional strategy to manage e-waste. The import and export of hazardous waste on the territory of the EAEU is actually regulated in accordance with the requirements of the Basel Convention and the Eurasian Economic Commission Decision No. 30 of 2015 'On measures of non-tariff regulation' in relation to other countries, which approved the Unified list of goods, including hazardous waste, prohibited for import and hazardous waste, to which non-tariff regulation measures are applied in trade with third countries. For the implementation of state regulation of the export and import of goods (including hazardous waste), the EAEU uses the international classifier: EAEU TN VED. The first six characters of the product code correspond to the HS nomenclature, the seventh and eighth correspond to the Combined Nomenclature of the European Community, the ninth corresponds to the TN VED CIS, and the tenth character of the product code is intended for detailing goods at the level of the EAEU TN VED.

Licences and permits are required for importation and/or exportation of hazardous waste.

TBM of hazardous waste must be subjected to licences in Belarus. This also relates to e-waste and products such as: scrap of electrical equipment or electro technical nodes (such as galvanic elements), batteries, mercury switches, and the glass of cathode-ray tubes. The requirements for licences and permits are defined by the Law of Belarus 'On waste management' No. 271-3 of 2007.

In 2018 and 2019, a total of 0.002 kg/inh of e-waste and e-scrap was exported from Belarus for secondary material recovery and recycling.

From the annual reports to the Basel Convention, it was possible to estimate that in 2018, 0.001 kg/inh (10.7 tons) of e-waste scrap have been exported to Germany. Reporting for 2019 shows that Belarus exported 0.0003 kg/inh (3 tons) of e-scrap to Lithuania, and the e-scrap was then gathered for further recycling and reclamation (R5, according to the legend about disposal operations in Annex IV of the Basel Convention). Among the products involved are metal waste and e-waste containing precious metals, antimony, and mercury compounds.

No data on importing of e-waste could be retrieved through the Basel Convention's annual reporting.

Belarus does not import significant amounts of used-EEE.

Though no quantifiable information regarding used EEE in Belarus is currently available, the flow is likely to be very marginal.

Stakeholders Mapping

The four governmental authorities with responsibility in the e-waste sector are the Ministry of Natural Resources and Environmental Protection of Belarus, the State institution 'Operator of secondary material resources' under the Ministry of Housing and Utilities, the National Statistical Committee, and the Ministry of Finance. There are also several public and private companies involved in e-waste collection and treatment/recycling, as well as NGOs and public associations conducting awareness and educational activities.

Stakeholder	Responsibility
Ministry of Natural Resources and Environmental Protection of Belarus Website	Responsible for the development of waste management policies and legislation.
Ministry of Housing and Utilities of Belarus Website	Responsible for the formulation and implementation of state policy and coordination of activities of state organisations in the field of waste management, including e-waste.
National Statistical Committee of Belarus (Belstat) Website	Belstat is the national government body in the field of state statistics and conducts state policy in the field of state statistics; it also regulates, controls, and coordinates the activities of other state bodies and other organisations in this area. Belstat reports directly to the President of Belarus.
Ministry of Finance Website	The Ministry is responsible for the implementation of a unified financial policy, as well as regulation and management in the financial sphere of activity and the coordination of activities of other national government bodies. As well, the Ministry is responsible for state regulation and control in the field of activities with precious metals and precious stones, the creation of reserves of precious metals, and precious stones in the country.
State institution 'Operator of secondary material resources' Website	The state non-profit organisation responsible for the management of secondary material resources. It coordinates the collection of waste as potential secondary material resources. It also deals with the accumulation of financial resources paid by manufacturers and suppliers, and their subsequent allocation to the implementation of government programmes, organisational, technical and information support for the collection and treatment/recycling system and other activities in the field of use of secondary material resources.
'BelVTI' OJSC and its regional branches Website	The company recycles any e-waste from legal entities and the general public. BelVTI OJSC accepts equipment in any quantity, as well as plastics-containing parts. BelVTI OJSC has the main relative share of collection and manual treatment in the country.

Stakeholder	Responsibility
Unidragmet BGU unitary enterprise Website	The company accepts any kind of e-waste for recycling, subsequently extracting both metals and precious metals. The treatment/recycling of e-waste is carried out in several stages: 1. Sorting products. 2. Manual disassembly of the appliance in order to separate the metal and plastic. 3. Some components are processed through mechanical presses, while others are shredded in crushers. The material obtained after grinding is recycled and transferred to industrial enterprises. Precious metals recovered during the disposal of equipment are supplied to the State Fund of precious metals and gemstones of Belarus.
'BelVtorOtkhody' LLC Website	The company accepts and processes any e-waste from both legal entities and the population.
Belarus Public Association 'Environmental Initiative' Website	The organisation initiates various actions to stimulate the collection and recycling of e-waste.
Institution 'Environmental Solutions Center' Website	The organisation carries out various public initiatives in the field of proper management of e-waste.
IPO 'Ecopartnership' Website	International Public Organisation that developed strategies for the management of e-waste for the Puchavičy district. As result of these strategies, and via partnerships with local authorities, it was possible to create an effective system for collecting old household appliances and batteries in the district.
Producers and Importers	Responsible for ensuring the collection, disposal, and/or treatment and recycling of electronic goods.
Treatment/Recycling Companies	See info above: 'BelVTI' OJSC and its regional branches, Unidragmet BGU unitary enterprise, 'BelVtorOtkhody' LLC.

Country:

Russia

143.9 million inhabitants
17,098,242 km²
Borders: Ukraine, Belarus, Latvia, Estonia, Finland, China, Mongolia, Kazakhstan, Caspian Sea, Azerbaijan, and Georgia
GDP per capita PPP: $26,449 USD
Average household size: 2.6 members

Legislation: ●●●●○
Infrastructure: ●○
Collection Rate: ● 2.5 %

Legend:
- ● Advanced
- ● Transition
- ● Basic
- ○ Unknown

National legislation on e-waste:

Extended Producer Responsibility:	✔ Introduced in 2014
National e-waste standards:	✔ Introduced in 2012 re: collection, storing, transporting, and disassembling
E-waste collection target:	✔ 15% of the EEE POM, approved in 2020
Legislation product coverage in UNU-KEYs:	33 of 54
Legislation product coverage in weight (%) on total and per category:	Total: 81% of the e-waste generated in 2019

95% 100% 26% 86% 59% 90%

International Conventions:

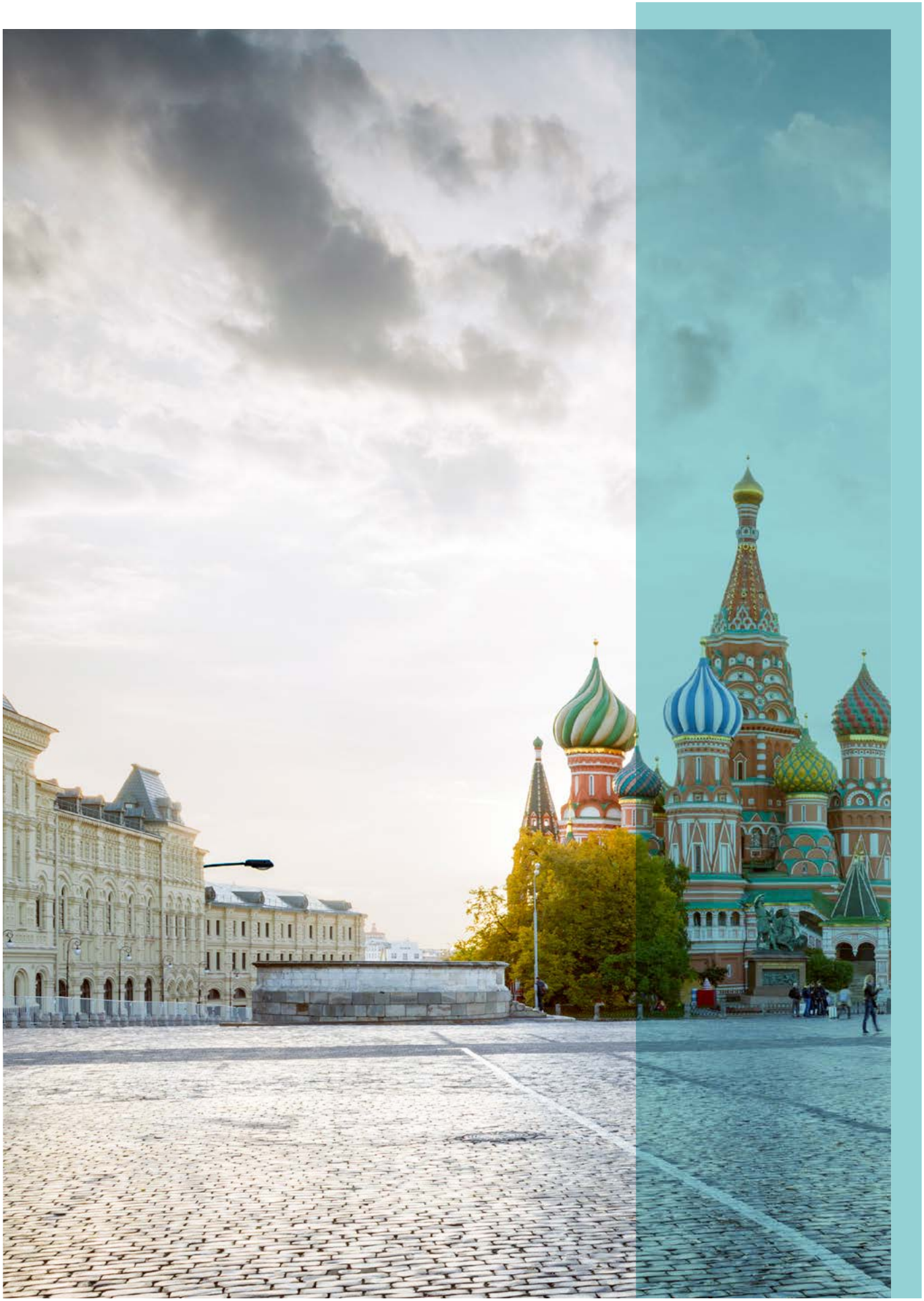
	Signature	Ratification/Accession	Entry into force
Basel Convention	22/03/1990	31/01/1995	01/05/1995
Rotterdam Convention	-	28/04/2011 (a)	27/07/2011
Stockholm Convention	22/05/2002	17/08/2011	15/11/2011
Minamata Convention	24/09/2014	-	-

EEE POM (2019):	E-waste generated (2019):	E-waste managed environmentally soundly (2019):
1,977 kt. 13.7 kg/inh.	1,631 kt. 11.3 kg/inh.	41.3 kt. 0.3 kg/inh.

(Source: UNU / UNITAR / Federal Service for Supervision in the field of natural resources)

Formal/environmentally sound e-waste management system in place:

✔ About 80 enterprises specialised in e-waste recycling.
✔ 2 companies specialised in recycling of batteries.



National Legal Framework

There is no e-waste-specific legislation in Russia, but e-waste is explicitly regulated within the existing federal legal and regulatory framework.

E-waste in Russia is not subject to a specific legislation, but it is covered by the legal framework on general waste management. Russia has a federal legal system with environmental matters regulated at both the federal and regional level. Waste management is covered by federal laws, which regulate the separate collection of waste, prescribe strict sanctions for improper disposal, and envision a phased ban on the disposal of waste suitable for recycling. The main legal acts regulating the management of e-waste are as follows (in reverse chronological order):

- Government Order of Russia of December 31, 2020 No. 3722-r 'On approval of standards for the utilisation disposal of waste from the use of goods for 2021'[42].
- Government Resolution of April 9, 2016, No. 284 'On establishment of environmental fee rates for every group of goods, that are subject to disposal after the loss of their consumer properties, paid by the producers, importers of goods, who do not provide independent disposal of waste after use of goods'[43] .
- Decree of the Government of Russia of December 30, 2015, No. 1520 'On a unified state information system for recording waste from the use of goods'[44].
- Government Resolution No. 1073, of October 8, 2015 'On the procedure for levying an environmental fee'[45].
- Government Order of Russia of December 31, 2020, No. 3721-r 'On approval of the list of goods, packaging of goods to be disposed of after they have lost their consumer properties' entered force on January 1, 2021.
- Government Order of Russia of September 24, 2015, No. 1886-r 'On approval of the list of goods, packaging of goods to be disposed of after they have lost their consumer properties' was repealed, effective 1 January 2018.
- Decree of the Government of Russia No. 1589-p 'On approval of the list of types of production and consumption waste, which include useful components, the disposal of which is prohibited'.
- Decree of the Federal Service for Supervision in the Field of Natural Resources of May 22, 2017, No. 242 'On Approval of the Federal Classification Catalogue of Waste' has approved the list of waste containing classified and structured information on the origin of the type of waste and its mix, the aggregate state and physical form of the type of waste, and the hazard class of the type of waste, depending on the degree of negative impact on the environment.
- Government Resolution of Russia of December 28, 2020, No. 2314 'On approval of the rules for the management of production and consumption waste in terms of lighting devices, electric lamps, improper collection, accumulation, use, neutralisation, transportation and placement of which may cause harm to the life, health of citizens, harm to animals, plants and environment'.
- Federal Law of May 22, 1998, No. 89 'On Production and Consumption Wastes' (as last amended) [46].

The Federal Law No. 89 of 1998 is the main regulatory act in the field of waste management.

The main law regulating waste activities is Federal Law No. 89 of 1998 'On the Production and Consumption Wastes', with amendments and addendum introduced in 2014. This Law formulates priority areas of the State policy in waste management as follows:

- Maximum use of feedstock and materials.
- Prevention of waste generation.
- Reduction of waste generation and waste hazardousness in the sources and moments of their generation.
- Waste treatment.
- Waste disposal.
- Waste neutralisation, i.e. the reduction of the harmful potential of the waste.

Federal Law No. 89 also regulates licencing of activities on the collection, transportation, treatment, disposal, neutralization, and dumping of waste according to four classes of hazardousness (I-IV classes). Storage is not included in the list. In 2017, amendments and additions were made to Federal Law No. 89 of 1998 regarding prohibition of the disposal of waste containing useful components (Article 12). As well, the principle of 'use of the best available technologies for waste management' was introduced into the same law on December 29, 2014 (Article 3).

[42] http://www.garant.ru/products/ipo/prime/doc/400069372/. [43] http://docs.cntd.ru/document/420348675.
[44] http://base.garant.ru/71296552/. [45] http://base.garant.ru/71212976/.

In the Russian legislation, e-waste is specifically mentioned as waste containing useful components that should not be disposed of.

The Decree of the Government of Russia No. 1589-p 'On approval of the list of types of production and consumption waste, which include useful components, the disposal of which is prohibited', dated July 25, 2017, includes e-waste under this classification.

The State Environmental Policy discourages landfilling and prescribes the use of BAT for waste management.

The basics of the State Environmental Policy of Russia [47] regarding waste management until 2030 includes the separate waste collection, strict sanctions for improper disposal, and step-by-step introduction of a ban on the landfilling of recyclable waste. Since 2016, owners of individual residential buildings are required to conclude a waste-handling agreement with regional operators. Since January 1, 2017, the landfilling of waste containing useful components subjected to disposal has been prohibited. Additionally, one of the principles of the State Environmental Policy is the use of BAT in waste-handling.

The use of BAT was introduced in 2014 by the Federal Law 219-FZ as of July 21, 2014, specifically in article 28.1 that was added to the Federal Law 'On Environment Protection'. The Environmental Security Strategy of Russia for the period up to 2025 (approved by the Decree of the President of Russia, dated April 19, 2017, in No. 176) notes that accelerating the introduction of the best-available technologies is one of the main mechanisms for implementing state policy in the field of environmental safety. By Order of the Government of Russia No. 2674-r, dated December 24, 2014, a list of BAT application areas was approved that included economic and/or other activities that have a significant negative impact on the environment, as well as technological processes, equipment, technical methods and methods used in the implementation of economic and/or other activities. Among others, the scope of the BAT application included activities for the disposal of waste. In 2016, the BAT reference book ITS 15-2016 was adopted; it included BAT for e-waste recycling and neutralisation.

Russia introduced the EPR principle in national legislation in 2014.

Amendments and an addendum made to the Federal Law No. 89 in 2014 laid the foundation for the beginning of implementation of the EPR principle in Russia. Accordingly, producers of goods shall ensure correct waste disposal deriving from the use of the goods they place on the market. The producer directly either creates the infrastructure for waste collection and disposal or delegates the function to the regional operator through a dedicated contract. Contracts with this operator can be concluded both by individual producers and producers' associations. Accompanying bylaws were also adopted, specifying the newly introduced provisions. EEE subject to EPR in Russia total roughly 125 types of products, organised in 11 groups (Table 10) and corresponding to 31 UNU-KEYs.

Table 10. Grouping of product types

Group Number	Name
Group # 27	Computers and peripheral equipment, office equipment
Group # 28	Monitors, TV receivers
Group # 29	Telecommunication equipment
Group # 30	Electronic household appliance
Group # 31	Optic and photographic equipment
Group # 32	Primary elements and batteries of primary elements
Group # 33	Lead accumulators
Group # 34	Accumulator batteries
Group # 35	Lightning electrical equipment
Group # 36	Electric household appliances
Group # 39	Industrial, refrigeration, and ventilation equipment

Russia foresees mandatory recycling of the abovementioned 11 groups of e-waste.
The new regulation adopted on December 31, 2020, No. 3722-r 'On approval of standards for the disposal of waste from the use of goods for 2021', approved a list of goods and packaging to be recycled after the loss of their consumer properties. This list includes 40 groups of products and 10 packing groups, as well as 11 groups of EEE.

The physical and chemical characteristics of products determine which group list they belong to, according to the All-Russian product classifier by type of economic activity – AC 03-2014 (PCEAU, 2008) – adopted and put into effect by order of the Federal Agency for Technical Regulation and Metrology of January 31, 2014 N 14-st[46]. The list also contains codes and names related to the positions of the products in the Commodity Nomenclature for Foreign Economic Activity of the EAEU (CN FEA EAEU).

Procedures, forms, and deadlines for declaring the number of finished goods (including packaging) issued on Russian territory by producers and importers of goods to be disposed of for the previous calendar year are established by the Statute approved by the Government Resolution of Russia No. 1417 of December 24, 2015. The procedures, forms, and deadlines for submission by producers and importers of goods subject to the disposal of reports on the implementation of utilisation standards are established by the Rules for Submission approved by the Government Resolution of Russia No. 2010 of December 3, 2020.

[46] http://ivo.garant.ru/#/document/70650730/paragraph/39211:0.

Targets for disposal have also been approved in 2020.
Suppliers (producers and importers) of such products are required to discard waste according to the standards of waste disposal approved in 2020 by the Government Order of Russia of December 31, 2020 No. 3722-r 'On approval of standards for the utilisation of waste from the use of goods for 2021' and calculated in percentage from volume of goods POM.

An environmental fee for producers and importers of EEE is likely to be imposed.
The procedure for levying an environmental fee – including the procedure for its calculation, its due date, and the procedure for monitoring the correctness of calculation – was established by Government Resolution No. 1073 of October 8, 2015. Decree No. 284 of 2016 sets the environmental fee rate for producers/importers of EEE who do not provide for the correct disposal of e-waste arising from the products they POM in the previous year. The target is also used to calculate the ecological fee paid by producers/importers if they do not fulfil it. The environmental fee (Table 11) is calculated as the environmental tax rate multiplied by both the weight of the products EEE POM and the recycling rate.

Table 11. Environmental fee

Groups subject to utilisation after the loss of their consumer properties, approved by the RF Government Order No. 3721-r of 2021		Standards of waste utilisation, in %, as of 2020	Environmental fee rate (roubles per ton)
Group #27	Computers and peripheral equipment, office equipment	15	26,469
Group #28	Monitors, TV receivers	15	26,469
Group #29	Telecommunication equipment	15	26,469
Group #30	Electronic household appliance	15	26,469
Group #31	Optic and photographic equipment	15	26,469
Group #32	Primary elements and batteries of primary elements	20	33,476
Group #33	Lead accumulators	20	2,025
Group #34	Accumulator batteries	20	33,476
Group #35	Lightning electrical equipment	15	9,956
Group #36	Electric household appliances	15	26,469
Group #39	Industrial, refrigeration, and ventilation equipment	15	26,469

The legislation on waste of Russia defines the term utilisation as 'the use of waste for the production of goods (products), performance of work, provision of services, including the reuse of waste, including the reuse of waste for its intended purpose (recycling), their return to the production cycle after appropriate preparation (regeneration), extraction of useful components for their reuse (recovery), as well as the use of solid municipal waste as a renewable energy source (secondary energy resources) after the extraction of useful components from them at processing facilities'. As such, the term is broad and includes recovery, reuse, and recycling. Similarly, the term 'waste treatment' is defined as a 'preliminary preparation of waste for further utilisation, including sorting, disassembly, cleaning'.

Waste data are collected in Russia through the unified national information system that has been in place since 2015. A specific form for measuring e-waste streams is used.

The unified national information system of waste accounting from use of goods, created in compliance with the Law No. 89 and by Russia Government Resolution No. 1520 of 2015 operates on the territory of Russia. Rosprirodnadzor is specified as the operator of the waste-accounting system. The waste-accounting system is designed to automate the processes of collection, processing, storing, and analysis of information in waste-handling, as well as for informational provision of activities for control compliance with waste disposal standards. The following information subsystems are included in the system:

- Roster of producers and importers of goods.
- Waste subjected to EPR.
- Roster of the basic technological equipment (capacity) for provision of waste disposal.
- Roster of licences for realisation of activities on collection, transportation, treatment, disposal, neutralisation, and dumping of I-IV hazard classes of waste.
- Handbook and classifiers.
- Data bank on waste and technological disposal and neutralisation of waste.
- Electronic services, including services for calculation of an environmental fee amount.

There is no open access to the system's data.

Localisation of sources of waste generation and waste movement are contained in the territorial schemes for waste management of each region of Russia. The No 2-TP (waste) – form of the Federal statistical survey is used to measure streams of e-waste. Legal entities and private entrepreneurs involved in production and consumption who are responsible for waste management provide annual information on all types of waste (in tons) and operations, in compliance with the Form No2-TP (waste) to the Territorial bodies of the Rosprirodnadzor. According to the index system of Form No2-TP, (waste) data are provided by waste codes in compliance with the Federal Classification Catalogue of Waste (FCCW) of Russia that contain entries for 25 groups of e-waste, including defective accumulators, batteries, and mercury-containing waste. The structure of FCCW is based on two classifiers (of economic activities and of products of economic activities) and includes practically all types of goods. In some cases, goods from different FCCW groups were combined. A systematization of this information on regional level is carried out in the Territorial bodies. From there, the information is sent to the Central Office of Rosprirodnadzor, where data systemisation on the Federal level is performed.

EHS standards on e-waste management were adopted in 2012.

National standards for e-waste management are in place in Russia. The legal act regulating the proper management of e-waste is the 'Guideline on the safe collection, storing, transporting and disassembling of the e-waste except mercury-containing devices and appliances'[47], approved and put into effect by the Order of the Federal Agency for Technical Regulation and Metrology on November 14, 2012.

National Statistics on E-waste

The Federal State Statistics Service – Rosstat is a federal executive body responsible for generating official statistical information. It processes and publishes data on production and consumption of waste that are provided by Rosprirodnadzor, as well as data on manufactured products. Statistics on e-waste generated and collected are regularly compiled in the country. The catalogue of waste also contains information disaggregated per region, city, economic activity of origin, the chemical composition of the waste, and its material. The main sources for official statistical information on production and consumption waste in Russia are available on the relevant actors' websites:

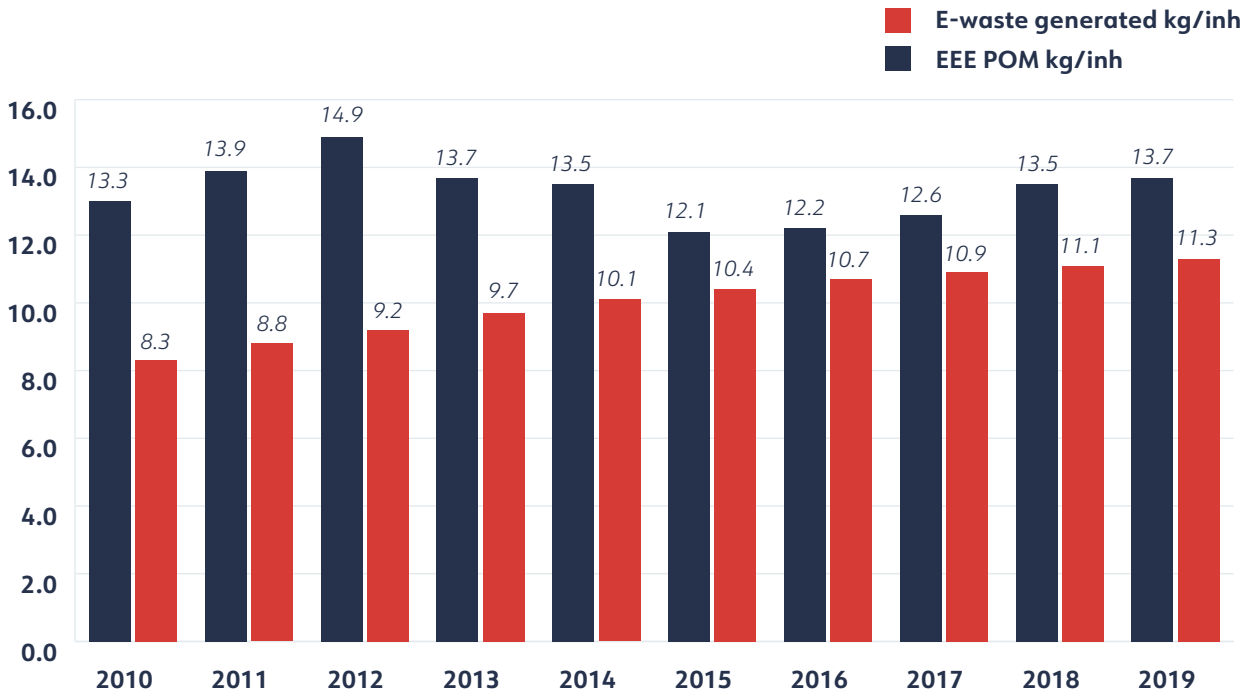
- Website of the Rosprirodnadzor[48].
- In unified interagency information statistical system (UIISS)[49].
- Website of the Rosstat[50].

The data available includes 'Generation of production and consumption waste by type of economic activity', 'Generation, recycling, neutralisation, and disposal of production and consumption waste in Russia', and 'Recycling and neutralisation of production and consumption waste by type of economic activity'. Nevertheless, the data is aggregated, so isolation of e-waste is not possible.

[47] http://docs.cntd.ru/document/1200104723. [48] https://rpn.gov.ru/opendata/.
[49] https://www.fedstat.ru. [50] https://www.gks.ru/folder/11194.

Russia has not yet identified a responsible authority for working on EEE POM and e-waste generated data quantification. In this respect, Rosstat does not currently plan to work on these calculations. Therefore, UNU/UNITAR internal data has been used to estimate the main e-waste statistics indicators for the country (Figure 18).

Figure 18. EEE POM and e-waste generated in Russia

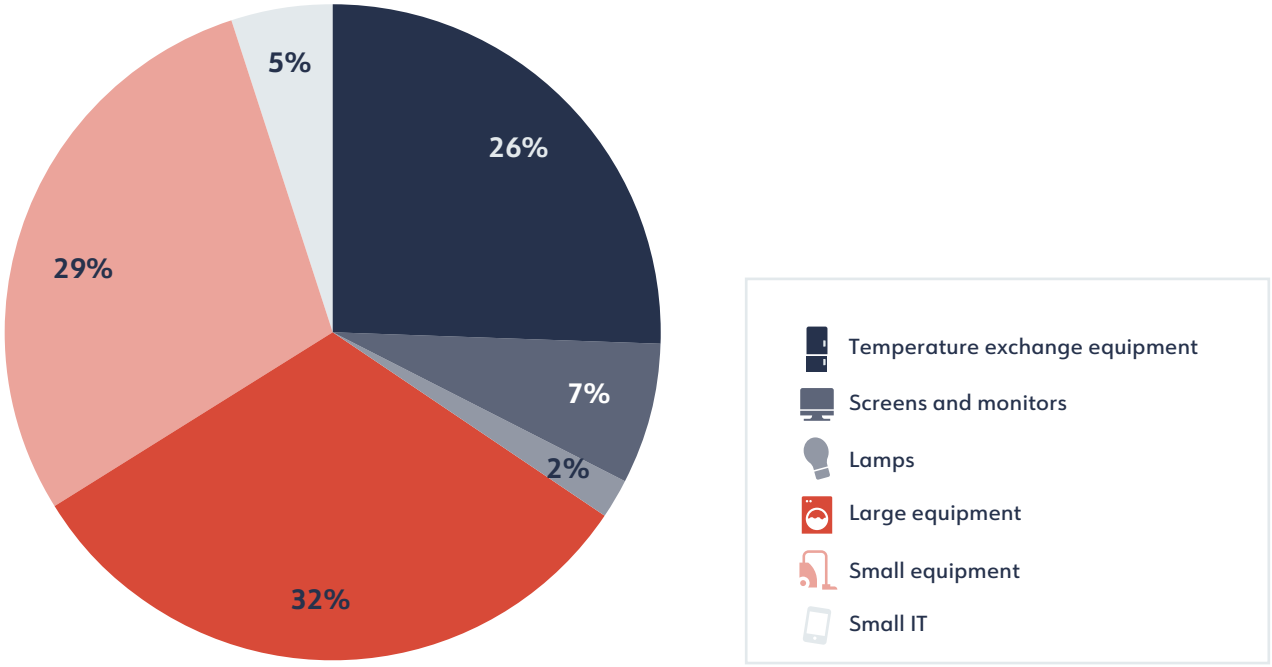


EEE POM in Russia has increased slightly, from 12.2 kg/inh in 2015 to 13.7 kg/inh in 2019, and is the highest in the CIS+ Region.

The amount of EEE POM in Russia increased from 13.0 kg/inh (1,855.3 kt) in 2010 to 14.9 kg/inh (2,139.2 kt) in 2012, then decreased to 12.1 kg/inh (1,745.3 kt) in 2015 and registered another positive trend until 2019 with 13.7 kg/inh (1,976.6 kt). The volume of EEE POM per inhabitant in Russia is the highest in the CIS+ region. In 2019, the EEE POM per inhabitant in Russia was 23 percent higher than the regional average, equal to 11.0 kg/inh.

Russia is generating the highest amount of e-waste per capita in the region. The EPR system and the presence of several EHS e-waste management standards could help improve the sector.

Figure 19. Share of categories in the EEE POM (2019)



The largest two shares were for large equipment (Cat. IV), with EEE POM of 4.4 kg/inh (32 percent), and small equipment (Cat. V) with 4.0 kg/inh (29 percent). By contrast, the lowest share was for lamps (Cat. III), corresponding to 0.2 kg/inh (2 percent) (Figure 19).

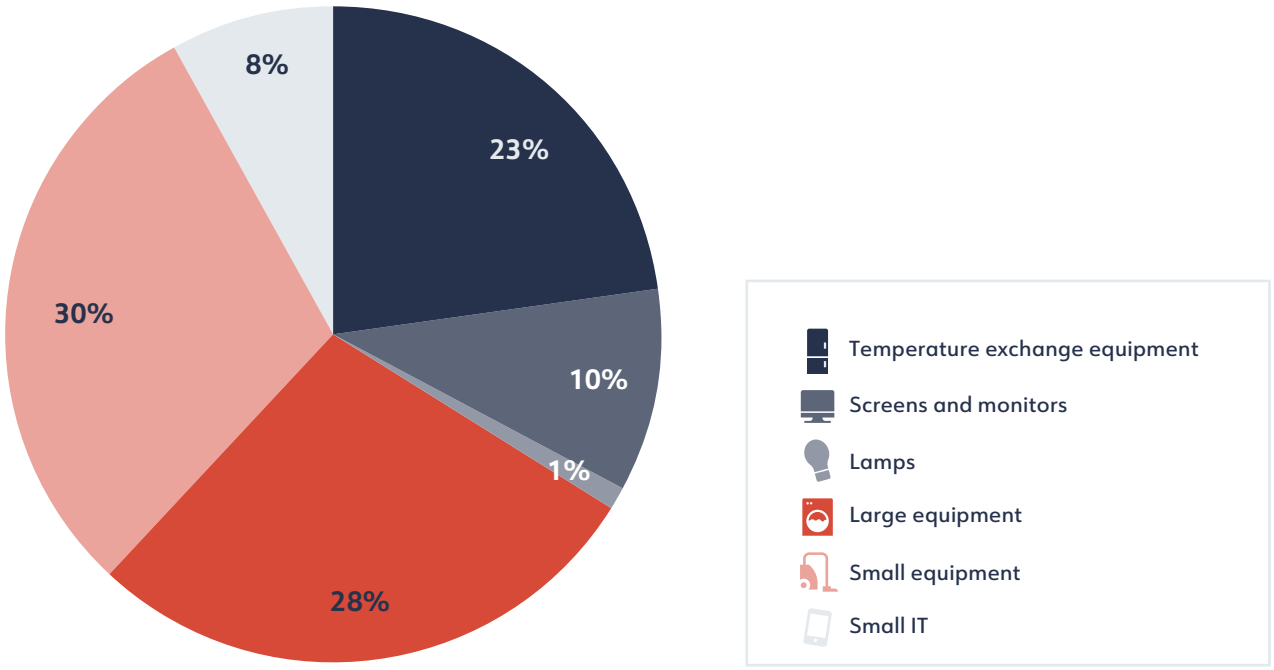
2,000 kt of EEE were produced domestically in Russia in 2018.

EEE production statistics are available in Russia according to the All-Russian classifier of products by type of economic activity (OKPD2) in the unit of measurement 'pieces'. Data are compiled by Rosstat on the form No 1-natura-CB 'Information production, shipment of products and production capacity balance', according to the All-Russian classifier of products by types of economic activity, harmonised with Statistical classification of Products by Activity in the European Economic Community (2008 version). In 2018, 2,000 kt of EEE were produced in total. Based on the data from the Federal Custom Service, 1,014.9 kt of EEE was imported into Russia in 2018, whereas 125.4 kt was exported. Based on Rosstat information, the majority of exporting involves washing machine and refrigerators.

In the last decade, the e-waste generated in Russia increased by 36 percent, from 8.3 kg/inh to 11.3 kg/inh.

Based on UNU/UNITAR internal data, the e-waste generated in Russia consistently increased, from 8.3 kg/inh (1,191.5 kt) in 2010 to 11.3 kg/inh (1,631.2 kt) in 2019. The amount of e-waste generated per inhabitant in 2019 was approximately 30 percent higher than the regional average of 8.7 kg/inh.

Figure 20. Share of categories of e-waste generated (2019)



Regarding EEE categories, the highest two shares of e-waste generated for 2019 in Russia are for small equipment (Cat. V) with 3.3 kg/inh (30 percent) and large equipment (Cat. IV) with 3.2 kg/inh (28 percent). Screens and monitors (Cat. II) and small IT represent respectively 1.2 kg/inh (10 percent) and 0.9 kg/inh (8 percent) (Figure 20).

Based on Rosstat data, 231.8 kt of small equipment and large equipment are currently in use by Russian households.

The possession of durable goods by households were compiled by Rosstat based on the results of a sampling survey of households' budgets. In 2018, EEE available in long-term use in Russian households reached 231.8 kt. Specifically, some UNU-KEYs that types of identified electric and electronic equipment belonged to include: dishwashers (0102), kitchen equipment (0103), washing machines (0104), dryers (0105), fridges (0108), freezers (0109), air conditioners (0111), microwaves (0114), vacuum cleaners (0204), desktop personal computers (0302), laptops (0303), mobile phones (0306), CRT monitors (0308), flat-panel monitors (0309), portable audio and video (0402), music instruments (0403), cameras (0406), CRT TVs (0407), flat-panel TVs (0408), and game consoles (0702).

Data from Rosprirodnadzor indicates that e-waste collected and treated using ESM in 2019 was equal to 0.3 kg/inh, or 2 percent of the e-waste generated.

The amount of e-waste in Russia that is collected and treated annually using ESM is rather limited and difficult to quantify. Based on Rosprirodnadzor data, 0.3 kg/inh (41.3 kt) of e-waste was collected and handled using ESM in 2019, broken down as:

- 3.2 kt of mercury, fluorescent, and light-emitting diodes and incandescent lamps.
- 18.9 kt of refrigerators.
- 2.1 kt of dishwashers.
- 16.0 kt of washing machines.
- 1.0 kt of microwaves.

This corresponds to a collection rate of 2 percent of e-waste generated, which is still far from the targets set by the legislation (15 percent of EEE POM). Some data on the collection and recycling of e-waste is available in the 2018 publication 'Market of waste utilisation' [48]. Based on the Association of Recyclers of Electronic and Electrical Appliances, 70 kt of e-waste is recycled per year, which corresponds to 4 percent collection rate. Estimates given in the 'Strategy for the development of industry for the recycling and disposal of production and consumption waste for the period up to 2030' [49] determine the volume of e-waste collected and recycled annually as equal to 25 kt. Differently, based on UNIDO calculations mentioned in the 'Market of waste utilisation' publication from 2018, about 20 percent of e-waste generated in Russia is recycled. As is noticeable, several sources at the national level concern the amount of e-waste collected for environmentally sound management, which show different quantities depending on the scope adopted in each case. For the purpose of this analysis, it was chosen to report all the sources and figures available, selecting the official national data from Rosprirodnadzor to be used for the regional analysis and reflected in the front page of the country profile.

Of the 20 kt of waste batteries generated per year, only 1.7 percent are collected and recycled.

According to recent publications[51], the recycling rate for waste batteries is also low. In fact, about 20 kt of batteries in Russia (or about a billion pieces) are thrown away annually, but no more than 1.7 percent are recycled.

[51] https://rg.ru/2019/11/18/reg-cfo/kak-v-rossii-utiliziruiut-batarejki.html.

E-waste Management System

An e-waste management system is under development in Russia.

Since 2017, introduction of a new waste management system has begun in the constituent entities of Russia. Transformations are carried out in accordance with the stages fixed in Federal Law No. 89, as last amended. Each province of Russia has its own waste management plan, which has to be coordinated at a regional level under guidance of the Federal Laws. The producer or importer is obliged to create a system and infrastructure for the collection and disposal of waste or entrusts this function to the regional operator and concludes an agreement with him. The contract with the operator can be concluded both by individual producers and producer associations. In this context, a specific system for the management of e-waste is currently being developed.

A number of e-waste recycling companies exist in Russia, and they collaborate with an EPR Association.

The association 'System of collective responsibility Electronics-Utilisation'[52], a non-commercial organisation based on voluntary membership of producers and importers of household appliances and computer equipment, implements its activity throughout the country. The association was founded in 2017 and aims to build an effective system for the disposal of household appliances and electronics. To its members, the association provides:

- assistance in searching counterparties with auditing of the future partners;
- current control of the companies' activities on electronic and household appliances recycling;
- verification of primary and closing documentation to confirm compliance with the waste disposal standard;
- provision of disposal acts in compliance with the requirements of the environmental legislation for submission to the executive authorities;
- participation in the development of normative documents and initiation of changes in legislation in the field of waste recycling.

Companies specialised in the recycling of electronics and household appliances collaborate with the association, obtaining the following advantages:

- Assistance in organising the implementation of legislative requirements (i.e. EPR) and provided legal advice in the area.
- Information support in cooperation with public environmental organisations under agreement with the waste disposer.
- Guaranteed payment for the activities conducted under the disposal agreements within the time period established by the agreement.

Approximately 80 companies are active in Russia's e-waste recycling sector, but they face challenges in obtaining raw materials due to the lack of separated collection infrastructure.

According to the 2018 publication *Market of waste utilisation*, there are approximately 80 facilities involved in e-waste recycling. Nevertheless, enterprises dealing with existing e-waste recycling facilities in Russia do not have a sufficient capacity to cover the needs of the country. Data on capacities are collected by Rosprirodnadzor. Most of them are involved in the collection and pre-processing of waste that is limited to the disassembling and selling of the most commercially attractive fractions (e.g. metals, printed circuit boards, and some types of plastics). Several treatment/recycling plants provide fairly advanced processing, extracting in addition to precious metals some other useful fractions. The main problem is the difficulty of organising a constant flow of raw materials for recycling, due to the lack of a selective collection infrastructure.

[52] http://e-epr.ru/.

The level of e-waste collection among the population is very low, and only a small portion (2 percent) of the e-waste generated is documented to be collected and treated using the ESM approach.

About 1.5 Mt of e-waste are generated in Russia each year. The system of accounting for the separated collection of such waste in Russia is poorly developed, so it is difficult to know exactly what percentage of the amount of e-waste generated is collected in an environmentally sound manner, but the Federal Service for Supervision in the Field of Natural Resources registered the e-waste collected and recycled/reused/refurbished in an environmentally sound way in 2019 as equal to 41.3 kt (0.3 kg/inh) – obtained as the sum of the records in the 'Utilisation' column (Table 12).

Table 12. Products that lost their consumer properties in 2019 (tons) – Federal Service for Supervision in the Field of Natural Resources

	Waste Origin		Waste Treatment			UNU-KEYs
Waste type	Primary generation	Pre-treatment	Utilisation*	Neutralized#	Disposed^	
Lamps – total	13,947	323	3,207	7,405	4,431	0502, 0503, 0504, 0505
Mercury lamps, mercury-quartz, fluorescent lamps	11,895	307	3,070	7,326	1.3	0502, 0503, 0504
LED lamp	100	14	20	16	0.1	0505
Incandescent lamps	1,872	1.9	115	2.8	4,428	0503
Household refrigerators that do not contain ozone-depleting substances	10,470	7,753	18,876	141	12	0108
Household dishwashers	1,213	648	2,148	187	-	0102
Household washing machines	9,072	7,181	16,046	11	-	0104
Microwave ovens	557	209	973	11	4.4	0114

* Utilisation is a specific term in Russian legislation that essentially refers to recycling, refurbishing, remanufacturing, or recovery.
# Neutralized is a specific term in Russian legislation that refers to the reduction of the harmful potential of waste.
^ Disposed in the Russian legislation indicates landfilling of the waste.

The recycling rate for batteries is very low. Batteries are effectively recycled by only two enterprises in Russia, but seven more companies will be established by 2024.

The procedure for the collection and recycling of batteries is not defined in any legal or regulatory document, so the recycling rate for batteries is very low (1.7 percent). Currently, batteries are effectively recycled only by two enterprises, located in the cities of Chelyabinsk and Yaroslavl, respectively. The company in Yaroslavl is the largest battery recycling enterprise in Russia: the plant will be able to process up to 2 kt per year. By 2024, it plans to open up seven similar facilities throughout the country and create an infrastructure for the management of waste of I-II hazard classes, specifically fluorescent lamps and batteries. The opening of new treatment/recycling plants is actually hindered by economic factors. An enterprise is profitable if it processes at least 2-2.5 kt per year. However, not every region accumulates such volumes of hazardous waste. It is possible to collect such waste from several regions and, given the wide extension of the country, the required volumes could be reached, but for economic feasibility transportation should not occur for more than 500 km. In order for the population to collect hazardous waste in special containers – including used batteries – the Yaroslavl region is developing infrastructure under a trilateral agreement between the regional government, Duracell Russia, and the National Ecological Company. New containers for collecting batteries appeared in all multifunctional centres of Yaroslavl, in some shopping centres, and in universities. By the end of 2021, about a hundred places for collecting batteries will be equipped, and 1,100 new collection points are expected. With a proper collection system, the recycling business could become profitable, since valuable raw materials are obtained as a result of treatment/recycling hazardous waste and the content of non-ferrous metals is ten times higher than in ore. As well, pure iron and insulating material also remain. So, from one hundred kilograms of used AA batteries, 40 kilograms of raw materials are obtained, including 15-30 kg of zinc and iron.

Data on the informal sector are not available.

Neither quantitative nor qualitative information could be retrieved concerning the role of the informal sector in Russia.

Import and Export of E-waste

Russia is Party to the Basel, Rotterdam, and Stockholm Conventions. It has signed the Minamata Convention, but the ratification process is not yet complete.
Regulation of the export and import of e-waste is carried out in accordance with the requirements of the Basel Convention, ratified by Russia in 1995, but no export and import data were provided via official reporting for 2018.

The national legislation prohibits the importation of waste for landfilling purposes.
According to Art. 17 of Federal Law No. 89 'On Production and Consumption Wastes', the import of waste into Russia for the purpose of its burial and neutralisation is prohibited. The import of waste into Russia for the purpose of its management is carried out on the basis of a permit issued in accordance with the established procedure.

As well, regulation of the import and export of hazardous waste in the country is carried out in accordance with the regulation of the EAEU.
The import and export of hazardous waste in Russia is regulated by the regulations on the importation of hazardous waste to the customs territory of the EAEU and exportation from the customs territory of the EAEU. These were adopted by the Decision of the Board of the Eurasian Economic Commission dated April 21, 2015 No.30 (as amended on February 24, 2021) 'Single list of goods to which non-tariff regulation measures are applied in trade with third countries and the Regulations on the procedure for the import and/or export of these goods'. Importation to the EAEU customs territory and/or exportation from the EAEU customs territory of hazardous wastes (related to e-waste – scrap of electrical equipment or electrotechnical nodes, including galvanic elements, batteries, mercury switches, glass of cathode-ray tubes, etc.) in cases foreseen by international legal acts constituent EAEU law are performed based on license to the export and/or import of goods or permits.

Regulations on the importation of hazardous waste to the customs territory of the EAEU and exportation from the customs territory of the EAEU (adopted by the Decision of the Board of the Eurasian Economic Commission) were dated April 21, 2015 N. 30 (and amended on February 24, 2021).

The Ministry of Industry and Trade is the authority that issues licences and permits.
In Russia, the authorised body responsible for issuing licences for export and/or import is the Ministry of Industry and Trade of Russia (Ministry of Industry and Trade of Russia), in accordance with the Decree of the Government of Russia of June 05, 2008 N. 438 'On the Ministry of Industry and Trade of Russia'.

No data on the import and export of e-waste could be found for Russia, based on the Basel Convention reports.
Data about flows of e-waste in the country are available in the reports of the Russian Ministry of Nature, which provides information to the Secretariat of the Basel Convention according to the requirements of the Basel Convention. Unfortunately, no data on the import and export of e-waste could be retrieved for the 2016-2019 reports[53].

No data on the import and export of used-EEE could be identified for the country.

[53] http://www.basel.int/Countries/NationalReporting/NationalReports/BC2019Reports/tabid/8645/Default.aspx.

Stakeholders Mapping

The two national authorities responsible for e-waste in Russia are the Ministry of Natural Resources and Ecology and the Federal Service for Supervision in the field of natural resources – Rosprirodnadzor. Furthermore, producers, importers, recyclers, and recyclers' respective associations are responsible for the proper e-waste and waste management of the country.

Stakeholder	Responsibility
Ministry of Natural Resources and Ecology Website	A federal executive body that carries out the functions of developing state policies and legal regulations in the field of waste management.
Federal Service for Supervision in the field of natural resources – Rosprirodnadzor Website	The service carries out control and supervision in the field of waste management and operates a unified waste accounting system. Rosprirodnadzor processes and posts on its website statistical information on waste and collects data on the capacities of treatment/recycling enterprises.
Producers and Importers	These entities are required to create an infrastructure for the collection and treatment/recycling of waste or entrust the function to the regional operator via a signed agreement. The legislation envisions targets that they have to achieve. If they do not provide waste for utilisation (i.e. recycling, recovery, or refurbishment), they are required to pay an environmental fee.
Treatment/Recycling Companies	Provide treatment and recycling of e-waste.
The association, 'System of collective responsibility Electronics-Utilisation' Website	This is a non-profit organisation, which is a voluntary membership association of manufacturers and importers of electrical and computer equipment. The association, founded in 2017, aims to build an effective system for the utilisation of household appliances and electronics. It develops and implements its own projects for the collection of electronics and household appliances.

Country:

Kazakhstan

18.7 million inhabitants
2,725,000 km²
Borders: China, Kyrgyzstan, Russia, Turkmenistan, Uzbekistan
GDP per capita PPP: $24,904 USD
Average household size: 3.5 members

Legislation: ●●○○○
Infrastructure: ●●
Collection Rate:
● 8.8 %

Legend:
● Advanced
● Transition
○ Basic

National legislation on e-waste:

Extended Producer Responsibility: ✔ Introduced in January 2016
National e-waste standards: ✔ On management safety requirements (draft)
E-waste collection target: ✔ Min. 30% of the EEE POM in 2021
Legislation product coverage in UNU-KEYs: 35 of 54
Legislation product coverage in weight (%) on total and per category: Total: 77% of the e-waste generated in 2019

84% 100% 12% 82% 60% 100%

International Conventions:

	Signature	Ratification/Accession	Entry into force
Basel Convention	-	03/06/2003	01/09/2003
Rotterdam Convention	-	01/11/2007	30/01/2008
Stockholm Convention	23/05/2001	09/11/2007	07/02/2008
Minamata Convention	-	-	-

EEE POM (2019):	E-waste generated (2019):	E-waste managed environmentally soundly (2019):
221.6 kt. 11.8 kg/inh.	136.1 kt. 7.3 kg/inh.	11.9 kt. 0.6 kg/inh.

(Source: Bureau of National Statistics / State Cadastre of Production and Consumption Waste)

Formal/environmentally sound e-waste management system in place:

✔ 4 licenced organisations specialised in e-waste collection and 22 enterprises having e-waste collection points.
✔ 30 treatment/recycling enterprises for treating and recycling e-waste.
✔ 15 cities covered.

National Legal Framework

Kazakhstan has a specific e-waste legislation that is part of the Environmental Code adopted in 2007[54].

The environmental code is the main normative legal act defining the requirements in the field of waste management, including the waste's separation, removal of hazardous substances, and subsequent safe recycling. E-waste is identified as a specific waste stream, so Article 292 of the Code defines the environmental requirements and the national standards for e-waste management. As well, considering the e-waste's hazardous components, Article 293 of the Code establishes requirements for the waste's sorted collection and transfer for recycling and/or safe disposal to specialised organisations. Based on the same consideration of hazardousness, Article 301 of April 2017 forbade e-waste landfilling and incineration. As of January 2021, Kazakhstan has updated and adopted a new Environmental Code, which will come into force starting this July.

Since January 2016, Kazakhstan has introduced the EPR principle for EEE and e-waste.

According to the EPR principle, introduced in 2016, physical persons and legal entities engaged in production and/or importation of EEE on the territory of Kazakhstan must ensure the collection, transportation, recycling, neutralisation (meaning reduction of harmful potential), and disposal of e-waste generated when consumers discard EEE. The implementation of an EPR scheme in Kazakhstan is regulated by Law No. 407-V, dated November 17, 2015, 'On amendments and addendum to some legislative acts of Kazakhstan on the issues of industrial and innovation policy'. In accordance with the law, the following Government Resolutions and Orders have been also developed and adopted:

- No. 1137, 2015 *'On determining the operator of EPR (importers)'*[55].
- No. 28, 2016 *'On approval of the Rules for implementation of EPR (importers)'*[56].
- No. 695, 2015 *'On approval of the list of products to which EPR (importers) are applied'*[57].
- No. 708, 2015 *'On approval of the Rules for submission by producers (importers), who have their own system of waste collection, recycling, and disposal, to the operator of EPR (importers) of documents, confirming collection, recycling and/or disposal of waste generated after the loss of consumer properties of products (goods), to which EPR (importers) and its packaging applies'*[58].
- No. 761, 2015 *'On approval of requirements to the own system of waste collection, recycling, and disposal'*[59].
- No. 762, 2015 *'On approval of the Methodology of payments calculation for organisation of waste collection, transportation, recycling, neutralisation, use and/or disposal'*[60].

EEE producers provide annual information on the amount of products produced in the territory of Kazakhstan to the Ministry of Energy, whereas information on imported products is submitted on a quarterly basis to the Ministry of Energy by the State Revenue Authorities of Kazakhstan.

Furthermore, Kazakhstan signed the Dushanbe Agreement on developing a regional strategy for managing e-waste. On November 2, 2018, in Minsk, the Action Plan for the implementation of the Agreement was approved by the Resolution of the Council of CIS State Leaders.

The list of products subjected to EPR includes 57 items corresponding to 35 UNU-KEYs and 7 items related to batteries.

The EPR scheme covers 57 products included in 35 UNU-KEYs, as well as 7 items related to electric batteries and battery separators. The 57 items belong to the categories of lamps (including electric or gas-discharge incandescent, sealed directional light lamps, ultraviolet or infrared, mercury containing, etc.), and medical or veterinary thermometers, as well as large-sized EEE, midsized, and small-sized EEE. EPR obligations are applied to the products included on the list approved by order of the Minister of Energy of Kazakhstan. The names of the products are linked to the Codes of the Foreign Economic Activity Commodity Nomenclature of the Eurasian Economic Union (CN FEA EAEU).

[54] http://adilet.zan.kz/rus/docs/K070000212_. [55] http://adilet.zan.kz/rus/docs/P1500001137. [56] http://adilet.zan.kz/rus/docs/P1600000028.
[57] http://adilet.zan.kz/rus/docs/V1500012565 [58] http://adilet.zan.kz/rus/docs/V1500012580. [59] http://adilet.zan.kz/rus/docs/V1500012669.
[60] http://adilet.zan.kz/rus/docs/V1500012753.

A target has been set internally by the EPR Operator that requires the collection and ESM treatment of 30 percent of the waste generated by EEE POM by 2021, but the amount is currently only around 9 percent.

Kazakhstan has a target of collecting and recycling 30 percent of the e-waste POM, and the target must be achieved by the EPR Operator for 2021. A 30 percent collection target is also expected to be implemented nationally by 2025 according to the Minister of Ecology, Geology, and Natural Resources. However, Kazakhstan is still far from reaching the target, and the shortcoming is result of the high costs sustained and intermittent financing mechanisms. Since 2017, for EEE the EPR applies a 'zero' payment rate, but the EPR Operator and Ministry of Energy are working to revise the rate of the utilisation fee for e-waste treatment/recycling and EEE imports. In fact, it will be essential to start charging a fee to EEE producers and importers for covering the costs of collection and treatment/recycling. As well, the level of the fee should, as much as possible, reflect the individual characteristics of the products POM and their impact on the e-waste management system in order to encourage use of products that are more easily and effectively treated and recycled [50].

With regard to EHS standards, Kazakhstan has developed a national draft for safety requirements for e-waste management.

Currently, the draft standard re: EHS requirements for the separate collection of e-waste and its storage and treatment is undergoing approval in Ministries and authorities of the country and is being prepared for the registration procedure as a National Standard of Kazakhstan. As well, other environmental requirements for waste management, especially concerning lamps, mercury-containing waste, and batteries are:

- ST RK 3132-2018 *'Resource Saving. Lead storage batteries. Scrap and waste handling'*.
- ST RK 2793-2015 *'Containers for lamp and chemical powers supplies collection'*.
- ST RK 1504-2006 *'Energy saving. Waste handling. Documentation and regulation of activities on production and consumption waste handling. Basic provisions'*.
- ST RK 1513-2019 *'Energy saving. Waste handling in all stages of technological cycle. Classification and methods for mercury waste recycling. Basic provisions'*.
- ST RK 1155-2002 *'Mercury-containing devices and products. Vacuum-thermal utilisation'*.

An e-waste reporting system has been implemented in Kazakhstan that relates to 7 categories and 3 levels of hazardousness, but clear criteria still have to be developed, and future harmonisation with the European Waste Codes is expected.

Stakeholders involved in e-waste and hazardous waste management are required to keep regular records. The reporting must indicate the quantity, type, and properties of collected, transported, processed, and disposed of waste in the course of their activities. The waste records must be retained for five years, and annual reports on waste inventory must be submitted regularly for their inclusion in the State Waste Cadastre. The reporting form[61] on the waste inventory envisions the differentiation of e-waste into 7 categories: large and small household equipment, information technology and communications equipment, consumer equipment, lighting equipment, EEE, and other e-waste. However, precise criteria for referring e-waste to one of the specified categories has not yet been officially approved. To date, the waste classifier is composed of three levels of hazards, but a transition is undergoing toward the use of the European classification of waste. Indeed, the importance of harmonising the country with the European Waste Code as future action point is recognised. The State Waste Cadastre is a subsystem of the UISEP (i.e. Unified Information System for Environmental Protection), a database that reflects information on individuals and legal entities submitting reports on hazardous and non-hazardous waste. The database is updated regularly by the Information and Analysis Centre for Environmental Protection of the Ministry of Ecology, Geology, and Natural Resources of Kazakhstan. The Bureau of National Statistics generates statistics on municipal waste treatment and disposal, which are published in two main reports. The development of a new and comprehensive report form is expected in future years.

[61] Об утверждении формы отчета по инвентаризации отходов и инструкции по ее заполнению - ИПС "Әділет" (zan.kz).

Inconsistency of the reporting systems implemented in the country can interfere with the correctness of data and information accounting on e-waste.

As mentioned above, while the EPR operator reporting system includes three e-waste categories (large-sized, medium-sized and small-sized), thermometers, lamps, and batteries, the State Waste Cadastre follows a different classification, distinguishing across seven categories. This discrepancy is due to both the lack of a unified waste management strategy implemented at the national level and to interdepartmental disunity. Kazakhstan should invest in developing identical classifications, which is important for the correct accounting of data on e-waste.

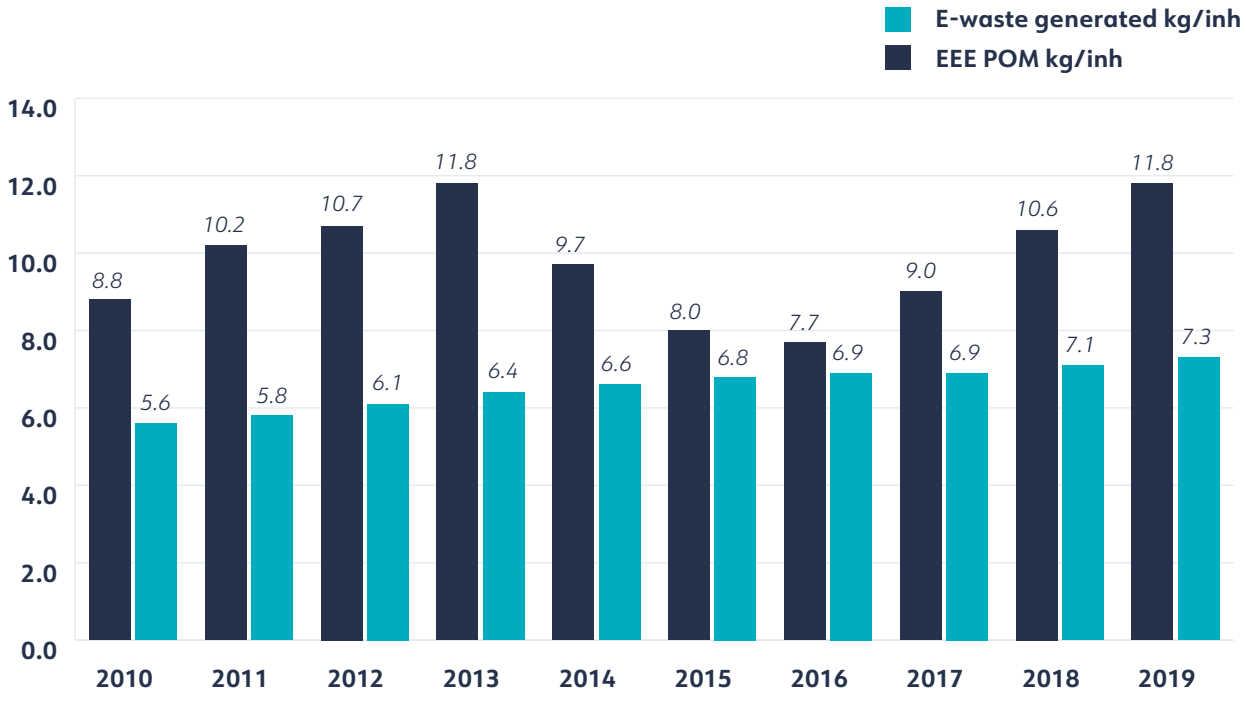
National Statistics on E-waste

Official data is available at the national level, and the Bureau of National Statistics is currently taking additional efforts to make them internationally comparable.

Statistics on e-waste collection per region in Kazakhstan are available at the Bureau of National Statistics for 2016-2019, and the information is based on the data received from legal entities and annual reports. Official data can also be provided by the State Waste Cadastre – which reported 4 kt (0.2 kg/inh) of e-waste generated in 2018 – reflecting information uniquely on individual and legal entities who use natural resources (according to the definition of the Environmental Code of Kazakhstan) and which submits reports on hazardous waste. Thus, the data consider neither all the sources of e-waste generation nor all categories of e-waste.

Efforts have been taken by the Bureau of National Statistics to calculate the EEE POM and the e-waste generated through the methodology developed by UNU/UNITAR, and the official data provided have been used to analyse the main e-waste statistics indicator for Kazakhstan (Figure 21).

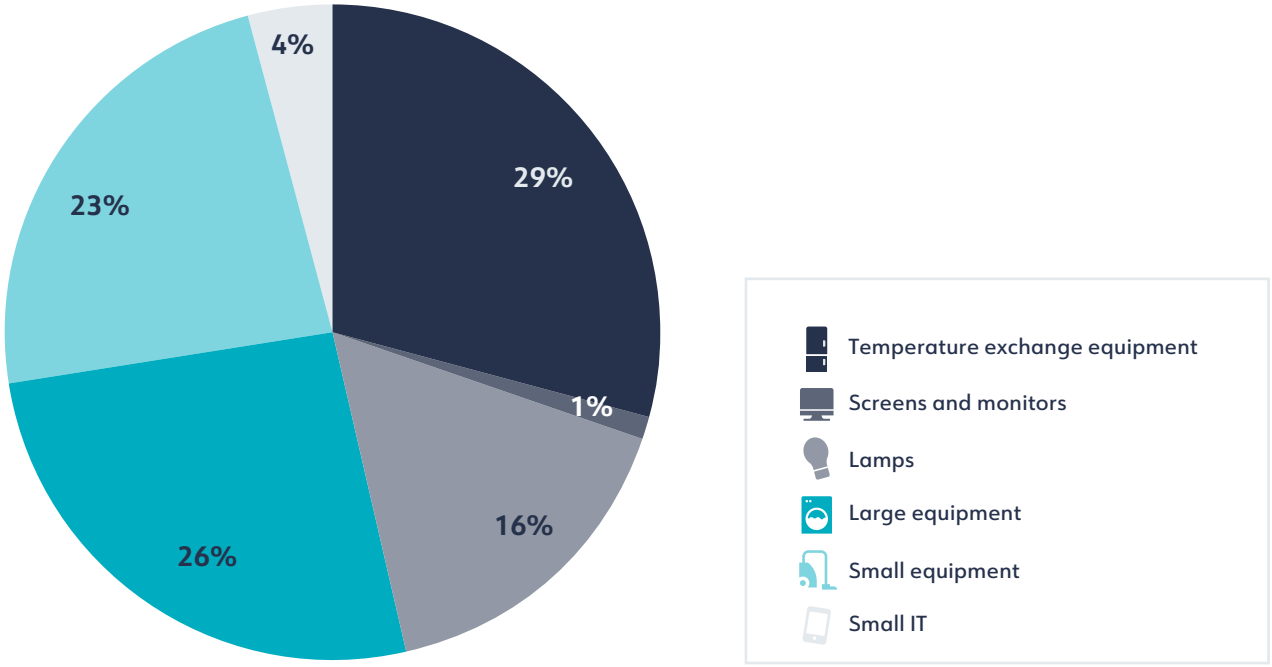
Figure 21. EEE POM and e-waste generated in Kazakhstan



Overall, EEE POM has been increasing, from 8.8 kg/inh (144.3 kt) in 2010 to 11.8 kg/inh (221.6 kt) in 2019.

The annual amount of EEE POM consistently increased over the past decade – however slightly -- beginning from 8.8 kg/inh (144.3 kt) in 2010 to 11.8 kg/inh (202.5 kt) in 2013. The amount then decreased to 7.7 kg/inh (138.0 kt) in 2016, followed by another increasing trend until 11.8 kg/inh (221.6 kt) in 2019.

Figure 22. Share of categories in the EEE POM (2019)



Temperature exchange equipment and large equipment (Cat. I and IV), with 3.4 kg/inh and 3.1 kg/inh, respectively, account for the highest share of EEE POM in Kazakhstan for 2019 (corresponding to 55 percent of the total). The smallest share is that of screens and monitors (Cat. II), with 0.2 kg/inh, equal to 1 percent of the total. Lamps (Cat. III) register a high share of EEE POM for 2019, equal to 16 percent of the total (1.9 kg/inh) (Figure 22).

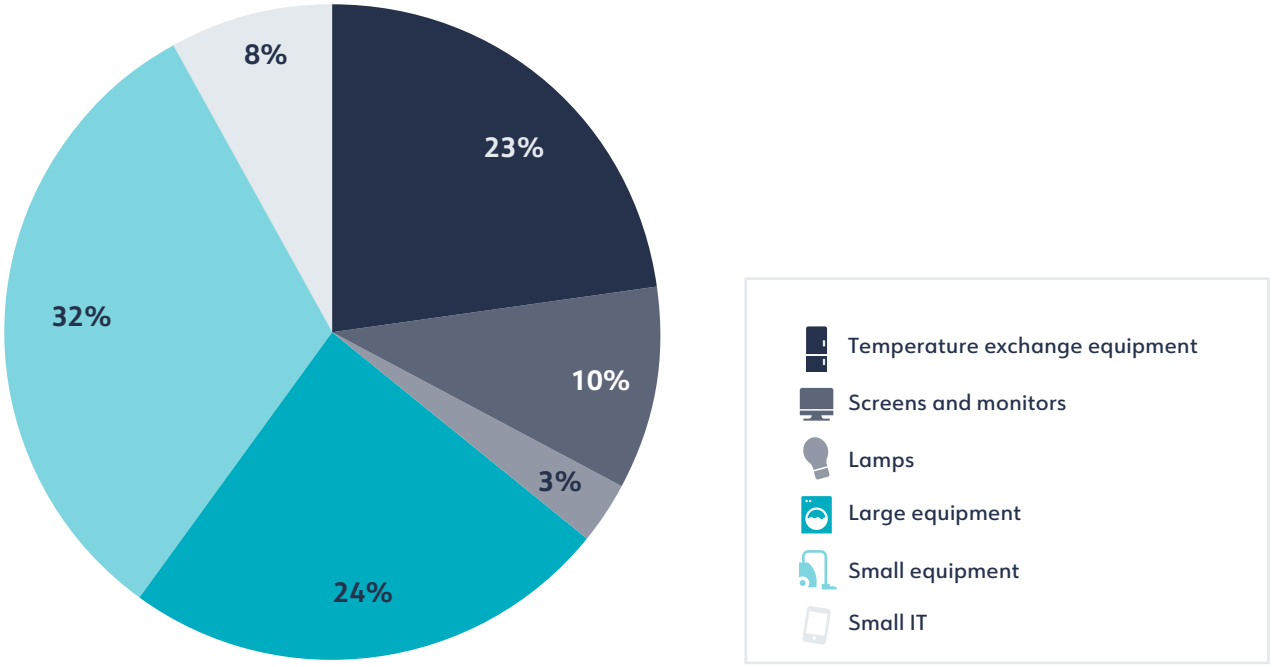
Most EEE is imported in the country.

Some domestically produced EEE in Kazakhstan includes central heating boilers (0.33 kt, 0.02 kg/inh), transmission and receptions apparatus for televisions and radios (3.4 kt, 0.18 kg/inh), data processing units and CPUs (0.07 kt, 0.004 kg/inh), printers (1.54 kt, 0.08 kg/inh), and portable lamps (0.001 kt, 0.0001 kg/inh). Despite producing certain EEE at domestic levels, Kazakhstan is mostly an importer. Based on the data provided by the Bureau of Statistics, Kazakhstan exported 6.1 kt (0.3 kg/inh) of EEE in 2018, whereas it imported 199.4 kt (10.8 kg/inh) of EEE. Similar figures were registered for 2019 as well, with 6.3 kt of EEE exported and 218.2 kt of EEE imported. The majority of the amount of EEE (by weight) imported and exported corresponded to washing machines, refrigerators, air conditioners, and heating boilers.

E-waste generated increased from 5.6 kg/inh (91.3 kt) in 2010 up to 7.3 kg/inh (136.1 kt) in 2019.

The e-waste generated in Kazakhstan showed a consistent increase, from 5.6 kg/inh (91.3 kt) in 2009 to 7.3 kg/inh (136.1 kt) in 2019. The amount of e-waste generated calculated by the Bureau of National Statistics looks, overall, to be aligned with the data reported by the EPR Operator of 136.8 kt of e-waste generated in 2018. Since the estimation of the amount of e-waste generated is closely linked to the average lifetime adopted for each EEE, the Bureau of National Statistics observed that the quantification might considerably be influenced by the fact that the lifetime of EEE is commonly extended in the CIS+ Region, as a result of existing repairing systems. Though rather complex methodologies are needed to obtain precise data on lifetime of products, it is recommended that the topic be investigated, e.g. by administering household surveys.

Figure 23. Share of categories of e-waste generated (2019)



Small equipment (Cat. V) represents the highest share (32 percent) of e-waste generated in 2019, equal to 2.3 kg/inh. Then follows temperature exchange equipment (Cat. I) and large equipment (Cat. IV), each with 1.7 kg/inh (23-24 percent). The category with the smallest share is lamps (Cat. III), with 3 percent with 0.2 kg/inh (Figure 23).

According to the data from EPR Operator, the State Cadastre of Production and Consumption Waste, ESM of e-waste was equal to 0.3 kg/inh (4.7 kt) for 2018 and 0.6 kg/inh (11.9 kt) for 2019.

The environmentally sound collection and treatment of e-waste is organised by the EPR Operator in Kazakhstan. The EPR Operator launched a tender for e-waste management addressed to specialised organisations and operating enterprises for collection in 2017 and 2018 and for the transport and treatment of e-waste. In 2017, 0.14 kg/inh (2.5 kt) of e-waste were collected and treated/recycled, which increased to 0.25 kg/inh (4.7 kt) in 2018. As well, official data from the State Cadastre of Production and Consumption Waste, reported by the Bureau of National Statistics Agency for Strategic Planning and Reforms of Kazakhstan, indicates a total amount of 11.9 kt of e-waste reused and recycled in 2019[62]. The significant majority of that (98 percent) comes from the e-waste category defined in the national legislation as 'large-sized household equipment'. The EPR Operator has a recycling target of 30 percent of the equipment POM (in weight) being collected by 2021. However, the collection of e-waste is currently still a challenge for the country, and the largest portion (91 percent) of e-waste generated does not end up in the official system and most likely is not managed in an environmentally sound manner. Referring to the list of products included and based on the official data on e-waste generated produced by the Bureau of National Statistics, the EPR scheme as elaborated in Kazakhstan is theoretically able to cover 77 percent of the mass of e-waste generated in the country. But e-waste collection is still limited. The low collection rate can be linked to the lack of funds regularly destined to the sector and to an inadequate e-waste collection and recycling infrastructure, when compared to the amount of e-waste generated annually in the country.

[62] http://adilet.zan.kz/rus/docs/V1600014234.
[63] Электронные отходы - обратная сторона достижений электронной техники | UNDP in Kazakhstan.

It has been estimated by UNDP that the maximum annual potential recycling capacity of Kazakhstan is approximately 2 kg/inh (40 kt) of all total e-waste generated.

Studies[63] on collection and recycling of e-waste have been carried out in the framework of a UNDP project, with data collected mainly through interviews and questionnaires administered by the e-waste treatment and recycling companies. The study's outcomes showed that if all companies were working full-time and regularly supplied with sufficient e-waste through an efficient collection system, Kazakhstan's annual potential recycling capacity would reach 2 kg/inh (40 kt), equating to roughly 25 percent of total e-waste generated (8.9 kg/inh). This means that Kazakhstan can further utilise its current e-waste management infrastructure, as the amount of e-waste collection is 0.25 kg/inh by the EPR scheme.

As such, Kazakhstan can rely in the future on exporting e-waste in order to environmentally manage all of its e-waste or expand the current e-waste treatment and recycling capacity. But due to the country's large size, transportation logistics represent a significant obstacle. There are clusters of e-waste collection points across the territory, and the transportation for connecting them with the treatment facilities is expensive.

E-waste Management System

Kazakhstan has an e-waste collection system in place. Currently, 4 specialised organisations carry out the collection of e-waste in 15 cities, and 30 treatment and recycling enterprises are active in the country.

According to the national legislation and the EPR principle, the hazardous fraction of municipal waste such as e-waste, mercury-containing waste, batteries, and accumulators must be collected separately and sent for disposal and recycling to specialised enterprises. Furthermore, individuals and enterprises are not allowed to accept e-waste, mercury lamps and devices, or lithium and lead-acid batteries for landfilling and incineration. There are currently 4 specialised organisations in charge of e-waste collection, and 22 enterprises also have e-waste collection points, whereas a total of 30 facilities are involved in e-waste treatment/recycling in more than 15 cities. Collection points are available mostly in large cities, and some enterprises also operate as mobile points (working and providing their service through calls). The steps required by the e-waste management infrastructure include e-waste dismantling (most commonly manual) and sorting, according to material groups (such as metals, plastics, glass, and printed circuit boards). All liquids and hazardous components (e.g. CRTs, toner cartridges, brominated flame retardants, persistent organic pollutants, chlorofluorocarbons, mercury, batteries, accumulators, etc.) must then be safely removed. Finally, the environmentally sound recycling is mandatory for ferrous metals, copper, aluminum, PCBs, several polymers and the safe removal of R-12 (Freon). While metals, plastics, and glass are often processed domestically, other e-waste components are shipped to Russia or the European Union in order for secondary materials to be obtained. The residual fraction is then sent both to controlled and uncontrolled landfills. To date, waste management is mainly a business of private companies in Kazakhstan. There are only a few state companies in operation, and a proper licencing system has not been developed, but one is expected to be implemented through the update of the Environmental Code that has been adopted on December 21, 2020 by the Senate of Kazakhstan.

The formal e-waste management system in Kazakhstan relies substantially on the implementation of the EPR principle.

The implementation of the EPR scheme foresees two possibilities:

- Producers and importers can organise their own e-waste collection and treatment/recycling system autonomously.
- Producers and importers can stipulate an agreement, through the payment of an appropriate fee, with the EPR Operator, a non-for profit partnership of private companies active in the field of collection, transportation, treatment, and/or disposal of e-waste.

Opting for an autonomous collection and treatment/recycling system for producers and importers presupposes the existence of their own infrastructure facilities. Nevertheless, the majority ensure the execution of the EPR scheme by concluding an agreement with the EPR operator and paying a fee.

The activity of the EPR Operator is regulated by the Environmental Code, which also defines its responsibilities.

The duties of the EPR Operator are defined by the Environmental Code and include:

- organisation of events for the collection, treatment/recycling , transportation, and disposal of e-waste;
- payment of compensation to enterprises collecting, recycling, transporting, and disposing of e-waste;
- maintaining the register of producers and importers of EEE that are subjected to EPR;
- arrangement of collection and transfer outside the country of waste for which there are no suitable treatment facilities in the country.

The EPR Operator is supervised by an authorised governmental body in the field of environmental protection, the Committee for Environmental Regulation and Control, a Department of the Ministry of Ecology, Geology and Natural Resources carrying out the functions of environmental regulation and control. The EPR Operator has the exclusive right to collect fees for organising the collection, transportation, treatment, and/or disposal of e-waste and to manage these payments in accordance with the legislation of Kazakhstan. The Operator receives information about the produced and imported EEE from the Ministry of Energy and

monitors the correctness, completeness, and timeliness of payments made by the producers. In turn, the EPR Operator submits to the Ministry of Energy a report on the progress of the EPR implementation, including information on the volume of e-waste to be processed and an indicator of the actual status of the activities.

The companies involved in the e-waste management system in Kazakhstan are compensated for their activities in the EPR Operator.

The EPR Operator does not carry out the activities for effective e-waste management (i.e. collection, transport, sorting, treatment, and disposal) independently. As part of the organisation of the activity and on the basis of open procurement procedures, the EPR Operator attracts enterprises that are specialised in the field and compete to be awarded with the tender. The companies entering into partnership with the EPR Operator receive compensation for the expenses carried over from the EPR Operator itself. Specifically, for EEE, the allocated compensation are:

- Small-sized EEE = $0.35 per kg.
- Medium-sized EEE = $0.14 per kg.
- Large-sized EEE = $0.10 per kg.

Kazakhstan e-waste management is improving, and Kazakhstan is currently achieving the second-highest collection rate in the region.

Not all enterprises carrying out operations for the management of e-waste are covered by the EPR Operator, and some operate independently. As well, no payment has been made for the disposal fee for more than two years. Consequently, it is possible to infer that funding mechanisms for e-waste collection are not yet in place in Kazakhstan.

The 91 percent of e-waste generated in Kazakhstan is either destined for landfills with mixed residual waste or managed without ESM techniques.

Given the fact that the e-waste management system in place is able to intercept only a marginal portion of all e-waste generated in Kazakhstan, it is reasonable to assume that the remaining 91 percent is either not separately collected and disposed of with mixed residual waste and ends up in solid waste landfills or that it is managed by the informal sector and destined to substandard treatments. Indeed, an informal sector exists in the country and, though it was not possible to quantitatively determine the flows of e-waste involved (since official data is not currently available), it is likely to manage a vast portion of it.

Import and Export of E-waste

Kazakhstan has been a Party to the Basel Convention on the Control of TBM of Hazardous Wastes and Their Disposal since 2003.
Waste imported into the territory of Kazakhstan from countries outside the EAEU as well as the export of waste to these countries for their recycling or disposal are carried out based on the licences issued by authorities delegated by the Government. Though the country submits annual reports to the Secretariat of the Basel Convention, no data on e-waste could be retrieved from the latest ones (2016-2019). Some collected e-waste is exported for compliant treatment purposes, mostly to Russia and the European Union. For the import and export of e-waste by authorised bodies, regulation for hazardous waste is carried out in accordance with the 30 decisions of the UNECE 'On non-tariff regulation measures'[64].

The import and export of waste are also regulated through the Environmental Code[65].
Specifically, according to the Code (Article 295), the export of hazardous waste is prohibited for countries party to the Basel Convention, to developing countries, and whenever there is a reason to believe that the treatment of the waste will not be carried out in an environmentally sound manner. Moreover, waste import and export by individuals for personal use (and not non-commercial purposes), as well as waste imported for the purpose of landfilling and neutralisation, is prohibited (Article 288 of the Code).

The amount of used EEE imported and exported in Kazakhstan could not be quantified.
Kazakhstan does not have any direct ban on the import/export of used EEE, the country does not have a monitoring system in place, and no data is available.

Stakeholder Mapping

In Kazakhstan, the entities involved in waste and e-waste management belong to both the public and private sectors. They are the Ministry of Ecology, Geology and Natural Resources, the Committee for Environmental Regulation and Control, the Bureau of National Statistics' local executive bodies on the territory, as well as the EPR Operator, treatment/recycling enterprises, and individual consumers. Summarised below is the role and the responsibility of each stakeholder.

[64] http://adilet.zan.kz/rus/docs/H15EK000030.
[65] https://online.zakon.kz/document/?doc_id=30085593#pos=291;-52.

Stakeholder	Responsibility
Ministry of Ecology, Geology, and Natural Resources of Kazakhstan Website	In charge of developing waste management policies and legislation.
Committee for Environmental Regulation and Control Website	The department belongs to the Ministry of Ecology, Geology, and Natural Resources. It carries out functions related to environmental regulation enforcement and control.
'Information and Analytical Center for Environmental Protection' of the Ministry of Ecology, Geology, and Natural Resources Website	Subordinate organisation of the Ministry responsible for the maintenance of the State cadastre of production and consumption waste, which provides reports from individuals and legal entities on the inventory of waste. The State Cadastre of Wastes is a subsystem of this organisation.
Local executive bodies (covering the regions of the country, the capital, and other cities)	Responsible for organising a safe system for collecting municipal waste, which must be able to provide a separate collection, storage, regular removal, and treatment/recycling of hazardous components, final disposal of the waste, and depollution activities. It must ensure compliance with the requirements for the ESM of waste.
'EPR Operator' LLP Website	Main areas of activity for the company: the organisation of the collection, transportation, treatment/recycling, and disposal of waste products covered by the EPR scheme. The not-for-profit company was appointed by public authorities to collect fees from producers and to use them for financing various programmes on waste collection and treatment/recycling [50].
Ministry of Energy of Kazakhstan Website	The EPR Operator receives information on the produced and imported products from the Ministry of Energy and monitors the correctness of calculation, completeness, and timeliness of payments made by producers. In turn, the EPR Operator submits a report on the progress of the EPR implementation to the Ministry of Energy, which includes information on the volume of waste processed as an indicator of the actually completed volume.
Bureau of National Statistics Website	Produces statistics on waste generated, collected, and treated. The content flows into two main reports on collection and processing, as well as on the disposal of municipal waste.
Kazakhstan Management Association waste 'KazWaste' Website	Since 2014, the Association is a member of the International Solid Waste Association ISWA. The Association supports the creation of a waste treatment/recycling industry in Kazakhstan and implements new projects to improve and optimise business processes in the field of waste management.
Treatment/Recycling Companies	Stakeholders performing sorting, treatment, and recycling operations on waste in order to obtain secondary materials that will be included in new product manufacturing. They also treat waste in order to facilitate its handling and reduce its volume and hazardous properties.
Consumers	When pursuing economic activities that generate waste, individuals and legal entities are required to provide measures for their safe handling in order to comply with environmental and sanitary-epidemiological requirements and take measures for their recycling and safe disposal.

Country:

Ukraine

41.9 million inhabitants
603,628 km²
Borders: Poland, Belarus, Russia, Moldova, Romania, Hungary, and Slovakia
GDP per capita PPP: $8,510 USD
Average household size: 2.5 members

Legislation: ●●○○○
Infrastructure: ●○
Collection Rate: Unknown

Legend:
- ● Advanced
- ● Transition
- ● Basic
- ○ Unknown

National legislation on e-waste:

Extended Producer Responsibility: ✖ In draft since 2017
National e-waste standards: ✔ On safe e-waste management and hazardous substances restrictions
E-waste collection target: ✖
Legislation product coverage in UNU-KEYs: 0 of 54
Legislation product coverage in weight (%) on total and per category: Total: 0% of the e-waste generated in 2019

0% 0% 0% 0% 0% 0%

International Conventions:

	Signature	Ratification/Accession	Entry into force
Basel Convention	-	08/10/1999 (a)	06/01/2000
Rotterdam Convention	-	06/12/2002 (a)	24/02/2004
Stockholm Convention	23/05/2001	25/09/2007	24/12/2007
Minamata Convention	-	-	-

EEE POM (2019):	E-waste generated (2019):	E-waste managed environmentally soundly (2019):
365.7 kt. 8.7 kg/inh.	324.1 kt. 7.7 kg/inh.	Unknown

(Source: UNU / UNITAR / UNSD questionnaire, 2019. This data also contains data reported on batteries and accumulators)

Formal/environmentally sound e-waste management system in place:

✔ About 115 organisations have licence to manage e-waste.

National Legal Framework

E-waste is regulated within the framework of the general waste management regulations in Ukraine, but a number of technical regulations and orders specifically dedicated to e-waste management are in place.

The main regulatory document governing waste management is the Law of Ukraine 'On Waste', dated March 5, 1998 No. 187/98-BP[66], as amended and supplemented. The legal framework covers the full list of existing waste, including e-waste. As well, a number of Ministerial resolutions and orders are dedicated to e-waste management. The Law 'On Waste' defines the basic principles of state policy on waste, namely: ensuring the collection and disposal of waste; minimizing waste generation; organisation of control over the placement of waste; etc.

With respect to e-waste, the following adopted normative legal acts are in place:

- Resolution of the Ministers Cabinet of Ukraine of September 22, 2017 'On approval of the Technical regulation on use restriction for some hazardous substances in EEE'[67].
- Resolution of the Ministers Cabinet of Ukraine 'On the procedure of functioning and maintenance of roster and information system, registration, reporting in information system for placement in the management market of EEE and e-waste'.
- Order of the Ministry on the issues of the housing and communal services (HCS) of Ukraine 'On approval of the methodological recommendations for collection of WEEE in the composition of domestic waste'[68].
- Order of the Ministry on the HCS issues of Ukraine 'On approval of the methodological recommendations on detection of morphological content of solid domestic waste'.
- Order of the Ministry of the regional development, construction, and HCS of Ukraine No. 423 dated August 30, 2013 'On approval of the Methodological recommendations on safe handling of hazardous waste components in the composition of domestic waste'.
- Order of the Cabinet of Ministers of Ukraine dated July 13, 2020 No. 1120 'On approving the provision on control over cross-border transportation of hazardous wastes and their utilisation/removal and yellow and green list of wastes'.

Additionally, in 2017, the Decree of the Cabinet of Ministers of Ukraine No. 820-r, dated November 8, 2017, introduced the 'National Strategy of Waste Management in Ukraine until 2030', which is focused on addressing the challenges posed by the generation, accumulation, storage, treatment/recycling, utilisation, and disposal of waste[69].

A draft EPR system is in the process of being established in Ukraine along with other draft laws focused on improving the current e-waste management and recycling system.

In Ukraine, an EPR system based on the EU WEEE Directive is in development by the Association Agreement from the EU and Ukraine, signed in 2014 and ratified in 2017[70]. The Association Agreement also includes a timetable of gradual adaptation of the Ukrainian legislation on waste and resource management to the EU law and policy on environmentally safe waste and resource management [51]. Within the EU-funded Twinning project, the Ministry of Regional Development of Ukraine received support for improving the legal framework on disposal of e-waste and batteries. In this framework, two draft laws have been developed:

- The draft law 'On batteries and accumulators'[71].
- The draft law 'On e-waste'[72].

Both draft laws are currently undergoing approval procedures. These laws regulate separate collection of e-waste and EPR, obliging producers to take care of the recycling and disposal of products that they deliver to the market, after completion of the working lifespan. Also, in the framework of approximation to the EU legislation in the field of e-waste management, the following documents have been developed and are pending formal approval:

- The draft bylaw 'On establishing rules for marking the capacity of portable secondary (rechargeable) and automotive batteries and accumulators.'
- The draft resolution of the Cabinet of Ministers of Ukraine 'On creation of the State Agency of Ukraine on waste management', announced on August 14, 2019, but not yet approved.
- The draft law of Ukraine 'On the State Environmental control'.

[66] https://zakon.rada.gov.ua/cgi-bin/laws/main.cgi?nreg=187%2F98-%E2%F0#Text. [67] https://zakon.rada.gov.ua/laws/show/139-2017-%D0%BF#n13.
[68] http://online.budstandart.com/ru/catalog/doc-page.html?id_doc=54947. [69] https://ecsdev.org/ojs/index.php/ejsd/article/download/1038/1028/2049.
[70] https://www.kmu.gov.ua/en/yevropejska-integraciya/ugoda-pro-asociacyu. [71] http://w1.c1.rada.gov.ua/pls/zweb2/webproc4_1?pf3511=67236.
[72] http://w1.c1.rada.gov.ua/pls/zweb2/webproc4_1?pf3511=67234.

As part of this gradual adaptation to the EU legal framework, a process of alignment for the codes used for customs and trade with the EU ones are also being carried out.

The existing legislative framework does not allow for effective accounting and reporting or for monitoring systems in the field of e-waste management.

Regular reporting on waste management is actually in the mandate of the State Statistic Service of Ukraine, as part of the form No. 1-wastes, 'wastes generation and treatment'. Nevertheless, information on e-waste is not specifically available or required. In Ukraine, there is currently no definition of the list of goods and products related to e-waste, there is no statistical record of the volume of their production and treatment/recycling, and there is no legal basis for regulating the process of handling them[73]. As well, no administrative liability exists for failure to separate waste collection. Once Ukraine's draft law on waste management is adopted, the possibility will exist for involving other entities in the normative and legal acts for waste management, and for instituting required reporting, including e-waste – such as the Ministry of Environmental Protection and Natural Resources of Ukraine and the Ministry of Communities and Territories Development of Ukraine (especially for household waste).

Classification of waste is undertaken based on a toxicity scale, and the current waste list is expected to be aligned with the EU waste list in the near future.

The Ukrainian classification of waste is based only on toxic indicators (I-IV hazardous grades of waste). Class IV of toxicity is considered to be 'non-hazardous' waste. E-waste is also allocated to different classes depending on the substances contained. The country also uses a list of waste not corresponding to the EU list of waste; changes are expected shortly as one of the actions anticipated by commitments under the Association Agreement with the EU [52].

EHS standards regarding e-waste are applied in Ukraine.

A set of environmental, health, and safety standards are in place in Ukraine as established by some of the legal and regulatory instruments mentioned in the first paragraph, namely:

- Resolution of the Ministers Cabinet of Ukraine 'On approval of the Technical regulation on use restriction for some hazardous substances in EEE'.
- Order of the Ministry of the regional development, construction, and HCS of Ukraine 'On approval of the methodological recommendations on safe handling hazardous waste components in the composition of domestic waste'.
- Order of the Ministry of Environment and Natural Resources of Ukraine 'On approval of the List of hazardous properties and instructions on monitoring of transboundary transportation of hazardous waste and their disposal/removal'.

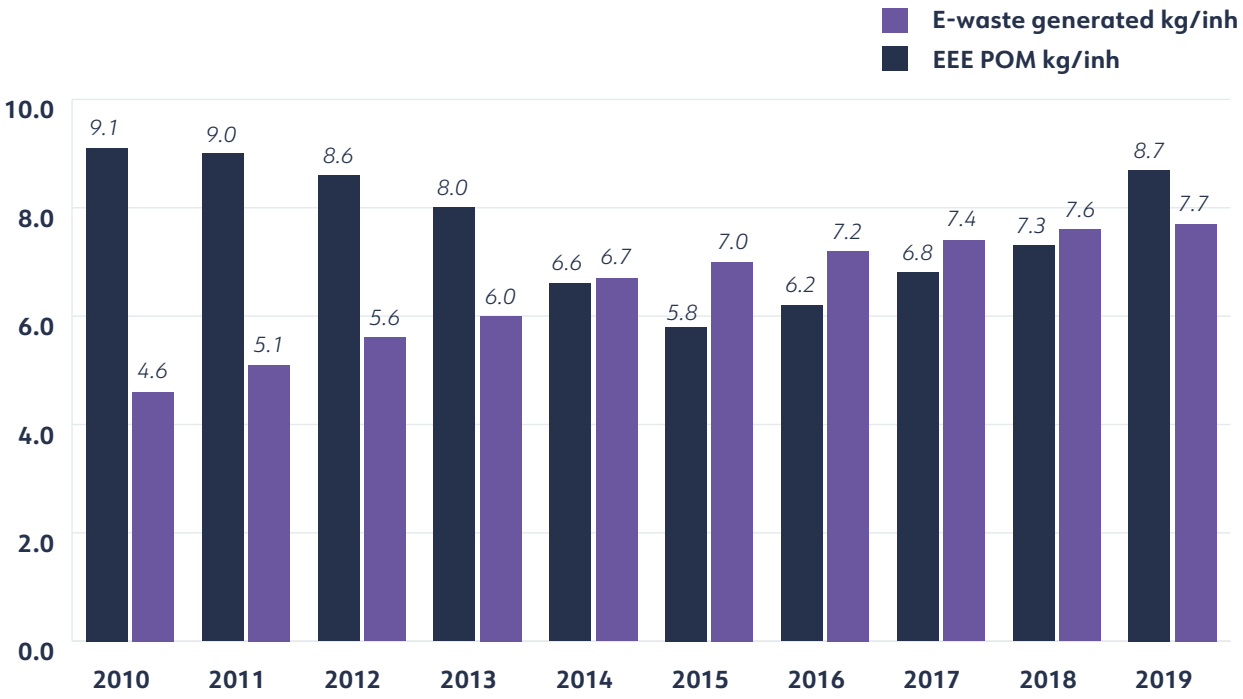
[73] https://ecsdev.org/ojs/index.php/ejsd/article/download/1038/1028/2049 p.425.

National Statistics on E-waste

EEE production and e-waste data are available in Ukraine through the State Statistical and State Customs Service, though the data is not complete.

In Ukraine, possible sources for a quantitative evaluation of e-waste management are data of the State Statistical Service, State Customs Service, and business accounting reports. However, since a proper data accounting and reporting system has not been defined by the legislation, the information available at the national level is likely to be partial and incomplete. Furthermore, no separate survey or analysis about e-waste takes place in Ukraine. A common classification of waste is used, SC 005-96 (State Classifier of Waste), which contains information on e-waste as well. But it is difficult to separate the amount of e-waste exclusively from aggregate data. Every year, data on indicators in line with the methodological provisions and plan for statistical activities approved by the Cabinet of Ministers of Ukraine are published, but no separate publication on e-waste is in place. Unfortunately, it was not possible within this project's framework to gather any official data from the country, so UNU/UNITAR internal data has been used to quantify the main statistics indicators for e-waste in Ukraine (Figure 24).

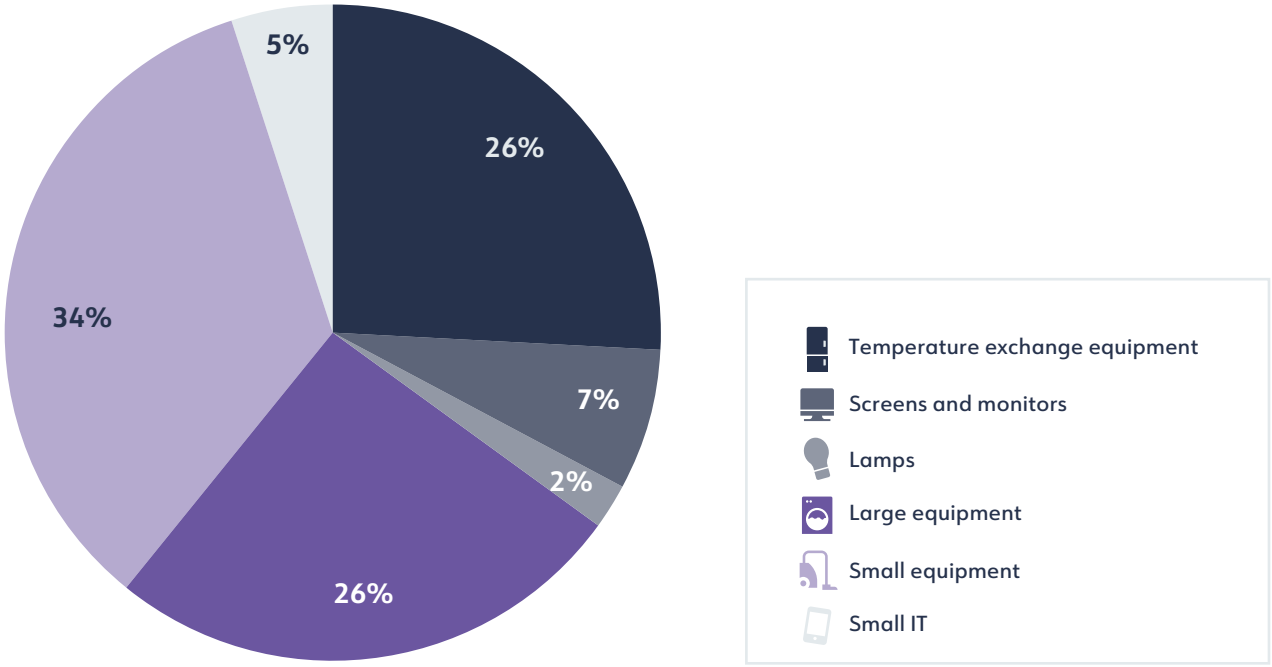
Figure 24. EEE POM and e-waste generated in Ukraine



EEE POM in Ukraine decreased considerably, from 9.1 kg/inh in 2010 to 5.8 kg/inh in 2015, then showed an increasing trend to 8.7 kg/inh in 2019.

The amount of EEE POM in Ukraine has increased over the past five years. Still, there was a relevant drop from 9.1 kg/inh (414.8 kt) in 2010 to 5.8 kg/inh (248.2 kt) in 2015 before the increase to 8.7 kg/inh (365.7 kt) in 2019; in any case, it has not reached the level of 2009.

Figure 25. Share of categories in the EEE POM (2019)



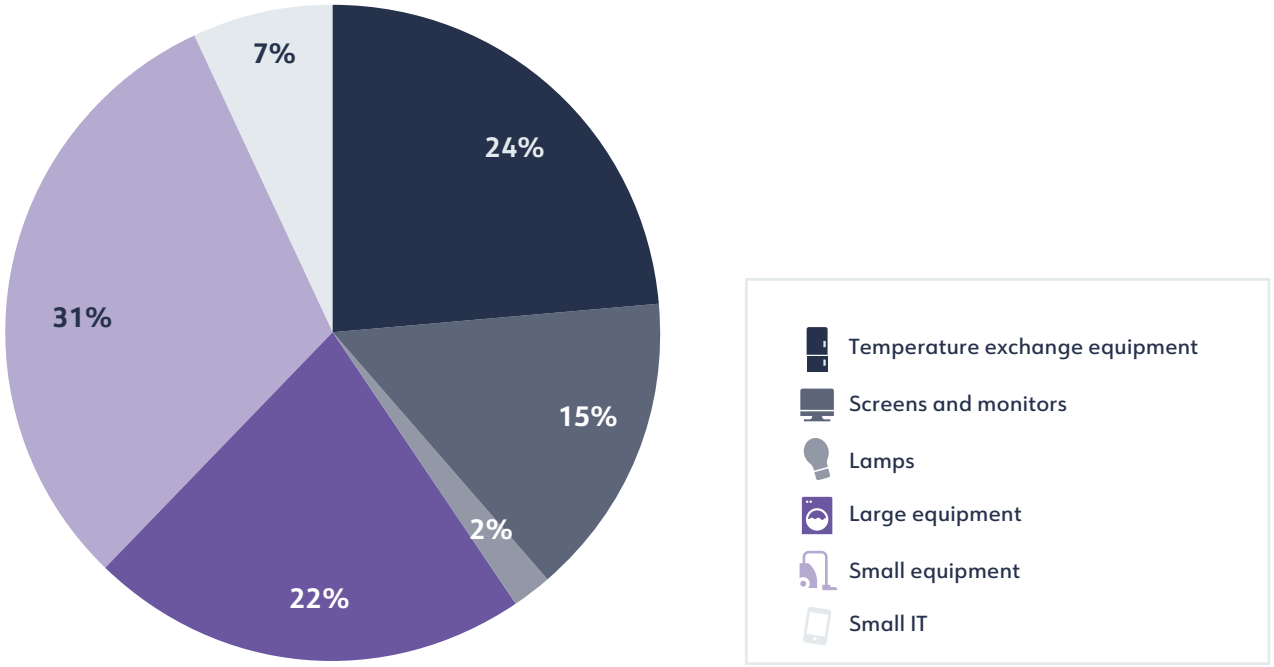
The largest share of EEE POM is the category of small equipment (Cat. V), with 3.0 kg/inh (34 percent), followed by temperature exchange equipment (Cat. I) and large equipment (Cat. IV) – both with 2.3 kg/inh, equivalent to 26 percent of the total EEE POM per inhabitant. By contrast, the smallest share is that of lamps (Cat. III), equal to 0.2 kg/inh (2 percent) (Figure 25).

There is domestic production of EEE in Ukraine, but quantities are currently unknown.

Some of the EEE domestically produced in Ukraine are:

- Household appliances.
- Computers and computer facilities.
- Motors and electric generators and transformers.
- Switchgears and control devices.
- Equipment for radio, television, and communications.
- Electric lamps, various devices and equipment for electro diagnostics, wires, and cables.

Figure 26. Share of categories of e-waste generated (2019)



The e-waste generated in Ukraine consistently rose from 4.6 kg/inh (211.1 kt) in 2010 to 7.7 kg/inh (324.1 kt) in 2019.

In terms of the six categories, the highest share of e-waste generated for 2019 in Ukraine was small equipment (Cat. V), with 2.5 kg/inh (31 percent), followed by temperature exchange equipment (Cat. I) with 1.9 kg/inh (24 percent). Screens and monitors (Cat. II) and small IT (Cat. VI) account for 1.1 kg/inh (15 percent) and 0.5 kg/inh (7 percent), respectively (Figure 26).

In 2017, Ukraine managed to collect 1.0 kg/inh of batteries and accumulators that might have also contained e-waste.

Based on the 2019 questionnaire conducted by United Nations Statistics Division (UNSD), Ukraine managed to collect 1.0 kg/inh (40.0 kt) of e-waste in an environmentally sound manner in 2017. In 2016, the amount was even higher, equal to 1.1 kg/inh (45.9 kt). Interpretations are that the share of e-waste is small compared to the relatively heavy accumulators, so this data point is omitted from the calculation of the regional totals.

E-waste Management System

The legal framework of Ukraine hinders the establishment of proper e-waste management, as there are no effective accounting, reporting, and monitoring systems in place.

A formal e-waste management system is in place in Ukraine, but it still faces some shortcomings. Waste management is a joint responsibility of various central and local institutions. The Ministry of Environment and Natural Resources (MENR) is required to establish common rules for waste management, including financial mechanisms, as well as adopt strategical documents with clear and real goals. On its website, MENR maintains an interactive map of the reception points of recyclable materials and hazardous waste, including e-waste[74]. The Ministry of Regional Development, Construction and Housing Communal Services establishes norms and rules for domestic waste-handling and ensures coordination with local authorities and stakeholders involved. Namely, at the local level, it is necessary to organise collection, disposal of domestic waste, and development of the local programs on waste management, and to monitor the rational use of the resources on the local territory and the closing of unauthorised and uncontrolled dumping sites. But no effective accounting, reporting, or monitoring systems in the field of e-waste management are currently in place.

The draft EPR clarifies a list of stakeholders responsible for e-waste management in the country.

To date, the EPR system in the country has only begun being introduced, but the relevant legislation is still in draft. Specificaly, the draft Ukraine law on waste management was adopted by the Parliament of Ukraine in the first reading on July 21, 2020 and is now being finalised. Once the envisioned EPR system is in place and fully operational, e-waste will be managed with the contributions of the following actors:

- Consumers (households and other users).
- EEE producers and importers of batteries and accumulators, which are responsible for initial placement of goods in the market.
- Distributors (retail chains) – distributors of goods exclusively to end consumers.
- Organisations of the EPR (OEPR)/importers, or individual systems, which are non-governmental and non-profit organisations.
- Coordination body for OEPR – which is the organisation coordinating OEPR and individual systems to cover services for all municipalities.

One example of an individual system is the 'Centre of waste management' in Kiev, which has opened the first collection point of inoperative equipment, accepting old non-functioning phones, wires, computer mice, printers, laptops, and boilers.

[74] https://ecomapa.gov.ua/

Market actors, such as producers, service centres, retail traders, and importers/exporters will have to provide annual reporting. All producers of EEE, batteries, and accumulators working in Ukraine will have to be included in the State Register and submit reports to the information systems. The State Statistic Service is currently compiling information on waste management, but not on e-waste, specifically.

A general coordinating body for allocating responsibility and checking services' quality is also envisioned.

The body for OEPR/individual systems will be created and financed by OEPR and individual systems themselves. Its main goals will be to:

- calculate market share for every OEPR and individual system;
- determine the territory, where OEPR and individual systems have to operate with the goal of ensuring equal coverage with services on the national level;
- distribute waste volumes that have to be collected and recycled among OEPR and individual systems according to the market share;
- check reliability of data provided by producers;
- ensure equal quality for service provisions in all regions of Ukraine.

The coordinating body will assign the municipalities to the OEPR/individual systems, based on the respective market share of each organisation.

Consumers can hand e-waste over at municipal or private collection points and at retail shops that have take-back obligations.

State and local authorities, the OEPR, and individual systems conclude collaboration agreements with the goal of ensure e-waste and used batteries and accumulators collection in all municipalities across all of Ukraine.

Such agreements define requirements for collection and fixed prices, which will be equal for all municipal collection points. Consumers can hand e-waste, used batteries, and accumulators over to the municipal, private, or mobile collection points. Retail shops are required to accept small household appliances, batteries, and automobile accumulators from households directly in the shops, and they are also required to receive old large household appliances when buying and delivering to the consumer new ones of the same type or with similar functions.

The financing mechanism for e-waste management system is implemented by the OEPR, the individual systems, and the consumers themselves.

Transportation and treatment are paid to the direct service provider by the OEPR or individual systems. For this purpose, the OEPR and individual systems conclude a contract with companies on collection and transportation, as well as with companies recycling e-waste, batteries, and accumulators. Consumers also pay for e-waste and batteries collection and recycling when they buy new equipment; in fact, the cost of these services is included in the price of goods. Producers transfer the collected funds to the OEPR or use them in case of independent fulfilment of the producer obligations through individual systems. The OEPR and individual systems

Ukraine recently implemented a financing mechanism for e-waste management, and many companies have already been licensed to act in the sector.

finance e-waste and batteries collection and recycling. Municipalities are paid exclusively for the waste they collect. Companies' recycling services are paid, taking into account profit they obtain from sales of recycled materials that are generated as a result of the e-waste recycling. The OEPR and individual systems also finance information campaigns to enhance population awareness on e-waste and batteries management.

More than one hundred companies are licenced for e-waste management in Ukraine, and the majority are also licenced for waste recycling.

In Ukraine, there are approximately 115 organisations licenced for e-waste management (e.g. collection, transport, processing, etc.). The large majority of them, roughly 80 percent, are also licenced for e-waste recycling. So, the infrastructure of the country is developed enough to implement an effective e-waste management system.

The absence of a reporting and monitoring system, penalties, and clear collection targets are some of the challenges facing effective e-waste management in Ukraine.

Despite the presence of an organisational setup and the availability of a developed infrastructure for the country's e-waste management, Ukraine is facing challenges regarding the achievement of a proper e-waste collection and recycling system. Indeed, the EPR has only recently been introduced, and the legislation does not foresee a data accounting, reporting, and monitoring system. Additionally, the legal framework does not define clear e-waste collection targets, and no administrative liability exists for those who do not fulfil their responsibility in the e-waste management chain.

The informal sector exists in Ukraine, but data on its involvement were not provided.

In addition to the formal e-waste management system described above, the informal sector is also active in Ukraine, but there is no available information on its involvement.

Import and Export of E-waste

Ukraine is Party to the Basel, Rotterdam, and Stockholm Conventions, but has not yet signed the Minamata Convention.
The country signed/accessed the three main relevant International Conventions in the early 2000s, but it still has not signed the 2013 Convention on Mercury.

No data on e-waste import and export is officially available.
The official reports from Ukraine to the Basel Convention available for 2016-2019 have been reviewed, looking at the declared import and export quantities of hazardous waste. However, no e-waste import and export flows could be quantified.

Data on used EEE is not available.
The Custom Service has data on the import and export of EEE, but data on used EEE is not available.

Stakeholder Mapping

The four central authorities which in charge of e-waste and waste management in Ukraine are the Ministry of Ecology and Natural Resources, the Ministry of Regional Development, Construction and Housing and Communal Services, the State Customs Service, and the State Statistics Service. Other stakeholders responsible are all the local authorities at regional level, the EPR Organisation, the OEPR Coordinating Body, the importers and exporters, the producers and distributors, the consumers, and the treatment/recycling companies.

Stakeholder	Responsibility
Ministry of Ecology and Natural Resources Website	Establishes general rules for waste management, including financial mechanisms, and participates in the development and adoption of strategic documents.
Ministry of Regional Development, Construction and Housing and Communal Services Website	Establishes norms and rules in the field of household waste management. Provides coordination of local executive authorities and local authorities.
State Customs Service Website	Entity responsible for tracking the import and export of EEE and e-waste.
State Statistics Service Website	Entity responsible for collection and processing of data.
Local executive authorities and local authorities	These authorities are obliged to organise a process for the implementation of the legislation: organise the collection and disposal of household waste, develop local waste management programs, monitor the rational use and safe management of waste on its territory, and eliminate unauthorised and uncontrolled landfills.
Consumers	They pay for the collection and treatment/recycling of e-waste and batteries when purchasing new equipment and batteries. The cost of these services is included in the price of the producers' goods.

Stakeholder	Responsibility
Importers, Exporters, Producers	Provide reports on manufactured, imported, and exported products. Producers and importers transfer the consumers' funds to the EPR Organisations or use them themselves if they independently fulfil the responsibilities of the producers through an individual system.
Distributors	They are obliged to accept small household appliances, portable batteries, and car batteries of domestic origin directly in stores, and also have the obligation to pick up old large household appliances when buying and delivering to the consumer a new one of the same type of equipment or with similar functions.
EPR Organisations (OEPR)	A collective system for fulfilling producer responsibilities. It includes non-governmental and not-for-profit organisations.
OEPR Coordinating Body	The Coordinating Body is created and funded by the OEPR and individual systems. It covers the services of all municipalities. Its main tasks are to: • calculate market share for each OEPR and individual system; • define the territories in which the OEPR/individual systems should operate in order to ensure uniform coverage of services at the national level; • distribute the amount of waste that needs to be collected and processed between the OEPR/individual systems in accordance with their market share; • check the accuracy of the data provided by producers; • provide the same quality of service in all regions of Ukraine.
UKRPEK Website	The Ukrainian Packaging and Ecological Coalition (UKRPEK) is an association of packaging and packaging manufacturers for unifying the efforts in the rights protection of their category, as well as for raising the standards of sectoral activities to the European level.
Licenced companies working in the waste management sector (collection, treatment/recycling)	These companies carry out the collection, separation, and treatment/recycling of e-waste. Some examples are Bondarivka and the Lviv CE (Green Lviv), licenced since 2016, as well as MRT System International, which uses closed cycle-wasteless technologies.
NGOs and other organisations	Involved in educational and public awareness activities about e-waste and environmental protection as well. Some of them are VEGO 'Mama 86', MBO 'Ecology. Right. Human being', the Center of ecological initiatives 'Ecodia', the Ukrainian ecological league, and the National Ecological Centre of Ukraine.

Country:

Tajikistan

9.3 million inhabitants
143,100 km²
Borders: Afghanistan, China, Kyrgyzstan, Uzbekistan
GDP per capita PPP: $3,529 USD
Average household size: 6.0 members

Legislation:
Infrastructure:
Collection Rate:
(0.8 %)

Legend:
- Advanced
- Transition
- Basic

National legislation on e-waste:

Extended Producer Responsibility: ✗ In draft since 2017
National e-waste standards: ✗ On safe e-waste management and hazardous substances restrictions
E-waste collection target: ✗
Legislation product coverage in UNU-KEYs: 3 of 54 (lamps), but no collection target is in place
Legislation product coverage in weight (%) on total and per category: Total: 2% of the e-waste generated

0% 0% 55% 0% 0% 0%

International Conventions:

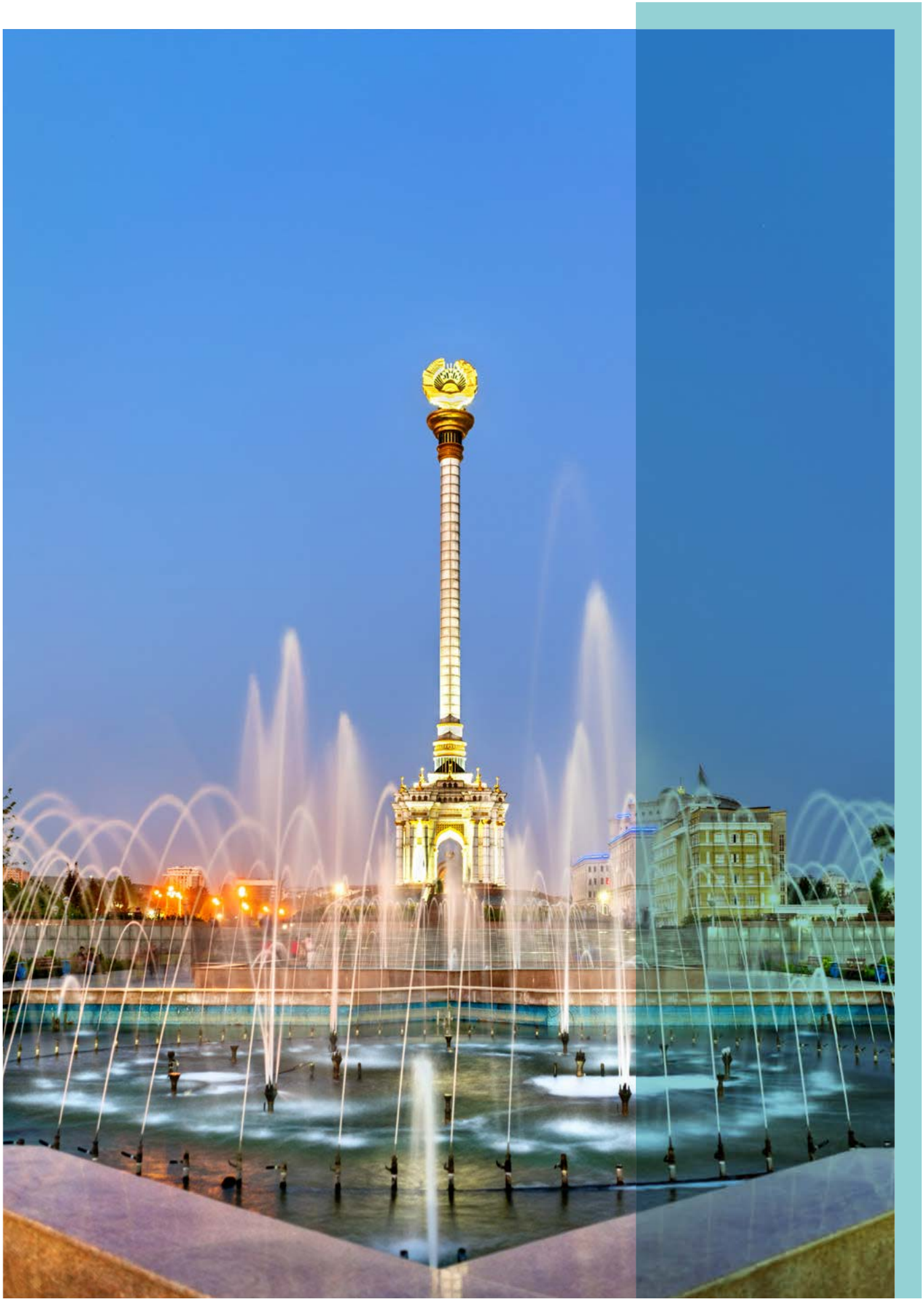
	Signature	Ratification/Accession	Entry into force
Basel Convention		30/06/2016	28/09/2016
Rotterdam Convention	28/09/1998		
Stockholm Convention	21/05/2002	08/02/2007	03/05/2007
Minamata Convention	-	-	-

EEE POM (2019):	E-waste generated (2019):	E-waste managed environmentally soundly (2019):
23.7 kt. 2.6 kg/inh.	12.9 kt. 1.4 kg/inh.	0.11 kt. 0.011 kg/inh.

(Source: UNU / UNITAR / Isfara waste plant – internal data)

Formal/environmentally sound e-waste management system in place:

✓ One company officially engaged in e-waste collection and recycling.



National Legal Framework

Tajikistan does not have a specific legal or regulatory instrument dedicated to e-waste, but it has signed the Dushanbe Agreement on e-waste.

There is no special normative act in Tajikistan that regulates e-waste. Provisions on other waste streams are defined by a number of regulatory acts in the country, namely:

- Law 'On production and consumption wastes' No. 4, dated 2002.
- Law 'On licencing of certain types of activities' No. 5 dated 2004.
- Law 'About environmental monitoring' No. 147, dated 2001.
- Decree of the Government No. 97, dated March 3, 2011, 'On measures for organisation systems for collection, storing, transportation and disposal of used mercury lamps'.

Tajikistan signed the Dushanbe Agreement on e-waste. On November 2, 2018, in Minsk, the Action Plan for the implementation of this Agreement was approved by the Resolution of the Council of CIS State Leaders.

Tajikistan manages waste mercury-containing lamps through ad-hoc legal measures.

Tajikistan adopted the Decree of the Government No. 97, dated March 3, 2011, 'On measures for organisation systems for collection, storing, transportation, and disposal of used mercury lamps'. This is the only type of e-waste that is currently legislated by the country; it corresponds to UNU-KEYs 0502, 0503, and 0504. However, the environmental issues of the de-mercurisation-wasted mercury lamps has not yet been solved in the country.

Law No.4 of 2002 regulates waste management in Tajikistan and defines waste responsibilities, albeit not compliantly with the principle of the EPR.

A significant step forward in the regulatory framework of waste management was the adoption of the Law of Tajikistan 'On production and consumption wastes' No. 4, dated 2002 [53]. This law sets forth the competence of the government in the waste sector, and particularly in the formation and implementation of the state policy for waste management, in supervision-related activities, in the development and implementation of target programs, and in the adoption and approval of normative legal acts. According to the specified law, producers or generators of waste are responsible for the waste when it is discarded, and they have the duty to transfer it to another person or until it is recycled or disposed of, as foreseen by the legislation. The responsibility of the waste producer with respect to the waste is valid only until it is transferred to another person involved in the waste management chain. Though it uses similar terminology, such as producers and responsibility, it is not the same as the principles of the EPR. When waste ownership is not identified, the local state authorities are responsible for it. Specifically, local state authorities must:

- ensure the proper disposal of waste, including financial compensation of damage to the environment at the expense of those responsible for the waste;
- create economic and social stimuli to facilitate recycling of waste for recovering secondary raw materials;
- organise collection (including separate collection) of waste and disposal of domestic waste.

The national legislation regulates the availability of permissions and licences for waste handling, the implementation of processes and technologies that generate a low amount of waste or use the generated waste as a product for other processes, and the carrying out of waste inventory. As well, the legislation states that operating production activities generating hazardous waste is prohibited if the waste cannot be removed in an environmentally sound manner.

A system for the classification of hazardous waste is implemented in Tajikistan, and activities in the field are licenced and monitored by the national legal framework, though e-waste is not yet specifically monitored.

Hazardous waste is classified by the level of harmful effects on human health and the environment. Hazard classes of waste are defined by their producer according to the normative acts, approved by the authorised bodies for waste management, as well as sanitary-epidemiological, mining, and technical inspection in the scope of their competencies. Hazardous waste-dumping is allowed only at specially equipped facilities suitable for dumping, based on permissions issued in the established legal order. Licencing of activities for hazardous waste management is carried out according to the Law 'On licencing of certain types of activities' No. 5, dated 2004. The law includes collection, transportation, and dumping of hazardous waste, as well as activities for the utilisation of chemically hazardous industrial facilities. The Law 'About environmental monitoring' No. 147, dated 2001, prescribes the monitoring of hazardous waste management. To date, e-waste is not specifically monitored in Tajikistan.

Data on waste collection have been recorded since 2009 in Tajikistan, but the reporting system does not contain information on the volumes are actually generated and lacks specific entries for hazardous and toxic waste.

The European Waste Classifier is used to compile statistics on municipal waste in Tajikistan. The data is collected and checked by the Agency of Statistics and by the Committee for Environmental Protection. However, the country currently lacks a complete system for the statistical accounting and monitoring of data on the volume of waste generation (since only the municipal waste collected is actually included in the reporting from the Agency of Statistics), composition, the level of impact on the environment and human health, and recycling of production and consumption waste as secondary raw materials. As well, the country does not have an official statistical reporting system specifically on hazardous waste, and the Agency of Statistics has abolished the statistical reporting forms on secondary resources and the 'Report on the generation and storage of toxic waste'.

In Tajikistan, the quantity and characteristics of waste mercury lamps are registered at the receiving collection points.

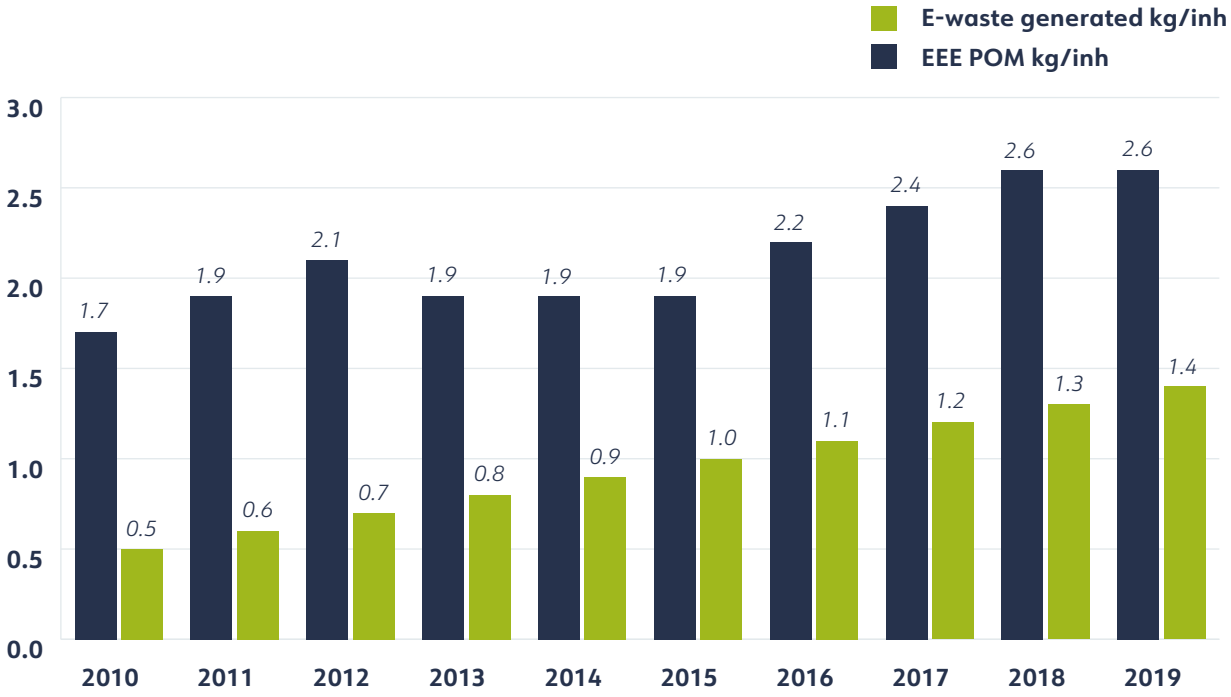
A detailed accounting system is regularly kept for used mercury lamps at all collection points, as well as by legal entities and individual entrepreneurs. Records are registered in a special roster that indicates the movement of mercury lamps and the date of their delivery. Data is filled in a registration book by the responsible person who accepts the mercury lamps for storage at collection points. Data includes information on the integrity or damage of a bulb, the number of lamps, and the date of receipt, and the person who delivered the waste is also noted.

National Statistics on E-waste

Information about sales of electric and electronic products are gathered from legal and physical entities via market surveys conducted twice a year by the Agency of Statistics (indicatively from May-November). The classification used for trade and production is based on the SCP codes – Statistical Classifier of Products approved by Statistical Committee of the CIS. But for imported and exported EEE, the Customs Service of Tajikistan adopts the codes of the Commodity Nomenclature of Foreign Economic Activities. Still, a fully integrated monitoring system for quantification and monitoring of the volumes of EEE, e-waste generated, e-waste collection, and recycling is not currently in place.

The Agency of Statistics has begun experimenting with the UNU/UNITAR-harmonised framework to compile e-waste statistics, but the work has not yet been finalised. As such, at this stage UNU/UNITAR internal data has been used for quantifying the main e-waste statistics indicators for Tajikistan. Specifically, since the data about EEE import and export available on the UN Comtrade Database did not allow for compiling a long-enough time series, the data for Moldova was used as the starting point and adjusted proportionally based on the number of inhabitants in the country. The selection of Moldova as a comparable country for Tajikistan, from an economic development perspective, results from an analysis of the GDP per capita of the different countries within the Region from 2009-2019 (Figure 27).

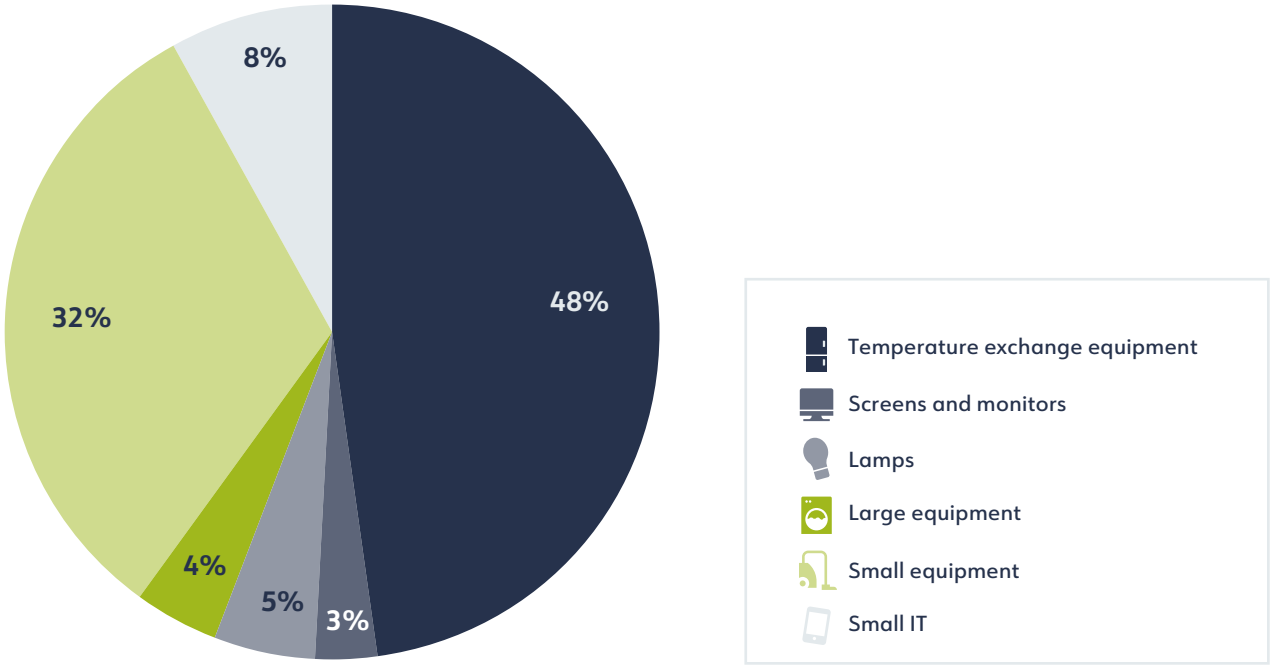
Figure 27. EEE POM and e-waste generated in Tajikistan



EEE POM in Tajikistan has increased over the last decade by 54 percent, from 1.7 kg/inh in 2010 to 2.6 kg/inh in 2019.

The amount of EEE POM in Tajikistan increased by 54 percent, from 1.7 kg/inh (12.7 kt) in 2010 to 2.6 kg/inh (23.7 kt) in 2019. The regional average of EEE POM is 10.0 kg/inh, so the quantity of EEE POM per inhabitant in Tajikistan is roughly 1/4th of the average for the CIS+ region.

Figure 28. Share of categories in the EEE POM (2019)

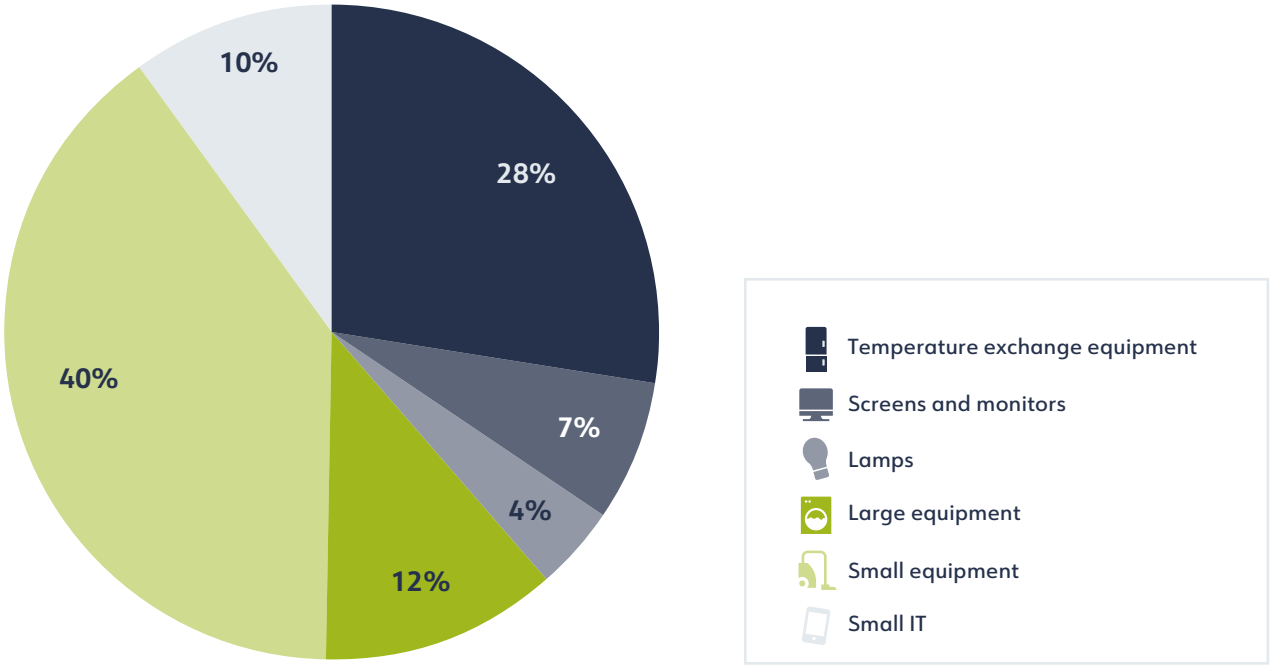


Nearly half (48 percent) of the equipment POM are comprised of temperature exchange equipment (Cat. I), with 1.2 kg/inh in 2019. By contrast, large equipment (Cat. IV) and screens and monitors (Cat. II) represent the two categories with the smallest share, equal to 0.11 kg/inh (4 percent) and 0.07 kg/inh (3 percent), respectively (Figure 28).

Data on EEE domestic production for Tajikistan is not available.
Tajikistan relies mostly on importation for EEE placed on the market. Specific data on the amount of EEE domestically produced could not be obtained.

Information on internally produced EEE is provided by all organisations and enterprises registered in a business register, according to the 'Programme of the statistical work', which is approved annually by Tajikistan Government. Some information can be retrieved through the statistical report form No. 1 on production. Based on the information received through the Agency of Statistics, EEE in Tajikistan are usually imported from Belarus and Turkey, whereas exports are to China, though in smaller amounts.

Figure 29. Share of categories of e-waste generated (2019)



E-waste generated in Tajikistan nearly tripled, from 0.5 kg/inh in 2010 to 1.4 kg/inh in 2019.

The amount of e-waste generated in Tajikistan steadily increased, from 0.5 kg/inh (4.0 kt) in 2010 to 1.4 kg/inh (12.9 kt) in 2019. However, these figures remain more than six times less than the regional average, which was 8.7 kg/inh in 2019.

The largest share of e-waste generated for 2019 is small equipment (Cat. V) with 0.5 kg/inh (40 percent), followed by temperature exchange equipment (Cat.I), with 0.4 kg/inh (28 percent). The smallest share of e-waste generated per inhabitant is that of lamps (Cat. III), with 0.06 kg/inh (4 percent) (Figure 29).

0.001 kg/inh of computers and 0.01 kg/inh of lamps were collected in Tajikistan for 2018-2019.

There is currently only one facility in Tajikistan with license to collect and process e-waste. It is in the city of Isfara and, per its internal data for 2018 and 2019, it managed to collect 0.001 kg/inh (7.0 t) of discarded computer equipment, 0.2 t of discarded batteries, and one million discarded lamps (with an average unit weight of 0.1 kg/unit, this is 0.1 kt of lamps).

E-waste Management System

In Tajikistan, municipalities are responsible for waste management, and no significant separate collection and recycling of e-waste are currently happening.

The responsibility for proper waste management in Tajikistan belongs to the country's municipal authorities. However, conditions for separate collection of e-waste and its recycling have not yet been created, despite sufficient awareness of stakeholders on issues arising from the careless management of e-waste. The common consumers' practices involving a significant portion of EEE are limited to either storing used EEE at home or throwing it out to dumping sites with other domestic waste. There is a repair culture in Tajikistan, so some equipment is repaired and reused, whereas non-repairable equipment ends up in dumping sites. The same happens with official waste garbage collectors, who dump e-waste in landfills alongside other mixed domestic waste. The official recycling sector is poorly developed.

A single plant in Isfara obtained the licence for managing e-waste and collected 7.2 tons of computers and batteries in the past two years, but proper recycling has not yet begun occurring.

In 2018, only one private entrepreneur in the country, Rakhimov A., obtained a license for EEE collection and disposal from the Committee for Environmental Protection under the Government of Tajikistan. Rakhimov A. carries out collection of all types of e-waste, which is then stored at the Isfara plant for e-waste. To date, the Isfara plant has collected one million mercury lamps (UNU-KEYs 0502, 0503, and 0504), 200 kg of waste batteries, and 7 tons of wasted computer equipment (UNU-KEYs 0302 and 0303) as totals for 2018 and 2019. Recycling and safe disposal measures for mercury lamps, batteries, and computer equipment was planned to begin in 2020 by using units for fluorescent lamp recycling Ecotrom 2U. An agreement has also been concluded for the import of waste de-mercurization unit URL-2m from Russia. Nevertheless, for the time being, e-waste and batteries are collected and stored at the plant, but non-recyclable equipment is available due to funding issues.

Tajikistan is incentivising the collection of mercury lamps through specific legislative acts and collection points.

The Government of Tajikistan has adopted a number of measures on mercury waste management. In 2009, The Government made a decision regarding the nationwide use of mercury energy-saving lamps in place of the customary incandescent lamps. As a recent consequence, based on the indication of the Committee for the Environmental Protection and the State Unitary Enterprise for Housing and Communal Services 'Manzilii communali' (SUE HCS) in all cities, districts and 'jamoats' have to be created for the country's collection points for mercury lamps. At the moment, 1,763 collection points are functioning in Tajikistan and managed to collect 1,168,495 mercury lamps until January 2020 as a total from 2018 and 2019.

Tajikistan manages e-waste in an environmentally sound manner by a single licensed plant that has already developed regulations and a collection system for mercury-containing lamps.

Despite the steps taken within the RT Government Resolution No. 97, dated March 3, 2011, 'On measures for organisation system of neutralisation, collection, storing, transportation and disposal of used mercury lamps', the issue of de-mercurisation of collected phased-out mercury lamps is still relevant for the country.

The informal sector exists in Tajikistan, operating through scrap dealers or informal collection points without any environmentally safe measures.
Informal recycling of e-waste is quite common in Tajikistan and is rather profitableis primarily associated with lower operating costs than the ones of official recyclers. Basically, waste is collected by dealers who collect the available e-waste directly from apartments. By contrast, the owners themselves deliver the e-waste to (informal) collection points. Informal collection and recycling of e-waste implies the laborious, and often dangerous, manual dismantling of equipment using simple tools to quickly separate materials, this dismantling is mainly limited to extracting the most valuable and accessible components.

Import and Export of E-waste

Tajikistan became party to the Basel Convention in 2016.
Import and export of e-waste is regulated by the Basel Convention, which was signed by Tajikistan in 2016, when it also entered into force.

The national legislation allows TBM of waste only for recycling purposes.
By legislation, importation of hazardous cargo and goods is not allowed in Tajikistan, since such importing poses a threat to the emergence and spread of infectious diseases or mass non-infectious diseases (poisonings). The import of waste with the intent of landfilling and neutralisation is prohibited in Tajikistan. Any TBM of waste for their use as secondary raw material is carried out only with permission issued by the authorised body for waste management and other delegated state authorities.

The CN FEA codes are used to register EEE import and export flows in Tajikistan.
Data on import and export of EEE can be obtained by the Customs Service through the Commodity Nomenclature for Foreign Economic Activities classification.

No data is officially available for Basel Convention reporting.
No annual reporting from Tajikistan to the Basel Convention could be found, so e-waste import and export flows could not be quantified.

In recent years, the import of used EEE has been limited, due to higher tariffs and legal bans.
Based on the information provided by the Agency of Statistics, before 2014-2015 there was a lot of importing of used EEE in Tajikistan. By contrast, import bans are now in place for used-EEE older than a certain number of years, and there is also a higher tariff applied on imports of used-EEE.

Stakeholder Mapping

The two national authorities responsible in the field of waste and e-waste management in Tajikistan are the Committee for Environmental Protection under the Government (from the policy side) and the Agency of Statistics under the Government (from the statistical side). Municipalities are also responsible for waste management in their respective territories. As well, the Foundation for the Support of Civil Initiatives is a public association that initiated a number of activities for raising awareness about proper management of e-waste.

Stakeholder	Responsibility
Committee for Environmental Protection under the Government Website	Development and implementation of policies and legislation, as well as control in the field of waste management.
Agency of Statistics under the Government Website	The Agency records statistics on municipal waste, electronic products produced, and electronic products sold. The country does not have official statistical reporting on hazardous waste.
Ministry of Industry and New Technology	Responsible for all the new technologies imported in Tajikistan. Specifically, it can give some manufacturers a quota (mandate) for the imports of resource-saving technologies. The main focus is on attracting resource-saving and green technologies.
Municipalities	Responsibility for waste management in municipalities.
Public Association 'FSCI, Dastgiri Center' Website	The Foundation for the Support of Civil Initiatives. It initiates a variety of public awareness activities on the proper management of e-waste.

Country:

Armenia

3 million inhabitants
29,743 km²
Borders: Azerbaijan, Georgia, Iran, Turkey
GDP per capita PPP: $9,457 USD
Average household size: 3.8 members

Legislation:
●●○○○
Infrastructure:
○○
Collection Rate:
(0.1 %)

Legend:
- ● Advanced
- ● Transition
- ○ Basic

National legislation on e-waste:

Extended Producer Responsibility:	✗ In preparation since 2018
National e-waste standards:	✗
E-waste collection target:	✗
Legislation product coverage in UNU-KEYs:	0 of 54
Legislation product coverage in weight (%) on total and per category:	Total: 0% of the e-waste generated

0% 0% 0% 0% 0% 0%

International Conventions:

	Signature	Ratification/Accession	Entry into force
Basel Convention		01/10/1999	30/12/1999
Rotterdam Convention	11/09/1998	26/11/2003	24/02/2004
Stockholm Convention	23/05/2001	26/11/2003	17/05/2004
Minamata Convention	10/10/2013	13/12/2017	13/12/2017

EEE POM (2019):	E-waste generated (2019):	E-waste managed environmentally soundly (2019):
44.2 kt. 14.8 kg/inh.	14.9 kt. 5.0 kg/inh.	0 kt. 0 kg/inh.

(Source: Armstat / UNU / UNITAR)

Formal/environmentally sound e-waste management system in place:

✗

National Legal Framework

In Armenia, e-waste is partly addressed within the general framework of the waste regulation.

The legislative framework of the waste regulation of Armenia lays the foundation for a proper waste management, which should be realised in accordance with established procedures. However, the application of current regulations for management of e-waste is currently very limited, as e-waste has not yet been included in waste lists, except for mercury lamps and fluorescent tubes. For this reason, accounting and reporting of e-waste is not carried out, and a strategy and specific legislation for e-waste management are absent.

The main piece of legislation for the waste sector in Armenia is the Law on Waste, dated December 21, 2004 No. 3P-159[75].

The Law on Waste, which is the main reference for the waste sector, regulates the legal and economic foundations for activities associated with the collection, transportation, storage, treatment and recycling, and disposal of waste. The document also introduces measures for preventing negative effects on environment and human health. As well, Armenia adopted a Law on Waste Disposal and Sanitary Cleaning in 2011. In accordance with the national legislation, the following measures are taken in the field of waste management:

- Waste classification.
- State registration of waste.
- Licencing and permitting of hazardous waste.
- Registration of waste generation and treatment, as well as disposal sites.
- Tracking of processes for the approval of waste-related projects.
- Activities conducted on the state waste cadastre, which is currently maintained on paper and will be soon shifted to an electronic format.

The classification of waste adopted in the country does not explicitly include e-waste.

Armenia classifies waste according to the following normative acts:

- Decisions of the Government of Armenia on *'Establishment of the procedure for the state registration of waste'* (2006) and for *'Establishment of the procedure for conducting the State Cadastre of Waste'* (2007).
- Order of the Ministry of Nature Protection of Armenia (RA), No. 342-H, dated October 26, 2006 *'On approving the list of production (including subsoil use) and consumption waste generated in Armenia'.*
- Order of Armenia Ministry of Nature Protection, No. 430-H, dated December 25, 2006 *'On approving the list of waste, classified by hazard'.*

Through the two Decisions of the Government, the procedure for the state registration of waste and the subsequent maintenance of the State Cadastre of Waste were established. The first Order presents a list of hazardous and non-hazardous waste, systematised by origin, physical state, hazardous properties, and degree of harmful impact on the environment. The second Order introduces a list of hazardous waste based on the hazard class. With the exception of waste from mercury lamps and fluorescent tubes, other types of e-waste are not included in the abovementioned lists.

In 2001, Armenia introduced a law and resolution for regulating licencing activities related to hazardous waste.

Armenia introduced a law for regulating licencing activities related to management of hazardous waste in 2001. As well, in order to ensure its application, the country adopted a Resolution *'On approving the procedure for licencing hazardous waste handling activities in Armenia'*. Such licences are issued by the Ministry of the Environment on the basis of the conclusions of an interdepartmental commission consisting of representatives from the competent State Administrations' bodies and sectoral experts.

Armenia signed the Dushanbe Agreement on e-waste.

Armenia, Belarus, Kazakhstan, Kyrgyzstan, Russia, Tajikistan, and Uzbekistan signed the Dushanbe Agreement on e-waste. On November 2, 2018, in Minsk, the Action Plan for the implementation of this Agreement was approved by the Resolution of the Council of CIS State Leaders. The purpose of the Agreement is to promote the creation of a regional system for e-waste management in the states' parties and to maximise the involvement of such waste in the economic circle as a source of secondary material resources through development of the best-available technologies.

[75] https://www.arlis.am/documentview.aspx?docid=1722.

The Agreement sets forth cooperation of states in improving legal regulation on the basis of unified approaches, classification of such waste, and harmonisation of standards.

EPR for e-waste is being prepared in Armenia.
The establishment of an EPR system in Armenia is planned to be implemented, according to the EU-Armenia Comprehensive and Enhanced Partnership Agreement road map, which was adopted by Prime Minister Decree 01.06.2018 N666-N. Specifically, Armenia has an obligation to introduce a 'polluter pays' principle, and by 2024, the EPR will also establish a full-cost recovery mechanism via approximation of national legislation in accordance with the Directive 2008/98/EC on waste.

E-waste data-reporting procedures are under discussion.
Currently, Armenia has begun the process of accession to the Agreement 'On cooperation of Member States of the CIS in the area of handling waste of electronic and electrotechnical equipment', dated June 1, 2018. After the ratification of the Agreement, the responsible bodies for coordination of the Agreement implementation will be assigned.

A Working Group will be established for the implementation of the Agreement, and specifically for the:

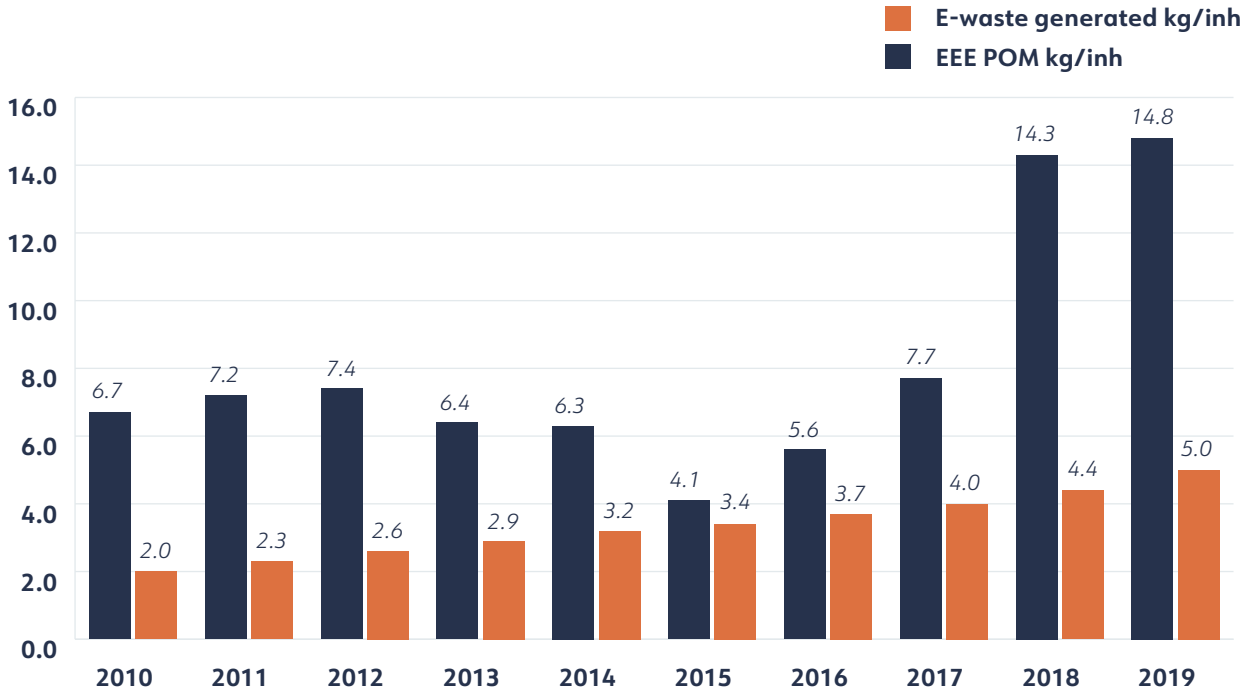
- development and approval of the main documents of the Working Group (status, provisions, Action Plan);
- determination/identification and approval of the List of Regulatory Legal Acts in the area of e-waste subject to mainstreaming, including procedures to regulate e-waste TBM;
- collection and exchange/sharing information on application of accepted legal/legislative acts and regulatory technical documentation of CIS Member States;
- development and approval of measures for customs regulation on e-waste TBM in CIS Member States based on requirements of the Basel Convention on the Control of TBM of Hazardous Wastes and their Disposal;
- preparation of Forms and maintaining national statistical records on volumes of e-waste generation, accumulation, and treatment;
- preparation of recommendations for the loads optimisation for e-waste management entities.

National Statistics on E-waste

Specific e-waste statistics are not currently compiled and are not reported to the authorities.
Data and information about the import, export, and generation of e-waste are available at both the customs authorities and the Ministry of Environment of Armenia, but they are aggregated with other waste streams.

Nonetheless, via data on importing, exporting, and production of EEE – available on the website of the Statistical Committee of Armenia (Armstat)[76] – it was possible to determine the main statistical indicators on e-waste in Armenia. Specifically, the data used was obtained from the Output of Main Commodities in the Industrial Organisations[77] and from the section of the Armstat databases related to Foreign Trade of Armenia[78]. The official data provided by the Statistical Committee have a time series available until 2019 (Figure 30).

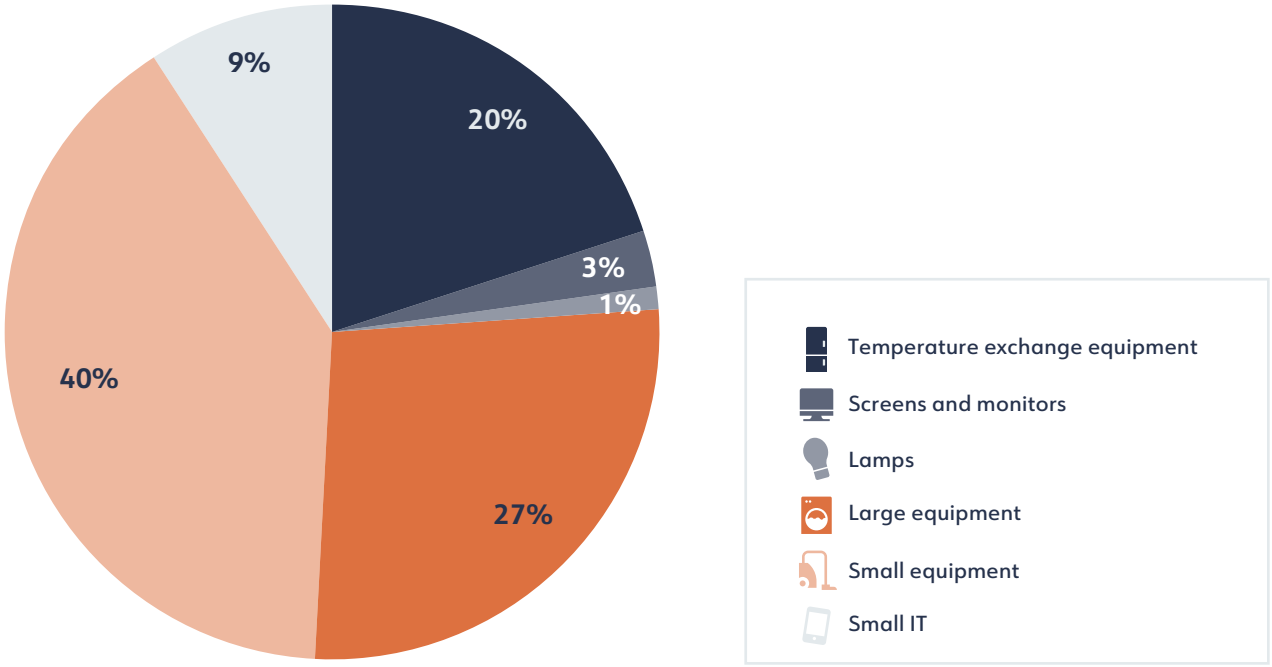
Figure 30. EEE POM and e-waste generated in Armenia



EEE POM fluctuated between 6.7 kg/inh and 7.7 kg/inh from 2010 to 2017, then increased to 14.8 kg/inh in 2019.
The amount of EEE POM fluctuated between 6.7 kg/inh and 7.7 kg/inh from 2010 to 2017. The amount of EEE POM shows two peaks in 2018 and 2019, at 14.3 kg/inh (42.7 kt) and 14.8 kg/inh (44.2 kt), respectively. Some of the UNU-KEYs that contributed the most to the relevant increase are central heating (UNU-KEY 0001), from 0.5 kg/inh in 2017 to 2.9 kg/inh in 2018, dishwashing machines (UNU-KEY 0102), from 0.07 kg/inh in 2018 to 0.4 kg/inh in 2018, printers (UNU-KEY 0304), from 0.05 kg/inh in 2017 to 0.5 kg/inh in 2018 and 0.9 kg/inh in 2019, professional luminaires (UNU-KEY 0507), from 0.3 kg/inh in 2018 to 1.1 kg/inh in 2019, and household tools (UNU-KEY 0601), from 0.1 kg/inh in 2017 to 0.4 kg/inh in 2018 and 0.3 kg/inh in 2019.

[76] https://armstat.am/en/.
[77] https://armstat.am/en/?nid=82&id=2196.
[78] https://www.armstat.am/en/?nid=778.

Figure 31. Share of categories in the EEE POM (2019)



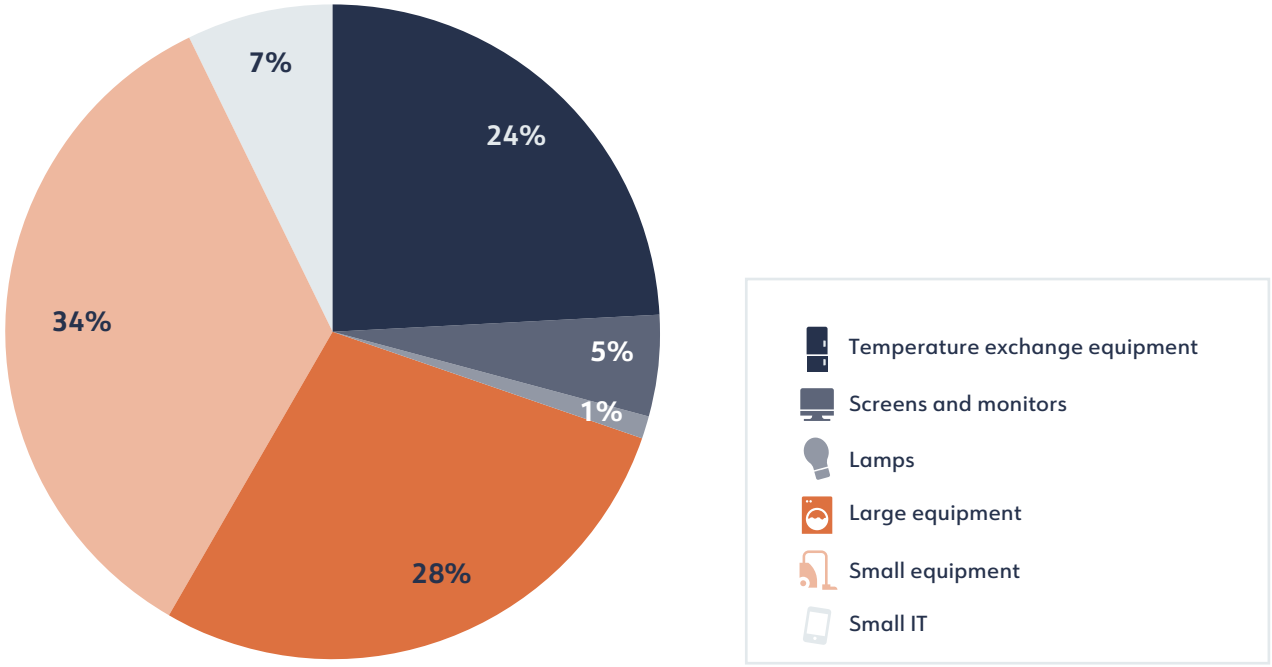
Large and small equipment (Cat. IV and V) had the highest share of EEE POM (67 percent) in 2019. Specifically, 6.0 kg/inh of small equipment were POM in 2019, and 3.9 kg/inh were large equipment. The smallest share is that of lamps, with 0.1 kg/inh POM in 2019 (Figure 31).

Domestic production of EEE averaged 0.01 kg/inh annually from 2010 to 2019.
Though the amount of EEE POM in Armenia depends mostly on importing, the country registered a total of 1.3 kt (0.44 kg/inh) of EEE domestically produced from 2010 to 2019. Armenia's domestic production in 2018 and 2019 was mainly for:

- Cat II, screens and monitors: laptops, incl. tablets (UNU-KEY 0303).
- Cat III, lamps: compact fluorescent lamps (UNU-KEY 0502).
- Cat IV, large equipment: photovoltaic panels (UNU-KEY 0002), professional luminaires (UNU-KEY 0507), professional monitoring and control (UNU-KEY 0902).
- Cat V, small equipment: other small household (UNU-KEY 0201), household luminaires (UNU-KEY 0506), household tools (UNU-KEY 0601), household monitoring and control (UNU-KEY 0901).
- Cat VI, small IT: mobile phones (UNU-KEY 0306), music Instruments, radio, HiFi (incl. audio sets) (UNU-KEY 0403) and video (f.i. Video recorders, DVD, Blue Ray, set-top boxes, UNU-KEY 0404).

Specifically, Armenia domestically produced 0.3 kt (0.12 kg/inh) of photovoltaic (PV) panels from 2017 to 2019.

Figure 32. Share of categories of e-waste generated (2019)



E-waste generated nearly tripled in 10 years, from 2.0 kg/inh 2009 to 5.5 kg/inh in 2019.

The amount of e-waste in Armenia steadily increased from 2.0 kg/inh (6.0 kt) in 2010 to 5.0 kg/inh (14.9 kt) in 2019.

E-waste generated in 2019 accounted for 34 percent of small equipment (Cat. V), or 1.7 kg/inh, followed by large equipment (Cat. IV) with 1.4 kg/inh (28 percent) and temperature exchange equipment (Cat. I) with 1.2 kg/inh (24 percent) (Figure 32).

ESM of e-waste is close to zero.

E-waste is not separately collected in Armenia, and no specific recycling target for e-waste is currently in place, so the quantity of e-waste formally collected and recycled in the country is likely close to 0 kg/inh. The only accessible data on ESM of e-waste is from a 2014 UNECE questionnaire and corresponds to 0.01 kt (0.004 kg/in).

E-waste Management System

Armenia is currently improving its waste management system, and the EPR for e-waste is also being prepared.

Armenia does not yet have an official system for collection and treatment of e-waste, but activities are ongoing to start improving waste management. A working group in the field of waste management, recycling, and disposal has been created in the country to coordinate activities at the national level. The group was created upon decision of the Prime Minister of Armenia and is headed by his Chief Advisor. In this framework, a Programme has been designed that focuses on improving collection, primarily the sorting and disposal of municipal solid waste. The Programme is currently at the approval and negotiation stage with involved stakeholders.

Most the e-waste is managed by the informal sector or ends up in landfills. In Armenia, as in other countries of the Region, prerequisites exist for the development of e-waste treatment and recycling, but the insufficient collection of this type of waste hinders proper development. The situation is further complicated by the fact that a certain amount of e-waste is processed illegally. In this regard, a 2019 study titled *Armenia: Waste Quantity and Composition Study* was implemented by the Environmental Centre Acopian of the American University of Armenia (AUA) and supported by the Manukian Simon Research Foundation and the Armenian government. Quantities and composition of e-waste along with other waste streams were investigated. One of the study's outcomes [54] showed that the share of e-waste in the mixed residual waste from sample containers taken to landfills corresponds to very low percentages (about 0.3 percent, equivalent to approximately 13 kg over 4 tons), meaning that there is an informal e-waste recycling system active in the country. Indeed, consumers discard most e-waste (e.g. small appliances, batteries, lamps, etc.) into mixed residual waste bins. The most valuable materials (e.g. precious, ferrous, and non-ferrous metals), as well as components and assemblies suitable for reuse as spare parts, are then extracted from medium- and large-sized e-waste by informal collectors and pickers, whereas the remaining fractions, including hazardous substances, usually ends up in landfills.

To date, no precise information concerning the role of the informal sector in Armenia is available, and the quantity of e-waste informally collected and recycled is unknown, but the quantity is likely to be relevant and unstable over time.
Considering that the country does not have an environmentally sound e-waste management system in place, the entire quantity of e-waste generated is probably either mixed by consumers with other residual waste and thus destined to landfilling or incineration or informally collected and recycled with substandard treatments for recovering valuable materials.

Import and Export of E-waste

The import and export of hazardous waste are regulated according to the requirements of the Basel Convention on the Control of TBM of Hazardous Waste and their Disposal.

In Armenia, as well as in the other EAEU countries, there is no explicit prohibition on the import of e-waste. But two additional normative acts for the country are:

- Resolution of the Government of Armenia No. 90 – H, dated February 5, 2015 *'On approval of the lists of certain goods prohibited and subjected to restrictions under customs clearance, forms of licences, and applications for export and import of goods, establishing the specifics of granting licences for the export and import of some goods'*[79].
- Resolution of the Government of Armenia No. 1524 – H, dated December 25, 2014 *'On approval of the lists of goods, prohibited and subjects to restrictions under customs clearance, establishing authorised bodies and approval of the framework procedure for granting licences and permits for the export and/or import of goods'*[80].

The import and/or export of e-waste is allowed under licencing conditions, but is forbidden for mercury lamps and fluorescent tubes.

Armenia has prohibited the import of used mercury lamps and fluorescent tubes (UNU-KEYs 0502, 0503, 0504). However, the import and/or export of e-waste and e-waste fractions, including batteries, mercury switches, and glass from CRTs – is allowed under licences as hazardous waste. Transporters can receive the approval for the TBM of waste, including e-waste, after submitting the licences issued by the Ministry of Environment to the customs authorities. Other waste explicitly prohibited for TBM are waste lead-acid batteries, waste glass (also from CRT) containing an active coating, and waste-containing pollutants above certain concentrations (e.g. arsenic, mercury, PCBs, polybrominated biphenyls, etc.).

No official data on e-waste import and export was reported from 2016-2019.

Through the analysis of the annual reports to the Basel Convention for 2016 to 2019, data specifically on e-waste and e-waste components could not be retrieved or quantified.

Used EEE imported and exported could not be quantified.

Since statistics on imports and exports of used EEE are not available in Armenia, it was not possible to quantify those amounts.

[79] https://www.arlis.am/documentview.aspx?docid=95600.
[80] https://www.arlis.am/documentview.aspx?docID=95134.

Stakeholder Mapping

In Armenia, five ministries and governmental bodies are involved in the waste sector and can play a role in Armenia's e-waste management, namely the Ministry of Environment, the Ministry of Territorial Administration and Infrastructures, the Inspectorate for Nature Protection and Mineral Resources, the Statistical Committee, and the Customs Service. Below is the role and responsibility of each stakeholder.

Stakeholder	Responsibility
Ministry of the Environment Website	Issuance of permits and licences for the TBM of hazardous waste, including e-waste.
Customs Service Website	Maintaining a register for recording the import and export of goods, including EEE.
Statistical Committee Website	In charge of the following publications: • Foreign trade databases. • Generation and movement of industrial waste by hazard class. • Volume of mixed residual waste transported to the collectors and treatment operators.
Inspectorate for Nature Protection and Mineral Resources Website	Maintaining a register based on statistical reporting on the generation, treatment, and disposal of waste. The report is submitted by legal entities carrying out activities related to the treatment of production and consumption waste.
Ministry of Territorial Administration and Infrastructures Website	Authorised body in the field of waste collection in the area of Armenia.

Country:

Uzbekistan

33.2 million inhabitants
448,978 km²
Borders: Afghanistan, Kazakhstan, Kyrgyzstan, Tajikistan, Turkmenistan
GDP per capita PPP: $7,308 USD
Average household size: 5.0 members

National legislation on e-waste:

Extended Producer Responsibility:
National e-waste standards:
E-waste collection target:
Legislation product coverage in UNU-KEYs:
Legislation product coverage in weight (%) on total and per category:

International Conventions:

	Signature	Ratification/Accession	Entry into force
Basel Convention		07/02/1996 (a)	07/05/1996
Rotterdam Convention	-	-	-
Stockholm Convention		28/06/2019 (a)	26/09/2019
Minamata Convention	-	-	-

EEE POM (2019):	E-waste generated (2019):	E-waste managed environmentally soundly (2019):
		

Formal/environmentally sound e-waste management system in place:

National Legal Framework

Waste in Uzbekistan is regulated by the Law of Uzbekistan 'On Waste', dated April 5, 2002, № 362-II.
The purpose of this law is to regulate relations in the field of waste management, and the main tasks are to prevent the harmful effects of waste on the life and health of citizens and the environment, reduce waste generation, and ensure their rational use in economic activities. According to article 24, benefits are provided to legal entities and individuals who develop and implement technologies focused on reducing waste generation and disposal, creating enterprises and workshops, producing equipment for waste disposal, taking a share in financing measures for waste disposal, and reduction of waste generation. Local governments may establish, within their competence, additional measures to stimulate waste disposal and reduce waste generation.

Waste information is generated on the basis of the state statistical reporting form on ecology.
Another important piece of legislation for the country is the Resolution of Ministers Cabinet No. 295, dated October 27, 2014 'On approval provision for procedure of implementation of the State accounting and monitoring in the field of waste handling', which defines the reporting procedure for waste information in the country.

Waste data is collected by Goskomstat as part of monitoring the SDGs achievement.
Information on SDG indicators 12.4.2.1, 12.4.2.2 is posted on the website nsdg.stat.uz. Waste data are published in the bulletin 'Main indicators of nature protection, rational use of natural resources, forestry and hunting'. Also, data on waste and scrap is formed on the basis of the state statistical reporting form for industry. Information on this waste is classified in accordance with the Governmental Classifier of Economic Activities of Uzbekistan (GCEA - rev. 2), developed according to the Statistical Classification of Economic Activities in the European Community (NACE Rev.2).

Solid waste management strategy in Uzbekistan for 2019-2028 is focused on creating an effective system for the management of solid household waste in Uzbekistan.
The strategy for the management of solid household waste in Uzbekistan for the period 2019 – 2028 was approved by the Decree of the President of Uzbekistan dated April 17, 2019 No. PP-4291.

The strategy is focused on regulating the management of solid household waste, their transportation, storage, disposal, and recycling.

The solid waste management strategy for 2019-2028 is intended to be multi-sectoral and structured to cover the country's whole territory. The strategy focused on the management, transportation, storage, disposal, and recycling of municipal solid waste has the following objectives:

- Development of environmentally friendly infrastructure to provide the population with comprehensive services for the collection and processing of solid household waste.
- Creation of an effective and modern system for processing solid household waste.
- Maintenance of solid waste landfills.
- The use of solid waste management facilities as alternative energy sources.

The goal of the strategy is to reduce and minimise the negative impact of municipal solid waste on the environment.

This new and long-term strategy aims to create an efficient waste management system and opens up great opportunities for potential investors to implement various projects in the field of waste management.

Benefits apply to enterprises that attract investment in waste management activities.
Based on the Resolution of RUz President 'On additional measures for stimulation of direct private foreign investments attraction' No. RP-3594, dated April 11, 2005, enterprises operating in the field of waste management that attract direct private foreign investment are exempt from a number of taxes.

Work on handling mercury-containing lamps is regulated by decrees of the Cabinet of Ministers of Uzbekistan:

- 'On measures to organise production and a phased transition to the use of energy-saving lamps', dated June 2, 2011 No. 161.
- 'On the approval of the regulation on the organisation of collection and disposal of spent mercury-containing lamps', dated September 21, 2011 No. 266.
- 'On streamlining the activities of enterprises for the use and disposal of mercury-containing lamps and devices', dated October 23, 2000 No. 405.
- 'On measures to expand the domestic production of energy-saving lamps', dated October 20, 2015 No. 299.

A National Strategy in place is aiming to improve statistical indicators in the field of ecology and environmental protection.

In accordance with the roadmap for the implementation of the National Strategy for the Development of Statistics of Uzbekistan in 2020-2025, approved by the Decree of the President of Uzbekistan 'On measures to further improve and develop the national system of statistics of Uzbekistan', dated August 3, 2020 No. 4796, it is planned to improve statistical indicators in the field of ecology and environmental protection based on international standards.

In Uzbekistan, there are 4 classes of waste hazard by characteristics and composition, and the classes are also part of the official statistical reporting of the country.

Waste hazards are determined on the basis of the Resolution of the Cabinet of Ministers of Uzbekistan 'On further improvement of the environmental impact assessment mechanism' No. 541, dated September 7, 2020, sanitary norms and rules 'Hygienic classifier of hazardous industrial waste' SanPin-0128-02, and 'Sanitary procedures for inventory, classification, storage and disposal of industrial waste' SanPin - 0127-02.

E-waste Management System

Though a waste management system already exists, Uzbekistan is still in the process of developing an e-waste system.

There are about 100 waste disposal organisations. The largest enterprise is State Unitary Enterprise 'Makhsustrans', operating in the capital Tashkent. According to the State Committee on Ecology and Environmental Protection, there are 183 enterprises for the processing of solid household waste in Uzbekistan with a total processing capacity of 894,000 tons per year. Similarly, an important step toward increasing the efficiency of utilisation of valuable solid household waste from consumers is the creation of specialised clusters in nine cities (i.e. Andijan, Nukus, Bukhara, Jizzak, Karshi, Navoi, Termez, Gulistan, and Urgench) for collection, transportation, sorting, processing, and final disposal of municipal solid waste. The technologies used in these clusters are focused on sorting the incoming mixed solid waste for the subsequent extraction of secondary material resources and processing.

Infrastructure for the collection and processing of e-waste exists in Uzbekistan, but it is currently very limited.

According to the State Committee for Ecology and Environmental Protection, the company Toshrangmetzavod Recycling LLC is currently engaged in processing electronic waste in Uzbekistan. The company recycles several types of e-waste, including equipment for heat exchange, screens, monitors, and other large-sized equipment.

Mercury-containing lamps are collected by recycling organisations and shops where consumers also receive incentives to buy new equipment.

The collection of the spent resource of mercury-containing lamps is carried out at:

- recycling organisations;
- manufacturers of energy-saving lamps, including through the points of sale of energy-saving lamps;
- collection points for household waste, using specially installed containers that exclude damage to lamps and the ingress of mercury-containing substances contained in them into the air, water supply sources, soil, and food products.

Uzbekistan is currently collecting and recycling mercury-containing lamps and developing an e-waste management system.

Trade enterprises that sell mercury-containing lamps to the population through stationary retail outlets, in shopping malls, or in company stores and representative offices of manufacturers (importers), without any restrictions, receive mercury-containing lamps from the population that have exhausted their usefulness, with subsequent delivery to manufacturers of energy-saving lamps.

When purchasing a new energy-saving lamp of domestic production with the simultaneous return of a used mercury-containing lamp (regardless of the manufacturer), a reward of 10% off of the purchased lamp is provided.

Uzbekistan is making great improvements in the management of waste batteries management, although there are still challenges related with their further processing.

According to the State Committee on Ecology and Environmental Protection, one of the main problems in Uzbekistan is waste generated from used batteries, which are usually collected alongside municipal solid waste and taken to existing landfills or landfills without any environmental protection measures. In this regard, expert advice and research on best practices would be very useful for the country. Previously, residents of Uzbekistan had few options for getting rid of used batteries. But recently, great transformations have begun in the field of household waste management.

There is a step-by-step solution to the problems accumulating in the field, including the issue of disposing batteries. By order of the State Committee on Ecology and Environmental Protection, in 2020 all territorial subdivisions of the State Unitary Enterprise 'Toza Hudud' and 'Makhsustrans' were instructed to begin widespread installation of special containers of the established standard for collecting batteries – first of all, in waste collection points. A similar proposal was addressed to alternative specialised sanitation companies. To date, 530 containers of Makhsustrans State Unitary Enterprise and 171 of private sanitary cleaning companies have been installed in Tashkent. The installation of containers for collecting batteries continues, and will cover all existing waste collection points in the Fergana region. It is also necessary to ensure that batteries collected in this manner are regularly removed. They will be stored in large containers mainly on the territory of local branches of the Toza Hudud and Makhsustrans enterprises.

The issue of their further processing has yet to be resolved, since there are not yet any corresponding production capacities in Uzbekistan.

The introduction of specific rules and technical instructions will improve the management of e-waste in Uzbekistan.

According to the State Committee on Ecology, it is necessary to adopt and fully implement the regulatory document 'On Approval of the Regulation on the Procedure for Delivery, Collection, Settlement, Storage, Processing and Use of Electronic Waste', which should provide the necessary basis and tools for processing enterprises, including incentives and the provision of appropriate benefits, as well as the responsibility of consumers for the fact that they do not ensure the disposal of this type of waste in accordance with the law. It would also be useful for Uzbekistan to develop an official list of instructions on technological processes for the processing and disposal of electronic waste.

Import and Export of E-waste

Uzbekistan joined the Basel Convention in 1995.

In accordance with the Basel Convention, national legislation establishes a list of waste subject to environmental certifications for import and export. The Resolution of the Cabinet of Ministers of Uzbekistan 'On the regulation of the import into Uzbekistan and export from its territory of environmentally hazardous products and waste', dated April 19, 2000 No. 151, approved the nomenclature of products and wastes subject to mandatory environmental certification. Per the nomenclature, List A includes waste subject to mandatory environmental certification, the import and export of which is subject to government regulation in accordance with the Basel Convention. List A includes used mercury lamps and fluorescent tubes.

Stakeholder Mapping

The three national authorities responsible in the field of waste and e-waste management in Uzbekistan are the State Committee for Ecology and Environmental Protection, the State Committee on Statistics, and the local governments. Besides these authorities, other parties responsible in the field of e-waste management include the e-waste processing companies, producers, and their associations (i.e Uzeltekhsanoat).

Stakeholder	Responsibility
State Committee for Ecology and Environmental Protection Website	The Committee monitors compliance with legislation in the field of waste management and organises a system for collecting, transporting, processing, and disposing of household waste in close cooperation with local authorities and local governments.
State Committee on Statistics Website	The Committee carries out the formation of information on waste based on the forms of state statistical reporting on ecology, as well as industry.
Local governments	Participate in resolving issues related to the placement of waste management facilities in the relevant territory. Promote the sanitary cleaning of settlements and the timely payment of fees for the collection of household waste. They carry out public control over the sanitary and ecological state of waste management facilities.
Joint Stock Company 'Uzbek Plant for the Preparation and Processing of Scrap, Non-Ferrous Metal Waste' – JSC' 'Uzvtorcvetmet' Website	Enterprise for the collection of non-ferrous metal waste and their subsequent processing.
Association of Electrotechnical Enterprises of Uzbekistan – Uzeltekhsanoat Website	The Association unites manufacturers of cable and wire products, electrical household appliances, and electric power equipment.
Limited Liability Company 'Toshrangmetzavod Recycling' Website	Reception and processing of electronic waste.

Country:

Azerbaijan

10.1 million inhabitants
86,600 km²
Borders: Armenia, Georgia, Iran, Russia, Turkey
GDP per capita PPP: $16,414 USD
Average household size: 4.5 members

Legislation:
Infrastructure:
Collection Rate:
(0.0 %)

Legend:
- Advanced
- Transition
- Basic

National legislation on e-waste:

Extended Producer Responsibility:	✗
National e-waste standards:	✗
E-waste collection target:	✗
Legislation product coverage in UNU-KEYs:	0 of 54
Legislation product coverage in weight (%) on total and per category:	Total: 0% of the e-waste generated

0% 0% 0% 0% 0% 0%

International Conventions:

	Signature	Ratification/Accession	Entry into force
Basel Convention		01/06/2001	30/08/2001
Rotterdam Convention	-	-	-
Stockholm Convention		13/01/2004	17/05/2004
Minamata Convention	-	-	-

EEE POM (2019):	E-waste generated (2019):	E-waste managed environmentally soundly (2018):
121.9 kt. 12.1 kg/inh.	80.1 kt. 8.0 kg/inh.	0.01 kt. 0.001 kg/inh.

(Source: UNU / UNITAR / JSC "Tamiz Schahar")

Formal/environmentally sound e-waste management system in place:

✔ One company officially engaged in e-waste collection and recycling.

National Legal Framework

Azerbaijan does not have a specific legal or regulatory instrument dedicated to e-waste. The management of waste, including hazardous waste, is regulated by several national laws and rules.

A normative framework for regulating e-waste is not developed in Azerbaijan. There is no definition of e-waste in the national legislation, and requirements for the management of e-waste are not defined.

The management of waste, including hazardous waste, is regulated by two laws: 1) 'On industrial and solid domestic waste', one of the main regulatory acts in the field of waste management, adopted on June 30, 1998 and amended in accordance with the Basel Convention in 2007, and 2) 'On environmental safety', dated June 8, 1999 No. 677-IG. In accordance with these laws, relevant rules are applied to hazardous waste-handling (e.g. collection, transportation, storing, disposal, etc.). The law 'On industrial and domestic waste' has been enriched by amendments and additions according to the provisions of the Basel Convention, which Azerbaijan joined in 2001. Another relevant legal act concerning the management of hazardous waste is the Resolution of the Cabinet of Ministers N. 228 of June 14, 2016, 'Rules for storage of hazardous waste'. As well, the following pieces of legislation on waste management have been developed and approved:

- 'State strategy on hazardous waste management in Azerbaijan' (2004).
- 'Passportisation rules of hazardous waste' (2003).
- 'Rules for waste management' (2007).
- 'Rules for TBM of hazardous waste' (2008).
- 'Rules for waste inventory generated in the process of production' (2008).

A national strategy for the improvement of solid waste management in Azerbaijan was introduced in 2018.

A 'National Strategy on improvement of solid waste handling in Azerbaijan for 2018-2022' was approved by the Decree of President of Azerbaijan No. 637, dated November 1, 2018. The strategy envisions fulfilment of activities focused on improving solid waste handling, but for the time being, they have been oriented exclusively in building new landfills in order to accommodate the needs of the country and do not tackle the e-waste issues specifically. The Ministry of Economy of Azerbaijan is the coordinating body for the implementation of National Strategy.

The State Statistics Committee approved a system for the classification of hazardous waste in 2009.

A classification system for hazardous waste was approved on the basis of the national legislative acts concerning waste, as well as the Basel Convention. This is part of the 'Statistical Waste Classifier', a classification approved by Goscomstat (State Statistics Committee) in 2009 and based on the European Waste Codes applied in EU.

E-waste data accounting is not kept in Azerbaijan, and no reporting system is in place.

Among the forms of the official statistical observations conducted in the country, there is no position on e-waste. According to the national legislation, there is no possibility to include a notion among the forms of official statistical observations (which include reporting, questionnaires, etc.) in case that notion is not reflected in the country's normative legal acts. Therefore, e-waste in Azerbaijan is totalled alongside other waste.

National Statistics on E-waste

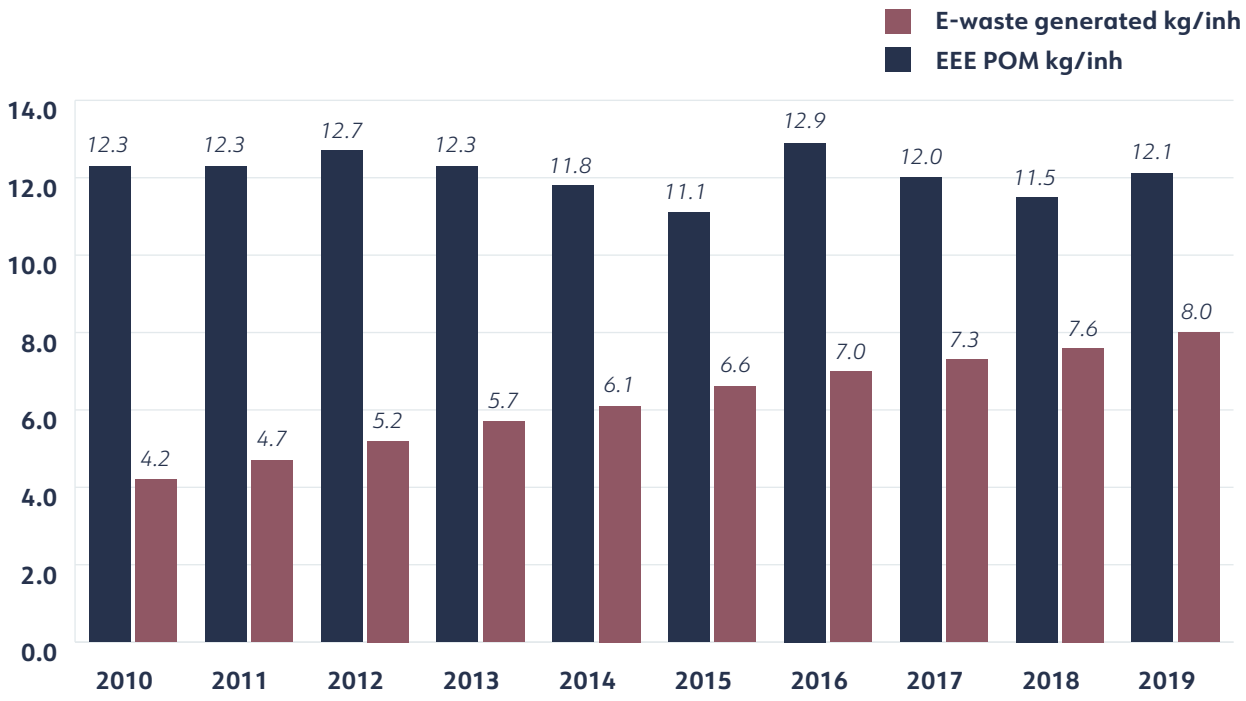
E-waste statistics are not compiled in Azerbaijan, and e-waste is not documented separately from other waste streams.

Data on foreign trade is handed over to Goscomstat (State Statistics Committee) by the Customs Committee and is published annually by Goscomstat in various official reports[81]. The 'Commodity Nomenclature for Foreign Activity of Azerbaijan' is applied at the national level in the trade statistics and is compliant with the international Harmonised System. Despite the availability of data on domestic production and foreign trade, which can be used to compute EEE POM and e-waste generated, those statistics are not yet compiled in Azerbaijan.

Goscomstat keeps statistics on industrial, solid household, hazardous, and medical waste. The existing acts in the waste framework do not mention e-waste, and the requirements for ESM of e-waste are not defined. This makes monitoring e-waste flows challenging, as the concept is not reflected in any regulatory act.

Because of this, UNU/UNITAR internal data has been used for Azerbaijan's EEE POM and e-waste generated indicators (Figure 33).

Figure 33. EEE POM and e-waste generated in Azerbaijan

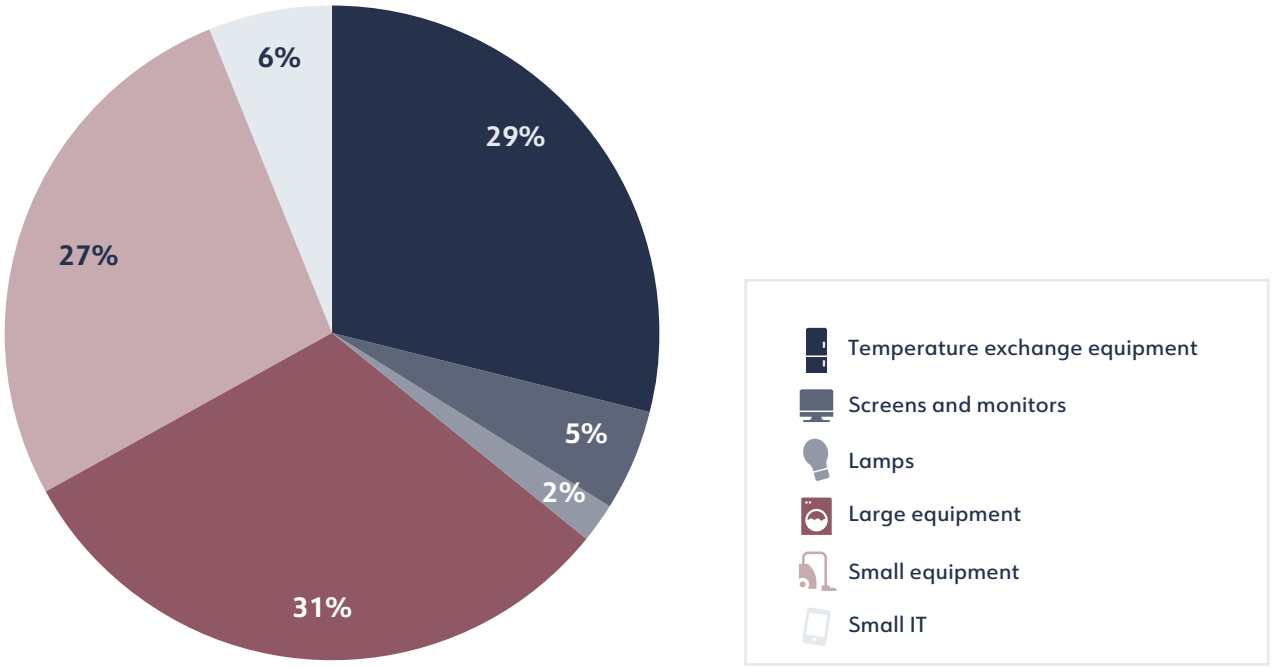


EEE POM in Azerbaijan has been fluctuating between 11.1 and 12.9 kg/inh, whereas e-waste generated doubled from 4.2 to 8.0 kg/inh.

The amount of EEE POM in Azerbaijan did not vary much in recent years, ranging from a minimum of 11.1 kg/inh (106 kt) in 2015 to a maximum of 12.9 kg/inh (125 kt) in 2016. In 2019, Azerbaijan POM had an amount of 12.1 kg/inh (121.9 kt) of EEE.

[81] https://www.stat.gov.az/source/trade/.

Figure 34. Share of categories in the EEE POM (2019)



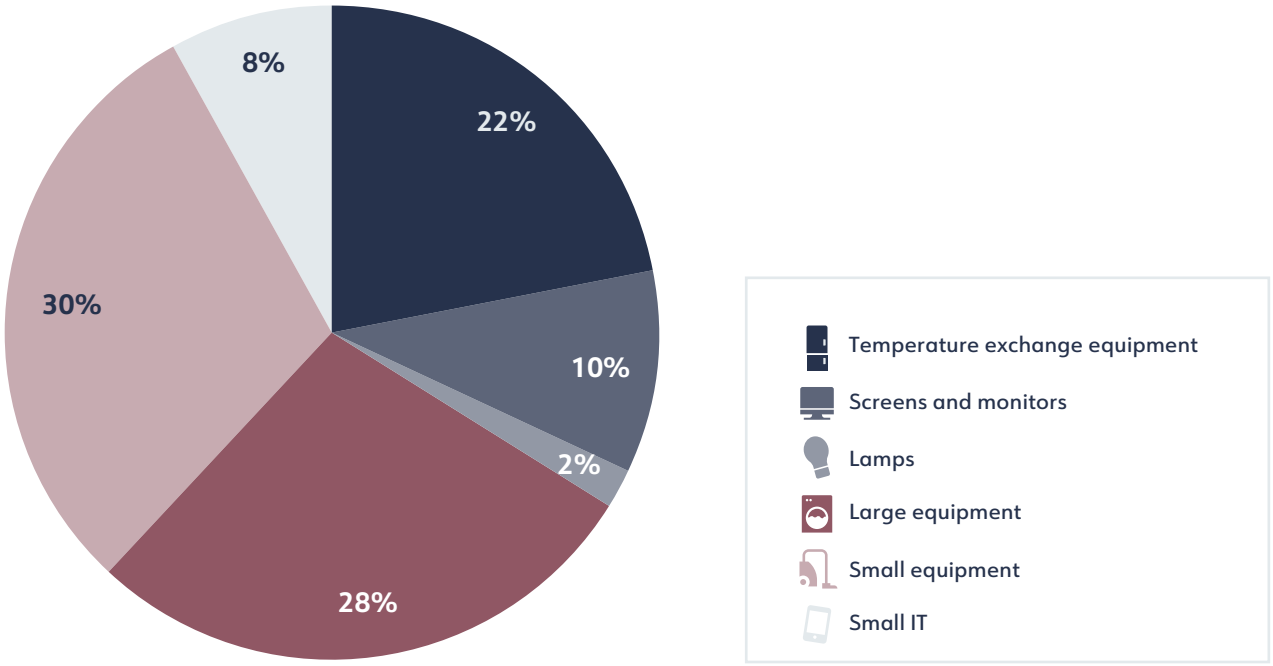
The largest shares are observed for large equipment (Cat. IV), with 3.9 kg/inh, and temperature exchange equipment (Cat. I), with 3.5 kg/inh, equivalent to 31 percent and 29 percent of the total EEE POM. The smallest share is that of lamps (Cat. III) and screen and monitors (Cat. II), with 0.2 kg/inh (2 percent) and 0.7 kg/inh (5 percent), respectively (Figure 34).

Information on EEE domestically produced in Azerbaijan is available at the national website of Goscomstat.

Data on internal production of EEE is available publicly at the website of Goscomstat[82]. For domestic production, Azerbaijan applies the national Statistical Classifier of Industrial Products (SCP) developed on the basis of the EU PRODCOM. Data is currently published as a total of units, and no conversion to weight has been made.

[82] https://www.stat.gov.az/source/industry/?lang=en.

Figure 35. Share of categories of e-waste generated (2019)



The e-waste generated in Azerbaijan increased steadily, from 4.2 kg/inh (37.6 kt) in 2010 to 8.0 kg/inh (80.1 kt) in 2019.

Regarding e-waste categories, the highest two shares in the amount of e-waste generated for 2019 in Azerbaijan are those of small equipment (Cat. V) with 2.4 kg/inh (30 percent) and large equipment (Cat. IV) with 2.2 kg/inh (28 percent), whereas the smallest one is lamps (Cat. III) with 0.1 kg/inh (2 percent) (Figure 35).

Approximately 0.001 kg/inh of e-waste per year in Azerbaijan is managed using ESM.

Since Azerbaijan has neither an e-waste law, an e-waste collection target, nor an e-waste management system, and since it is not compiling e-waste statistics, it can be assumed that the volume of e-waste collected and recycled using ESM is very small and limited to sporadic initiatives. Based on the data provided by the state organisation JSC 'Tamiz Schahar', which provides waste disposal services in the city of Baku, the amount of e-waste annually separately collected and destined to be recycled in Azerbaijan is in the range of 0.001 kg/inh (0.009-0.01 kt). JSC 'Tamiz Schahar' collects but does not process e-waste alongside other streams. JSC 'Tamiz Schahar' separates e-waste and sells it to contracted companies, including a company that exports the waste to Turkey. Since no other data could be retrieved on quantities of e-waste treated using ESM, it is reasonable to assume that the remaining volume is mixed with other municipal waste and disposed of in landfills or managed informally.

E-waste Management System

Azerbaijan does not have a formal e-waste management system in place, and landfilling is the most common practice for all waste streams.

E-waste in Azerbaijan is not separately collected, since there are no legal collection points of such waste. There is also no sorting of e-waste from mixed waste streams undertaken. As such, the waste is recycled and not separately collected.

Regarding other waste streams, the most common treatment is landfilling. In fact, 8 new landfills are supposed to be realised in several of Azerbaijan's regions as part of the National Strategy for the improvement of solid waste management. As well, a special landfill has been built to respect the requirements of international standards for the disposal (i.e. landfilling) of hazardous waste. All functions related to landfilling procedure and maintenance are coordinated by the National Centre for Hazardous Waste[83].

An informal sector probably exists in Azerbaijan, though it has not been quantified.

Given the fact that an e-waste management system is not in place in Azerbaijan and e-waste is not separately collected, it can be assumed that a portion of the amount generated in the country is mixed with residual waste and landfilled, alongside other hazardous or non-hazardous waste. Another portion is also likely to be informally managed, undergoing substandard treatments to recover valuable materials without proper reclamation of the hazardous substances.

Azerbaijan is making its first attempts to create an e-waste collection and recycling system.

Azerbaijan is currently taking its first steps to begin collecting e-waste through private initiatives on a relatively small scale.

Financing systems for e-waste collection are not currently in place.

Since legislation on e-waste has not been formed in Azerbaijan, there is no justification for an e-waste collection financial mechanism yet.

To begin tackling the e-waste problem, Azerbaijan should work on the legislative, data accounting, and infrastructural sides.

What is recognised in Azerbaijan as next steps for the country's e-waste management is the creation of a state commission headed by the Ministry of Economic Development with the goal of organising a systematic collection of this type of waste among the population and to begin working on the introduction of the EPR principle. Besides the elaboration of a legislative framework on e-waste, other relevant aspects for the country are to adapt the reporting forms and the waste classifiers to include e-waste, as well as to begin collecting data and preparing a national database for their publication.

Azerbaijan is beginning to take action in the field, mainly through small-scale private initiatives.

[83] http://ttpoligon.com/.

Import and Export of E-waste

The import and export of e-waste in Azerbaijan is regulated by the Basel Convention and by a national resolution prohibiting the import of e-waste into the country.

Azerbaijan has been a Party to the Basel Convention on the Control of TBM of Hazardous Wastes and Their Disposal since 2001. Besides requirements introduced by the Basel Convention, another piece of legislation regulates the import and export of e-waste in Azerbaijan. Specifically, according to the Resolution of the Ministers Cabinet No. 167, dated July 25, 2008, 'On confirmation of the rules for TBM of hazardous wastes', the import of e-waste to Azerbaijan is prohibited. This is due to the fact that the waste contains hazardous substances and is not properly recycled in the country. Similarly, the export of e-waste outside of Azerbaijan and transit of some types of e-waste must also be carried out with the permission of the Ministry of Ecology and Natural Resources.

No official data on e-waste importing and exporting could be quantified for Azerbaijan.

The official reports to the Basel Convention for the years 2016, 2017, 2018 and 2019 were reviewed to gather information on e-waste imported and exported in Azerbaijan. Though statistics are available in the reports, no data specifically on e-waste could be identified for Azerbaijan.

Information on used-EEE imported and exported is not available, but the flows for Azerbaijan are likely marginal.

No information on used EEE (or second-hand) imports and exports could be identified. However, such transport is likely not happening for Azerbaijan, at least not in relevant quantities, as the Ministry of Ecology and Natural Resources has not received any official appeals regarding this type of import and export flows.

Stakeholder Mapping

The four governmental bodies responsible for waste management in Azerbaijan are the Ministry of Ecology and Natural Resources, the Ministry of Economic Development, the State Statistics Committee, and the State Customs Committee. Municipalities and a waste collection and treatment company also play a role in the sector.

Stakeholder	Responsibility
Ministry of Ecology and Natural Resources Website	The control body is in charge of development and preparation for approval of legislative and regulatory acts of the Government in the field of waste management.
Ministry of Economic Development Website	Issues licences for the treatment, recycling, and disposal of hazardous waste.
Goscomstat (State Statistics Committee) Website	Collection and compilation of official data on waste.
State Customs Committee Website	Keeps records of imports and exports of EEE in the country.
Municipalities and private companies	Responsible for municipal waste collection and subsequent disposal in landfills.
JSC 'Tamiz Schahar' Website	Waste treatment and recycling, mainly through incineration. Keeps partial records of e-waste.

Country:

Kyrgyzstan

6.5 million inhabitants
199,945 km²
Borders: Kazakhstan, China, Tajikistan, Uzbekistan
GDP per capita PPP: $3,475 USD
Average household size: 4.2 members

Legislation:
Infrastructure:
Collection Rate:
(0.0 %)

Legend:
- Advanced
- Transition
- Basic

National legislation on e-waste:

Extended Producer Responsibility:	✗
National e-waste standards:	✗
E-waste collection target:	✗
Legislation product coverage in UNU-KEYs:	0 of 54
Legislation product coverage in weight (%) on total and per category:	Total: 0% of the e-waste generated

0% 0% 0% 0% 0% 0%

International Conventions:

	Signature	Ratification/Accession	Entry into force
Basel Convention		13/08/1996 (a)	11/11/1996
Rotterdam Convention	11/08/1999	25/05/2000	24/02/2004
Stockholm Convention	16/05/2002	12/12/2006	12/03/2007
Minamata Convention	-	-	-

EEE POM (2019):	E-waste generated (2019):	E-waste managed environmentally soundly (2019):
18.5 kt. **2.8 kg/inh.**	**10 kt.** **1.5 kg/inh.**	**close to 0 kt.** **0 kg/inh.**

(Source: UNU / UNITAR)

Formal/environmentally sound e-waste management system in place:

✗ 2 or 3 companies could potentially be involved in e-waste recycling with a license obtained for the recycling and storage of hazardous waste, but no separate collection of e-waste in Kyrgyzstan is taking place.

National Legal Framework

There are no specific legal instruments regulating the handling of e-waste, nor is there any 'e-waste' definition in the national legal framework.

Kyrgyzstan has neither an e-waste specific legal act nor a legal definition of e-waste. The sector is regulated by the legal and regulatory framework related to waste management issues, which comprises the following:

- The law 'On Environment Protection' No. 53 of June 16, 1999 (as amended by Law No.124 in 2005).
- The law 'On Official Statistics' No. 82, dated July 8, 2019.
- The law 'On Production and Consumption Wastes' No. 89 of November 13, 2001 (as last amended in 2019)[84].
- The 'General Technical Regulations on Environmental Safety' No. 151 of May 8, 2009 (as last amended in 2019)[85].
- The law 'On Atmospheric Air Protection' No. 51 of June 12, 1999 (as last amended in 2016)[86].
- The law 'On Environmental Expertise' (also known as Law on Environmental Review) of June 16, 1999 No. 54 (as last amended in 2015) [55].
- Governmental Decree 'Procedure for Management of Hazardous Wastes in the Territory of Kyrgyzstan', No. 885 of December 28, 2015[87].
- The law 'On Local-Self Governance' No. 101 of July 15, 2011[88].
- The law 'On License and Permit System in Kyrgyzstan' No. 195 of October 19, 2013 (as amended in 2020) [89].

Specifically, the law 'On Production and Consumption Wastes' of November 13, 2001 No. 89 regulates the process of generation, collection, storage, recycling, depollution, transportation, and disposal of waste. It assigns responsibilities to public administration, supervision, and control bodies in the field of waste management, as well as the prevention of negative impact of production and consumption waste on the environment and human health. It is Kyrgyzstan's main law in the field of waste management. The legislation regulates the primary accounting of waste generation, statistical reporting, certification, and development of regulatory and technical documents in this area. Issues related to the organisation of activities in the field of production and consumption waste management, definition of requirements for waste disposal, and facilities for waste disposal are carried out in accordance with the 'Procedure for management of production and consumption waste in Kyrgyzstan', approved by the Resolution of the Government of Kyrgyzstan as of August 5, 2015 No. 559. This procedure sets out the requirements for separate collection of waste to be used as secondary material resources and their recycling. The activities of companies and individuals associated with waste management are subject to licencing in accordance with the 2013 law 'On Licencing' [56]. Law No. 89 also contains a definition of hazardous waste. The modalities of hazardous waste management and disposal are set forth by the Governmental Decree 885 of 2015, which applies to both natural and legal persons. However, it is not applicable to radioactive waste, solid waste and mixed waste, and TBM of waste. Decree No. 885 of 2015, 'Procedure for Management of Hazardous Wastes in the Territory of Kyrgyzstan', focuses specifically on mercury-containing waste, waste car batteries, and waste oils. Requirements are defined for the handling of particular hazardous wastes, such as: the packaging of waste and chemical materials, mercury waste, used accumulator batteries, and used petroleum products. Provisions are also included with respect to the transportation and recycling of hazardous waste. A disposal charge for mercury goods has also been introduced into the national legislation. However, the requirements for the management of e-waste are not specified in the document.

No EPR system is currently in place for e-waste, but Kyrgyzstan plans to introduce the EPR principle into the legislation.

Kyrgyzstan does not have an EPR system in place yet, but the government plans to introduce the principle into the national legislation.

A hazardous waste classification system is in place but is not harmonised with UNU-KEYs or the six e-waste categories.

The Kyrgyz waste classification system is harmonised neither with the six e-waste categories nor with the UNU-KEYs. The requirements for classification of the hazardous waste by hazard level, the identification of the waste list, and their characteristics, as well as coding by the type of waste generation activity, physical method of handling, and aggregate state are regulated

[84] https://cis-legislation.com/document.fwx?rgn=352. [85] https://cis-legislation.com/document.fwx?rgn=27858.
[86] https://cis-legislation.com/document.fwx?rgn=290. [87] http://www.fao.org/faolex/results/details/en/c/LEX-FAOC161075/.
[88] https://www.ilo.org/dyn/natlex/natlex4.detail?p_lang=en&p_isn=90348&p_country=KGZ&p_count=276. [89] https://cis-legislation.com/document.fwx?rgn=63232.

by the Hazardous Wastes Classifier, approved by the Resolution No. 9 of January 15, 2019. In accordance with this classifier, several items of electronic and electrical waste can be classified both as production waste and domestic waste. Hazardous waste is classified in five categories in Kyrgyzstan: (a) extremely hazardous, (b) highly hazardous, (c) moderately hazardous, (d) slightly hazardous, and (e) effectively non-hazardous.

Kyrgyzstan signed the Dushanbe Agreement on e-waste.

Kyrgyzstan, Armenia, Belarus, Kazakhstan, Russia, Tajikistan, and Uzbekistan signed the Dushanbe Agreement on e-waste. On November 2, 2018, in Minsk, the Action Plan for the implementation of the Agreement was approved by the Resolution of the Council of CIS State Leaders. Nevertheless, to date, no activity has been carried out within the Agreement's framework, since not all countries have yet carried out domestic procedures for accomplishing its requirements.

Kyrgyzstan adopted several interstate standards for waste management as national standards [57].

The following interstate standards are in effect and have been adopted as national standards in Kyrgyzstan:

- 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 waste. Basic provisions'.

The National Statistical Committee established two reporting forms on generation and disposal of waste that are also delivered to the Convention Secretariat, but there are not specific entries dedicated to e-waste.

Economic entities carry out primary accounting in the field of waste management in accordance with the two Kyrgyz laws 'On Official Statistics' and 'On production and consumption waste' – based on a unified system established by the National Statistical Committee. Official statistical reporting includes:

- Form 1 – Waste 'On the formation and treatment of production and consumption waste'. This report is submitted by all economic entities, regardless of their form of ownership, carrying out activities in the field of generation and treatment of production and consumption waste, except for radioactive and medical waste, as well as enterprises and organisations where toxic industrial waste is generated, stored, reused, destroyed. The report is drawn up on the basis of data from an inventory of sources of waste generation and other primary documents on accounting for the movement of waste.
- Form 2 – Waste 'On disposal of production and consumption waste'. This report is submitted by enterprises and organisations whose activities are related to the disposal of production and consumption waste.

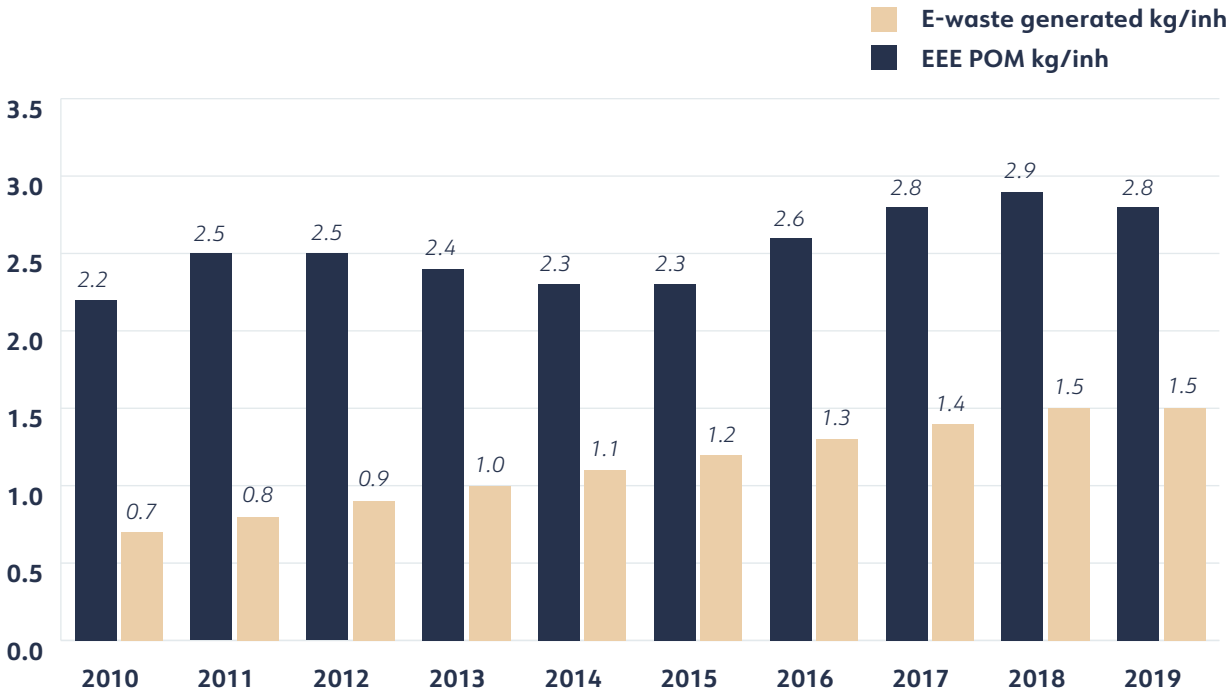
The National Statistical Committee processes the received reporting data and annually publishes statistical compilations for a five-year period in the 'Environment in Kyrgyzstan', which includes a section on 'Production and consumption waste'. In accordance with the Basel Convention, the national report is submitted to the Convention Secretariat on the annual basis.

National Statistics on E-waste

E-waste data is not yet available in Kyrgyzstan.

Since e-waste is not separately collected in Kyrgyzstan, no e-waste-specific data are available at the country level. Some data on hazardous waste in general are available, and the accounting is performed according to the united system based on the procedure established by the State Statistical authority. The national statistical reporting includes two forms: Form 1 – Waste 'On generation and handing of production and consumer wastes' and Form 2 – Waste 'On dumping of production and consumer wastes'. Considering that no official data could help the quantification of e-waste in the country, UNU/UNITAR internal data has been used to estimate the main e-waste statistics indicators (Figure 36).

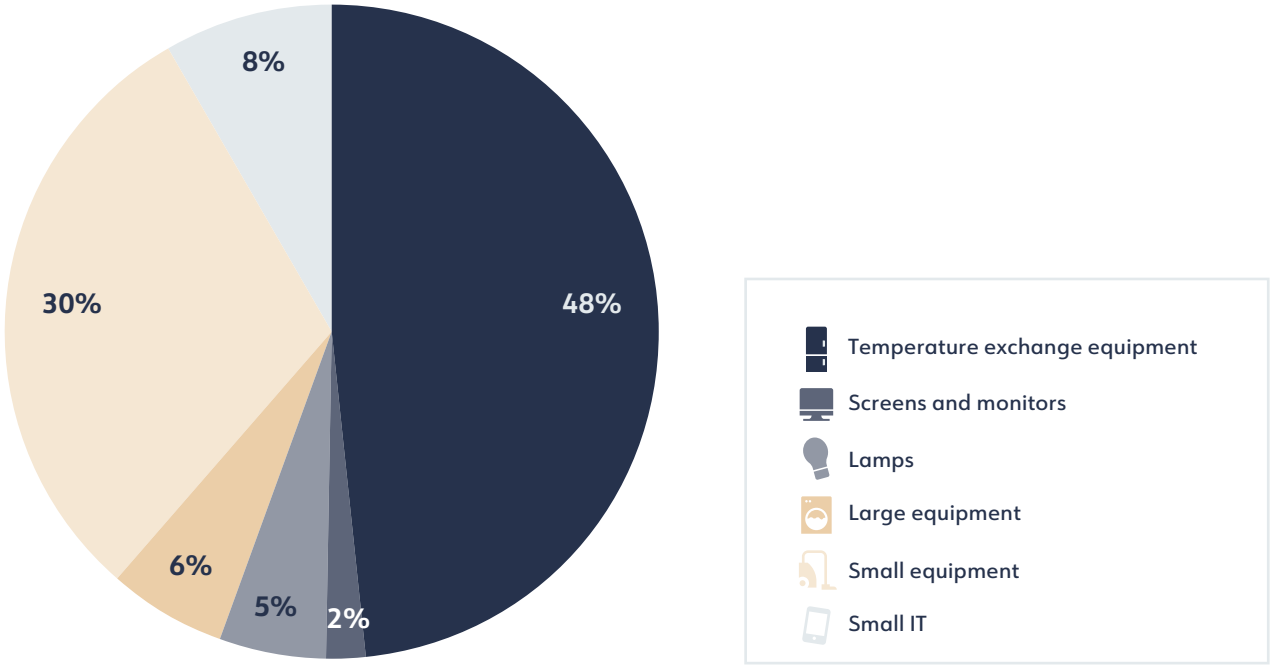
Figure 36. EEE POM and e-waste generated in Kyrgyzstan



EEE POM in Kyrgyzstan has increased by roughly 30 percent in the last decade, from 2.2 kg/inh in 2010 to 2.8 kg/inh in 2019.

The amount of EEE POM in Kyrgyzstan increased in the past decade from 2.2 kg/inh to 2.8 kg/inh (18.5 kt), with some minor fluctuations over time. The EEE POM is considerably lower than the CIS+ average of 11.0 kg/inh.

Figure 37. Share of categories in the EEE POM (2019)

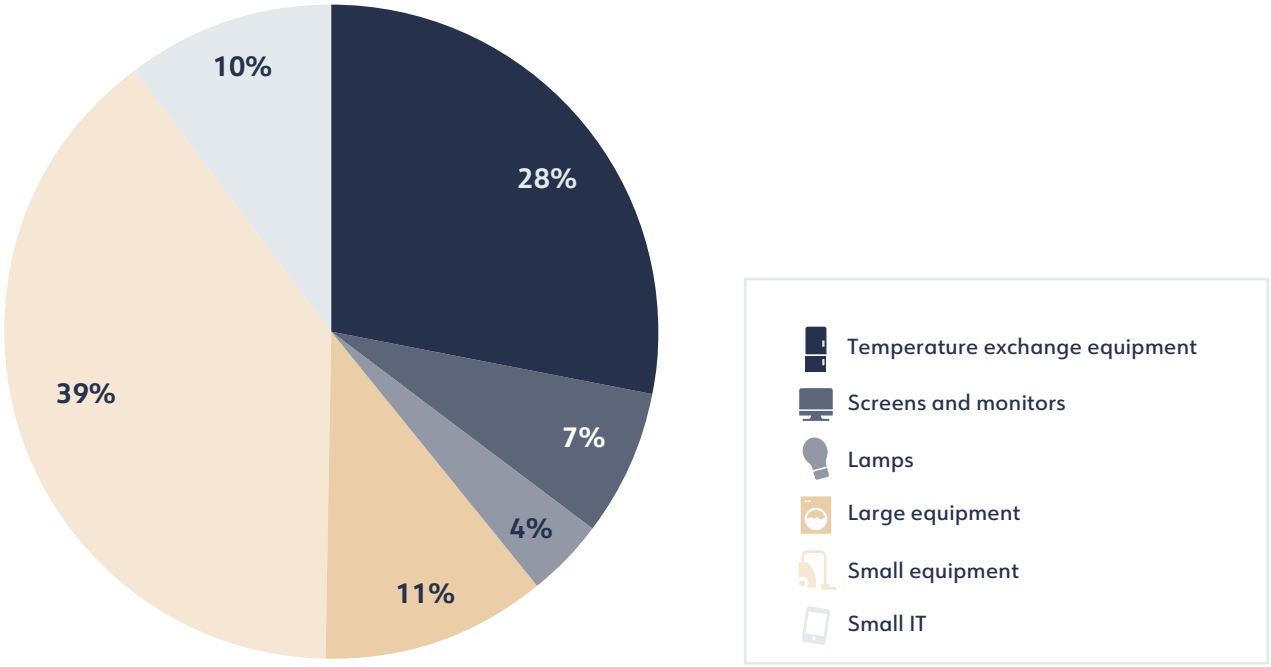


Almost half of the EEE POM is temperature exchange equipment (Cat. I), with 1.4 kg/inh. Category I is followed by small equipment (Cat. V), with 0.9 kg/inh (30 percent). By contrast, the smallest share is that of screens and monitors (Cat. II), equal to 0.1 kg/inh (2 percent). Lamps (Cat. III) have a relatively high share in Kyrgyzstan, with 5 percent of the total EEE POM (Figure 37).

The amount of EEE produced in Kyrgyzstan consists primarily of televisions, household heaters, cleaning and cooking equipment, and lamps. However, the figures provided are not comprehensive, as there is an amount expressed through aggregated-data not publicly available.

According to the National Statistical Committee, 14.0 kt (1.42 kg/inh) of EEE were produced in Kyrgyzstan in 2019. The EEE consisted mainly of discharged and incandescent lamps (9.3 kt), washing machines (4.5 kt), electric heaters and radiators (0.15 kt), and ovens and other cooking equipment (0.12 kt). Nonetheless, more detailed data are not publicly available, as the information in non-aggregated form is confidential according to the law on statistics.

Figure 38. Share of categories of e-waste generated (2019)



E-waste generated in Kyrgyzstan steadily increased from 0.7 kg/inh in 2010 to 1.5 kg/inh in 2019.
The amount of e-waste generated in Kyrgyzstan nearly tripled from 2010 to 2019 and increased from 0.7 kg/inh (3.7 kt) to 1.5 kg/inh (10.1 kt). The e-waste generated in Kyrgyzstan per inhabitant is almost six times less than the regional average (8.7 kg/inh in 2019).

The highest shares of e-waste generated for 2019 are small equipment (Cat. V), with 0.6 kg/inh (39 percent), and temperature exchange equipment (Cat. I), with 0.4 kg/inh (28 percent) (Figure 38).

The amount of e-waste collected and recycled using ESM in Kyrgyzstan is close to zero.
Kyrgyzstan is lacking an organised separated collection infrastructure for e-waste, and the companies that could be active in the field of treatment and recycling receive e-waste mixed in with other hazardous waste streams and mostly already dismantled by the informal sector. Thus, it can be assumed that the recycled amount of e-waste for Kyrgyzstan is very limited. As well, no official data are available in this area.

There is no data on lifetimes and only limited data on stocks.
In 2018, an inventory of the stock of waste in Kyrgyzstan was carried out [58] [59] using the visual inspection approach and identified that roughly 10 percent of all waste was e-waste, medical waste, and construction waste. Of the total waste stock, 3 percent was identified as e-waste, but the outcomes cannot be extrapolated to the entire country. No studies investigating the average lifetime of EEE for the country have yet been conducted.

E-waste Management System

Separate collection of e-waste is not carried out in Kyrgyzstan. In cases where used EEE is not suitable for further use, it is usually disposed of alongside ordinary household waste.

As no separate collection of e-waste exists, the majority of e-waste is mixed in with other household waste and destined to be landfilled. Based on a consumer survey, the preliminary assessment conducted in 2017 [57] revealed that on average, at the end of its service life, the equipment is dumped together with other waste in 70 percent of cases, it is stored in residences in 20 percent of cases, and is given to a friend in 10 percent of cases. Due to the lack of an organised e-waste collection system or recycling system for secondary raw materials in the country, e-waste from private and corporate consumers is mostly disposed of in containers and dumped alongside other waste. Municipal enterprisers provide utility services in the field of sanitary cleaning of settlements, including collection and removal of waste at the cost of population and economic entities. Solid domestic waste is transported to the municipalities' functional dumping sites.

Kyrgyzstan has a strong repair culture with several repair shops, especially for household appliances.

Used electronic equipment disposed of and still suitable for reuse is mainly sold as second-hand equipment, for which a license is not required. Large shopping centres selling household appliances periodically hold campaigns to collect used equipment. A significant amount of household appliances accumulates in repair shops, but household appliances' repair shops do not collect e-waste. Depending on the repair shop equipping and on the type of equipment, an average of 15-50 units of equipment are repaired each month. The equipment components or equipment that cannot be repaired and that are not suitable for following use are disposed of with the rest of the garbage in containers for ordinary household waste.

Household appliances are taken to Kazakhstan for further treatment, recycling, and disposal.

When the equipment is not suitable for reuse and cannot be processed in Kyrgyzstan, it is often taken to Kazakhstan for further treatment, recycling, and disposal. This process is especially common with household appliances.

The informal sector is very active in the collection of used EEE and e-waste in Kyrgyzstan, both for reselling purposes and for the extraction of valuable materials.

E-waste sorting by the formal sector is not performed, but it is implemented by actors of the informal sector at various stages of the waste supply chain, from the garbage containers site to the waste dumping sites. Informal sector actors are involved in the collection of used functioning electronic equipment for reselling, but are also involved in collecting non-functioning equipment for the extraction of ferrous and non-ferrous metals. Indeed, informal treatment and recycling of e-waste is a common phenomenon in the country, as it is a profitable business due to lower operating costs than that of official processors. Informal activities related to collection, treatment, and recycling of e-waste often include dangerous manual dismantling using simple tools for rapid separation of materials, and are mainly limited to recovering the most valuable and accessible components. Groups of 3-5 individuals usually carry out such work in private houses or garages. Collectors drive around announcing the collection of old equipment, including refrigerators, washing machines, accumulators, and other large household appliances and then buy the waste at an agreed-upon price. The equipment collected is then dismantled and sorted. The sorted scrap is sold to companies in the formal sector that have permits for collecting, buying, recycling, and selling ferrous and non-ferrous metals. There are currently about 20 companies dealing with metal scrap in Kyrgyzstan, some

of which are of Chinese, Pakistani, and Indian origin. Of the major portions of companies available in the market, roughly 8 companies have Chinese capital. The price per 1 kg of ferrous metal scrap is 5 kg, and the price per 1 kg of non-ferrous metal scrap varies from 40 kg to 350 kg. Plastic parts are usually discarded in dumping sites. Components such as acid from accumulators (cells), oils from spare parts, and the other reagents are discharged into the soil without any standards or remediation action.

The informal sector also plays a role in the uncontrolled export of raw materials obtained from e-waste.

Export of ferrous and non-ferrous metal scrap from Kyrgyzstan is carried out on weekly basis. Uncontrolled exports by the legal entities and physical persons of such materials are increasing, due to the significant demand for such raw materials and theirs high prices. This demand negatively affects the official sector that deals with recycling.

There are 2-3 organisations in Kyrgyzstan that are involved in e-waste recycling with a license obtained for 'recycling, storage, disposal, and depollution' of the hazardous waste, but they struggle with accessing waste, which is instead intercepted by the informal sector.

A treatment and recycling infrastructure exists in the country: indeed, in accordance with the KR law 'On License and Permit System in Kyrgyzstan', several companies operate in the field of hazardous waste and e-waste recycling. These enterprisers accept lead-acid cells, mercury waste, and electronic equipment. Large enterprises (employing 500 or more people) can confer these types of waste upon a fee-based system. However, the companies have difficulties with the provision of raw materials by the enterprises, due to the fact that the large majority of e-waste is intercepted by representatives of the informal sector and is treated with substandard treatments for extracting valuable materials or is resold.

Kyrgyzstan has a small formal infrastructure, with three organizations involved in e-waste recycling.

Lack of funds, insufficient infrastructure, and the absence of specific regulations are the main challenges for e-waste management in Kyrgyzstan.

According to the 2017 survey conducted as a preliminary assessment of e-waste in Kyrgyzstan, the main obstacles to implementing a proper e-waste management in the country are the lacking infrastructure, the absence of a legislation or bylaws for recycling requirements, implementation plans to apply the existing one, and an insufficient collection system. Additionally, the lack of available funds hinders the possibilities of the organisations active in the field of waste management, as they are not prepared to incur additional expenses for the collection, treatment, and recycling of e-waste. As well, despite a general awareness on the hazardous properties of some components of e-waste, both individual and corporate consumers hand over used equipment, store it at home, or dispose it with the residual waste because the activities of the formal collectors are insufficient and the consumers are unaware of existing strategies for improving e-waste management. The ability to implement approaches to process this type of waste at the country

level effectively would reduce the burden on the environment and the amount of waste to be disposed of, as well as ensure the recovery and involvement of useful components into the secondary raw materials cycle.

Import and Export of E-waste

Kyrgyzstan has been Party to the Basel Convention since 1996 and has also been part of the Eurasia Economic Union since 2014; both regulate the country's waste imports and exports.

Kyrgyzstan, having acceded to the Treaty on the EAEU of 29 May 2014, applies the single Commodity Nomenclature of Foreign Economic Activity of the EAEU[90]. Importing and exporting of hazardous waste are regulated in the country in accordance with the Resolution of the Board of the Eurasian Economic Commission No. 30, dated April 21, 2015 'On measures of non-tariff regulation'.

Licences are required for the TBM of hazardous waste streams.

In accordance with the law 'On Licencing', a license is required for the TBM of hazardous waste and other waste. The licence is issued based on the expert report provided by an expert organisation registered in the list of licensers and expert organisations approved by the resolution 'On adoption of the list of exported and imported specific goods subject to licencing' No. 115 of March 2015.

No data on importing and exporting of e-waste and hazardous waste was officially reported by Kyrgyzstan.

The latest annual reports for the Basel Convention Secretariat on waste import/export flows were in 2019 and 2020, but no export and import data was provided[91]. Also, there is no data on part of the reporting on the movement of goods on the territory of the EAEU.

For importing and exporting, it was not possible to distinguish data on used or new EEE.

[90] http://ers.basel.int/ERS-Extended/FeedbackServer/fsadmin.aspx?fscontrol=respondentReport&surveyid=77&voterid=50044&readonly=1&nomenu=1.
[91] http://ers.basel.int/ERS-Extended/FeedbackServer/fsadmin.aspx?fscontrol=respondentReport&surveyid=77&voterid=50044&readonly=1&nomenu=1.

Stakeholder Mapping

The five authorities with responsibilities in the field of waste management in Kyrgyzstan are the State Agency for Environmental Protection under the Government, the State Inspectorate for Environmental and Technical Safety under the Government, the Ministry of Economy, the Ministry of Health, and the National Statistical Committee. There are also local authorities, treatment and recycling enterprises, and NGOs.

Stakeholder	Responsibility
State Agency for Environmental Protection under the Government	• Develops rules and regulations governing the ESM of waste. • Is in charge of issuance, suspension, and annulment of: license for the disposal, destruction, and burial of waste-containing toxic materials and substances, including radioactive ones; license for the transportation (including transboundary) of toxic waste products; permit for the disposal of waste in the environment. • Carries out a state environmental review of project documentation of the planned activities for: disposal of hazardous and toxic waste; treatment and disposal of industrial and domestic waste. • Provides expert advice on the export and import of hazardous waste in accordance with the Basel Convention. • Coordinates the management of production and consumption waste, their TBM, and the primary accounting of the generation of production and consumption waste at all economic entities. • Maintains the state waste cadastre and a classifier of hazardous wastes.
The State Inspectorate for Environmental and Technical Safety under the Government Website	Oversees compliance with the rules and regulations, limits, and standards for waste disposal in the environment and requirements for the management of production and consumption waste, including all stages of waste management (i.e. collection, transportation, temporary storage, treatment and recycling, disinfection, placement, and burial).

Stakeholder	Responsibility
Ministry of Economy Website	Issues a licence for the import/export of specific types of goods, waste, and hazardous waste, based on the expert opinion of the State Agency for Environmental Protection.
Department of Disease Prevention and State Sanitary and Epidemiological Surveillance of the Ministry of Health Website	Issues a conclusion on the compliance with the sanitary rules of the procedure, conditions, and methods for the collection, use, neutralisation, transportation, storage, and burial of production and consumption waste, when the local authorities establish the specified order of conditions and methods.
National Statistical Committee Website	The state body in the field of official statistics and the leading producer of official statistics, ensuring the coordination of the development, production, and dissemination of official statistics in the national statistical system. It collects and develops data for the section 'Waste from production and consumption' on the basis of official statistical reporting forms on an annual basis. Statistical data are posted on the official website in the Statistics-Environment section and are also published in the statistical collection 'Environment in Kyrgyzstan', which includes the section 'Production and consumption waste'.
Local authorities	• Control of the activities of businesses and organisations in the field of waste. management located on their territory. • Organise a rational waste collection system, providing for the separate collection of components, storage, regular removal, disposal, and waste disposal, as well as the restoration of the territory under its jurisdiction. • Provide the population with information on waste management, the state of their storage, and treatment and recycling in the region.
Treatment/Recycling Companies	Required to obtain positive feedback from the state environmental review and a license for their waste treatment and recycling activities to operate in Kyrgyzstan.
Public organisations, NGOs	Periodically conduct research and events to raise public awareness in the field of waste management, including e-waste.

Country:

Turkmenistan

6 million inhabitants
491,210 km²
Borders: Afghanistan, Iran, Kazakhstan, and Uzbekistan
GDP per capita PPP: $17,825 USD
Average household size: 5.1 members

Legislation:
Infrastructure:
Collection Rate:
(0.0 %)

Legend:
- Advanced
- Transition
- Basic

National legislation on e-waste:

Extended Producer Responsibility:	✖
National e-waste standards:	✖
E-waste collection target:	✖
Legislation product coverage in UNU-KEYs:	0 of 54
Legislation product coverage in weight (%) on total and per category:	0%

0% 0% 0% 0% 0% 0%

International Conventions:

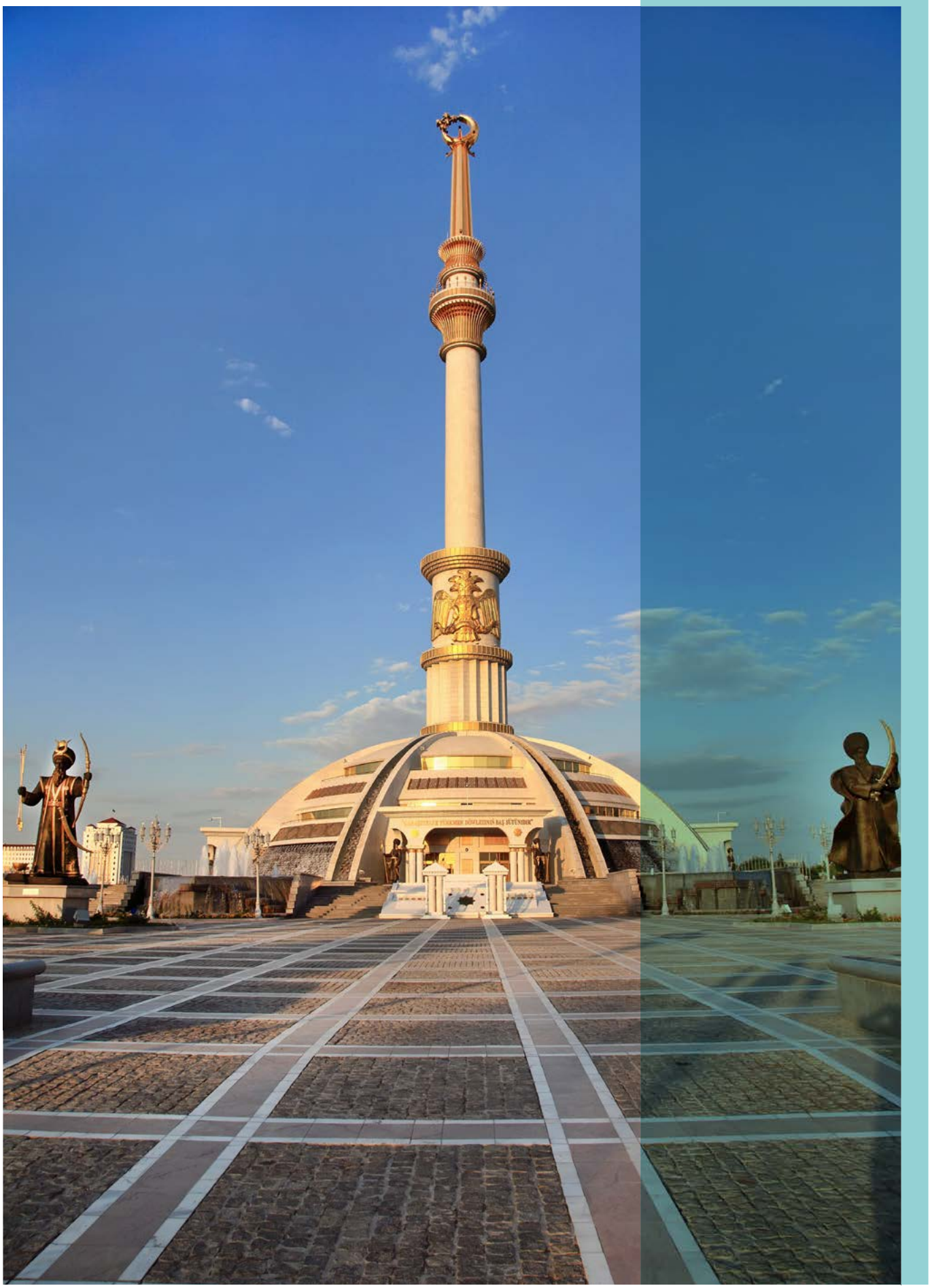
	Signature	Ratification/Accession	Entry into force
Basel Convention		25/09/1996	24/12/1996
Rotterdam Convention	-	-	-
Stockholm Convention	-	-	-
Minamata Convention	-	-	-

EEE POM (2019):	E-waste generated (2019):	E-waste managed environmentally soundly (2019):
75.7 kt. 12.7 kg/inh.	38.6 kt. 6.5 kg/inh.	close to 0 kt. 0 kg/inh.

(Source: UNU / UNITAR)

Formal/environmentally sound e-waste management system in place:

✖



National Legal Framework

In recent years, Turkmenistan has taken a number of measures to reduce the negative impact of municipal solid waste on the environment, but e-waste is currently not specifically addressed.
Despite the fact that an e-waste law is not yet developed in Turkmenistan, at the legislative level, the pollution of the environment caused by improper solid waste management is prohibited by several codes and normative acts such as the 'Law on Nature Protection', the 'Sanitary Code', the 'Forestry Code', the 'Water Code', and the 'Land Code'.

One of the factors that significantly helped to improve the waste sector and reduce the generation of all waste types in Turkmenistan was the May 23, 2015 adoption of the 'Law on Waste', which regulates waste management.
According to the 'Law on Waste' adopted in 2015, waste is classified into five hazardous classes. Additionally, waste is subjected to ownership, which belongs to its producer or other legal entity (or individual entrepreneurs) who have received its property right in accordance with the legislation of Turkmenistan. This law also regulates the requirements for reducing the amount of waste generated. To implement these requirements, legal entities and individual entrepreneurs must:

- apply low-waste and non-waste technologies and systems that allow the prevention, or reduce the amount, of waste generation;
- take measures to maximise the effective disposal of the amount of generated waste;
- carry out measures for waste storage, transport, recovery, and disposal at their own expenses;
- implement waste-sorting procedures and avoid indiscriminate mixing;
- pay a regulated fee when using the services of external enterprises that collect and remove waste;
- keep a mandatory record of the waste generated and provide it to authorities;
- provide the authorised governmental bodies with information on cases of unauthorised waste disposal into the environment and the measures taken to avoid it;
- compensate for any harm and damages caused to public health and the environment from the improper storage or disposal of waste from their own production activities or derived as a result of the violation of the requirements of Turkmenistan legislation in the field of waste management.

The 'Law On Waste' does not define e-waste, alas, nor does it specify any special requirements for e-waste management.
Though the legislative framework of Turkmenistan introduces some key principles for an effective waste management system that could be applied to the e-waste sector as well, specific requirements for managing e-waste and key principles such as the EPR have been not yet developed.

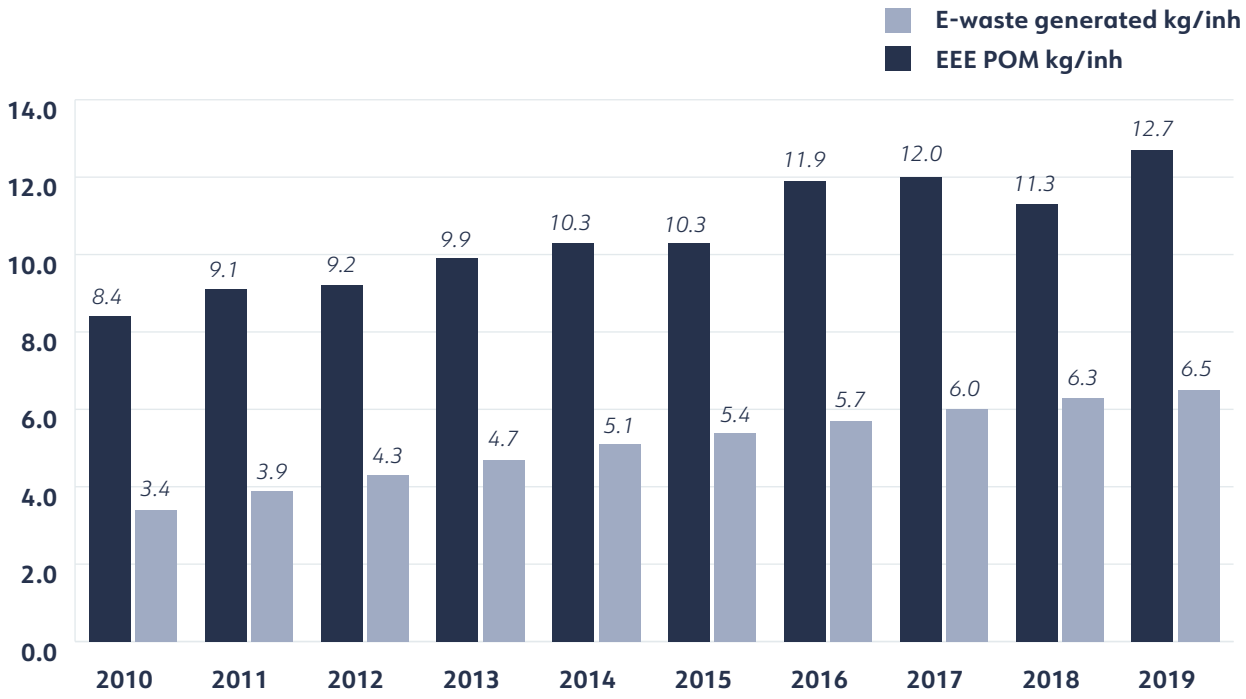
Detailed information on any waste-reporting system are not available for Turkmenistan, but the country adopts a statistical reporting form on industrial and household waste.
In accordance with the action plan for the implementation of the State Program of the President of Turkmenistan, 'Health', the Ministry of Agriculture and Environmental Protection and the State Committee for Water Resources of Turkmenistan developed a form for the statistical reporting on industrial and household waste as well as a document, *Instruction on the procedure for accounting for the generation and use of industrial waste*. The form was agreed to by the Ministry of Health and Medical Industry and the State Statistics Committee of Turkmenistan. The State Statistics Committee approved and introduced the form in 1998.

National Statistics on E-waste

Official e-waste statistics are not compiled at national level.

Since no official records on EEE importing and exporting in Turkmenistan could be retrieved and official statistics on e-waste are not available, UNU/UNITAR internal data has been used to estimate the main indicators for the country. Since only limited records on EEE imports/exports are available on the UN Comtrade Database and all relate to 2000, the EEE POM and e-waste generated statistics for Turkmenistan have been adjusted through a statistical routine, combining the few records available on UN Comtrade with the average obtained from the same stratum. In the calculation routine, countries are classified by stratums representative for the average PPP of the country. Such stratums are used in the calculation routine for predicting the consumption trend of some countries when limited data on importing and exporting are available on the UN Comtrade Database, by using data of countries across the world with a similar economic status (i.e. stratum) as proxies (Figure 39).

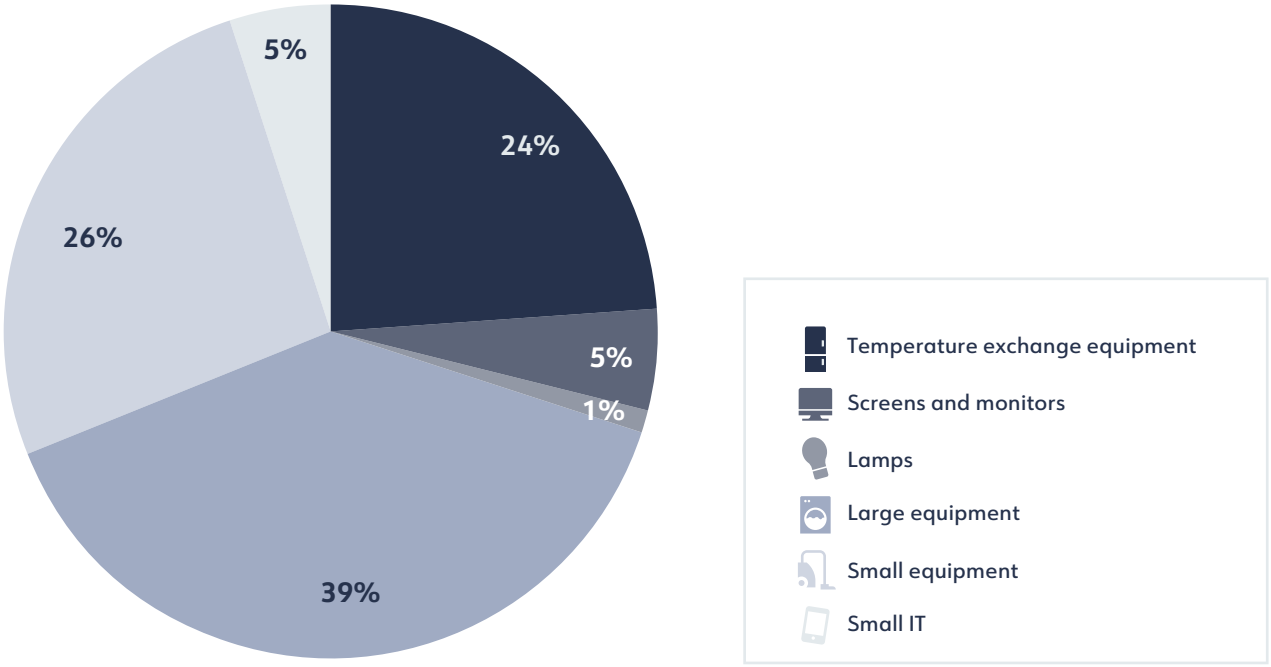
Figure 39. EEE POM and e-waste generated in Turkmenistan



The amount of EEE POM in Turkmenistan increased from 8.4 kg/inh in 2010 to 12.7 kg/inh in 2019.

The EEE POM increased from from 8.4 kg/inh (42.5 kt) in 2010 to 12.0 kg/inh (69 kt) in 2017. It decreased by 0.7 kg/inh to 11.3 kg/inh (65.4 kt) in 2018, then increased again to 12.7 kg/inh (75.7 kt) in 2019.

Figure 40. Share of categories in the EEE POM (2019)

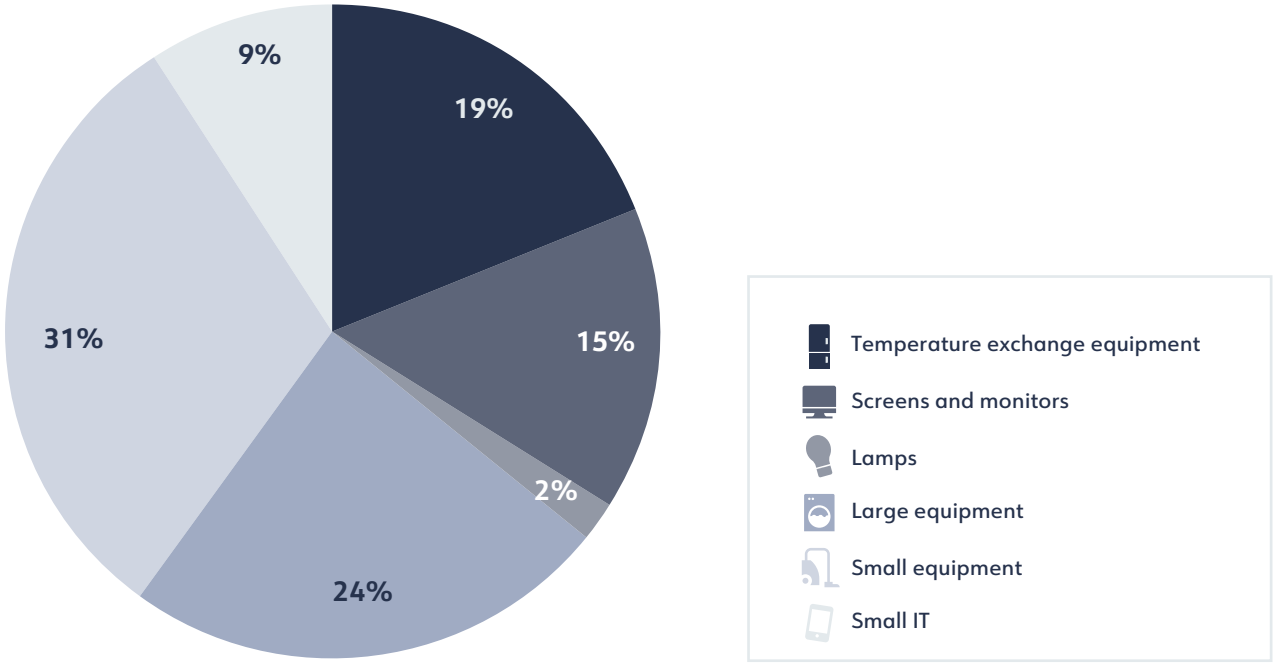


The largest share of EEE POM is large equipment (Cat. IV), with 4.9 kg/inh, or 39 percent of the total EEE POM. The smallest three shares are for lamps (Cat. III), 0.2 kg/inh (1 percent), screens and monitors (Cat. II), and small IT (Cat. VI), which have both 0.7 kg/inh (5 percent) (Figure 40).

Information on domestic production in Turkmenistan could not be identified.

Given the fact that Turkmenistan primarily imports EEE, the amount of products produced internally to the country is likely to be small and limited to only a few items.

Figure 41. Share of categories of e-waste generated (2019)



The amount of e-waste generated in Turkmenistan nearly doubled, from 3.4 kg/inh (17.5 kt) in 2010 to 6.5 kg/inh (38.6 kt) in 2019.

The highest shares of e-waste generated for 2019 in Turkmenistan are those of small equipment (Cat. V), with 2.0 kg/inh (31 percent), and large equipment (Cat. IV), with 1.6 kg/inh (24 percent), while the smallest share is that of lamps (Cat. III), with 0.1 kg/inh (2 percent) (Figure 41).

For the time being, it was not possible to determine whether Turkmenistan manages to collect and recycle any amount of e-waste using ESM.

Since Turkmenistan does not have an e-waste law, e-waste collection target, or e-waste management system and is also not compiling e-waste statistics, it can be assumed that the volume of e-waste collected and recycled using ESM is very limited if not altogether absent.

A preliminary assessment conducted in 2018 in cooperation with a Kyrgyz NGO estimated an amount of 0.57 kg/inh (3.3 kt) generated from 3 types of e-waste in Turkmenistan, in line with UNU/UNITAR internal data for the same items (0.76 kg/inh, 4.4 kt).

A preliminary assessment study [57] on various waste streams was conducted in 2018 with assistance of the 'Independent Ecological Expertise' NGO (Kyrgyzstan). The assessment of mass flows was carried out for five Central Asian countries (including Turkmenistan), taking into consideration the waste generated from refrigerators, computers, and mobile phones. During the mass flow assessment, it was found that that contrary to other countries included in the analysis such as Kazakhstan and Uzbekistan (which are domestically producing EEE), Turkmenistan is primarily an importer. According to the calculations, the smallest amount of e-waste among the five countries considered was generated by Turkmenistan, and this result was directly related to the level of consumer demand for these types of goods, which depended also on the purchasing power of the population for the previous period (2006 to 2011). As reported by the assessment, the amount of e-waste generated in Turkmenistan for the selected equipment was equivalent to 0.54 kg/inh (3.1 kt) of refrigerators (UNU-KEY 0108), 0.02 kg/inh (0.13 kt) of computers (UNU-KEY 0302), and 0.01 kg/inh (0.07 kt) of mobile phones (UNU-KEY 0306), for a total of 0.57 kg/inh (3.3 kt). The outcomes of the study appear to be in line with the amount estimated, based on UNU/UNITAR internal data for the same items in 2018, which equalled 0.76 kg/inh (4.4 kt).

E-waste Management System

An e-waste management system has not yet been developed in Turkmenistan, and information on how e-waste is handled in the country is not available.

Considering that a specific law addressing e-waste has not been developed in Turkmenistan and that there is no information concerning any infrastructure in place, it is possible to assume that Turkmenistan has not yet started to tackle the e-waste issue or that it is taking only its initial steps toward doing so.

Turkmenistan is showing an increasing interest, and is taking action, in the field of waste management.

With regard to other waste streams, a modern treatment/recycling plant has recently been built near the city of Ashgabat. Medical waste is one of the waste types accepted in the plant. In the last year, Turkmenistan has made progress in managing radioactive waste and has improved the practice of chemicals management used in the oil and gas industry. Noteworthy is the example of the State Concern Turkmenhimiya, an organisation with a mission of cleaning and depolluting the territory of toxic waste. For instance, the company collects hazardous waste from abandoned pesticide storage facilities throughout the country and takes care of its subsequent disposal in special sites that are fenced, guarded, and periodically monitored.

In Turkmenistan, e-waste currently remains unmanaged, but the country is making remarkable efforts to improve the management of some waste streams, such as medical and radioactive waste.

No information could be retrieved on the existence or role of the informal sector in the waste field.

Since Turkmenistan is taking its initial steps in the field of e-waste management, it is reasonable to believe that all e-waste generated in the country is either mixed in with residual solid waste by the population and destined to landfills or intercepted by the informal sector and subjected to substandard treatments and subsequent improper dumping.

Import and Export of E-waste

The import and export of e-waste is not specifically addressed from the legislation in Turkmenistan, but the 'Law On Waste' regulates the import and export of waste per requirements of the Basel Convention.

According to the 'Law on Waste', the import of any kind of waste into Turkmenistan for the purpose of disposal is prohibited. The export of hazardous waste from Turkmenistan to foreign countries is carried out in accordance with a list of waste subjected to TBM that is developed based on the state regulation. The Cabinet of Ministers of Turkmenistan approves the list. TBM of hazardous waste is also carried out in accordance with the requirements of the international treaties (i.e. Basel Convention on the Control of TBM of Hazardous Waste and their Disposal) to which Turkmenistan is a party. Specifically, the permits for TBM of waste are issued by the authorised government body in the field of environmental protection in agreement with the Cabinet of Ministers of Turkmenistan. These permits can be suspended or cancelled if the legal requirements are violated.

No official data on the import and export of e-waste in Turkmenistan is available.
Through the review of the annual reports to the Basel Convention for 2018 and 2019, no official data on the import or export of e-waste could be identified for the country.

The import and export bans for e-waste and used EEE are not applied in Turkmenistan.
At this stage, it was not possible to clarify whether specific import and export bans on e-waste or used EEE are in place in Turkmenistan. However, since the country does not have e-waste legislation, it is likely that the sector undergoes the same import and export requirements mentioned in the 'Law on Waste' for other waste streams.

Stakeholder Mapping

In Turkmenistan, the three stakeholders that could be identified involved in the waste sector are the Ministry of Agriculture and Environment Protection of Turkmenistan, the State Statistical Committee of Turkmenistan, and the Turkmenhimiya LLC Group. The respective roles are described below.

Stakeholder	Responsibility
Ministry of Agriculture and Environment Protection of Turkmenistan Website	Two of the main roles of the Ministry are the implementation of state policy and interdepartmental control in the field of protection and rational use of natural resources and the coordination of other state bodies and authorities for activities in the area.
State Statistical Committee of Turkmenistan Website	Executive body that carries out the functions of forming official statistical information on the social, economic, demographic, and environmental situation of the country, as well as the functions of control and supervision in the field of state statistical activities on the territory of Turkmenistan.
Turkmenhimiya LLC Group Website	'Turkmenhimiya' was established by the Decree of the President of Turkmenistan on August 24, 2007 in order to meet the needs of the national economy and the population of Turkmenistan in mineral fertilizers and chemical products, as well as the export of these products abroad. The company collects hazardous waste from abandoned pesticide storage facilities throughout the country and takes care of its subsequent correct disposal in appropriate sites.

10. REFERENCES

[1] Step Initiative, 'Solving the E-Waste Problem (Step) White Paper: One Global Definition of E-waste', Step Initiative., Jun. 2014, [Online]. Available: https://collections.unu.edu/eserv/UNU:6120/step_one_global_definition_amended.pdf.

[2] Forti, V., Baldé, C.P. and Kuehr, R. (2018). E-waste Statistics: Guidelines on Classifications, Reporting and Indicators, second edition. United Nations University ViE – SCYCLE, Bonn, Germany. 2018. Available: http://collections.unu.edu/view/UNU:6477.

[3] Forti, V., Baldé, C.P., Kuehr, R. and Bel, G. (2020). The Global E-waste Monitor 2020: Quantities, flows, and the circular economy potential. United Nations University (UNU)/United Nations Institute for Training and Research (UNITAR) – co-hosted by the SCYCLE Programme, International Telecommunication Union (ITU), & International Solid Waste Association (ISWA), Bonn/Geneva/Rotterdam, 2020.

[4] UNEP. (2021). Global Chemicals and Waste Indicator Review Document. United Nations Environment Programme, Nairobi.

[5] Balde, C.P., Kuehr, R., Blumenthal, K., Fondeur Gill, S., Kern, M., Micheli, P., Magpantay, E. and Huisman, J. (2015). E-waste Statistics: Guidelines on Classifications, Reporting and Indicators. United Nations Universit, IAS-SCYCLE, Bonn, Germany. https://www.itu.int/en/ITU-D/Statistics/Documents/partnership/E-waste_Guidelines_Partnership_2015.pdf.

[6] Seyring, N., Kling, M., Weissenbacher, J., Hestin, M., Lecerf, L., Magalini, F., Sinha-Khetriwal, D. and Kuehr, R. (2015). Study on WEEE Recovery Targets, Preparation for Re-use Targets and on the Method for Calculation of the Recovery Targets, Final Report. European Commission. April, 2015. [Online]. Available: https://ec.europa.eu/environment/waste/weee/pdf/16.%20Final%20report_approved.pdf.

[7] UNECE. (2021) Task Force on Waste Statistics – Conference of European Statisticians. UNECE, Geneva, 2021 under approval (United Nations Economic Commission for Europe, UNECE).

[8] Honda, S., Sinha-Khetriwal, D. and Kuehr, R. (2016). Regional E-waste Monitor: East and Southeast Asia, United Nations University ViE – SCYCLE, Bonn, Germany.

[9] Huisman, J., Stevels, Ab., Baldé, K., Magalini, F. and Kuehr, R. (2019a) The e-waste development cycle. Part I: Introduction and country status. Chapter 2, in: Waste Electrical and Electronic Equipment (WEEE) Handbook, Second Edition. Edited by Goodship, V., Stevels, Ab. and Huisman, J. United Kingdom, 2019. ISBN: 978-0-08-102158-3; pp 17-51.

[10] Huisman, J., Stevels, Ab., Baldé, K., Magalini, F. and Kuehr, R. (2019b) The e-waste development cycle. Part II: Impact assessment of collection and treatment. Chapter 3, in: Waste Electrical and Electronic Equipment (WEEE) Handbook, Second Edition. Edited by Goodship, V., Stevels, Ab. and Huisman, J. United Kingdom, 2019. ISBN: 978-0-08-102158-3; pp 57-89.

[11] Huisman, J., Stevels, Ab., Baldé, K., Magalini, F. and Kuehr, R. (2019c) The e-waste development cycle. Part III: Policy & legislation, business & finance, and technologies & skills. Chapter 4, in: Waste Electrical and Electronic Equipment (WEEE) Handbook, Second Edition. Edited by Goodship, V., Stevels, Ab. and Huisman J. United Kingdom, 2019. ISBN: 978-0-08-102158-3; pp 93-137.

[12] UNDP (2014). Country: Kyrgyzstan. Project Document (Protect human health and the environment from unintentional releases of POPs and mercury from the unsound disposal of healthcare waste in Kyrgyzstan). United Nations Development Programme. https://info.undp.org/docs/pdc/Documents/KGZ/HCWM%20ProDoc%20Kyrgyzstan%20final%2004072014.pdf.

[13] Kyrgyzstan (2012). Kyrgyzstan: Bishkek Solid Waste – Feasibility Study. Environmental and Social Impact Assessment Bishkek October, 2012. https://www.ebrd.com/documents/environment/esia-41712-esia.pdf.

[14] UNDP/GEF (2012). Mid-Term Evaluation of the UNDP/GEF Project: "Management and Disposal of PCBs in Kyrgyzstan" Atlas No.: 00072737. PIMS No.: 4101. 20 August, 2012 https://erc.undp.org/evaluation/documents/download/6027.

[15] IPEN (2011). Preparation of the Assessment Report and Conducting Awareness-Raising Activities on E-Waste and Batteries Management in Belarus (Extension of ISIP 1 Project). International SAICM Implementation Project (ISIP). Organised by Center for Environmental Solutions in Belarus. February 2011. https://ipen.org/project-reports/preparation-assessment-report-and-conducting-awareness-raising-activities-e-waste.

[16] Basel Convention (2019) Basel Convention On The Control Of Transboundary Movements Of Hazardous Wastes And Their Disposal Protocol On Liability And Compensation For Damage Resulting From Transboundary Movements Of Hazardous Wastes And Their Disposal. Texts and Annexes. Revised in 2019. http://www.basel.int/TheConvention/Overview/TextoftheConvention/tabid/1275/Default.aspx.

[17] Nairobi Declaration (2006) Nairobi declaration on the environmentally sound management of electrical and electronic waste Eighth meeting of the Conference of the Parties to the Basel Convention on the Control of Transboundary Movements of Hazardous Wastes and their Disposal, Nairobi, 27 November–1 December 2006. http://www.basel.int/Portals/4/Basel%20Convention/docs/meetings/cop/cop8/NairobiDeclaration.pdf.

[18] Cartagena Declaration (2011) Cartagena Declaration on the Prevention, Minimization and Recovery of Hazardous Wastes and Other Wastes Tenth meeting of the Conference of the Parties to the Basel Convention on the Control of Transboundary Movements of Hazardous Wastes and their Disposal, Cartagena, Colombia, 17-21 October 2011. http://www.basel.int/Portals/4/Basel%20Convention/docs/meetings/cop/cop10/CartagenaDeclaration.pdf.

[19] Odeyingbo, O., Nnorom I.C. and Deubzer, O. (2017). 'Person in the Port Project – Assessing Import of Used Electrical and Electronic Equipment into Nigeria'. http://collections.unu.edu/eserv/UNU:6349/PiP_Report.pdf.

[20] Baldé, C.P., Wagner, M., Iattoni, G. and Kuehr, R. (2020) In-depth Review of the WEEE Collection Rates and Targets in the EU-28, Norway, Switzerland, and Iceland. United Nations University (UNU) / United Nations Institute for Training and Research(UNITAR) – co-hosting the SCYCLE Programme, Bonn, Germany, 2020.

[21] Huisman, J., Botezatu, I., Herreras, L., Liddane, M., Hintsa, J., Luda di Cortemiglia, V., Leroy, P., Vermeersch, E., Mohanty, S., van den Brink, S., Ghenciu, B., Dimitrova, D., Nash, E., Shryane, T., Wieting, M., Kehoe, J., Baldé, C.P., Magalini, F., Zanasi, A., Ruini, F., Männistö, T. and Bonzio, A. (2015). Countering WEEE Illegal Trade (CWIT) Summary Report, Market Assessment, Legal Analysis, Crime Analysis and Recommendations Roadmap. Lyon, France. August 30, 2015. http://www.cwitproject.eu/wp-content/uploads/2015/09/CWIT-Final-Report.pdf.

[22] Huisman, J. and Baldé, K. (2013) 'EEE mass balance and market structure in Belgium', Final Rep. Comm. Recupel U.N. Univ., 2013.

[23] J. Huisman, M. Van der Maesen, R. Eijsbouts, F. Wang, C. P. Baldé, and C. Wielenga 'The Dutch WEEE flows', U. N. Univ. ISP–SCYCLE Bonn Ger., vol. 15, 2012.

[24] Monier, V., Hestin, M., Chanoine, A. Witte, F. and Guilcher, S. (2013) Study on the quantification of waste of electrical and electronic equipment (WEEE) In France, 2013, BIOIS, Paris, France.

[25] Government of Georgia. (2016). On approval of the technical regulation on special requirements for the collection and treatment of hazardous waste. Resolution of the Government of Georgia. 29/03/2016. http://www.fao.org/faolex/results/details/en/c/LEXFAOC166695/.

[26] Government of Gorgia. (2015). Resolution No. 426 of 2015 of Georgian Government on Determining List and Classifying Waste according to Types and Characteristics. Resolution of the Government of Georgia On the definition and classification of waste lists according to species and characteristics. 17/08/2015 https://www.informea.org/en/legislation/resolution-no-426-2015-georgian-government-determining-list-and-classifying-waste.

[27] Government of Georgia. (2015). Resolution of the Government of Georgia № 421. (August 11, 2015, Tbilisi) On Approval of technical regulation on the construction, operation, closure and after-care of landfills. http://waste.gov.ge/ka/wp-content/uploads/2015/07/FINAL-Landfill-Bylaw-RES_421_ENG_20150713.pdf.

[28] Government of Georgia (1996). Law of Georgia on environmental protection. Tbilisi
10 December 1996. No 519_IS https://www.matsne.gov.ge/ka/document/download/33340/19/en/pdf.

[29] GEO. (2020). Draft Charter of a PRO on Waste Electrical and Electronic Equipment. Resolution № 326 of 25 May 2020 (WEEE Regulation). Georgia's Environmental Outlook (GEO). https://geo.org.ge/wp-content/uploads/2020/11/WEEE-PRO-Charter_ENG.pdf.

[30] EU. (2014). Association Agreement between the European Union and the European Atomic Energy Community and their Member States, of the one part, and Georgia, of the other part. Official Journal of the European Union. 30.8.2014. L261/4. https://eur-lex.europa.eu/legal-content/en/TXT/PDF/?uri=CELEX:22014A0830(02).

[31] GEO. (2020). Assess the capacity needs of waste collection and processing facilities for waste electrical and electronic equipment. 2020. 23 Sep. Georgia's Environmental Outlook (GEO)/UNDP, 2020. https://geo.org.ge/wp-content/uploads/2020/11/Capacity-Needs-Assessment-of-Informal-Sector.pdf.

[32] GEO. (2020). Capacity Needs Assessment of Waste Electric and Electronic Equipment (WEEE) Collectors. 2020 Sep 23, 2020. UNDP/Sida/Georgia's Environmental Outlook (GEO). https://www.ge.undp.org/content/georgia/en/home/library/democratic_governance/ewaste-EPR.html.

[33] GEO. (2018). Waste Electrical And Electronic Equipment - International And National Context. 'Supporting the introduction of Extended Producer Responsibility (EPR) principle as required by the Waste Management Code'. Ministry of Environmental Protection and Agriculture of Georgia/UNDP/Sida/Georgia's Environmental Outlook (GEO). March 2018. https://geo.org.ge/wp-content/uploads/2019/02/E-watse_International-and-National-Context-1.pdf.

[34] GEO. (2017). Financial feasibility of e-waste recycling in Georgia. October 2017. This document was prepared in the frame of the project 'Supporting the introduction of Extended. Producer Responsibility (EPR) principle as required by the Waste Management Code'. Ministry of Environmental Protection and Agriculture of Georgia/UNDP/Sida/Georgia's Environmental Outlook (GEO). October 2017. https://geo.org.ge/wp-content/uploads/2019/02/Financial-feasibility-on-recycling-of-e-waste-in-Georgia-_ENG-1.pdf.

[35] ERS Basel. (2018). Party: Georgia. Electronic Repor-

ting System of the Basel Convention (Year: 2018). Note to the Focal Point about important features and key updates to the electronic reporting. http://ers.basel.int/ERS-Extended/FeedbackServer/fsadmin.aspx?fscontrol=respondentReport&surveyid=77&voterid=50020&readonly=1&nomenu=1.

[36] Moldova. (2018). Regulation on waste electrical and electronic equipment. Government HOST No. 212 of 07-03-2018. Published: 23-03-2018 in Official Gazette No. 95-104 art. 262 https://www.legis.md/cautare/getResults?doc_id=102175&lang=ro.

[37] Moldova. (2018). Moldova Government HOST No. 501 of 29-05-2018 for the approval of the Instruction on record-keeping and transmission of waste data and information and its management Published: 01-06-2018 in Official Gazette No. 176-180 art. 552 https://www.legis.md/cautare/getResults?doc_id=108614&lang=ro.

[38] Moldova. (2018). Order Of The Government Of The Moldova of January 30, 2018 No. 99 About approval of the List of waste https://cis-legislation.com/document.fwx?rgn=104969.

[39] Moldova. (2016). Moldova parliament FINAL No. 209 from 29-07-2016. Waste Published: 23-12-2016 in Monitorul Oficial No 459-471 Article No. 916 https://www.legis.md/cautare/getResults?doc_id=118272&lang=ru.

[40] Moldova. (2003). Moldova government TIME No. 637 from 27-05-2003 to streamline control over cross-border waste transport and disposal Published : 06-06-2003 in Monitorul Oficial No 99 Article No 676 https://www.legis.md/cautare/getResults?doc_id=112863&lang=ru.

[41] EU WEE Recast. (2012). Directive 2012/19/EU of The European Parliament And Of The Council of 4 July 2012 on waste electrical and electronic equipment (WEEE). The European Parliament And The Council Of The European Union. Official Journal of the European Union 24.7.2012. L 197/38. https://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=CELEX:32012L0019&from=EN.

[42] Moldova. (2018). Moldova government TIME No 212 from 07-03-2018 Approval of the Electrical and Electronic Waste Regulations. Published: 23-03-2018 in Monitorul Oficial No 95-104 Article No. 262 https://www.legis.md/cautare/getResults?doc_id=102175&lang=ru.

[43] Belarus. (2020). National Legal Internet Portal of Belarus, 07/14/2020, 5/48195. Resolution of The Council of The Republic of Belarus June 30, 2020 № 388 On the implementation of the Decree of the President of Belarus of January 17, 2020 № 16 https://pravo.by/document/?guid=12551&p0=C22000388&p1=1.

[44] Belarus. (2020). National Statistical Committee of Belarus. Plan of scientific and methodological work of Belstat for 2019. Order 'On approval of the Plan of scientific and methodological work of the National Statistical Committee of Belarus for 2021'. https://www.belstat.gov.by/upload-belstat/upload-belstat-pdf/o-belstate/Plan_NMR_2021.pdf.

[45] Belarus. (2020). Order of Belstat 'On maintaining state statistics in 2021'. https://www.belstat.gov.by/upload-belstat/upload-belstat-pdf/o-belstate/Plan_NMR_2021.pdf.

[46] Russia (1998). Federal Law on Waste of Production and Consumption of 24.06.1998 N 89-Fz (last edition). Russia, Federal Law on Waste Production And Consumption. Adopted State Duma May 22, 1998. https://cis-legislation.com/document.fwx?rgn=1630/.

[47] Russia. (2012). Fundamentals of state policy in the field of environmental development of Russia for the period up to 2030, approved by the President of Russia on April 30, 2012 https://policy.asiapacificenergy.org/node/841.

[48] Russia. (2018). National Research University Higher School of Economics, Development Centre. Waste utilisation market. https://dcenter.hse.ru/data/2018/07/11/1151608260/%D0%A0%D1%8B%D0%BD%D0%BE%D0%BA%20%D1%83%D1%82%D0%B8%D0%BB%D0%B8%D0%B7%D0%B0%D1%86%D0%B8%D0%B8%20%D0%BE%D1%82%D1%85%D0%BE%D0%B4%D0%BE%D0%B2%202018.pdf.

[49] Russia (2018). The strategy for the development of the industry for the processing, utilisation and disposal of production and consumption waste for the period up to 2030, approved by the order of the Government of Russia dated January 25, 2018 No. 84-r http://static.government.ru/media/files/y8PMkQGZLfbY7jhn6QMruaKoferAowzJ.pdf.

[50] Green Action Task Force. (2019). Extended Producer Responsibility in Kazakhstan. Review and Recommendations. September 2019. Government of Kazakhstan/ OECD/ Green Action Task Force. https://www.oecd.org/environment/outreach/EPR_KAZ_report_Web.pdf.

[51] IFC (2015). Municipal solid waste in Ukraine: development potential scenarios for developing the municipal solid waste management sector. International Finance Corporation (IFC, World Bank Group). With the support of the Free State of Saxony, the Ministry for Foreign Affairs of Finland, and the Agency for International Business and Cooperation of the Dutch Ministry of Economic Affairs. https://www.ifc.org/wps/wcm/connect/24f11a48-d7a0-4970-9bd1-37ff9244f60e/21.+Municipal+Solid+Waste+in+Ukraine+DEVELOPMENT+POTENTIAL+Scenarios+for+developing+the+municipal+solid+waste+management+sector+.pdf?MOD=AJPERES&CVID=lNpD-tO.

[52] Cherinko, O and Balanyu, A. (2018). Waste Management in Ukraine: Opportunities for Dutch Companies. Final Report. Bilfinger Tebodin Ukraine/ Embassy of the Kingdom of the Netherlands. Commissioned by the Netherlands Enterprise Agency, October 5, 2018. https://www.rvo.nl/sites/default/files/2019/02/Waste-management-in-Ukraine.pdf.

[53] Tajikistan. (2002). Law of Tajikistan dated May 10, 2002, No. 44 'On production and consumption waste' as amended by the Law of Tajikistan dated July 25, 2005 No. 109, dated June 28, 2011 No. 736. https://tajtrade.tj/media/44.pdf and http://www.adlia.tj/show_doc.fwx?rgn=3243.

[54] Bolagen, L.L. (2020). Armenia Waste Quantity and Composition Study. Yerevan: AUA Acopian Center for the Environment and AUA Manoogian-Simone Research Fund, American University of Armenia https://ace.aua.am/files/2020/08/WQCS-Report-Eng.pdf and https://ace.aua.am/waste/wqcs.

[55] Lawrence, P., Sydykova, A., Doolotkeldieva, A., Jorupbekova, A., Crawford, A. and Bliss, M. (2018). IGF Mining Policy Framework Assessment: Kyrgyzstan. Intergovernmental Forum on Mining, Minerals, Metals and Sustainable Development, Winnipeg: IISD. https://www.iisd.org/system/files/publications/kyrgyzstan-mining-policy-framework-assessment-en.pdf.

[56] Kyrgyzstan. (2018). Kyrgyzstan Ministry Of Emergency Situations Project : Enhancing Resilience In Kyrgyzstan (Erik Project) Environmental And Social Management Framework (ESMF) Bishkek March – 2018. https://ewsdata.rightsindevelopment.org/files/documents/35/WB-P162635_ZEJ10Im.pdf.

[57] UNEP. (2017). Preliminary and brief initial assessment of electronic waste for Central Asia focusing on Kyrgyzstan and Tajikistan, Bishkek 2017. UNEP/ Basel Convention/European Union/Independent Ecological Expertise. http://eco-expertise.org/wp-content/uploads/2009/06/WEE_CA_ENG-_26_10_2017.pdf and http://eco-expertise.org/wp-content/uploads/2009/06/Elektronnye-othody_TSA_2017.pdf.

[58] Kyrgyzstan. (2009). Technical summary on the inventory of consumption waste disposal sites on the territory of Kyrgyzstan (within the framework of the program of the Government of Kyrgyzstan 'Forty steps into a new era') http://eco-expertise.org/wp-content/uploads/2009/06/201805251452183.pdf.

[59] Kyrgyzstan. (2018) Set of measures on the waste management modernization: Preparation of a national waste management strategy (concept) until 2025. http://eco-expertise.org/wp-content/uploads/2009/06/201805251451523.pdf.

11. ANNEXES

A. UNU-KEYs and Six E-waste Categories

UNU-KEY	Full Name	Six Categories
0001	Central Heating (household-installed)	IV
0002	Photovoltaic Panels	IV
0101	Professional Heating & Ventilation (excl. cooling equipment)	IV
0102	Dishwashers	IV
0103	Kitchen (e.g. large furnaces, ovens, cooking equipment)	IV
0104	Washing Machines (incl. combined dryers)	IV
0105	Dryers (wash dryers, centrifuges)	IV
0106	Household Heating & Ventilation (e.g. hoods, ventilators, space heaters)	IV
0108	Fridges (incl. combi-fridges)	I
0109	Freezers	I
0111	Air Conditioners (household-installed and portable)	I
0112	Other Cooling (e.g. dehumidifiers, heat pump dryers)	I
0113	Professional Cooling (e.g. large air conditioners, cooling displays)	I
0114	Microwaves (incl. combined, excl. grills)	V
0201	Other Small Household (e.g. small ventilators, irons, clocks, adapters)	V
0202	Food (e.g. toaster, grills, food processing, frying pans)	V
0203	Hot Water (e.g. coffee, tea, water cookers)	V
0204	Vacuum Cleaners (excl. professional)	V
0205	Personal Care (e.g. tooth brushes, hair dryers, razors)	V
0301	Small IT (e.g. routers, mice, keyboards, external drives & accessories)	VI
0302	Desktop personal computers (excl. monitors, accessories)	VI
0303	Laptops (incl. tablets)	II
0304	Printers (e.g. scanners, multi-functionals, faxes)	VI
0305	Telecom (e.g. [cordless] phones, answering machines)	VI
0306	Mobile Phones (incl. smartphones, pagers)	VI
0307	Professional IT (e.g. servers, routers, data storage, copiers)	IV
0308	Cathode Ray Tube Monitors	II
0309	Flat Display Panel Monitors (LCD, LED)	II
0401	Small Consumer Electronics (e.g. headphones, remote controls)	V

UNU-KEY	Full Name	Six Categories
0402	Portable Audio & Video (e.g. MP3, e-readers, car navigation)	V
0403	Music Instruments, Radio, Hi-Fi (incl. audio sets)	V
0404	Video (e.g. video recorders, DVD, Blu-ray, set-top boxes)	V
0405	Speakers	V
0406	Cameras (e.g. camcorders, photo, and digital still cameras)	V
0407	Cathode Ray Tube TVs	II
0408	Flat Display Panel TVs (LCD, LED, Plasma)	II
0501	Lamps (e.g. pocket, Christmas, excl. LED and incandescent)	V
0502	Compact Fluorescent Lamps (incl. retrofit and non-retrofit)	III
0503	Straight Tube Fluorescent Lamps	III
0504	Special Lamps (e.g. professional mercury, high & low pressure sodium)	III
0505	LED Lamps (incl. retrofit LED lamps and household LED luminaires)	III
0506	Household Luminaires (incl. household incandescent fittings)	V
0507	Professional Luminaires (offices, public space, industry)	V
0601	Household Tools (e.g. drills, saws, high-pressure cleaners, lawnmowers)	V
0602	Professional Tools (e.g. for welding, soldering, milling)	IV
0701	Toys (e.g. car racing sets, electric trains, music toys, biking computers)	V
0702	Game Consoles	VI
0703	Leisure (e.g. large exercise, sports equipment)	IV
0801	Household Medical (e.g. thermometers, blood pressure meters)	V
0802	Professional Medical (e.g. hospital, dentist, diagnostics)	IV
0901	Household Monitoring & Control (alarm, heat, smoke, excl. screens)	V
0902	Professional Monitoring & Control (e.g. laboratory, control panels and invertors)	IV
1001	Non-Cooled Dispensers (e.g. for vending, hot drinks, tickets, money)	IV
1002	Cooled Dispensers (e.g. for vending, cold drinks)	I

B. Mathematical Equations

The mathematical description of 'e-waste generated' is a function of the lifespans and EEE POM of the previous years. In particular:

- *E-waste Generated (n)* is the quantity of e-waste generated in evolution year *n*
- *POM (t)* is the product sales (POM) in any historical years *t* prior to year *n*
- t_0 is the initial year that a product was sold
- $L^{(p)}(t, n)$ is the discard-based, lifetime profile for the batch of products sold in historical year *t*

$$E\ waste\ generated\ (n) = \sum_{t=t_0}^{n} POM\ (t) * L^{(p)}(t,n)$$

The lifespan, $L^{(p)}(t, n)$ is the lifespan profile of an EEE sold in year *t*, which reflects its probable obsolescence rate in evaluation year *n*. The discard-based lifespan profile for a product could be modelled using several probability functions. The Weibull distribution function is considered most suitable for describing discard behavior for EEE and has been applied in the European Union and in scientific literature.

Due to social and technical developments, a product's lifespan could be time-dependent. For instance, the CRT monitor rapidly grew outdated, due to the technological developments of flat-screen monitors. In that case, lifespan distributions should ideally be modelled for each historical sales year. The Weibull function is defined by a time-varying shape parameter $\alpha(t)$ and a scale parameter $\beta(t)$ as described in the equation below:

$$L^{(p)}(t, n) = \frac{\alpha(t)}{\beta(t)^{\alpha(t)}} (n - t)^{\alpha(t) - 1} e^{-[(n-t)/\beta(t)]^{\alpha(t)}}$$

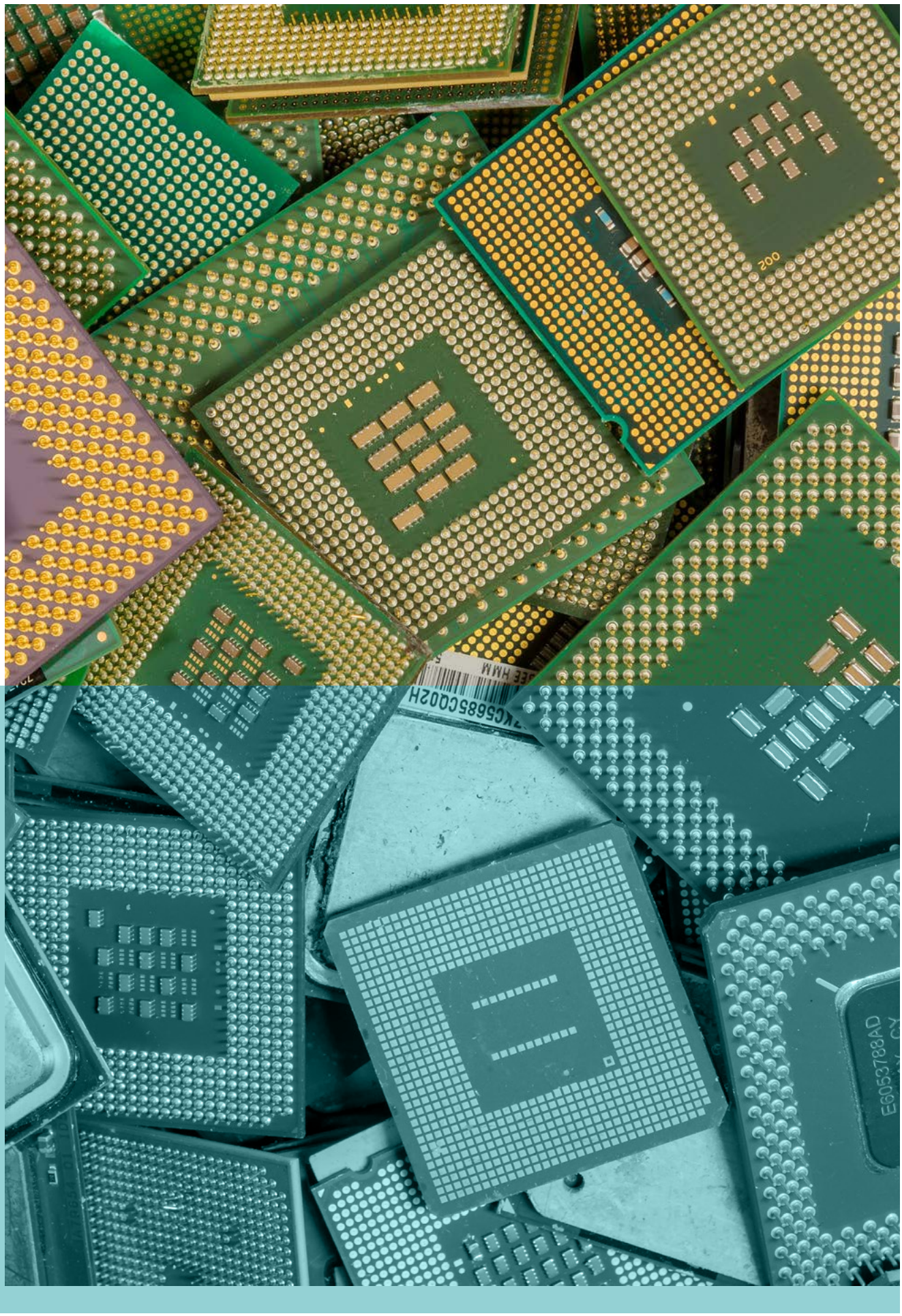
For other, more stable products, time-independent lifespans sufficiently describe actual behavior. In those cases, the variations of the shape and scale parameter over time are minor, and variations can be disregarded. The distribution of product lifespans can then be simplified as follows:

$$L^{(p)}(t, n) = \frac{\alpha}{\beta^{\alpha}} (n - t)^{\alpha - 1} e^{-[(n-t)/\beta]^{\alpha}}$$

C. List of Waste and Substances Under the Basel Convention That Are Relevant for E-waste

A,B Code	Description	Type of E-waste or Component Containing Hazardous Substances	Y code
A1180	Waste electrical and electronic assemblies or scrap containing components such as accumulators and other batteries included on list A, mercury-switches, glass from cathode-ray tubes, and other activated glass and PCB-capacitors, or contaminated with Annex I constituents (e.g., cadmium, mercury, lead, polychlorinated biphenyl) to an extent that they possess any of the characteristics contained in Annex III (note the related entry on list B B1110).	Any e-waste containing hazardous substances.	e.g. Printed circuit boards categorised as A1180 can also be categorised according to Annex I constituents: Y31 ('Lead; lead compounds'), Y20 ('Beryllium, beryllium compounds'), Y27 ('Antimony, antimony compounds'), Y45 ('organohalogen compounds other than substances referred to' elsewhere in Annex I).
B1110	Electrical and electronic assemblies: • Electronic assemblies consisting only of metals or alloys. • Waste electrical and electronic assemblies or scrap (including printed circuit boards) not containing components such as accumulators and other batteries included on list A, mercury switches, glass from cathode-ray tubes and other activated glass and PCB-capacitors, or not contaminated with Annex I constituents (e.g., cadmium, mercury, lead, polychlorinated biphenyl) or from which these have been removed, to an extent that they do not possess any of the characteristics contained in Annex III (note the related entry on list A A1180). • Electrical and electronic assemblies (including printed circuit boards, electronic components, and wires) destined for direct reuse, and not for recycling or final disposal.	Any e-waste containing hazardous substances.	
B4030	Used single-use cameras, with batteries not included on list A.	UNU-KEY 0406.	

A,B Code	Description	Type of E-waste or Component Containing Hazardous Substances	Y code
A1170	Unsorted waste batteries excluding mixtures of only list B batteries. Waste batteries not specified on list B containing Annex I constituents to an extent to render them hazardous.	Most likely batteries from e-waste.	
B1090	Waste batteries conforming to a specification, excluding those made with lead, cadmium, or mercury.	Most likely batteries from e-waste.	All.
A1010	Metal wastes and waste consisting of alloys of any of the following: antimony - arsenic - beryllium - cadmium - lead - mercury - selenium - tellurium - thallium.	Mercury in switches, contacts, and thermometers.	Y31 (lead; lead compounds), Y29 (mercury; mercury compounds), Y25 (selenium; selenium compounds), Y27 (antimony; antimony compounds).
A1020	Waste having as constituents or contaminants, excluding metal waste in massive form, any of the following: - Antimony; antimony compounds - Beryllium; beryllium compounds - Cadmium; cadmium compounds - Lead; lead compounds - Selenium; selenium compounds - Tellurium; tellurium compounds.	Could also be PCB (next to A1180) or antimony as flame retardants, lead compounds.	Y25 (selenium; selenium compounds), Y27 (antimony; antimony compounds), Y31 (lead; lead compounds).
A1030	Waste having as constituents or contaminants any of the following, - Arsenic; arsenic compounds - Mercury; mercury compounds. - Thallium; thallium compounds.	Mercury and arsenic are found in fluorescent and backlight lamps + mercury-added waste.	Y29 (mercury; mercury compounds).
A2010	Glass waste from cathode ray tubes and other activated glass.	Screens of cathode ray tubes.	Y31 (lead; lead compounds).
A3180	Wastes, substances and articles containing, consisting of or contaminated with PCB, polychlorinated terphenyl, polychlorinated naphthalene or polybrominated biphenyl, or any other polybrominated analogues of these compounds, at a concentration level of 50 mg/kg or more.	Can contain brominated flame retardants (in plastics) and persistent organic pollutants fractions of e-waste.	Y10 Waste substances containing or contaminated with PCBs, polychlorinated terphenyl, polybrominated biphenyls Y27 (antimony; antimony compounds).


E6053788AD

D. E-waste Statistics and Management Assessment Scores per Countries

Country	Legislation					Infrastructure	
	1.1 Existence of e-waste-specific legislation	1.2 Enforced products in national e-waste legislation (% of e-waste generated mass)	1.3 Is there an e-waste collection target?	1.4 Are there minimum standards of e-waste management?	1.5 Number of MEAs ratified or signed	2.1 Are there collection points in each municipality?	2.2 Are there treatment facilities in the country for ESM of e-waste?
Armenia	in development	0	no	no	4 ratified	no	no
Azerbaijan	no	0	no	no	2 ratified	no	yes
Belarus	no	100	yes	yes	2 ratified, 1 signed	yes	yes
Georgia	yes	100	yes	yes	3 ratified, 1 signed	no	no
Kazakhstan	no	77	yes	in development	3 ratified	main cities	yes
Kyrgyzstan	no	0	no	no	3 ratified	no	no
Moldova	yes	99	yes	yes	4 ratified	main cities	no
Russia	no	81	yes	yes	3 ratified, 1 signed	unknown	yes
Tajikistan	yes	2	no	no	2 ratified, 1 signed	main cities	yes
Turkmenistan	no	0	no	no	1 ratified	no	no
Ukraine	yes	0	no	yes	3 ratified	unknown	yes
Uzbekistan	yes	2	no	no	2 ratified	unknown	yes

Country	Year	EEE POM		E-waste generated		E-waste collected for ESM		Collection rate
		kg/inh	t	kg/inh	t	kg/inh	t	%
Armenia	2014	6.3	19,000	3.2	9,500	0.0	11	0.1
Azarbaijan	2018	11.5	114,000	7.6	76,000	0.0	10	0.0
Belarus	2019	10.6	100,000	8.1	76,000	2.7	25,500	33.6
Uzbekistan	2015	4.4	135,000	3.3	102,000	0.0	160	0.2
Georgia	2019	11.8	43,000	7.3	27,000	0.0	0	0.0
Kazakhstan	2019	11.8	222,000	7.3	136,000	0.6	11,912	8.8
Kyrgyzstan	2019	2.8	18,000	1.5	10,000	0.0	0	0.0
Moldova	2019	8.6	30,000	4.9	17,000	0.0	137	0.8
Russia	2019	13.7	1,977,000	11.3	1,631,000	0.1	41,260	2.5
Tajikistan	2019	2.6	24,000	1.4	13,000	0.0	107	0.8
Turkmenistan	2019	12.7	76,000	6.5	39,000	0.0	0	0.0
Ukraine	2017	6.8	288,000	7.4	313,000		Unknown	Unknown
Average	2019	11.0		8.7		0.3		4.9
Total			**3,060,000**		**2,454,000**		**79,096**	

12. ABOUT THE AUTHORS

Dr. Cornelis Peter Baldé

Dr. Cornelis Peter Baldé is a Senior Programme Officer at the Sustainable Cycles Programme, which is co-hosted by United Nations University and the United Nations Institute for Training and Research. He received his PhD in hydrogen storage at Utrecht University. Kees is the initiator of the Global E-waste Monitor series, a researcher holding an H-factor of 17, co-founder of the Global E-waste Statistics Partnership, author of various national e-waste and battery studies, and manager of research projects. He is also a member of global expert groups on circular economy, waste, and sustainable development goals. He frequently provides policy advice to governments and is the chair of the board of the Dutch National (W)EEE Register. Previously, he was the deputy team manager for environment statistics at Statistics Netherlands and was responsible for several groundbreaking publications on green growth and circular economy, as well as for various official statistics of the Netherlands.

Giulia Iattoni

Giulia Iattoni is a Programme Associate at the Sustainable Cycles Programme, co-hosted by UNU and UNITAR. Giulia graduated cum laude in Environmental Engineering at the University of Bologna and spent a research period at the Technical University of Vienna, focusing on water quality and resources sustainability. Since 2019, Giulia has been involved on various projects on e-waste data collection and quantification, as well as on projects concerning the analysis of e-waste management models and related environmental impacts at the national and regional level. She is also designing and conducting workshops to build institutional capacity on e-waste statistics and legislation for several countries worldwide.

Vittoria Luda di Cortemiglia

Vittoria Luda di Cortemiglia works as a consultant for the Sustainable Cycles Program of UNITAR. She graduated in law at the University of Turin and completed a Master of Arts (MA) in International Relations at St. John's University in New York. Vittoria leads analysis and training programs related to waste crime, transboundary waste shipments, and environmentally sound management of waste.

Dr. Innocent Nnorom

Dr. Innocent Nnorom works at Abia State University in Nigeria. He received his PhD in Analytical/Environmental Chemistry from the University of Ibadan, having studied pollution from e-waste management in Southern Nigeria. He was part of the 2009 E-waste Summer School. He has participated in several e-waste projects, including the E-waste Africa Project and the Person in Port (PiP) Project. He is a Senior Research Fellow at the Basel Convention Coordinating Centre for Africa (BCCC-A) in Nigeria. In 2019, he was a Visiting Research Fellow at the University of Manchester. He has contributed to the Global E-waste Monitor in recent years.

Oleg Pecheniuk

Oleg Pecheniuk began working as an environmental legal expert in 1997, while still a law student. As a lawyer trained and working in Kyrgyzstan, he has a deep understanding of the country's national environmental law. Over the years, Mr. Pecheniuk has prepared plenty of law projects, provided ecological expertise toward numerous normative legal certificates, and lead industrial targets for Kyrgyzstan. The main areas of Mr. Pecheniuk's activity include the improvement of the ecological policy and the normative legal basis, the conduct of the public ecological expertise, and the promotion of public participation on both national and international levels.

Dr. Ruediger Kuehr

Dr. Ruediger Kuehr is the Director of UNU's Sustainable Cycles (SCYCLE) Programme and Head of the recently established UNITAR Bonn Office. He also serves as Head and Senior Manager of the SCYCLE Programme under UNITAR. As a political and social scientist by education, Ruediger has worked for more than twenty years on the e-waste challenge. He co-founded the StEP Initiative, co-initiated the development of an e-waste coalition among the various UN organisations and the SCYCLE Programme, and initiated the permanent E-waste Academies and E-waste Monitors at the global, regional, and national levels. But the foundation of Ruediger's work is in establishing strategic approaches to sustainability, which renders life-cycle thinking indispensable in his activities; as such, he is also a frequent speaker for forward-thinking at conferences and in media appearances.

REGIONAL E-WASTE MONITOR

CIS + Georgia

2021

This project was funded by the German Federal Ministry for the Environment, Nature Conservation and Nuclear Safety Advisory Assistance Programme (AAP) for environmental protection in the countries of Central and Eastern Europe, the Caucasus, Central Asia, and other countries neighbouring the European Union. It was supervised by the German Environment Agency. The workshops during the project were co-funded by the International Telecommunication Union and the International Solid Waste Association and were co-organised by UNEP.

Funded and supervised by:

Federal Ministry for the Environment, Nature Conservation and Nuclear Safety

Umwelt Bundesamt

Supported by:

ITU

ISWA International Solid Waste Association

In cooperation with:

UN environment programme