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Chemicals and Waste in Agenda 2030



Bosnia and Herzegovina



Agency for Statistics of
Bosnia and Herzegovina

Sarajevo, 2020



United Nations
Environment Programme

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Abstract

Proper management of chemicals and waste is an essential component of sustainable development. There are a number of indicators of sustainable development (SDGs) specifically designed to monitor chemicals and waste and the impact of chemicals and wastes on the environment and human health. Specific indicators of chemicals and wastes for which the UN Environment is in charge include:

12.4.1 Number of parties to international multilateral environmental agreements on hazardous waste, and other chemicals, that meet their commitments and obligations in transmitting information as required by each relevant agreement

12.4.2 Hazardous waste generated per capita and proportion of hazardous waste treated, by type of treatment

12.5.1 National recycling rate, tons of material recycled

In addition, the SDG indicator framework includes indicators of water quality (indicator 6.3.2), communal solid waste (indicator 11.6.1), sustainable agriculture involving the use of fertilizers and herbicides (indicator 2.4.1), ocean eutrophication (indicator 14.1.1) and mortality caused by air, water and soil contamination (indicators 3.9.1, 3.9.2 and 3.9.3). There are also, indirect links between chemicals and waste and many SDG objectives related to ecosystem health and sustainable consumption and production.

Due to the nature of the originator and the influence of chemicals and waste, a holistic assessment of chemicals and waste is very complex. In addition, many countries do not have the capacity to produce and use statistics related to the production of chemicals and wastes and the impact of chemicals and waste itself on the environment and human health. The Basel, Rotterdam, Stockholm, Montreal and Minamata Conventions and Strategic Approach to International Chemicals Management (SAICM) provide frameworks for the management and reduction of chemicals. However, gaps remain in terms of measuring and understanding the production, use and impact of chemicals.

The United Nations Environment Program (UN Environment) co-operates with the Agency for Statistics of Bosnia and Herzegovina (BHAS) in regard to the United Nations Project entitled "*Chemicals and Wastes in Agenda 2030: Capacity Building for Sustainable Development Goals (SDG) and monitoring in countries in the development*".

This project contributes to the achievement of Sub-Program 7, the United Nations Environment Program 2018-2019: "State of the Environment under Review"; the expected achievement (c) "Capacity of countries to generate, access, analyze, use and transmit environmental information and improved knowledge"; the result 732: Capacities of regions, national institutions, major groups and other stakeholders have been increased in order to better use environmental information, knowledge and assessments in regional and national policies and planning processes. This is also a contribution to the UN Environment Program Project 732.1 "Strengthening the Data and Indicators for Monitoring and Reporting on Environmental Dimension Agenda 2030 and SDG"; the result 3, "Provide tools and training to build capacity of developing countries to measure, monitor, and report on the environmental dimension of sustainable development goals".

1. EU WASTE LEGISLATIVE FRAMEWORK

1.1 Waste Legislation

The Waste Framework Directive

The Waste Framework Directive 2008/98/EC (hereinafter WFD) is the key legislative document on waste at the EU level. Being a Directive, the WFD is transposed into the national legislation of the MS by means of separate legal acts. The scope of the Directive is determined by the definition of 'waste' in Article 3(1) WFD as: *"any substance or object which the holder discards or intends or is required to discard"*. If a substance or object fulfils the criteria for being waste, it is subject to waste legislation including rules on waste classification (unless it is specifically excluded from the scope of WFD).

The WFD defines *'hazardous waste'* in its Article 3(2) as: 'waste which displays one or more of the hazardous properties listed in Annex III'.

Strict conditions apply to the managing of hazardous waste, in particular:

- the obligation to provide evidence for the tracking of the waste according to the system put by the relevant Member State (Article 17 WFD);
- a mixing ban (Article 18 WFD, see for details the WFD Guidance).
- specific labelling and packaging obligations (Article 19 WFD).

The EU legislation further determines that hazardous waste must only be treated in specially designated treatment facilities that have obtained a special permit as required under Articles 23 to 25 of the Waste Framework Directive, but also under other legislation such as the Landfill and Industrial Emissions Directives.

The properties of waste which render it hazardous, laid down in Annex III to the WFD have been adapted to scientific progress through Commission Regulation (EU) 1357/2014 , applicable as of 1 June 2015, and Council Regulation (EU) 2017/997 , applicable as of 5 July 2018. EU regulations are directly applicable in the Member States without transposition to national legislation. In the context of waste classification, Article 7 of the Waste Framework Directive establishes the basis for the List of Waste and its implementation

European List of Waste (LoW).

Commission Decision 2000/532/EC (11) establishes the European List of Waste (LoW). The LoW is the key document for classification of waste. A consolidated version of the LoW has existed since 2000 and has been revised by Commission Decision 2014/955/EU (12), in order to adapt the LoW to scientific progress and align it with developments in chemicals legislation.

The LoW is divided into chapters, subsections and entries Classification according to the LoW firstly means that each waste is to be classified by a six digit number. Classification enables businesses and competent authorities for a decision in terms of the question whether the waste is hazardous or not. The LoW recognises three types of entries:

- 'Absolute hazardous entries': Wastes which are assigned to absolute hazardous entries cannot be allocated to non-hazardous entries and are hazardous without any further assessment;
- 'Absolute non-hazardous entries': Wastes which are assigned to absolute non-hazardous entries cannot be allocated to hazardous entries and are non-hazardous without any further assessment;
- 'Mirror entries', where waste from the same source might under the LoW be allocated to a hazardous entry or to a non-hazardous entry depending on the specific case and on the composition of the waste.

Waste Shipment Regulation

Regulation (EC) No 1013/2006 on shipment of waste ('Waste Shipment Regulation' or 'WSR') implements into EU law the provisions of the Basel Convention and OECD Decision C(2001)107/Final. In the context of identification of waste for the purpose of correct procedure and documentation, the classification according to the lists contained in Annex III-IV of the WSR (the incorporated lists of international agreements) applies. These lists provide for a classification approach different to the one of the LoW. The sorting approach applied to these lists is different comparing to Liste of Waste. There are two control procedures for the shipment of waste, namely:

- the general information requirements of Article 18 which is normally applicable to shipments for recovery of wastes listed in Annex III ('green' listed wastes) or IIIA, and
- the procedure of prior written notification and consent for any other type of shipment of wastes.

Regarding the case of shipments of waste subject to the procedure of prior written notification and consent, the codes to be used for the hazardous characteristics (H codes) and treatment operations (D and R codes) on the notification and movement documents (Annexes IA and IB) are those set out in Annexes III and IV to the Basel Convention.

The Landfill Directive

The Landfill Directive contains rules on the management, permit conditions, closure, and after-care of landfills. The Council Decision 2003/33/EC specifies acceptance criteria for waste for the different classes of landfills as recognised by the Landfill Directive. Council Decision 2003/33/EC, specifies waste acceptance criteria ('WAC') for acceptance of waste in the different classes of landfills as recognised by the Landfill Directive. The classification of waste as hazardous according to LoW and Annex III to the WFD is important also for the purposes of the Landfill Directive since hazardous waste should as a general rule be disposed of at landfills for hazardous waste, and non-hazardous waste should be disposed of at landfills for non-hazardous waste or inert waste. Stable, non-reactive hazardous wastes may be disposed of at landfills for non-hazardous wastes if the conditions set out in Annex II of the Landfill Directive and the WAC are fulfilled.

Extractive Waste Directive

The objective of the Extractive Waste Directive 2006/21 / EC is to ensure that waste from the mineral extraction industries is managed in such a way as to prevent or minimize any adverse effects on the environment and any risks to human health. Although waste from mineral extraction is excluded from the scope of the Framework Directive, classification according to the Waste List is important: operators must develop a Waste Management Plan in accordance with the Extractive Waste Directive, in accordance with the Plan, hazardous waste should be sorted in accordance with the criteria of the Waste List. Hazardous waste from the mineral extraction industries should be classified in accordance with the List of Waste, although they are excluded from the scope of the Waste Framework Directive.

Regulation REACH

Regulation (EC) 1907/2006 concerning the Registration, Evaluation, Authorisation and Restriction of Chemicals ('REACH') (16) entered into force in 2007. REACH is the general chemicals law at EU level, applying to substances (as such, in mixtures or in articles). The purpose of REACH is to ensure a high level of protection of human health and the environment, including the promotion of alternative methods for assessment of hazards of substances, as well as the free circulation of substances on the internal market while enhancing competitiveness and innovation. REACH defines and operates a number of processes with the overarching aim of ensuring the safe use of chemicals:

- registration of substances (requires the submission of information on the properties and uses of substances, subject to certain conditions, to the European Chemicals Agency ECHA);
- improved communication in the supply chain by means of extended Safety Data Sheets (eSDS);
- evaluation of substances by public authorities with the aim of providing certainty as regards the proper functioning of the registration process and to further clarify concern regarding certain substances;
- restriction of use of substances for which an unacceptable risk has been determined; — authorisation
- applicable to certain substances of very high concern (SVHC) which can only be placed on the market and used subject to the granting of a specific and time-limited authorisation, subject to certain conditions.

The REACH regulation lays down the registration, evaluation, authorization and restriction of chemicals in the EU. Waste is not a substance, article or mixture within the meaning of REACH. Nevertheless, information generated in the framework of REACH may be relevant for waste classification. Nonetheless, information on chemical substances obtained and delivered under REACH, in particular hazard information, and their subsequent use in the classification under the Classification Labelling Packaging (CLP) Regulation, are crucial for the classification of waste.

POP Regulation

Regulation (EC) 1272/2008 on classification, labelling and packaging of substances and mixtures ('CLP Regulation') adapts for the EU the UN international chemicals classification system (Globally Harmonised System — GHS). In this context, it sets out detailed criteria for assessing substances and determining their hazard classification. Waste is not considered as a substance, mixture or article

under CLP. However, the hazardous properties applicable for waste are related to CLP criteria. Further, classification of substances under CLP may also be relevant for waste classification. Although Annex III to the WFD is based on the CLP Regulation, it does not contain a full 'one to one' transposition of the criteria as laid down in CLP. Instead, in terms of the classification of waste, it should be noted that some of the HP criteria of Annex III to the WFD directly make reference to CLP hazard classes and categories and to hazard statements and associated criteria for classification. Many mirror entries specifically refer to 'hazardous substances'. The classification of substances is done according CLP whereas the presence of hazardous substances contained in waste has to be evaluated in line with Annex III to the WFD.

Regulativa POP

Regulation (EC) 850/2004 on persistent organic pollutants (POP Regulation) has amongst its aims that of protecting the environment and human health from certain specified substances that are transported across international boundaries far from their sources, persist in the environment, and can bioaccumulate in living organisms, by implementing relevant international agreements. The Regulation's scope is restricted to the substances listed in the Annexes of the Regulation. Waste containing certain POPs as indicated in the Annex to the LoW (point 2, indent 3) above the relevant threshold ('low POP-content limit value') of the POP regulation have to be classified as hazardous, must be disposed of or recovered, without undue delay and in accordance with the provisions laid down in the POP Regulation in such a way as to ensure that the persistent organic pollutant content is destroyed or irreversibly transformed so that the remaining waste and releases do not exhibit the characteristics of persistent organic pollutants. Disposal or recovery operations that may lead to recovery, recycling, reclamation or re-use of the POPs are prohibited.

Seveso III Directive'

Directive 2012/18/EU on the control of major-accident hazards involving dangerous substances ('Seveso III Directive') has as main objective the prevention of major accidents which involve dangerous substances, and the limitation of their consequences for human health and the environment, with the goal of ensuring a high level of protection throughout the Union in a consistent and effective manner. It also applies to waste. Operators handling dangerous substances present in waste above certain thresholds must classify waste on the basis of its properties as a mixture. Relevant sources of information may include classification according to EU waste legislation. Operators handling dangerous substances above certain thresholds are obliged to take all necessary measures to prevent major accidents and to limit their consequences. The requirements include providing information to the public likely to be affected by an accident, providing safety reports, establishing a safety management system and an internal emergency plans. Note 5 to Annex I of the Seveso III Directive makes reference to CLP Regulation (EC) No 1272/2008 and mentions waste explicitly:

"In the case of dangerous substances which are not covered by Regulation (EC) No 1272/2008, including waste, but which nevertheless are present, or are likely to be present, in an establishment and which possess or are likely to possess, under the conditions found at the establishment, equivalent properties in terms of major-accident potential, these shall be provisionally assigned to the most analogous category or named dangerous substance falling within the scope of this Directive".

1.2 Eurostat Waste Statistics and Indicators

1.2.1 Regulation on Waste Statistics

The EU waste policy aims at establishing a circular economy in which materials and resources are kept in the economy for as long as possible and where waste disposal is the last waste management option. The new set of indicators of waste management provided by Eurostat is a way to monitor progress towards greater recycling and fewer disposals.

The long-term goal is to transform Europe into a recycling society, avoid waste by using it as a resource wherever possible. The goal is to achieve a much higher level of recycling and to minimize the extraction of additional natural resources. Proper waste management is a key part of ensuring resource efficiency and sustainable growth of economies. In order to achieve this goal, the revised Directive 98/2008 of 2008 introduced the hierarchy of waste in five steps where prevention is the best option, followed by reuse, recycling and other forms of treatment, with disposal, such as waste discarding, as the last step. Accordingly, the Seventh Environmental Action Program sets the following priority goals for EU waste management policy:

- To reduce the amount of waste generated;
- To maximize recycling and reuse;
- To limit burning of materials that can not be recycled;
- To limit the disposal of waste i.e. non-recyclable waste;
- To ensure full implementation of waste policy objectives in all Member States.

The waste management indicators set combines the data collected in accordance with the Waste Regulations (EC) Reg. 2150/2002 (WStatR) with data on imports/exports from external trade statistics (COMEXT databases) or from national sources. WStatR data provide information on the amount of waste in the countries, regardless of the country in which waste is generated. Therefore, the amount of treated waste reported by country A excludes waste that occurs in country A, but is treated in country B (eg. due to the lack of appropriate treatment facilities). However, it may include waste that is imported from country B for treatment. In order to link treatment data with domestic waste, WStatR data is adjusted for import and export through trade statistics according to following formula:

Quantity of treated domestic waste = Waste treated in the country (WStatR data) + Waste exported for treatment (COMEXT data) - Waste imported for treatment (COMEXT data)

Source of data and availability

The indicator set for waste management is based on waste data collected in accordance with Regulation (EC) No. 2150/2002 on waste statistics (WStatR). Data is adapted for import and export using international trade statistics (COMEXT data) or national data on import and export of waste. The indicators sets are available every second year, beginning with the reference year 2010.

The indicators set covers both, non-hazardous and hazardous waste, from all economic sectors and households. However, it excludes some types of mineral waste that is produced in large quantities and comes mainly from the mining and construction sectors.

Eurostat waste management indicators are considered as a good way to track domestic waste streams, but have some limitations:

- The Combined Nomenclature (CN) used for international trade statistics does not distinguish consistently waste and commodities, i.e. some CN codes do not cover only waste but also non-waste products.
- Foreign trade statistics provide information about the geographical destination of the waste, but not about the type of treatment at the destination. Therefore, the type of treatment is based on assumptions.
- Additional limitations come out from the fact that trade statistics within the EU do not cover 100% trading in goods/waste due to reporting thresholds.

Waste Statistics Regulation

On 25th of November 2002, the European Parliament and the Council of the European Union adopted the legal basis for the Waste Statistics Regulation:

- [Regulation \(EC\) No 2150/2002 of the European Parliament and of the Council of 25 November 2002 on waste statistics \(OJ L 332, 9.12.2002, p. 1-36\)](#)
- [Summary of EU legislation - Waste management statistics](#)

The Regulation was revised in 2010:

- [Commission Regulation \(EU\) No 849/2010 of 27 September 2010 amending Regulation \(EC\) No 2150/2002 of the European Parliament and of the Council on waste statistics \(OJ L 253, 28.9.2010, p 2-41\)](#)

As of 2002, several implementation measures have been adopted:

- [Commission Regulation \(EC\) No 1445/2005 of 5 September 2005 defining the proper quality evaluation criteria and the contents of the quality reports for waste statistics for the purposes of Regulation \(EC\) No 2150/2002 of the European Parliament and of the Council \(OJ L 229, 6.9.2005, p. 6\).](#)

Other EU Waste legislation

- [Waste legislation](#)
- [EU legislation on Packaging and packaging waste](#)
- [EU legislation on ELV](#)
- [EU legislation on WEEE](#)
- [EU legislation on Batteries](#)
- [EU legislation on Hazardous waste](#)
- [EU legislation on Waste shipment](#)

Methodological Manual on Waste Statistics, 2013

Data on production and waste management from enterprises and private households are regularly collected and published every two years following the common methodological recommendations. With experience, some disadvantages of the original legislation and methodological manual became obvious. As a consequence, Commission Regulation 849/2010, which was entered into force for the

reference year 2010, has led to simplification and improvement of the legal framework. Edition of the Manual on Waste Statistics from 2010, which is in line with the new legal basis, described the methodological development of previous data collection cycles in details. The 2013 edition does not introduce any significant changes in relation to the 2010 edition.

http://www.bhas.ba/metodoloskidokumenti/MWS_2013_001_01-bh.pdf

1.2.2 Eurostat Waste indicators

Eurostat produces a set of Sustainable Development Indicators (EU SDGs) and Resource Efficiency indicators, set up to monitor progress in achieving sustainable development objectives in the context of EU policies. The SDG indicators set contains 100 indicators that are structured by 17 UN SDG goals. The 41 out of 100 indicators are multipurpose, i.e. they are used to monitor more than one of SDGs. All SDG indicators are grouped into sub-topics to underline interconnections and highlight different aspects of each SDG. The key indicators related to waste are:

Table 1: The key waste related indicators

	Indicator	Source of data	Set of indicators
1.	Generation of municipal waste & treatment, by type of treatment	Voluntary data collection	Sustainable Development Indicators Resource Efficiency Indicators Circular economy SDG, REI, CE
2.	Generation of waste, excluding mineral waste	Regulation on Waste Statistics	Sustainable Development Indicators Resource Efficiency Indicators Circular economy SDG, REI, CE
3.	Waste management, excluding mineral waste	Regulation on Waste Statistics; COMEXT (or national import/export data)	-
4.	The percentage of recycled E-waste	Data collection according to WEEE Directive 2012/19/EU	Resource Efficiency Indicators Circular economy REI, CE
5.	Prices for recycling materials	COMEXT	

1. The municipal waste indicator shows the trends in the amount of waste generated and the quantities that are returned and disposed through recycling and composting, incineration (including energy recovery) and disposal.

It is expressed in kilograms per capita and published annually. The municipal waste indicator shows the trends in the quantities of waste generated and the quantities that are treated and disposed of: recycling and composting; incineration (including energy recovery); disposal.

The municipal waste indicator is part of the EU's sustainable development goal (SDG), which was established to monitor progress towards the SDG in the EU context. Indicator data are also used for calculation of the rate of recycling of municipal waste, which is one of the indicators of resource efficiency.

2. The indicator "Waste generation, excluding mineral waste" shows trends in waste production, including non-hazardous and hazardous waste from all sectors of the economy (production) and households (consumption).

It does not cover mineral waste or waste from the land, which is generated from the mining and construction sector, which are subject to significant fluctuations in waste generation over time. The indicator shows the amount of waste generated annually, and is expressed in kg per capita. It is based on data collected as prescribed by the Regulations on waste statistics.

The indicator is one of the EU indicators of sustainable development; it is also an indicator of resource efficiency.

3. The waste management indicator shows waste management measures and methods of final treatment. The set of indicators reflects the rates of waste treatment produced in a particular country by type of treatment. Indicators are expressed in the amount of treated waste per treatment category as a percentage of the total quantity of treated waste.

The indicator covers both, non-hazardous and hazardous waste, from all economic sectors and households, excluding mineral waste and soil.

The set of indicators includes rates for the 6 categories of waste treatment defined in the Waste Statistics Regulation:

<i>Treatment category</i>	<i>code</i>
<i>Recycling (R2-R11)</i>	RCV_O
<i>Backfilling</i>	RCV_B
<i>Energy Recovery (R1)</i>	RCV_E
<i>Incineration (D10)</i>	INC
<i>Disposal to or into the ground (D1, D5, D12)</i>	DSP_D
<i>Other disposal (D2-4, D6, D7)</i>	DSP_O

The set of indicators is based on data on waste treatment, collected as prescribed by the Waste Statistics Regulation. In addition, external trade statistics (COMEXT data or national data on import/export of waste) are used to display the quantities of waste exported and imported.

4. The indicator "E-waste recycling rate - Waste electrical and electronic equipment" presents a risk of life threat due to the presence of hazardous components. However, if E-waste is recycled then it is potentially a source of important secondary raw materials, such as precious metals and other highly valuable materials. Therefore, the indicator "E-waste recycling rate" monitors the recycling of waste electrical and electronic equipment.

The data collected under WEEE Directive 2012/19/EU includes the volumes collected for the treatment and recycling rate in the treatment plants. The billing rate is equal to the amounts collected divided by the average amount of EEE (electrical and electronic equipment) placed on the market in the previous three years. Therefore, the overall recycling rate of E-waste is the collection

rate multiplied by the rate of recycling in the treatment plants and it is assumed that the total amount of collected E-waste is actually sent to the treatment/recycling facilities.

The recycling rate of E-waste is one of the EU's resource efficiency indicators.

5. Income from secondary raw materials (waste materials or recyclates) can have a significant impact on total waste management costs. Therefore, understanding how the prices of recyclates happen over time is an important aspect of waste management.

Some waste materials - such as glass, paper and plastic - are covered by external trade statistics in quantities (tons) and values (€). Foreign trade statistics are published monthly, the primary indicator represents specific prices (€/tonne) in relation to the total amount of glass, paper and plastic for all related codes of the external trade statistics.

An additional indicator shows the total volume (import and export) of 3 waste materials. This indicator (tons/month) shows *market activity* and includes both internal and external trade.

2. LIST OF INDICATORS FOR WASTE AREA

Bosnia and Herzegovina adapts legislation to the European in the process of EU accession. Therefore, the objectives set out in European strategic documents and regulations are gradually being incorporated into national legislation. It is logical that BiH indicators in the waste area follow those identified by the EEA and Eurostat, particularly since the same methodology is used in their development, and especially for the reporting obligations of Eurostat.

Table 1 shows key and supporting indicators that follow avoidance and reduction of waste, sustainable waste management, economic instruments that monitor strategic goals, a circular economy and the efficiency of the use of natural resources. Key indicators are joined by follow-up indicators (sub-indicators) that are most often based on the same set of data, but provide a specific or more detailed view on the topic described by a key indicator.

Table 2: List of waste indicators

code	Type	Indicator name	Representation of indicator	Unit of measure
O_1	K	Total quantity of produced waste	quantity of produced waste - total (t/year), per capita (kg/capita/year), by type of waste (t/year), by area of activity of KD BiH (t/year)	(t/year) (kg/capita/year)
O_1_1	S	<i>Intensity of waste production</i>	total waste produced in relation to GDP (kg/year/EUR/year)	kg/year/EUR/year
O_2	K	Quantity of generated municipal waste	quantity of produced municipal waste - total (t/year), per capita (kg/apartment/year), by type of waste (key number) (t/year), quantity of separately collected municipal waste - by type	(t/year) (kg/capita/year)
O_2_1	S	<i>Percentage of inhabitants covered by public utilities</i>	the population covered by the public collection of municipal waste (number,% of the total population)	(number) (%)
O_2_2	S	<i>Quantity of household waste collected by public utilities</i>	quantity of produced households waste per year - total (t/year), by inhabitant per year (kg/inhab./year)	(t/year) (kg/inhab./year)
O_2_3	S	<i>Quantity of household waste by average personal consumption from households</i>	quantity of produced household waste compared to personal household consumption (kg/yr/KM/year)	kg/yr/KM/yr)
O_2_4	S	<i>Composition of municipal waste</i>	municipal waste composition by types - average annual (% by weight) (volume %)	(mas%) (vol%)
O_2_5	S	<i>Quantity of waste from service activities collected by public utilities</i>	quantity of produced waste from tourism - total (t/year), per tourist overnight stay (kg/tourist overnight/yr)	(t/yr) (kg/ overnight /yr) tourist stay
O_3	K	Quantity of waste from productive activities	quantity of produced waste - total (t/year), by type of waste (key number) (t/year), by area of activity (KD BiH) (t/year)	(t/yr)
O_3_1	S	<i>Quantity of waste from the manufacturing industry</i>	quantity of waste from the manufacturing industry (activity C, by KDBiH classes) (t/yr)	(t/yr)
O_4	K	Quantity of hazardous waste	quantity of produced hazardous waste - total (t/year), per capita (kg/capita/year), by type of waste (key number) and Y number (t/year) by area of activity of KD BiH (t /yr)	(t/yr) (kg/cap./yr) (%)
O_4_1	S	<i>Intensity of production of hazardous waste</i>	ratio of total produced hazardous waste per unit of GDP (kg/year/EUR/yr)	kg/yr/EUR/yr
O_4_2	S	<i>Quantity of produced hazardous waste from the manufacturing industry</i>	the amount of hazardous waste produced in the year from the manufacturing industry (activity C) by classes of KDBiH (t/year,% of total waste generated by	(t/yr) (%)

			activity C)	
O_5	K	Quantity of produced packaging waste	quantity of produced packaging waste - total (t/year), per capita (kg/cap/year), by type of waste (key number) (t/year), by type of packaging (paper, glass, plastic, textile) (t/yr) quantity of packaging put on the market - total (t/yr), by type of material (paper, glass, plastic, metal, wood, textile) (t/yr)	(t/yr) (kg/cap./yr)
O_5_1	S	<i>Quantity of packaging put on the market according to personal consumption in the household</i>	quantity of packaging placed on the market according to personal consumption in the household (t/year/KM/year)	(t/yr/KM/yr)
O_6	K	The amount of construction and demolition waste	quantity of produced construction and demolition waste - total (t/year), per capita (kg/cap/year), by type of waste (key LoW and EWCStat codes) (t/year)	(t/yr) (kg/cap./yr)
O_7	K	Quantity of produced E- waste	quantity of produced e-waste-total (t/year), per capita (kg/cap/year), by type of waste (key number) (t/year) quantity of electrical and electronic devices and equipment put on the market	(t/yr) (kg/cap./yr)
O_7_1	S	<i>The recycling rate of E-waste</i>	measures recycling of waste of electrical and electronic equipment	(t/yr) (%)
O_8	K	Quantity of produced waste vehicles	total number of cars (pcs/100 inhab.). amount of waste vehicles per year - total (t/year) (pcs/yr), per capita (t/cap/year)	(pcs /100 inhab.) (t/yr) (kg/cap./yr)
O_9	K	Amount of produced waste tires	quantity of waste produced from waste tires - total (t/year) per capita (kg/cap/year) the amount of tires placed on the market in the year (t/yr)	(t/yr) (kg/cap/yr)
O_10	K	Quantity of produced waste oil	quantity of produced waste oil per year - total (t/year), per capita in a year (kg/annually), by type of waste (key number) (t/year) quantity of oil put on the market (motor, edible/year)	(t/yr) (kg/cap./yr)
O_11	K	Quantity of produced waste sludge from the waste water treatment plant	quantity of waste sludge produced from waste water treatment plants in the year - total (tonnes dry substance/year), per capita (kg/cap/year), by type of waste (key number) (tons of dry substance/year). sludge pollution with Hg, Cd, P, Pb	(t dry Sub./yr) (kg/cap./yr) (mgHg,Cd,P,Pb/kg dry sub.)

			(mg Hg, Cd, P, Pb/kg dry matter).	
O_12	K	Quantity of produced waste from mining and extraction of mineral raw materials	quantity of produced waste from mining and extraction of mineral raw materials - total (t/year), per capita (kg/cap/year), by type of waste (key number) (t/year)	(t/yr) (kg/cap./yr)
O_13	K	Quantity of produced waste batteries and accumulators	the amount of waste batteries and accumulators produced per year - total (t/year), per capita (kg/capita/year), by type of waste (key number) (t/year) quantity of batteries and accumulators placed on the market in a year (t/yr)	(t/yr) (kg/cap./yr)
O_14	K	Amount of produced medical waste	quantity of produced medical waste - total (t/year), by type of waste (key number) (t/year)	(t/yr)
O_15	K	Quantity of produced animal waste	quantity of produced animal waste - total (t/year), by type of waste (key number) (t/year)	(t/yr)
O_16	K	Number of waste management plans	the total number of waste management plans produced by manufacturers, cities and municipalities	number
O_17	K	Waste treatment and disposal facilities (buildings)	number of buildings for waste treatment and disposal according to the processing methods R and disposal D - total, for hazardous waste and for special categories of waste (packaging, oils, waste vehicles, batteries, EE waste, tires, ...) (number). number of landfills - by type of landfill (number) number of regional waste management centers (number) number of municipal/city recycling yards for separate collection of types from municipal waste (number) capacity of facilities for processing/treatment of waste by processing methods R and disposal D (installed, actual, for landfills remaining) - total, for hazardous waste, for special waste categories (m ³) (t/year) (m ³ /year) (GJ/year)	(number) (m ³) (t/yr) (m ³ /yr) (GJ/yr)
O_18	K	Waste management - total quantities	amount of waste in the year addressed to processing/disposal/export - total and especially for	(t/yr) (% generated waste)

			communal, production, hazardous waste, special categories of waste (t/year) (% of generated waste)	
O_19	K	Quantity of processed waste per procedures R	amount of processed waste - total (t/year), by type of procedure R (t/year), especially for municipal waste, hazardous waste (t/year)	(t/yr)
O_19_1	S	<i>Quantities of processed waste for special waste categories</i>	total, by type of procedure R for each specific category of waste (t/year)	(t/yr)
O_19_2	S	<i>The ratio of processed waste and waste produced</i>	percentage of processed waste in relation to total waste produced - for total processed, for municipal, hazardous and special categories of waste (% of produced)	(%of produced)
O_20	K	Quantity of disposed waste by procedure D	quantity of disposed waste - total (t/year), by types of disposal procedures D (t/year), especially for municipal waste, hazardous waste (t/year)	(t/yr)
O_20_1	S	<i>Quantities of disposed waste for special purposes- categories of waste</i>	total by type of disposal procedures D (t/year) for each specific category of waste	(t/yr)
O_20_2	S	<i>The ratio of the total disposed waste to landfills per total waste produced</i>	quantity of disposed waste at landfills - total (t/year) and in relation to total waste produced (% of total waste produced)	(t/yr) (% of total waste produced)
O_21	K	Quantity of disposed biodegradable waste at landfills	quantity of disposed biodegradable waste to landfills - total (t/year) production of biodegradable waste (t/year)	(t/yr)
O_22	K	Cross-border traffic of waste	total imported/exported quantity per year (t/year)	(t/yr)
O_22_1	S	<i>Cross-border traffic of hazardous waste</i>	exported quantities of hazardous waste - total (t/year), by type of waste (t/yr), by country of export (t/yr).	(t/yr)
O_22_2	S	<i>Cross-border traffic of non-hazardous waste</i>	exported quantities of non-hazardous waste - total (t/year), by type of waste (t/year), by country (t/year) imported quantity of non-hazardous waste in the year - total (t/year) waste (t/year), by country (t/year)	(t/yr)
O_23	K	Greenhouse gas emissions (GHG) from waste	total greenhouse gas emissions from recovery and disposal (Mt CO2 - eq)	(Mt CO2 – eq)
O_24	K	Costs in environmental protection-waste	waste management costs	KM/t

O_24_1	S	<i>Investments in waste management</i>	Investments in waste management (KM/t)	KM/yr
O_24_2	S	<i>Resources of the Environmental Protection Fund spent for waste management projects</i>	total funds spent on waste management activities and projects - for waste prevention and reduction projects; for improvement waste management (infrastructure); for remediation of waste contaminated sites (KM/year)	(KM/yr)
O_25	K	Prices for recycling materials	the primary indicator represents specific prices (KM/tons) in relation to the total amount of glass, paper and plastic for all related FTS codes (Foreign Trade Statistics).	(KM/t)
O_25_1	S	<i>Total volume (import and export) 3 secondary materials</i>	the total volume (import and export) of glass, paper and plastic traded. This indicator (ton/month) shows market activity	ton/month
O_26	K	Resource Productivity	the ratio between GDP and DMC, expressed in KM per kilogram, as an index referring to 2010 as the base year, PPS per kg	KM/kg; PPS/kg 2010=100
O-26_1	P	<i>Domestic material consumption</i>	DMC is based on economic material accounts (EW-MFA)	

K-Key Indicators

S- Sub-indicators

3. SHARE of urban solid waste regularly collected and with adequate final discharge out of total urban solid waste generated, by cities

	O_2 Quantity of generated municipal waste
Link	SDG 11.6.1
Concept and definitions	<p>The indicator follows the achievement of the goal: avoiding and reducing waste generation. Data on public collection and treatment of municipal waste are reported. Annual reports are submitted by public utilities and other companies that collect data and discard costs, as well as waste management companies.</p> <p>Sub-indicators:</p> <ul style="list-style-type: none"> O_2_1 Percentage of inhabitants covered by public waste disposal O_2_2 Quantity of waste from households collected by public utilities O_2_3 Quantity of household waste by average personal consumption from households O_2_4 Composition of municipal waste O_2_5 Quantity of waste from service activities collected by public utilities <p>Coverage:</p> <ul style="list-style-type: none"> ▪ Regulation 2150/2002 on waste statistics (Regulation (EC) No 2150/2002 of the European Parliament and of the Council of 25th of November 2002 on waste statistics) ▪ International recommendations and Manual on waste statistics (Eurostat)

- Multiannual Statistical Program and Annual Plan of Statistical Activities
- Statistical classification of waste
- (http://bhas.ba/Arhiva/Klasifikacije/WST_CLA_2009_005_01-BH.pdf)
- The List of waste
- (http://bhas.ba/Arhiva/Klasifikacije/WST_CLA_2009_005_01-BH.pdf)

"**Waste**" is defined by the Waste Framework Directive of the EU, as any substance or object that the owner discards or intends or must discard. Six exceptions were made under the Waste Framework Directive (gas effluents emitted to the atmosphere, land in situ, unplanned land from construction activities, radioactive waste, recovered explosives and fecal matter, straw and other natural non-agricultural or forestry materials).

"**Municipal waste**" is defined as waste generated in residential areas, and includes waste from households, as well as other waste from production and/or service activities, if by its nature or composition it is similar to household waste. Municipal waste consists of waste collected by or on behalf of municipal authorities, or directly from the private sector. The main stream of waste originates from households, although similar wastes from sources such as shops, offices, public institutions, gardens and markets waste are included. It also includes bulky waste, but excludes waste from municipal sewage networks.

"**Mixed municipal waste**" is household waste, waste from shops, industry, institutions, construction waste, which is by characteristics and composition similar to household waste, and from which particular materials are not separated by certain materials (such as paper, glass etc.) and it is in the List of waste designated as 20 03 01.

"**Hazardous Waste**" is a waste that shows one or more of the hazardous properties listed in the Regulative Commission (EU) Regulation no. 1357/2014 of 18th of December 2014 on the replacement of Annex III to Directive 2008/98/EC of the European Parliament and of the Council on waste and repealing certain directives.

"**Waste data**" is divided into sources (19 business activities according to Classification of Activities and Households) and to categories of waste (according to European Classification for Statistical Purposes). Waste treatment information is divided into five types of treatment (reuse, incineration with energy recovery, landfill and land treatment) and categories of waste.

"**Waste categories**" are defined on the basis of the European Statistical Waste Classification (EWC-Stat), which is a matter-oriented nomenclature and specifically created for EU waste statistics. The 51 categories of waste contain 21 categories of hazardous waste and 30 categories of non-hazardous waste. Data sets contain a division into 51 categories of waste according to the European Waste Classification for statistical purposes: EWC-Stat. The classification is related to the administrative classification the List of Waste: List of wastes.

"Source of waste production"

Waste production is attributed either to manufacturing or consumer activities. An entity submitting waste to a waste management system is considered as a source. For manufacturing activities, distribution is followed by 18 economic activities according to NACE rev. 2 classification. Three of these activities are related to

	<p>waste management and contain secondary waste: collection, treatment and disposal of waste; reuse of materials (section 38), Environmental remediation and other waste management services (section 39) and Wholesale of waste and scrap (Class 46.77). In addition to waste produced by business activities, waste is also produced by households.</p> <p>Waste collection is the collection of waste, including its pre-storage for the purpose of transport to the waste treatment plant.</p> <p>Separate collection of waste is the collection, where waste streams are separated according to the type and nature of waste in order to facilitate the specific type of waste treatment.</p> <p>The Classification "List of Waste " contains a list of hazardous and non-hazardous waste that is classified based on the source of waste generation. Municipal waste is classified in the Waste List into group 20: Municipal waste and similar waste from industry, trade and service activities, including separately collected fractions.</p>
Methodology	
Source and form of data collection	<p>Data on municipal waste is collected through statistical surveys that are adapted to international standards and national needs in the area of waste statistics:</p> <ul style="list-style-type: none"> - Annual survey on municipal waste collectors (survey KOM-6aS) - Annual survey on waste brought to landfill sites (survey KOM-6aD)- including the amount of waste that citizens brought to landfills - Annual survey on collected waste from production and service activities (OTP) (Annex 3) - Annual survey on waste recycling/disposal (OTP-P)- data on waste vehicles (EWC-Stat. 08.120 i 08.121 <p>1. Annual survey on municipal waste collectors (survey KOM-6aS)</p> <p>For the annual statistical survey on municipal waste - KOM-6aS, reporting units are business entities, which have been granted the right to waste collection, regardless of whether they are only waste collectors or at the same time manage the landfill site. The reporting units show data on all quantities of municipal waste that were collected during the reference year. Within this survey data are collected for quantity of municipal waste, data on the source of municipal waste and data on the further handling of collected municipal waste. Data on the disposal of municipal waste were obtained from business entities to which the municipality gave permission for performing a public service for the collection and disposal of municipal waste. In addition to municipal waste from group 20 (Municipal waste - household waste and similar commercial, industrial and institutional waste, including separately collected fractions) and 15 01 (Packaging - including separately collected municipal waste packaging) from the List of Waste, the survey also includes waste from other groups that are collected within the public waste collection and disposal service. In 2017, 155 reporting units were covered, and the response rate was 96%.</p> <p>2. Annual survey on waste brought to landfill sites (survey KOM-6aD)</p> <p>For the annual statistical survey on municipal waste - KOM 6aD reporting units are</p>

the business entities that manage the municipal landfill. Data are collected on the amount of waste that, in the year of reporting, arrived at the landfill, regardless of how the waste was collected. Data are collected on the amount of received waste to landfills and the amount of waste disposed. In 2017, 124 reporting units were covered; the response rate was 99%.

3. Annual survey on collected waste from production and service activities (OTP)

Reporting units are business entities and parts of business entities that have 10 or more employees and are registered in sectors B by the Classification of Activities - Mining and quarrying, C - Manufacturing, D - Production and supply of electricity, gas, steam and air conditioning, F - Construction, G - Wholesale and retail, repair of motor vehicles and motorcycles (without 46.77 - Wholesale of waste and scrap), H - Transportation and storage, I - Accommodation and food service activities (hotel industry and catering). Reporting units present their own waste generated during the activity of the company where waste quantities generated in production activities (in tons) are recorded. The survey is completed based on the available documentation and records of the reporting unit or on the basis of an assessment if there is no documentation. In 2017, a total of 4,394 reporting units was covered; the response rate was 84.7%.

4. Annual survey on waste recycling/disposal (OTP-P)

Through this survey data on types and quantities of waste that have been processed, reused or disposed is collected. In 2017, there were 177 reporting units; the response rate was 89.0%.

Determination of waste generated by households

Indirect determination via waste collection		
1.1	Description of reporting unit	Municipal waste collectors and municipal public services
1.2	Description of the reporting system (regular survey on waste collectors)	<ul style="list-style-type: none"> • Annual survey on municipal waste collectors (KOM 6a-S) Some data are received through following surveys: <ul style="list-style-type: none"> • Annual survey on waste brought to landfill sites (KOM 6aD) (quantities brought on landfill sites by citizens); • Survey OTP-P (quantities of waste vehicles by citizens)
1.3	Waste types covered	<ul style="list-style-type: none"> • Municipal and similar wastes (LoW group 20) and packaging waste (LoW group 15 01) • Other waste generated by households (like waste motor vehicles, construction and demolition waste, etc.
1.4	Survey characteristics	
	a) Total no. of collectors /municipalities (population size)	155
	b) No. of collectors/	155

	municipalities selected for survey	
	c) No. of responses used for the calculation of the totals	155
	d) Factor for weighting	In the surveys carried out for this waste statistics, no weighting is used, because full coverage is applied for observed units
1.5	Method applied for the differentiation between the sources household and commercial activities	Within the questionnaire KOM 6a-S are three different columns that define the source of collected waste: quantities collected with public collection • from households • from production and service activities • from other public utility services. The reporting units themselves already estimate the collected amount of waste according to the source of waste generation.
1.6	Percentages of waste from commercial activities by waste types	<ul style="list-style-type: none"> • 20 Municipal and similar wastes (7%) • 15 01 Packaging waste (3%)
1.7	Population served by a collection scheme for mixed household and similar waste, in %	74%
Indirect determination via waste treatment		
2.1	Specification of waste treatment facilities selected	Landfill sites (survey KOM 6aD)
2.2	Waste types covered	Almost all waste types
2.3	Method applied for the differentiation between the sources household and commercial activities	From this source only amount of waste from households - amount brought to landfill sites directly by citizens themselves. Within the questionnaire KOM 6aD there are different columns that define the source of waste brought to landfill sites.

The survey uses the following Classifications:

	<i>Classifications</i>	<i>Description of classification (in particular compatibility with WStatR requirements)</i>
<i>Economic Activity</i>	KD BiH	Directly compatible with WStatR requirements
<i>Type of Waste</i>	LoW – List of Waste	Converted to EWC Classification Stat Statement Version 4 with Conversion Key (Directive No. 849/2010/EC
<i>Treatment operations</i>	R&D codes	Used as described in Directive No. 2008/98/EC

BHAS relevant documents:

Determination of the waste code according to the Waste List

http://www.bhas.ba/metodoloskidokumenti/LoW_2012_001_01_BA.pdf

Manual on waste statistics

http://www.bhas.ba/metodoloskidokumenti/MWS_2013_001_01-bh.pdf

Determination of waste weight

http://www.bhas.ba/metodoloskidokumenti/KFO_2015_001_01-bh.pdf.

Development of indicators "Quantity of produced municipal waste"

For Bosnia and Herzegovina, the percentage of inhabitants covered by the public waste collection system is around 74%. This percentage has been slightly changed from 2008. The rest of the population, which is not covered by communal services, is located in rural areas and suburbs of cities. Regarding the coverage of municipal waste collection by public services, there are various difficulties. The most common reasons for lack of coverage with public services are:

- streets without asphalt
- some areas (mountain part of the municipality) are not covered by organized public service
- newly-formed streets that are not included in the program for collecting and disposing of municipal waste
- the insufficiently developed capacity of the operator covering the area of collection and disposal services of municipal waste
- narrow streets where specialized trucks for transportation can not pass

The statistical survey KOM6aS provides data to be classified at the city level and at the lower level (within the city). The data is calculated for population covered by organized collection of municipal waste (number and % of the total population).

Table 1. Municipal waste collected by a public utility company, by municipalities

Source of waste						
No	The municipality in whose territory the waste is collected	Code	Number of settlements using the public waste disposal service	Number of households covered by the public waste disposal service	Percentage of residents of the municipality that use the public waste disposal service	Total annual amount of collected waste
a	name	b	number	number	%	tons
	TOTAL					

Calculation “Total generated municipal waste”- treatment of missing values

For those municipalities where the percentage of population covered by the public waste collection system is not exhaustive, the statistical estimation method is used to calculate the missing values of waste quantities:

$$Total\ generated\ municipal\ waste = total\ amount\ of\ collected\ waste * \alpha$$

α = correction factor (estimated value)

$$\alpha = (total\ population/population\ covered\ by\ public\ collection\ system) * \beta$$

β = impacts that are important for estimating the amount of waste generated by the population that is not covered by the public waste collection system

The following factors influence the coefficient of β :

- (i) population growth,

Among the many factors that influence for growth of waste, two can be identified that largely determine the growth of future waste quantities. The first is population growth, and the other is the consumer habits that directly depend on gross domestic product per capita. According to the macroeconomic data of 30 OECD countries, an increase in national income by 1% is estimated to increase the amount of generated waste by 0.69%. An increase in per capita income causes an increase in the consumption of goods and services, which directly leads to the growth of waste volumes.

As the most prominent scenario in the prediction of future population trends, a medium fertility and migration scenario have been assessed, which assumes a slight decline in the population at the level of the whole of Bosnia and Herzegovina.

- (ii) income growth of households,

The impact of personal consumption is directly related to the amount of municipal waste. The structure of expenditures can simplify the interdependence of this factor with a specific amount of waste per capita. Household income is the average monthly household consumption in KM. To estimate the generation of waste, household consumption growth is estimated to be between 1,0 and 2.0% per year. An international experience suggests that 1% of household income growth results

	<p>in 0.5% growth in waste generation in urban areas per capita and 0.25% of growth in waste generation in rural areas per capita.</p> <p>(iii) urbanization process Urbanization = population of urban areas/total population The urbanization rate for all municipalities in Bosnia and Herzegovina, according to the 2013 census data, can be found on the link: http://www.statistika.ba/?show=3#link3</p> <p>Urbanization and industrialization directly influence the increase in the amount of municipal waste. Two important factors are affected by urban expansion: the increase in the number of inhabitants, migration from rural area and smaller communities into richer urban areas.</p> <p>The most appropriate indicators for monitoring are the degree of urbanization (the share of urban in the total population), while the <i>size of the domestic product per capita could serve as an additional indicator of the quality of urbanization</i>. The assumption is that the limit values of these indicators (urbanization rates of the 2013 Census) that mark the critical mass of the urban population will not change and will not reach the necessary mass for transition to the next, higher phase of the urbanization process.</p> <p>(iv) Reduction / recycling at source of waste generation (v) Specific effects of the geographical region and the development of economic activities</p> <p>Economic growth, or growth in production and consumption, is a key driving force behind the increase in waste volumes. GDP is the economic factor through which the amount of generated municipal waste can be monitored, as GDP is an increase or decrease in production and consumption. GDP growth is not directly proportional to the amount of generated waste, which is a disadvantage when analyzing GDP as a criterion for the projection of waste quantities.</p> <p>(vi) Seasonal impact, frequency of collection</p> <p><i>SDG 11.6.1</i> = $\frac{\text{municipal solid waste that is regularly collected and with adequate final}}{\text{total municipal solid waste, by cities}}$</p> <p>The data for this indicator can be classified at the city level, according to the source of waste generation, sorting by type of final processing.</p>
Availability and comprehensibility	<p>Access to the latest release: http://www.bhas.ba/saopstenja/2018/ENV_01_2017_Y1_0_BS.pdf</p> <p>Publication "Sustainable Development Indicators": http://www.bhas.ba/tematskibilteni/TB_I_odr_razvBiH_BS.pdf</p> <p>Thematic bulletin "Statistics on Sustainable Development indicators" http://www.bhas.gov.ba/data/Publikacije/Bilteni/2019/RDE_00_2018_TB_BS_0.pdf</p> <p>The Agency for Statistics of BiH has prepared the Report on the quality of municipal waste and the report was submitted to Eurostat (WASTE_GENER_A2_BA_2012_0000_T0000_EU_V1.zip).</p> <p>Confidentiality - policy and data handling The confidentiality of statistical data is regulated by the law, and the staff conducting the statistical survey has the same legal obligation to protect confidentiality. The Law on Statistics of BiH (Official Gazette BIH 26/04 and 42/04 - Chapter XI - Article 23-29) establishes the principle of confidentiality as one of the</p>

	<p>main principles. The Agency for Statistics of BiH disseminates statistics in accordance with the statistical principles of the European Statistics Code of Practice, and in particular with the principle of statistical confidentiality.</p> <p>The document "Rules on the Protection of Statistical Data in the Agency for Statistics of BiH" lists procedures for ensuring confidentiality during collection, processing and dissemination - including, protocols for securing individual data access, rules for defining confidential cells in the output tables, and procedures for detecting and preventing subsequent exposures as well as access to microdata for survey purposes.</p> <p>Time and geographical comparability</p> <p>Length of comparable time series: data on municipal waste statistics are given for the 2009-2018 series in the annual dynamics. The length of comparable time series is the annual time series 10x1 = 10 (years). Waste statistics apply international methodological standards for data processing. This allows comparison of data of Bosnia and Herzegovina with municipal waste data from other countries.</p>
<p>Limitations and Challenges</p>	<ul style="list-style-type: none"> ✓ Infrastructure for waste collection is relatively developed and organized collection and disposal of municipal waste covers about 74% of the population of Bosnia and Herzegovina. The separation of usable components is at a low level, which means that most of the municipal waste is disposed in landfills, as one of the most frequent ways of waste disposal in BiH. ✓ Landfills keep records and fill out the forms of deferred waste. However, there are cases where the amount of municipal waste was assessed on the principle of vehicle volume, since the landfill does not have a weighing scale. Waste that is disposed of in the landfill is not measured, but the quantity records are based on existing vehicle park, waste collection method (waste disposal schedule) and waste collection containers. This leads to insufficient precision in determining the amount of municipal waste. This also affects the inaccurate and incomplete filling of statistical survey where reporting units are not able to record the total amount of waste by type of waste (Waste List codes). ✓ Important waste streams such as packaging, batteries, waste vehicles, electrical and electronic waste have special requirements. The set target values for recycling and processing of such waste, as crucial for achieving the satisfactory rate of reduction of municipal waste on landfills, will not be achieved if they are not coordinated at the local level. Cooperation between municipalities and utility companies is essential for an efficient waste management system, as well as informing the public by using official statistics on the quantities, types and management of municipal waste. ✓ In order to successfully manage waste volumes according to international ecological standards, municipalities and cities in BiH should join together and build regional landfills and waste sorting plants, as this is the only way for financial costs to be significantly lower (<i>"Analysis of Solid Waste Management Sector" - Strategic Directions and Investment Planning by 2025</i> " financed by the Swedish International Development Agency (SIDA), as part of a partnership between the World Bank and SIDA to assist Bosnia and Herzegovina in its activities to improve the solid waste management sector). The regional concept involves the merging of municipalities into a

	<p>region that has a central regional landfill, and each municipality has a developed system of selective collection and recycling, treatment, and transfer of waste to a sanitary regional landfill. Municipalities sign agreements on the disposal of their waste to a specific regional landfill. All municipalities have the same cost of transport and disposal regardless of the distance from the regional landfill.</p> <p>BiH is a country with a small number of inhabitants, and therefore the amount of waste that occurs in each municipality is relatively small. The need for cooperation between small municipalities in the area of collecting and disposing of waste is indicated, this would increase the amount of waste, and reduce the cost per ton and make it recyclable more financially. The new principle of regional waste management would mean that current prices of services must also increase. It is considered that the current price of waste management services is low and amounts to only 0.5% of total household expenditures (international practice is that this amount is between 1 and 1.5 percent). In addition, the current household fee includes 17% of VAT, while international practice, especially in EU member states, is not to charge VAT on solid waste collection and collection services for households, since the fee for this type of service is considered a tax.</p> <ul style="list-style-type: none"> ✓ Waste management problems are not equally and evenly expressed in all local governments (municipalities), and the implementation of activities on the introduction of an integral system depends primarily on the economic situation of each municipality. There is inadequate waste disposal at non-hygienic landfills, and besides municipal waste, there are many other types of waste whose disposal is prohibited by EU regulations. ✓ In most cases, wild dumps are located in rural areas and, as a result, there is a lack of funds for extending the waste collection system, as well as poor local waste management organization. The waste material is diverse: from municipal, through bulky waste (cars, trucks, household appliances, tires, organic and medical waste). In the municipalities whose territory is covered by forests, there is a problem of sawdust dumps. In some municipalities, there is a problem of farm wastes, as well as plastic packaging, and very often hazardous toxins, pesticides and herbicides used in agriculture is present. Quantities and composition of wastes deposited in wild landfills and out of control of municipal public utility companies are a particular challenge for monitoring in the context of statistical data not based on measurement. ✓ Methodology is needed to estimate the morphological composition of municipal waste and to determine other physical and chemical characteristics of waste (density, heat power, organic/inorganic matter content) in order to calculate emissions of greenhouse gases from waste.
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Interpretation:

The amount of municipal waste collected by the public collection system, BiH, tons

	2017	2018
TOTAL	914.232	920.540
Separately collected types of waste ¹⁾	38.175	37.042
Waste from gardens and parks ¹⁾	26.499	28.210
Other municipal waste ²⁾	830.567	836.539
Packaging waste	18.991	18.749

¹⁾ Waste from gardens and parks (biodegradable waste, soil, stone and other non-biodegradable waste)

²⁾ Other municipal waste (mixed municipal waste, waste from market, street cleaning, sewage treatment, cabbage waste)

Source of collected municipal waste, BiH, tons

	2017	2018
TOTAL	914.232	920.540
Household waste	700.062	712.844
Waste from productive and service activities	188.494	177.705
Waste from public utility services	25.676	29.991

Treatment with municipal waste, BiH, tons

	2017	2018
TOTAL¹⁾	950.599	957.494
Waste permanently disposed in landfill	945.537	946.054
Waste is otherwise disposed³⁾	1.324	1.639
Treated waste⁴⁾	3.738	9.801

¹⁾ Quantities of waste disposed at the landfill, waste according to the method of waste disposal

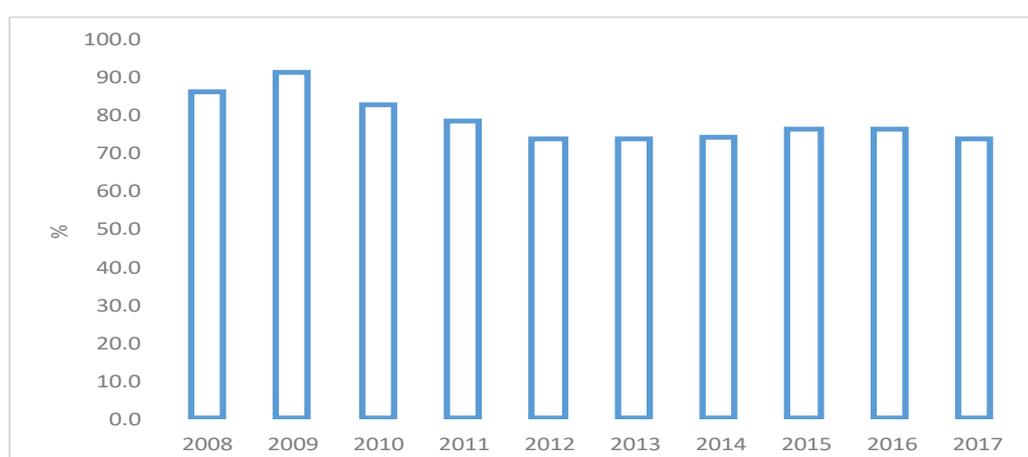
³⁾ Is covered by operations aimed at the final disposal of waste, which can not be processed and which is undergoing various treatment and disposal procedures.

⁴⁾ Removal procedures (incineration and other methods of removal); methods of processing (recycling, composting and other types of processing).

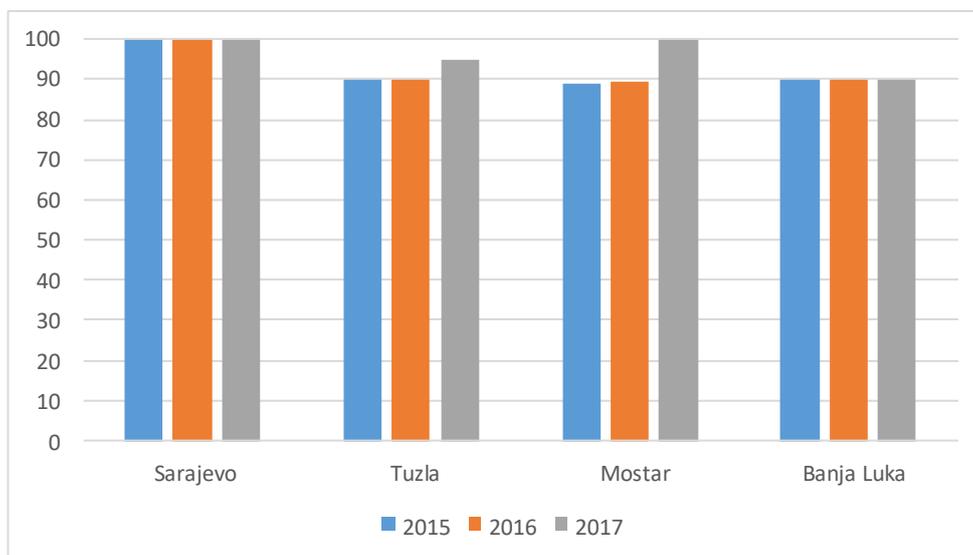
Quantities of generated municipal and household waste, kg per capita

	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018
<i>Municipal waste</i>	356	328	332	340	340	337	378	355	354	353	355
<i>From that: Household waste</i>	277	259	218	218	202	200	216	203	202	201	202

Municipal waste regularly collected, Bosnia and Herzegovina, 2008-2017, %



Proportion of urban solid waste regularly collected and with adequate final discharge out of total urban solid waste generated, by cities, %



4. HAZARDOUS WASTE PER CAPITA AND PERCENTAGE OF TREATED HAZARDOUS WASTE BY TYPE OF TREATMENT

	O_4 Quantity of produced hazardous waste
Link	SDG 12.4.2
Definition and concept	<p>The indicator monitors the flow of quantities of hazardous waste produced, by the types of waste and activities in which it arises. The indicator is followed by the achievement of a strategic goal: avoidance and reduction of waste generation.</p> <p>Sub-indicators:</p> <ul style="list-style-type: none"> O_4_1 Intensity of production of hazardous waste O_4_2 Quantity of produced hazardous waste from the manufacturing industry (class C) according to the classes of KD BiH <p>SDG sub-indicators:</p> <ul style="list-style-type: none"> Share of hazardous waste treated as recovery (%) The share of hazardous waste that is disposed in landfills as a way of treatment (%) The share of hazardous waste that is being treated during the incineration process (%) Share of hazardous waste that has special treatment and temporary storage (%) <p>Coverage:</p> <ul style="list-style-type: none"> ▪ Regulation 2150/2002 on waste statistics (Regulation (EC) No 2150/2002 of the European Parliament and of the Council of 25th of November 2002 on waste statistics) ▪ International recommendations and Manual on waste statistics (Eurostat) ▪ Multiannual Statistical Program and Annual Plan of Statistical Activities

- Statistical classification of waste
- (http://bhas.ba/Arhiva/Klasifikacije/WST_CLA_2009_005_01-BH.pdf)
- The List of Waste
- (http://bhas.ba/Arhiva/Klasifikacije/WST_CLA_2009_005_01-BH.pdf)

- Regulation (EC) No. 166/2006 of the European Parliament and of the Council on the establishment of the European Pollutant Release and Transfer Register (PRTR) and amending Council Directive 91/689/EEC
- Basel Convention on the Control of Transboundary Movements of Hazardous Waste and its Disposal
- Register of issued waste management licenses:
<http://www.vladars.net/sr-SP-Cyrl/Vlada/Ministarstva/mgr/Servisi/Pages/default.aspx>
<http://www.fmoit.gov.ba/bs/okolis/upravljanje-otpadom>

Definitions:

The "**Waste Framework Directive**" prescribes a strict hazardous waste control regime. The directive prescribes that hazardous waste must be recorded, identified and kept separate from other types of hazardous and non-hazardous waste. The assets of waste are dangerous by the Directive and are determined by Decision 2000/532/EC on the establishment of the Waste List (LoW).

The "**Basel Convention**" on the control of transboundary movement of hazardous wastes and their disposal is an international agreement that came into force in 1992 and was signed by 172 parties. It is intended to protect human health and the environment from possible harmful effects of hazardous waste, through the control of cross-border movement and disposal of hazardous waste. The driving force for the drafting and adoption of the Basel Convention was to prevent the delivery of hazardous waste from developed into less developed countries, a practice that began to take place as authorized disposal trails became more expensive as a consequence of stricter environmental protection regulations.

The "**Landfill Directive**" prohibited the joint disposal of waste, which in practice means that hazardous waste must be assigned to the landfill of hazardous waste (while municipal waste must go to the landfill for non-hazardous waste).

"**Hazardous Waste**" (HW) is a waste that shows one or more of the hazardous properties listed in the Regulative Commission (EU) No. 1357/2014 and the replacement of Annex III to Directive 2008/98/EC of the European Parliament and of the Council on Waste (WFD).

"**Production waste**" is waste generated in the production process in industry, craft and other processes, and by composition and properties it differs from municipal waste. Production waste does not include residues from the production process used in the production process of the same manufacturer.

"**Waste producer**" is any person whose activity generates waste (original producer) and/or which, by prior processing, mixing or other process, changes the composition or characteristics of waste.

"**Management of hazardous waste**" means the collection, disposal and discarding

	<p>the hazardous waste, including the subsequent care of landfill sites.</p> <p>"Approved location or facility" means a site or facility for the disposal of hazardous waste or other types of waste for which a license or permit has been issued by a state authority in charge of the area in which the facility is located.</p> <p>"Treatment": physical, thermal, chemical or biological processes, including sorting, which change the characteristics of waste in order to reduce the amount of waste or hazardous properties of waste, facilitate handling or increase the return of waste components.</p> <p>"Waste treatment" includes processing or disposal operations, including preparation for processing or disposal. A business entity for the treatment of waste may start with waste treatment activities after obtaining an environmental permit for treating waste from the Ministry.</p> <p>"Chemical treatment of waste" is mainly characteristic of the treatment of hazardous waste and is based on the basic processes of ion exchange, precipitation, oxidation, reduction and neutralization. These are specialized techniques for the treatment of very hazardous and problematic types of waste with mainly high treatment costs that are applied in cases where other technologies are not effective enough.</p> <p>"Component Recovery" means the return of materials and energy from used products or waste to the economic system using a particular technological process or incineration.</p> <p>"Preparation for re-use" means processing operations where products or parts of products that have become waste by check, purification or repair are being prepared for reuse without any additional processing.</p> <p>"Storage": disposal of waste by the manufacturer within the plant for a maximum period of 3 years, in a manner which excludes the danger to the environment and human health.</p>
Methodology	
Source and form of data collection	<p>Statistics on the generation and treatment of hazardous waste are based on data collected in accordance with the Waste Statutory Regulations (WStatR) and are used to compile the indicators of sustainable development "<i>Production of hazardous waste, by economic activities</i>".</p> <p>Statistics on the generation of hazardous waste and treatment are based on the obligation to report data to Eurostat, in accordance with the European Waste Statistics Regulation (EC) 2150/2002 (WStatR). The aim of the Regulation on Waste Statistics is to ensure better control over the implementation of EU waste policy objectives.</p> <p>Data is collected through statistical surveys adapted to international standards and national needs in the field of waste statistics:</p> <ul style="list-style-type: none"> - Annual survey on collected waste from production and service activities (OTP) - Annual Waste Treatment/Disposal Survey (OTP-P) - part referring to hazardous waste data

Statistical survey OTP (Annual survey on waste generated in production activities) is carried out in accordance with Regulation 2150/2002/EC on waste statistics. According to Regulation 2150/2002/EC, the survey should be conducted for all economic activity areas of NACE Rev. 2.

Statistical survey OTP-P (Annual Waste Treatment/Disposal Survey) is carried out in accordance with Regulation 2150/2002/EC on waste statistics (**in the part of waste treatment reporting**). Business entities involved in the collection, recycling, waste treatment and/or import/export of waste are included.

Business entities of this survey may be registered in any of the activities of NACE Rev. 2. For this reason, it is difficult to establish the statistical address book of reporting units for this survey, therefore the registry of competent ministries that issue waste management licenses is used. The address book of the chambers of commerce is also used in order to establish the statistical address book of active entities. According to Regulation 2150/2002/EC, the reporting obligation relates to waste management methods in the country, and to procedures R1 to R11 (processing operations) as well as procedures D1 - D7, D10, D12 (removal operations).

General description of the method for data collection (Waste production by waste category (EWC-STAT) and economic activities (KD BiH)

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19
Stavka otpada	A	B	C10 - C12	C13 - C15	C16	C17 - C18	C19	C20 - C22	C23	C24 - C25	C26 - C30	C31 - C33	D	E36, E37, E39	E38	F	G-I excl. 46.77	G46.77	on_EP_HH
011	Used solvents																		
012	Acid, alkaline waste																		
013	Used oils																		
CHEM B	Chemical waste																		
032	Industrial waste deposits																		
033	Sludge and liquid waste																		
...	...																		
12B	Another mineral waste																		
124	Combustion wastes																		
126	Land																		
127	Otpad nastao jaružanjem																		
128-13	Waste from treatment																		
011-128_13	all units from the OTP, OTP-P, KOM 6aS and KOM 6aD all units that reported positive business results in the reference period of observation																		
All active statistical units with 10 or more employees have not conducted a survey for economic activity A																			
G-U excl.. 46.77 - include data from the survey KOM (municipal waste collected from business entities and other utility companies)																			
G-I excl. 46.77																			
All active statistical units with 10 or more employees - survey not conducted																			
KOM 6As survey - full coverage of waste collectors; KOM 6Ad survey - full coverage of landfills (data on quantities disposal by citizens on EP_HH landfills); OTP-P (data on quantities of waste vehicles from citizens)																			

Commission Regulation (EU) No. 849/2010 of 27th of September 2010 amending Regulation (EC) No. 2150/2002 of the European Parliament and the Council on Waste Statistics, amended all three annexes: waste production, treatment and disposal, as well as the equivalence table.

To convert the amount of wet sludge into dry state, Eurostat conversion factors are used taking into account the specific category of EWC-Stat waste and the specific category of NACE Rev. 2. The conversion factors used to convert sludge are shown in the table below:

EWC-Stat	LoW	wet/dry	Conversion factors	Non-hazardous/hazardous
0.32	19 08 12	dry	0,27	Non-hazardous
	19 08 14			hazardous
	other	wet		
11.1	10 08 05	dry	0,2	Non-hazardous
	other	wet		
11.2	all	wet		
11.4	all	wet	0,2	Non-hazardous

Statistical data processing

Statistical units have been selected for the survey in accordance with the rules applicable to the Business Register. In the statistical form, the volume data are displayed in tons of waste with one decimal place. Telephone control of the data is carried out, for those data where it is suspected of the wrong unit of measure. Statistical form has not been changed since 2008, so companies are familiar with the form and content of the form, and generally have no problems with their filling in.

Once the forms are collected, they are recorded and sorted according to whether they are completed or not completed (filling in the list of reporting units with ID numbers for each reporting unit). Following visual inspection of completed questionnaires, within the visual control of all received questionnaires, all major errors are corrected (inaccurate data on quantities, wrong classification in relation to LoW codes, false links between activities of NACE Rev. 2 and LoW classification code, incomplete questionnaire, etc.).

When questionnaires are visually examined, attention is paid to whether the LoW codes shown are in line with certain business activities of NACE Rev. 2. If there is an unconceivable or unusual combination, the reporting unit is contacted by phone and inquired about the reasons for using certain waste code. After fast visual controls, data is entered. The data from the printed questionnaires are entered into the database using Microsoft Access Relational Database program.

Using the Access program, logical control of data in the questionnaires is carried out, and correction of undetected errors follows (errors missed during visual control) via telephone or e-mail contact with the responding units. When data is entered, data is transferred to the final database.

The most commonly identified processing errors are partially missing information (not all columns are filled in) and missing codes in relation to the production and treatment methods of waste. These are the most common types of mistakes. Less frequent mistakes, which still occur in significant numbers, are: the use of an incorrect or less precise classification number (LoW) of waste in connection with the business activities performed by the unit and the inconsistency between the amount of generated waste category and the amount of treated waste category. Wrong amount of waste (for example, instead of tons, quantities are shown in kilograms). There are also errors in displaying quantities in some other units (usually in cubic meters or "pieces").

Another inconsistency that appears is double counting, especially in codes 20 and 15 01 according to the Low classification. The types of treatment (codes) are in accordance with the explanations in the Waste Statistics Manual. Encoding errors related to the type of treatment is problematic for small companies; they usually do not know which code to report in the questionnaire.

	<p>In the total quantity of waste from the production and service activities shown in the statistical statements, the waste quantities of the four waste codes according to the EWCSat classification are excluded: Other mineral waste (12.2, 12.3, 12.5) and excavated land (12.7), and according to the List of waste code Waste from mining of mineral raw materials (0101) from section B - Mining and quarrying.</p> <p>The survey uses the following classifications:</p> <ul style="list-style-type: none"> • Classification of activities in BiH 2010 (NACE rev.2) • List of Waste • Statistical classification of waste EWCSat <p>The classification number of the waste is shown in the Rules on the categories of waste with the lists ("Official Gazette of Federation of Bosnia and Herzegovina No. 9/05" and "Official Gazette of RS 39/05"), and the List of waste can be found on the BHAS web site. http://bhas.ba/Arhiva/Klasifikacije/WST_CLA_2009_005_01-BH.pdf</p> <p>Documentation on the methodology: Determination of the waste code according to the Waste List http://www.bhas.ba/metodoloskidokumenti/LoW_2012_001_01_BA.pdf Manual on waste statistics http://www.bhas.ba/metodoloskidokumenti/MWS_2013_001_01-bh.pdf Determination of waste weight http://www.bhas.ba/metodoloskidokumenti/KFO_2015_001_01-bh.pdf Construction waste and demolition waste http://www.bhas.ba/metodoloskidokumenti/RD_STAT_GRO_2013_001_01_Bos.pdf</p>
Availability and comprehensibility	<p>Confidentiality - policy and data handling</p> <p>The confidentiality of statistical data is regulated by law, and the staff conducting the statistical survey has the same legal obligation to protect confidentiality. The Law on Statistics of BiH (Official Gazette BiH 26/04 and 42/04 - Chapter XI - Article 23-29) establishes the principle of confidentiality as one of the main principles. The BHAS disseminates the statistics in accordance with the statistical principles of the European Statistics Code of Practice, and in particular with the principle of statistical confidentiality.</p> <p>The document "Rules on the Protection of Statistical Data in the BHAS" lists procedures for ensuring confidentiality during collection, processing and dissemination - including, protocols for securing individual data access, rules for defining confidential cells in the output tables, and procedures for detecting and preventing subsequent exposures as well as access to microdata for survey purposes.</p> <p>Availability Calendar approach: http://bhas.gov.ba/Calendar/Category/27 The hazardous waste statistics are disseminated on a biannual basis. Access to the latest release: http://www.bhas.ba/saopstenja/2018/ENV_08_2014_Y2_0_BS.pdf Publication "Sustainable Development Indicators": http://www.bhas.ba/tematskibilteni/TB_I_odr_razvBiH_BS.pdf</p> <p>Time and geographical comparability Length of comparable time series: data on hazardous waste statistics in BiH are</p>

	available by the annual dynamic for 2008-2012 period and for 2012-2016 period by a biannual dynamic. The length of comparable time series can be considered $3 \times 1 = 3$ (years), observing the two-year dynamics. This allows comparison of data of Bosnia and Herzegovina with hazardous waste data from other countries, according to the Regulations on waste statistics.
Dissemination	The indicator is shown in a table or a chart as the quantity of produced hazardous waste: <ul style="list-style-type: none"> - total (t/yr), - per capita (kg/cap/year), - by type of hazardous waste (key number) - by activity (KDBiH) (t/year),
Reporting obligations and availability of data	BHAS, according to the requirements of Regulative EC 2150/2002, produces a two-year report and delivers it to Eurostat <ul style="list-style-type: none"> - Publication in statistical releases and BHAS thematic bulletins - NFP BIH prepares and delivers the Annual Report to the Secretariat of the Basel Convention <p>Note: Data are insufficiently good (failure to report, insufficient quality control of data), especially those related to certain types of hazardous waste and waste from certain activities.</p>
Limitations and Challenges	<p>✓ Classification of hazardous waste</p> <p>Appropriate waste classification is a precondition for the proper management of hazardous waste. The classification of waste as a dangerous activates the application of specific obligations as required by the WFD. Furthermore, the proper classification of hazardous waste is necessary for the collection of reliable data regarding the amount of hazardous waste produced, the most significant hazardous waste streams and the cross-border traffic of hazardous waste. In its action plan for the circular economy, the European Commission emphasized the importance of waste management in the way that waste hierarchy is implemented in practice. In this context, the proper classification of hazardous waste is important because proper and safe handling of hazardous waste contributes to the flow of recycled material without toxicity, which in turn should strengthen the market of secondary raw materials.</p> <p>✓ Treatment of hazardous waste in relation to generating</p> <p>Comparison of statistical data on the generation of hazardous waste and treatment, by excluding selected R & D procedures from the reporting obligation, can lead to a wrong picture of the "statistical gap" of Eurostat data.</p> <p>✓ Further aspects should be considered for a comprehensive assessment of statistical gaps.</p> <p>Due to various specific causes, it is not possible to get a completely consistent picture of the generation of hazardous waste and treatment data. The main reasons are:</p> <ul style="list-style-type: none"> - limitation of the reporting obligation under Annex II of the WStatR as the main reason for the statistical gap when using Eurostat data, - using a different methodology for collecting data, responsibilities and sources of data, creating and treating hazardous waste, - the impact of operations before to the treatment of hazardous waste, leading to the change of classification from hazardous to non-hazardous waste, - the amount of hazardous waste that is temporarily stored, - reporting quantities of data in dry or wet conditions, - data on the import and export of hazardous waste is based on the Common Questionnaire of the Basel Convention and Eurostat, which leads to the original reporting according to Basel Y codes where information based on EWC codes

(statistical classification) is added only on a voluntary basis. In addition, hazardous and non-hazardous waste are summarized for some positions.

✓ **Hazardous waste from households (HHW)**

A survey on hazardous waste from households with a major emphasis on hazardous chemicals has been carried out in some EU countries. For the purpose of the survey, the term "Hazardous Waste in Households (HHW)" is defined as "*Such waste that can potentially increase hazardous properties of municipal solid material when it is deposited, burnt or composted.*" The focus of the survey is the identification of hazardous household chemicals, which are not other hazardous waste that can be generated from households (such as batteries, waste oils and waste of electronic and electrical equipment). These waste streams are or will be subject to specific EC regulations that make their separate collection mandatory. It focuses on hazardous household products that pose a potential threat to health and the environment when households postpone and mix it with non-hazardous waste from households.

The methodology has identified a list of priority substances in solid waste that pose the greatest risk to human health and the environment. Fourteen hazardous substances are identified as priority substances for solid waste on the basis of emissions inventories from solid waste treatment and disposal facilities such as landfill and incineration: Arsenic, Lead, Cadmium, Chromium, Copper, Nickel, Mercury, Zinc, PCB, Benzene, Tetrachlorethylene, Trichlorethylene, Tetrachloromethane, Sodium Cyanide.

The most problematic HHW waste to manage and dispose are dyes, pesticides, wood-treated arsenic and fluorescent lamps. The main recommendations are listed below:

- Separate collection and recycling of low energy and fluorescent tubes are useful and continue to improve overall positive eco-balance at reasonable cost. Such a separate collection and treatment scheme already exist in some EU Member States.
- Arsenic is one of the main pollutants in solid waste, most of which comes from pressurized wood, with chromed arsenic (CAA). Alternatives are easily accessible, far less toxic and strongly favored by the European Commission. If the prohibition of use is carried out, the wood treated with arsenic remains a problem in the management of municipal waste, hence separate collection at the household level (probably together with other treated wood) as recommended action to minimize irregular waste disposal.
- There are alternatives to corrosive/aggressive cleaning products based on low toxicity substances.
- Filters for used oil are found in household waste when households replace their own oil. Although there is a separate collection of waste for waste oils, there is usually no information about oil filters.
- The list of identified HHWs varies from country to country, which means that the amount of HHW collected separately per capita varies from country to country. Some waste streams that are not usually defined as hazardous are considered problematic only in some countries and are selectively collected as HHW (eg. vegetable oils).
- The amount of hazardous waste from households represents a small percentage of total municipal waste stream. Generally, the amount of HHW generated is 1% (by weight) of household waste.
- Household Hazardous Waste (HHW) includes household cleaning products, lawns and gardens, car liquids, paints and color products, etc. There are no statistical data on HHW in BiH.

✓ **Challenges - Managing Hazardous Waste**

It was identified that the wrong classification appears in the entire chain of hazardous waste management, from the producer of hazardous waste, to the operator and to the treatment operator. The reasons for the occurrence of the wrong classification varies from country to country, most of which include the lack of clarity in the Waste List. For example, some HW categories in the Waste List are not clearly defined. Due to this reason, waste owners sometimes do not find the appropriate code for hazardous waste. In addition, for waste that can be classified as hazardous or non-hazardous according to the Waste List, a good knowledge of their composition is needed, which is not always possible to identify.

Proper classification of waste is important because the classification of waste as dangerous has a significant impact on the fate of this waste. There are a number of obligations related to waste management in EU legislation. The correct classification is of the utmost importance because the wrong classification can lead to HW entering the treatment streams that are intended for non-hazardous waste, which hinders the possibility of control for decision makers and leads to the underestimation of the overall generation of hazardous waste. In particular, the lack of clarity regarding the application of the definition and the different methods of application of the application gives greater attention.

Monitoring the management of hazardous waste from generation to treatment, based on the information system of the hazardous waste database, is necessary. It is difficult to present relevant information on hazardous waste treatment operations that are not part of the reporting obligations to WStatR. Monitoring the management of hazardous waste is limited to statistical data; additional statistics are needed to complete the picture and make the correct conclusions. Therefore, consideration is given to include all the procedures R and D without exemption from reporting obligations to WStatR. In the Quality Report, it is necessary to include additional information regarding the specificities of the land, for example, about temporary storage, specific operations of pre-treatments that lead to the change of classification from hazardous to non-hazardous waste, if any. In cases where statistical inconsistencies can not be explained - even when all the reasons explaining differences in data are taken into account - it can be concluded that there is no full record/control of hazardous waste activity.

In order to establish a successful hazardous waste management system, it is important to establish an information system for data on waste quantities in order to obtain precise data on the actual quantities of hazardous waste generated in the territory of BiH.

✓ **GDP&beyond**

The EU Framework Directive on Waste has set as one of the general objectives of "separation", discontinuation of the connection, between economic growth and the impact of economic growth on the environment over the amount of generated waste (GDP & beyond, Eurostat, 2010). The intensity of waste generation is an indicator of the effect of factors that influence the quantities of generated waste and shows the response to anthropogenic activities. Waste generated per unit of GDP (total waste intensity) shows whether there is a separation of the growth of waste quantities from economic growth. Changes in the value of this indicator make it possible to evaluate the effectiveness of environmental policy.

- ✓ The indicator can be completely produced after the developed Waste Accounts methodology

Interpretation

The indicator shows the amount of hazardous waste in "kg per inhabitant per year." Municipal waste includes areas B - Mining and quarrying, C - Manufacturing and D - Production and supply of electricity, gas, steam and air conditioning of the Classification of activities of BiH and hazardous waste from households, including hazardous waste from the treatment of waste (secondary waste). The indicator covers all wastes classified as dangerous according to the definition of the Waste Framework Directive (Directive 2008/98/EC), excluding radioactive waste.

The total amount of generated waste for sections B, C and D of the BiH Classification of Activities amounted to 4,703,879 tons in 2016, with an increase of 15.9% comparing to 2014.

The amount of hazardous waste generated from areas B, C, D, F and G-I (excluding 46.77) by the Classification of activities of BiH in 2016 was 13.190 tons. The largest part of hazardous waste originates from the area C - Manufacturing industry and it amounts to 10,638 tons, as 80.6% of the total generated hazardous waste. The largest part of hazardous waste from the area C - Manufacturing comes from the production of base metals and finished metal products, with a share of 83%.

Quantities of hazardous waste produced by industry - Production of base metals and finished metal products are increased by 110% comparing to 2014. For other industry branches, the amount of hazardous waste is declining, with the exception of the production of pulp, paper and paper products; the impact of this industry is negligible given that it generates 1.4% in the total generated hazardous waste.

Total quantities of waste from economic activities, Bosnia and Herzegovina, 2016, tons

	AREA of Classification of Activities of BiH	total, tons	From that, hazardous waste (tons)	% hazardous waste in total
B	Mining and quarrying	216.355	353	2,7
C	Manufacturing	1.425.537	10.638	80,6
D	Production and supply of electricity, gas, steam and air conditioning	3.061.987	226	1,7
F	Construction	156.920	650	4,9
G-I	Service activities	27.171	1.329	10,1

Quantities of waste and hazardous waste, according to the Classification of activities of BiH, 2016, tons

CLASSIFICATION OF ACTIVITIES OF BiH		Total	From that, hazardous
B	MINING AND QUARRYING	216.355	B
B04-B09	Mining and quarrying	216.355	B04-B09
C	MANUFACTURING	1.425.537	C
C10-C12	Manufacture of food products, beverages and tobacco	49.411	C10-C12
C13-C15	Manufacture of textiles, clothing, leather, and related products	5.015	C13-C15
C16	Manufacture of wood and products of wood	92.988	C16
C17-C18	Manufacture of pulp, paper and paper products; printing activity and copying	121.704	C17-C18

C19	Manufacture of coke and refined petroleum products	3.050	C19
C20-C22	Manufacture of chemicals, chemical products, basic pharmaceutical products, manufacture of rubber and plastic products	284.774	C20-C22
C23	Manufacture of other non-metallic mineral products	13.792	C23
C24-C25	Manufacture of basic metals and fabricated metal products	797.430	C24-C25
C26-C30	Manufacture of computers and electronic and optical products, electrical equipment, manufacture of machines and devices, motor vehicles, trailers and semi-trailers, other means of transport	32.751	C26-C30
C31-C33	Manufacture of furniture, other production, repair and installation of machines and equipment	24.623	C31-C33
D	PRODUCTION AND SUPPLY EL. ENERGY, GAS, STEAM AND AIR CONDITIONING	3.061.987	D
F	CONSTRUCTION	156.920	F
F41	Building construction	26.048	F41
F42	Civil engineering	109.631	F42
F43	Specialized construction activities	21.241	F43
G-I	SERVICE ACTIVITIES	27.171	G-I
	TOTAL	4.887.970	

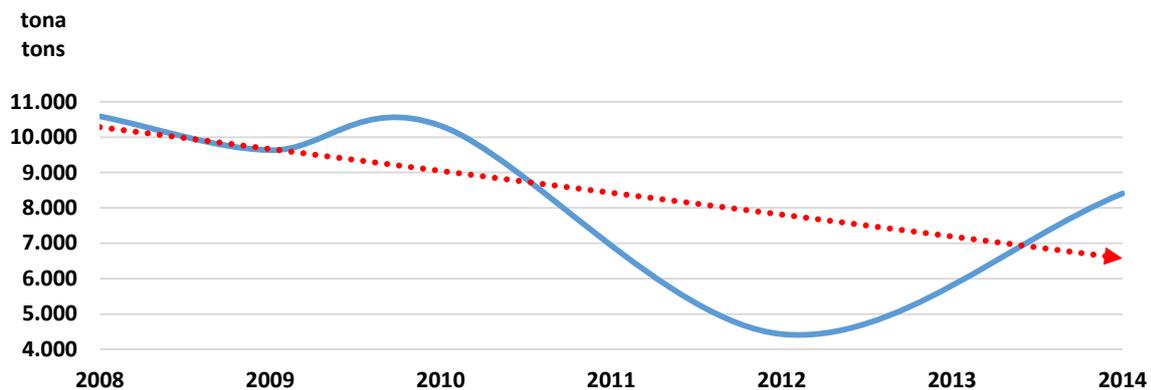
Hazardous waste according to EWC-Stat classification, Bosnia and Herezegovina, 2016. Tons

EWC-STAT	B05-B09	C10-C33	D35	F41-43	G-U EXCL. 46.77	TOTAL
01.1.		1		1		2
01.2.		5			1	6
01.3.	294	394	92	17	113	910
01.4,02,03.1.	26	1.983	68	7	30	2.114
03.2.	8	47			1	56
07.5.				1	1	2
07.7.		190	11	1	8	210
08.(OSIM08.1,08.41)	23	68	35	1	3	130
08.1.		3	2	3	14	22
08.41.	2	100	12	3	19	136
10.2.		4				4
12.1.		2		616		618
12.2,12.3,12.5		4415				4415
12.4.		3426				3426
12.6.					1139	1139
TOTAL	353	10638	220	650	1329	13.190

Hazardous waste from B, C, D of the KD BiH, tons

	2008	2009	2010	2012	2014	2016
TONS	10.588	9.632	10.320	4.432	8.408	11.211

Hazardous waste from B, C and D sector of the KDBiH, Bosnia and Herzegovina, 2008-2014, tons



Trend of generated hazardous waste from NACE sectors: B, C and D in Bosnia and Herzegovina is in decline.

Basel Convention on the Control of Transboundary Movements of Hazardous Wastes and their Disposal

The Basel Convention on the Control of Transboundary Movements of Hazardous Wastes and their disposal was adopted in 1989. By introducing a system to control the export, import and disposal of hazardous waste, the Convention aims to reduce the total volume of such trade in order to protect the health of people and their environment. One of the main principles of this Convention is to minimize the risks to human health and life, and the problem of a hazardous waste is, as considered, a possible place of production.

"The Amendments Convention Veto" entered into force in 1998 and referred to all States Parties to the Convention. It decided the total ban of the export of hazardous waste from OECD member countries to those that do not belong this organization.

The European Union has ratified the Basel and Amendments to Convention and implemented the Waste Disposal Regulations 2006/1013/EC. This means that no hazardous waste - including E-waste- should be exported from the European Union for processing to countries that are not members of the Organization for Economic Cooperation and Development.

In order to reduce the volume of cross-border movement of hazardous waste and the implementation of international obligations that BiH has undertaken with the ratification of the above-mentioned Convention, the Council of Ministers of BiH, on the proposal of the Ministry of Foreign Trade and Economic Relations of Bosnia and Herzegovina, at its 74th session, held on 22 September 2016, adopted conditions of cross-border movement of hazardous waste in accordance with the Convention on the Control of Transboundary Movement of Hazardous Wastes and their Disposal ("Official Gazette of BiH" No. 83/2016).

Information on international conventions and protocols in the field of environmental protection ratified by Bosnia and Herzegovina can be found at the Ministry of Foreign Trade and Economic Relations of BiH:

<http://www.mvteo.gov.ba/Content/Read/vodni-resursi-zastita-okoline-konvencije-sporazumi>

5. E - Waste

Waste of electrical and electronic equipment (E-waste) such as computers, televisions, fridges and cell phones is one of the fastest growing waste streams in the EU. E-waste is a complex mixture of materials and components that can cause major environmental and health problems due to its dangerous content. The production of modern electronics requires the use of scarce and expensive resources (eg. about 10% of the total gold in the world is used for their production). To improve E-waste management and contribute to the circular economy and increase resource efficiency, it is essential to improve primarily the collection, processing and recycling of E-waste.

Although computers and similar electronic devices at first glance do not act as excessively hazardous waste, they contain a variety of materials, including heavy metals, which can lead to serious environmental and health consequences if not disposed of and not recycled appropriately. Health risks caused by hazardous substances in electronic waste are one of the most important reasons for taking care of the quality management of such materials.

Electronic waste contains between 600 and 1000 different chemicals that are harmful to the environment and endangering the environment, of which the most common are substances: Lead, Mercury, Chromium, Cadmium, Beryllium and PVC plastics, Barium ...

- PVC, Beryllium, Chrome, Arsenic - are integral part of the standard component of computers. Each of these elements causes respiratory disturbances.
- Lead is located in the glass of the computer screen, and when the glass breaks, dust can contain lead. If the dust hits a human body, it causes severe damage to the brain, the nervous system, and the blood system.
- Brominated hydrocarbon derivatives - used in plastic coupling processes are considered as very dangerous because they affect the hormonal status of the organism and the reproductive system.
- Polychlorinated biphenyls (PCBs) - have great use in the production of transformers and catalyser; regardless of the fact that they are not in production, can be found in an electronic device. They are very toxic and affect the nervous and reproductive system.
- Cadmium - is found in CRT screens, rechargeable batteries and toner cartridges; causes kidney damage.
- Barium-soft silver-white metal used in CRT monitors to protect users from radiation. Short exposure to Barium causes swelling of the brain, weakening of the muscles, damage to the heart, spleen and liver.
- Selenium - is located in the photo drum photocopier. Exposure to excessive concentrations can cause hair loss, and central nervous system disorders.

E-waste is dangerous because of the ever-faster and cheaper technology that encourages more frequent change of E-devices, which consequently represents an increasing amount of E-waste and more dangerous materials at the landfills, while at the same time there is a negative impact on human health and the environment.

The European Commission published in 2012 the Directive 2012/19/EU of the European Parliament and of the Council ("WEEE2"), regarding waste of electrical and electronic equipment ("EEE"). From 2018 on, all EEE is classified within the 6 categories set out in Annex III of the WEEE2.

EEE categories:

1. **Large home appliances** (Large cooling appliances; Refrigerators, Freezers; Other large appliances used for refrigeration, conservation and storage of food; Washing machines; Clothes dryers; Dish washing machines; Cooking, Electric stoves; Electric hot plates; Microwaves; Other large appliances used for cooking and other processing of food; Electric heating appliances; Electric radiators; Other large appliances for heating rooms, beds, seating furniture; Electric fans; Air conditioner appliances; Other fanning, exhaust ventilation and conditioning equipment)
2. **Small home appliances** (Vacuum cleaners; Carpet sweepers; Other appliances for cleaning; Appliances used for sewing, knitting, weaving and other processing of textiles; Irons and other appliances for ironing, mangling and other care of clothing; Toasters; Fryers; Grinders; Coffee machines and equipment for opening or sealing containers or packages; Electric knives; Appliances for hair-cutting, hair drying, tooth brushing, shaving, massage and other body care appliances; Clocks, watches and equipment for the purpose of measuring, indicating or registering time; Scales)
3. **IT and telecommunications equipment** (Centralised data processing: Mainframes, Minicomputers, Printer units, Personal computing: Personal computers (CPU, mouse, screen and keyboard included), Laptop computers (CPU, mouse, screen and keyboard included), Notebook computers, Notepad computer, Printers, Copying equipment, Electrical and electronic typewriters, Pocket and desk calculators, Other products and equipment for the collection, storage, processing, presentation or communication of information by electronic means, User terminals and systems, Fax, Telex, Telephones, Pay telephones, Cordless telephones, Cellular telephones, Answering systems, Other products or equipment of transmitting sound, images or other information by telecommunications)
4. **Consumer equipment** (Radio sets, Television sets, Videocameras, Video recorders, Hi-fi recorders, Audio amplifiers Musical instruments, Other products or equipment for the purpose of recording or reproducing sound or images, including signals or other technologies for the distribution of sound and image than by telecommunications)
5. **Lighting equipment** (Luminaires for fluorescent lamps with the exception of luminaires in households, Traditional fluorescent lamps, Compact fluorescent lamps, High intensity discharge lamps including pressure sodium lamps and metal halide lamps, Low pressure sodium lamps, Other lighting or equipment for the purpose of spreading or controlling light with the exception of filament bulbs)
6. **Electrical and electronic tools** (with the exception of large-scale stationary industrial tools) (Drills, Saws, Sewing machine, Equipment for turning, milling, sanding, grinding, sawing, cutting, shearing, drilling, making holes, punching, folding, bending or similar processing of wood, metal and other materials, Tools for riveting, nailing or screwing or removing rivets, nails, screws or similar uses, Tools for welding, soldering or similar use, Equipment for spraying, spreading, dispersing or other treatment of liquid or gaseous substances by other means, Tools for mowing or other gardening activities)
7. **Toys, leisure and sports equipment** (Electric trains or car racing sets, Hand-held video game consoles, Video games, Computers for biking, diving, running and rowing, Sports equipment with electric or electronic components, Coin slot machines)
8. **Medical devices (with the exception of all implanted and infected products)** (Radiotherapy equipment, Cardiology, Dialysis, Pulmonary ventilators, Nuclear medicine, Laboratory

equipment for in-vitro diagnosis, Analysers, Freezers, Fertilization tests, Other appliances for detecting, preventing, monitoring, treating, alleviating illness, injury or disability)

9. **Monitoring and control instruments** (Smoke detector, Heating regulators, Thermostats, Measuring, weighing or adjusting appliances for household or laboratory equipment, Other monitoring and control instruments used in industrial installations (for example, in control panels))
10. **Automatic dispensers** (Automatic dispensers for hot drinks, Automatic dispensers for hot or cold bottles or cans, Automatic dispensers for solid products, Automatic dispensers for money, all appliances which deliver automatically all kind of products)

In the Regulation, there are four other categories, the first three of which are extracted from Categories 1-10:

11. - display equipment;
12. - cooling appliances containing refrigerants;
13. - gas discharge lamps.
14. - Photovoltaic Cells (solar panels)

The EEE classification of the six categories (EU-6) listed in Annex III of the WEEE Directive 2012/19/EU:

1. Temperature exchange equipment (TEE)
2. Screens, monitors, and equipment containing screens having a surface greater than 100 cm²
3. Lamps
4. Large equipment (any external dimension more than 50 cm)
5. Small equipment (no external dimension more than 50 cm)
6. Small IT and telecommunication equipment (no external dimension more than 50 cm)

Table 3: Correspondent table - EEE classification under UNU-KEY codes and UNU-KEY connexion with categories according to EU-10 and EU-6 classification:

UNUKEY	DESCRIPTION	EEE category under EU-10	EEE category under EU-6
0001	Central Heating (household installed)	1	4
0002	Photovoltaic Panels (incl. Inverters)	4	4
0101	Professional heating&Ventilation (excl. Cooling equipment)	1	4
0102	Dish washers	1	4
0103	Kitchen equipment (e.g. large furnaces, ovens, cooking equipment)	1	4
0104	Washing Machines (incl. Combined dryers)	1	4
0105	Drayers (wash drayers, centrifuges)	1	4
0106	Household Heating&Ventilation (e.g. hoods, ventilators, space heaters)	1	4
0108	Fridges (incl. Combi-fridges)	1	1
0109	Freezers	1	1
0111	Air Conditioners (household installed and portable)	1	1
0112	Other cooling equipment (e.g.dehumidifiers, heat pump dryers)	1	1
0113	Professional Cooling equipment (e.g.large air conditioners, cooling displays)	1	1
0114	Microwaves (incl. Combined, excl. Grills)	1	5
0201	Other small household equioment (e.g. small ventilators,		
0202	Irons, clocks, adapters)	2	5
0203	Equipment for food preparation (e.g. toaster, grills, food processing, frying pans)	2	5
0204	Small household equipment for hot water		
0205	preparation (e.g. coffee, tea, water cookers)	2	5
0301	Vacuum Cleaners (excl. Professional)	2	5
0302	Personal Care equipment (e.g. tooth brushes, hair dryers, razors)	2	5
0303	Small IT equipment (e.g. routers, mice, keyboards, external drives&accessories)	3	6
0304	Desktop PCs (excl. Monitors, accessoires)	3	6
0306	Mobile phones (incl. Smartphones, pagers)	3	6
0307	Professional IT equipment (e.e.g. servers, routers, data storage, copiers)	3	4
0308	Cathode Ray Tube Monitors	3	2
0309	Flat Display Panel Monitors (LCD, LED)	3	2
0401	Small Consumer Electronics (e.g. headphones, remote controls)	4	5
0402	Portable Audio&Video (e.g. MP3, e-readers, car navigation)	4	5
0403	Music Instruments, Radio, Hi-Fi (incl. Audio sets)	4	5
0404	Video (e.g. Video recorders, DVD,Blue Ray, set-top boxes) and projectors	4	5
0405	Speakers	4	5
0406	Cameras (e.g. camcorders, photo&digital still cameras)	4	5
0407	Cathode Ray Tube TVs	4	2
0408	Flat Display Panel TVs (LCD; LED, Plasma)	4	2
0501	Small lighting equipment (excl. LED&incandescent)	5	5
0502	Compact Fluorescent Lamps (incl. Retrofit&nonretrofit)	5	3
0503	Straight Tube Fluorescent Lamps	5	3
0504	Special Lamps (e.g. professional merury, high&low pressure sodium)	5	3
0505	LED Lamps (incl. Retrofit LED lamps)	5	3
0506	Household Luminaires (incl. Household incandescent fittings&household LED luminaires)	5	5
0507	Professional Luminaires (offices, public space, industry)	5	5
0601	Household Tools (e.g. drills, saws, high pressure cleaners, lawn mowers)	6	5
0602	Professional Tools (e.g. for welding, soldering, milling)	6	4
0701	Toys (e.g. car racing sets, electric trains, music toys, biking computers, drones)	7	5
0702	Game Consoles	7	6
0703	Leisure equipment (e.g. sports equipment, electric bikes,)	7	4
0801	Household Medical equipment (e.g. thermometers, blood pressure meters)	8	5
0802	Professional Medical equipment (e.g. hospital, dentist, diagnostics)	8	4
0901	Household Monitoring&Control equipment (alarm, heat, smoke, excl. Screens)	9	5
0902	Professional Monitoring&Control equipment (e.g.	9	4
1001	Laboratory, control panels)		
1002	Non-cooled Dispensers (e.g.for vending, hot drinks, tickets, money)	10	4
1002	Cooled Dispansers (e.g. for vending, cold drinks)	10	1

E-waste and its Relation to the Sustainable Development Goals

In September 2015, the United Nations and all Member States adopted the 2030 Agenda for Sustainable Development, identified 17 Sustainable Development Goals (SDGs) and 169 targets to end poverty, protect the planet, and ensure prosperity for all over the next 15 years. Increasing levels of e-waste, and improper and unsafe treatment, and disposal through

incineration or in landfills pose significant challenges to the environment and human health, and to the achievement of the SGDs.

A better understanding and more data on e-waste will contribute to the achievement of several goals of the 2030 Agenda for Sustainable Development. A better understanding and management of e-waste is closely linked to Goal 3 (Good health and Well-being), Goal 6 (Clean water and Sanitation), Goal 11 (Sustainable Cities and Communities), Goal 12 (Responsible Consumption and Production), Goal 14 (Life Below Water), and Goal 8 (Decent Work and Economic Growth).

Target 3.9 refers to the reduction of the number of deaths and illnesses caused by hazardous chemicals and air, water, and soil pollution and contamination. Target 6.1 seeks to achieve universal and equitable access to safe and affordable drinking water for all, and Target 6.3 aims to reduce pollution, eliminate dumping, and minimize release of hazardous chemicals and materials. Goal 14 refers to marine pollution and the protection of the marine ecosystem (Targets 14.1 and 14.2).

Similarly, Target 12.4 aims to achieve the environmentally sound management of chemicals and all waste throughout the life cycle, in accordance with agreed international frameworks, and to significantly reduce their release into air, water, and soil in order to minimize their adverse impacts on human health and the environment. Target 12.5 aims to substantially reduce waste generation through prevention, reduction, repair, recycling, and reuse. An increasing number of people on the planet are consuming growing amounts of goods, and it is critical to make production and consumption more sustainable by raising awareness levels of producers and consumers, specifically in the area of electrical and electronic equipment.

SDG Target 8.3 aims to promote development-oriented policies that support productive activities, decent job creation, entrepreneurship, creativity, and innovation, and to encourage the formalization and growth of micro-, small-, and medium-sized enterprises. Target 8.8 calls for the protection of labour rights and promotes safe and secure working environments for all workers, including migrant workers, particularly women migrants, and those in precarious employment. The sound management of e-waste can create new employment and contribute to economic growth in the recycling and refurbishing sector. Now, e-waste is often processed in the informal sector, and many e-waste disposal and recycling jobs are unsafe and not protected by formal regulation (Brett et al. 2009; Leung, et al. 2008). It is therefore necessary for countries to formalize the environmentally sound management of e-waste and to take advantage of the business opportunities it offers.

UNU E-waste tool

The "WEEE calculation tool" is an integral part of the methodologies for the calculation of the weight of electrical and electronic equipment (EEE) placed on the market and for the calculation of the quantity of WEEE generated. The WEEE calculation tool is customised for each Member State and is set up and made available by the Commission. This means that in practice there are 28 WEEE calculation tools which were developed on the basis of the same methodology but previously filled

in by each Member State. Therefore, a user wishing, for example, to calculate the total quantity of WEEE generated in a Member State, needs to use the tool customised for the specific Member State. The pre-filled data on the quantities of EEE placed on the market (POM) was done with the 'apparent consumption methodology'. Those calculation routines have been developed by United Nations University (UNU), the scripts were based on the tool developed by Statistics Netherlands (CBS) for Europe, but further developed by UNU for the rest of the world.

The methodology to calculate the total quantity of WEEE generated in a given year in the territory of a Member State is based on:

- the amount of EEE placed on the market (POM) in the preceding years, and on
- corresponding product lifespan.

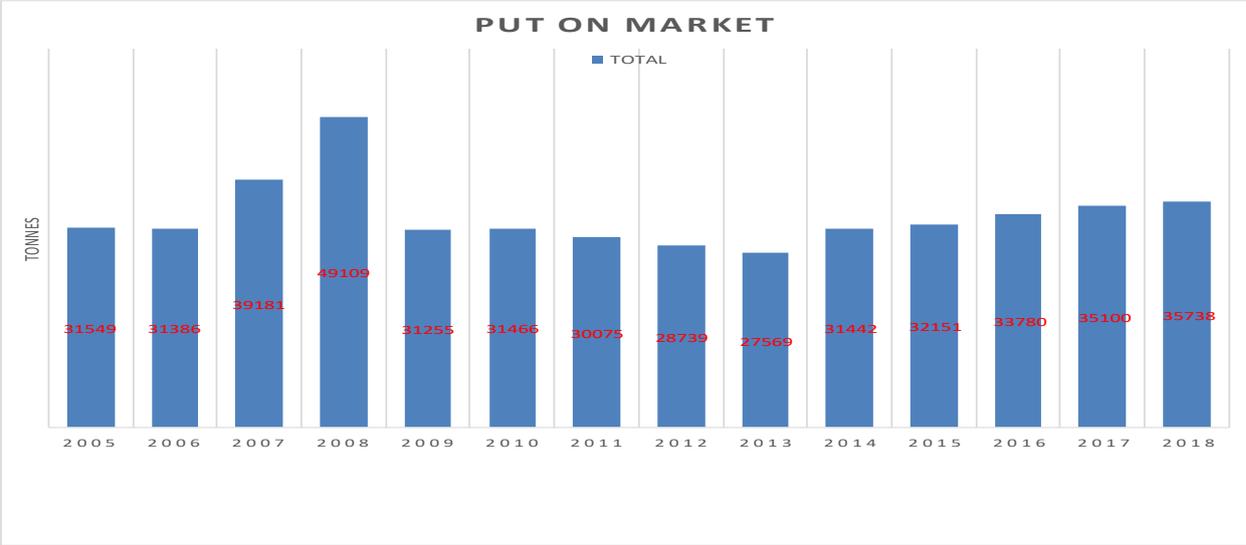
The E-waste calculation tool contains a number of different sheets. All of them are essential for the proper functioning of the tool. Most sheets are hidden by default to prevent accidental changes which will cause wrong calculations. The table below presents the different sheets of the E-waste calculation tool and explains their purpose.

Table 4: Sheets of the E-waste calculation tool

Sheet name	Description/purpose
Frontpage	User interface
Indicators	A table showing a summary of the quantities for each indicator (POM, WG, IMP, EXP and COL)
ResultPOM	A table showing the amounts of EEE POM per EU-6 classification
ResultWG	A table showing the amounts of WG per EU-6 classification
ResultIMP	A table showing the amounts of EEE Imports per EU-6 classification
ResultEXP	A table showing the amounts of EEE Exports per EU-6 classification
ResultCOL	A table showing the amounts of EEE Collected and Recycled per EU-6 classification
GraphLifespan	Graph illustrating the lifespan of selected UNU Key
GraphPOM_EU6	Graph illustrating Put on the market data of a specific country in Collection category 6
GraphWG_EU6	Graph illustrating waste generated data of specific country in Collection category 6
<i>The following sheets are hidden but can be made visible by clicking the "Show sheets" button</i>	
ResultDetail	A table showing the calculated amounts of WG per UNU-KEY classification
UNUkeys	A table that is used to convert the POM input of EU-6 categories into the UNU-KEY
POM	EEE POM data per UNU-KEY classification for country
Shape	The shape parameters for the Weibull distribution for your categories into the UNU-KEY
Scale	The scale parameters for the Weibull distribution for your country (per UNU-KEY)
Weibull	Used for calculations of product lifespan
POM_copy	Copy of the original POM data in the POM sheet. Do not modify.
Shape_copy	Copy of the original Shape parameters in the Shape sheet. Do not modify.
Scale_Copy	Copy of the original Scale parameters in the Scale sheet. Do not modify.
InputEU6	Used for entering POM based on de EU-6 classification
InputEU6PV	Used for entering POM based on de EU-6 classification with a separate input for PV panels
InputUNUkey	Used for entering POM based on UNU-KEY classification

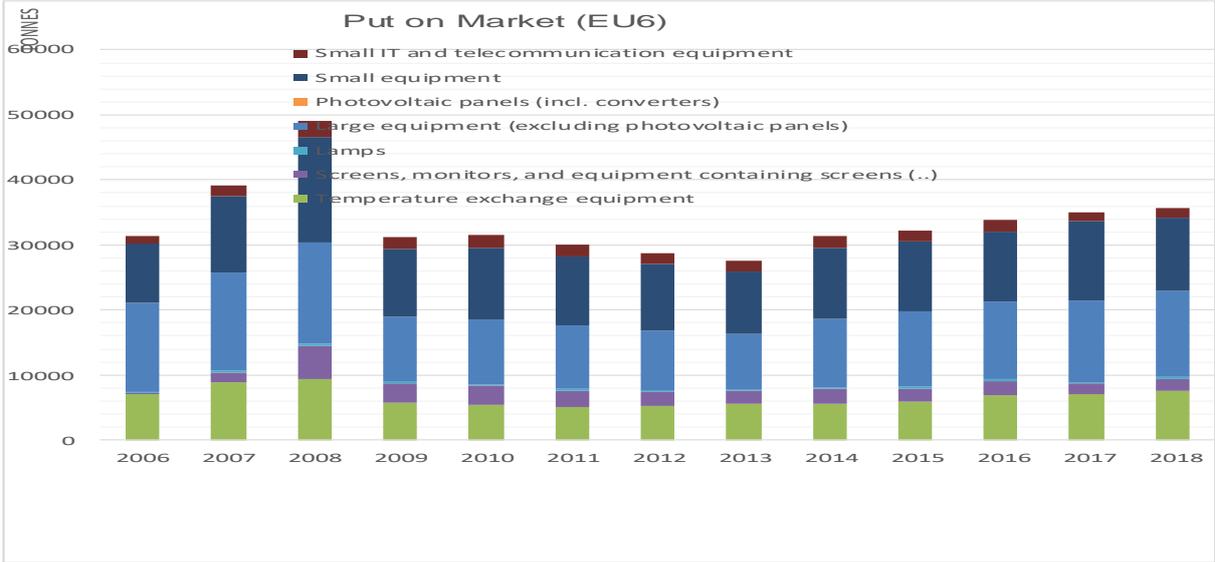
Interpretation

Bosnia and Herzegovina data on electrical and electronic equipment in accordance with the requirements of Directive 2012/19/EU of the European Parliament and the Council of 4th of July 2012 on waste electrical and electronic equipment (WEEE).



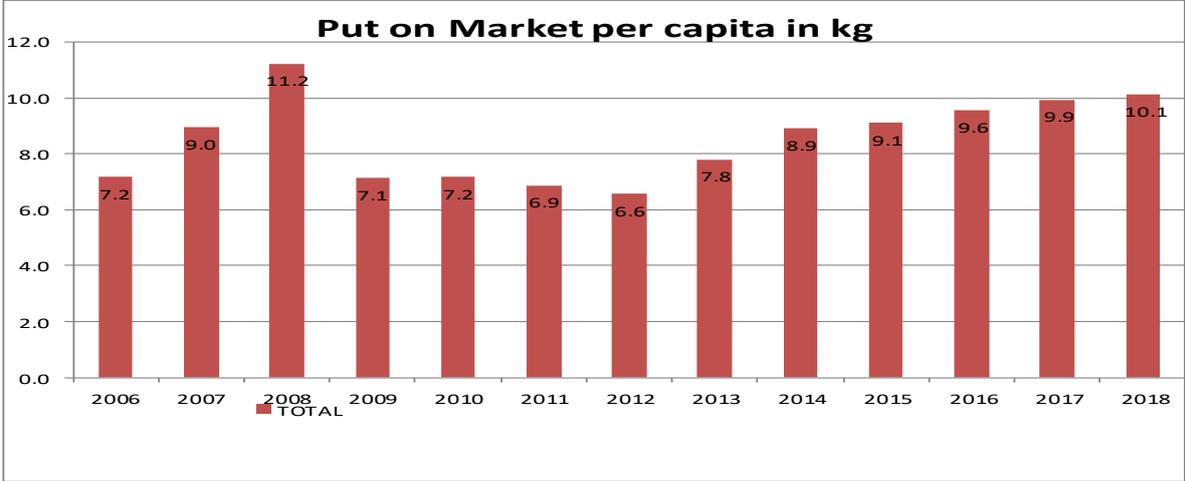
Data on electrical and electronic equipment placed on the market in accordance with the requirements of Directive 2012/19/EU on Waste Electrical and Electronic Equipment (WEEE) are presented. Between 2005 and 2018, the amount of electrical and electronic equipment that was placed on the market of Bosnia and Herzegovina increased from 31 thousand to 35 thousand of tons. The observed deviations from foreign trade statistics in 2008 may be the result of an error in reporting or a wrong classification in respect of CN codes.

Electrical and electronic equipment placed on the market (EU6), Bosnia and Herzegovina, 2005-2018, tons



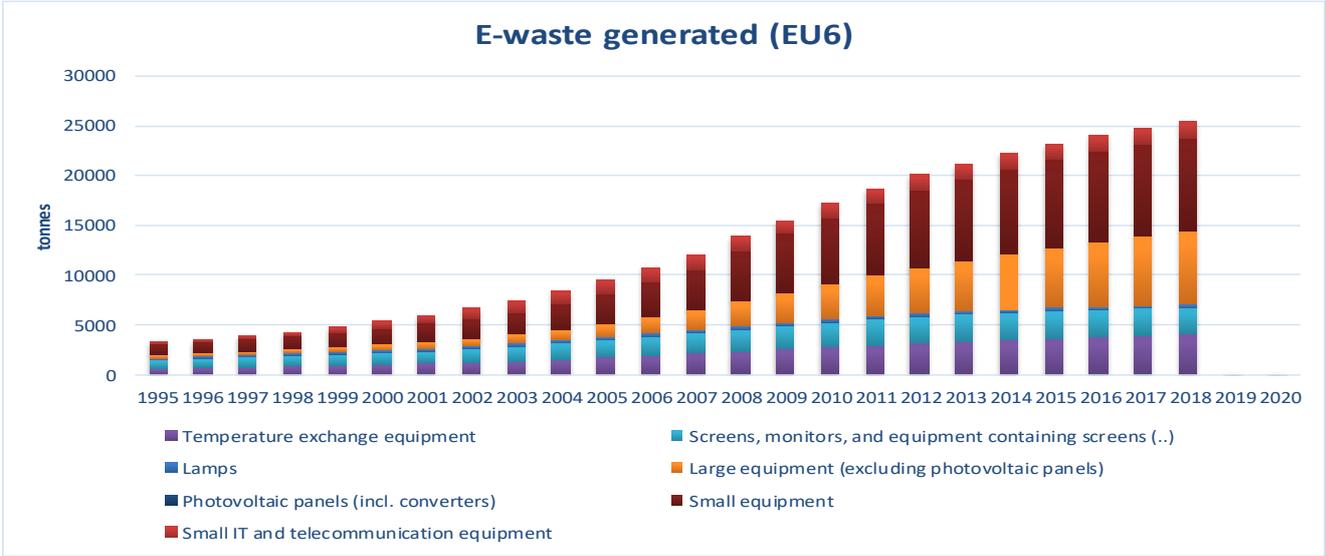
Large home appliances make up about 19,000. tons or 54.3% of the total WEEE in 2018, which is a percentage of the EU average.

Electrical and electronic equipment placed on the market, Bosnia and Herzegovina, 2005-2018, kg/inhabitant



The average annual volume of EEE placed on the market per capita is on the rise, in 2018 it is 2% higher than in the previous year.

Total generated electrical and electronic waste, Bosnia and Herzegovina, 2005-2018, tons



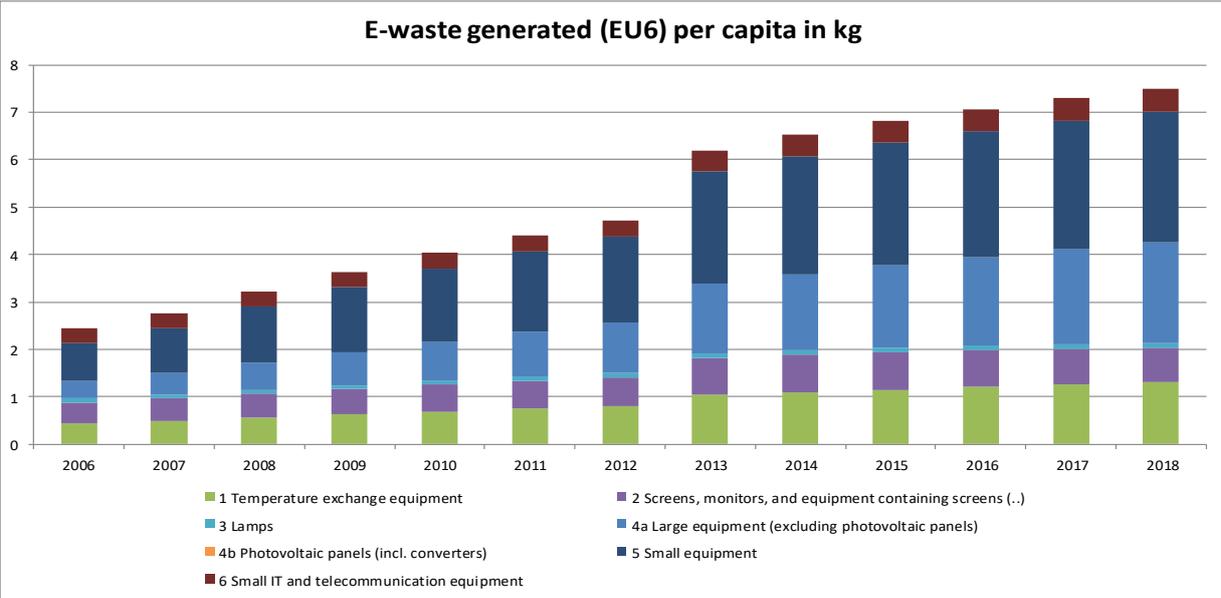
The total generated electrical and electronic waste is on the rise. The total amount of E-waste in 2018 is for 2.7% higher than in the previous year.

Total generated electrical and electronic waste, Bosnia and Herzegovina, 2006-2018, kg/inhabitant



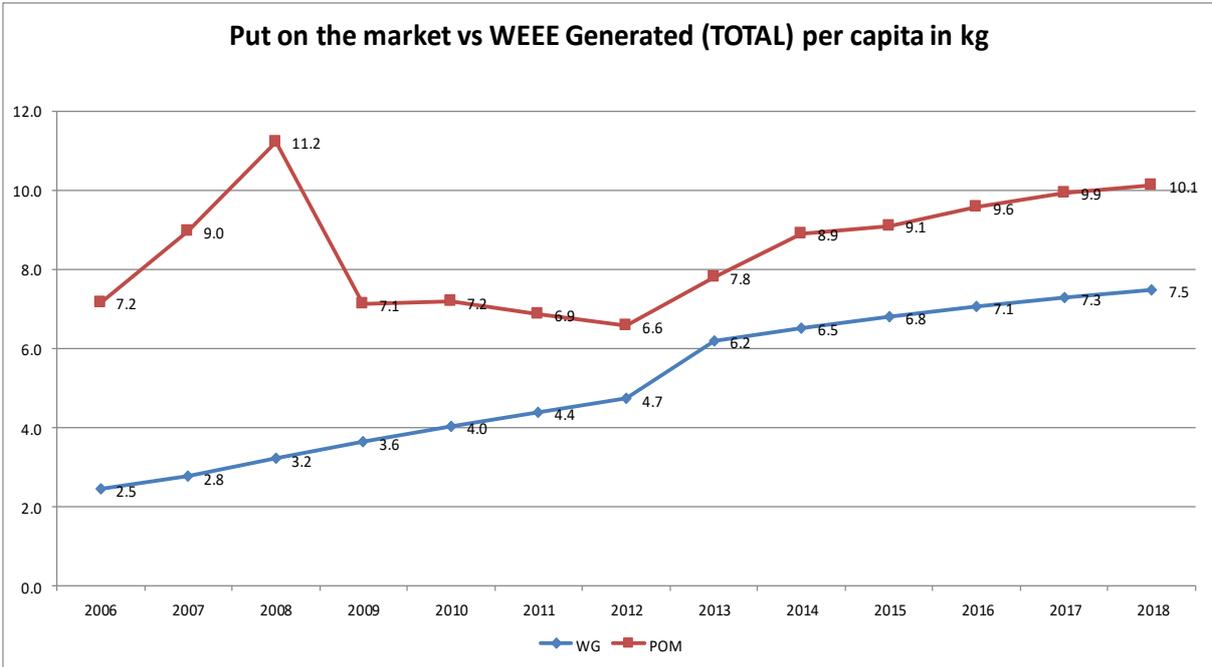
The average annual E-waste per capita is on the rise. In the period 2016-2018, the average annual E-waste per capita is approximately at the same level.

Total generated electrical and electronic waste (EU6), Bosnia and Herzegovina, 1995-2018, tons



Data on electrical and electronic equipment in six categories show trend of growth for all categories.

Electrical and electronic equipment placed on the market in relation to generated E-waste, Bosnia and Herzegovina, 2006-2018, tons



Modern trends in the design and production of electronic equipment that enhance the artificial shortening of the product replacement cycle affect the creation of E-waste and have a long-term trend of growth. Over 1,000 different types of materials are used to make electronic devices and their components - semiconductor chips, printed circuits, disk drives, etc. Many of them are poisonous, including chlorine based solvents, bromine-based antimicrobials, PVC, heavy metals (such as Lead, Mercury, Arsenic, Cadmium and Hexavalent Chromium), plastics and gases.

6. National recycling rate, tons of recycled material

Name	O_19 The amount of processed waste according to the procedures R
Link	SDG 12.5.1
Definitions and concept	<p>The indicators are monitored by the movement of the quantity of waste undergoing processing, according to the procedures “R”. The indicator follows the progress in achieving the goal: sustainable waste management.</p> <p>Sub-indicators:</p> <p>O_19_1 Quantities of processed waste for special waste categories</p> <p>O_19_2 The ratio of refined waste and total waste produced</p> <p>SDG supporting indicators:</p> <ul style="list-style-type: none"> Collected waste for reuse of material (tons) National recycling rate (%) <p>Coverage:</p> <ul style="list-style-type: none"> • Directive 94/62/EC on packaging and waste packaging • Regulation (EC) No 166/2006 of the European Parliament and of the Council of 18th of January 2006 concerning the establishment of a European Register of Release and Transfer Register and amending Council Directives 91/689/EEC and 96/61/EC • Regulation (EC) No 2150/2002 of the European Parliament and of the Council of 25th of November 2002 on waste statistics) • Multi-annual statistical programs and Annual Plan of Statistical Activities • International recommendations and Manuals (Eurostat) • Waste statistical classification <p>(http://bhas.ba/Arhiva/Klasifikacije/WST_CLA_2009_005_01-BH.pdf.)</p> <p>Definitions:</p> <p>Waste is a material or article from one of the waste categories listed in the List of Waste (Commission Decision of 18th of December 2014 amending Decision 2000/532/EC on the list of waste under Directive 2008/98/EC of the European Parliament and of the Council), which the owner discards or intends or is obliged to discard. In order to protect the environment or other public benefits, waste must be collected, handed over for processing or processed or disposed in a proper manner.</p> <p>Hazardous waste is waste that is dangerous or potentially harmful to our health or the environment. Hazardous wastes can be liquids, solids, gases or sludges. They can be discarded commercial products, like cleaning fluids or pesticides, or the by-products of manufacturing processes.</p> <p>Municipal waste consists of waste collected by or on behalf of municipal authorities, or directly by the private sector (business or private non-profit institutions) not on behalf of municipalities. The bulk of the waste stream originates from households, though similar wastes from sources such as commerce, offices, public institutions and selected municipal services are also included. It also includes bulky waste but excludes waste from municipal sewage networks and municipal construction and demolition waste.</p> <p>Separately collected fractions of waste mean household and similar waste,</p>

selectively collected in homogeneous fractions by public services, non-profit organisations and private enterprises acting in the field of organised waste collection.

List of Waste (LoW): The List of Waste (LoW) provides an EU-wide common terminology for waste classification to ease waste management, including hazardous waste. The assignment of LoW codes serves in a broad variety of activities, including the transport of waste, installation permits (which often refer also to specific waste codes), or as a basis for waste statistics.

A waste producer is anyone whose activities produce waste (the original manufacturer) and/or anyone who carries out the processing, mixing or other operations that result in a change in the nature or composition of the waste.

The waste collector is a legal person or an independent entrepreneur who performs waste collection activities. The collector can start collecting waste after receiving the decision on the entry in the records of waste collectors from the competent Ministry.

"Operator" is a natural or legal person responsible for any type of waste management activity.

Waste management includes the collection, transportation, processing and disposal of waste, including the supervision of such operations and the subsequent disposal on landfills, as well as traders or brokers.

Waste collection is the collection of waste, including its pre-storage for the purpose of transport to the waste treatment plant.

Separate collection of waste is the collection, where waste streams are separated according to the type and nature of waste in order to facilitate the specific type of waste treatment.

Waste treatment includes processing or disposal operations, including preparation for processing or disposal. A business entity for the treatment of waste may start with waste treatment activities after obtaining an environmental permit for treating waste from the Ministry.

Preparation for processing or disposal includes the processes of R12 and R13 from Annex 2 and procedures D8, D9, D13, D14, D15 from the Waste Categories and Waste Classification (Official Gazette RS No. 56/10, Official Gazette of the F BiH, No. 09/05).

Waste processing is a process that is the main result of waste being usefully applied in the facility or in other economic activities in a way to replace other materials that would otherwise be used to fulfill a particular function, or is ready to fulfill this function.

Recycling is any procedure of processing, including re-processing of organic material, by which the waste materials are processed into products, materials or substances for the original or other purpose, except for the use of waste for energy purposes, or processing into materials used as fuel or a stuffing material.

The total recycling rate is the total amount of recycled packaging waste divided by the total quantity of packaging waste produced (recycling/production).

Recycling rate for plastic waste means 'recycled material' divided by the amount of plastic packaging waste produced (recycling - material/production).

Disposal of waste is a procedure that is not processed, even if it is a secondary consequence of improving the substance or energy. The list of disposal procedures is part of the Regulations on Waste Categories and Waste Classification (Official Gazette of RS No. 56/10, Official Gazette of F BiH, No. 09/05), but this does not exclude other possible disposal procedures. In the environmental permit for the disposal of waste, the code (D) is determined, according to which the depositor of the waste is postponed.

Landfill is a disposal of waste in or on land, including internal landfills (eg. landfill where the waste producer carries out own waste disposal at the place of production), and fixed locations (i.e. more than one year) used for temporary storage of waste, but excludes:

- facilities in which the waste is unloaded to enable preparation for further transport for processing, treatment or disposal elsewhere;
- processing or treatment for a period of less than three years, or
- storage of waste before disposal in a period of less than one year.

Waste handover is the submission of waste for further waste management with the record sheet.

Leaving waste is the submission of waste for further waste management without records, when permitted by a special regulation governing the management of certain types of waste.

Packaging means all products made of any material of any nature that can be used for the retention, protection, handling, delivery and presentation of goods, from raw materials to processed goods, from the manufacturer to the consumer or the user. Non-return items used for the same purposes are also considered to be packaging.

Waste packaging means any packaging or packaging material that is covered by the definition of waste in the Waste Framework Directive 2008/98/EC, excluding production residues. All packagings put on the market and all packaging waste originating in the country are considered, regardless of whether they are used in industrial, commercial, office, service, household, or any other level, and regardless of materials that is used.

Buildings/treatment methods by categories, relevant structures and methods that are implemented in practice of waste treatment:

1. Biological treatment
2. Processing plants
3. Buildings for industrial production and incineration
4. Drives for chemical and physical treatment
5. Installations for thermal treatment of waste
6. Use of waste for construction and conversion work
7. Discharge into the environment

	8. Disposal of waste 9. Other																					
Methodology																						
Source and form of data collection	<p>The indicator is prepared on the basis of annual data on the quantity of waste processed according to individual processing methods R, and reported in accordance with the Regulations on the Application Sheets and according to the forms from the Rulebook on Special Categories of Waste.</p> <p>Data are also collected through Annual Statistical Surveys:</p> <ul style="list-style-type: none"> • Annual survey “Processing/Disposal Waste” (OTP-P) • Annual survey on collected municipal waste (KOM-6aS) - waste collected from households • Annual survey on Disposal Waste (Form KOM-6aD) • Annual survey on Waste from production and service activities (OTP) - only data on internal waste processing <p>The classification number of waste can be found in Official Gazette of the Federation of BiH No. 9/05, and Official Gazette of RS 39/05, or via following link: http://bhas.ba/Arhiva/Klasifikacije/WST_CLA_2009_005_01-BH.pdf</p> <p>The following classifications are used:</p> <ol style="list-style-type: none"> Classification of activities in BiH 2010 (NACE rev.2) Ordinance on categories of wastes with lists Statistical classification of waste EWCStat <p>Data collection on Waste treatment</p> <table border="1"> <thead> <tr> <th colspan="7">Description of data sources and methods by categories of treatment</th> </tr> <tr> <th></th> <th>Paragraph 1 Incineration (R1)</th> <th>Paragraph 2 Incineration (D10)</th> <th>Paragraph 3a Recycling (R2 – R11)</th> <th>Paragraph 3b Backfilling</th> <th>Paragraph 4 Disposal (D1, D5, D12)</th> <th>Paragraph 5 Other disposal (D2, D3, D4, D6, D7)</th> </tr> </thead> <tbody> <tr> <td>Source of data</td> <td>Annual statistical surveys: • OTP (internal) • OTP-P</td> <td>Annual statistical surveys: • OTP (internal) • OTP-P</td> <td>Annual statistical surveys: • OTP (internal) • OTP-P • KOM 6aD (covering)</td> <td>Annual statistical surveys: • OTP (internal) • OTP-P</td> <td>Annual statistical surveys: • OTP (internal) • OTP-P • KOM 6aD (disposal)</td> <td>Annual statistical surveys: • OTP (internal) • OTP-P</td> </tr> </tbody> </table>	Description of data sources and methods by categories of treatment								Paragraph 1 Incineration (R1)	Paragraph 2 Incineration (D10)	Paragraph 3a Recycling (R2 – R11)	Paragraph 3b Backfilling	Paragraph 4 Disposal (D1, D5, D12)	Paragraph 5 Other disposal (D2, D3, D4, D6, D7)	Source of data	Annual statistical surveys: • OTP (internal) • OTP-P	Annual statistical surveys: • OTP (internal) • OTP-P	Annual statistical surveys: • OTP (internal) • OTP-P • KOM 6aD (covering)	Annual statistical surveys: • OTP (internal) • OTP-P	Annual statistical surveys: • OTP (internal) • OTP-P • KOM 6aD (disposal)	Annual statistical surveys: • OTP (internal) • OTP-P
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Method	Data collection from all business entities that obtain a permit for incineration (R1), including the permit for internal incineration.	Data collection from all business entities receiving a permit for incineration (D10), including an internal burning permit.	Data collection from all business entities with Waste Processing Permit (R2 - R11), including a permit for internal waste processing and landfill data (the amount of waste used to cover the landfill).	Data collection from all business entities that receive a backfilling permit, including a permit for internal backfilling * .	Data collection from all business entities with permit for the waste disposal (D1, D5, D12), including the permit for internal waste disposal and landfill data.	Data collection from all business entities with permit for other waste disposal (D2, D3, D4, D6, D7) of including permit for other waste disposal .
Legal base	<ul style="list-style-type: none"> • Waste Management Regulations • Landfill Regulations • Law on Statistics • Annual Program of Statistical Surveys 					
Form of collecting data	Printed statistical forms are sent to reporting units by mail					
Frequency	Annually					
Used classifications	<p>Type of waste:</p> <ul style="list-style-type: none"> • Data is collected by the 6-digit classification number according to the Waste List and for reporting purposes according to the Waste Statistics Regulation, the conversion (pairing) into the statistical classification EWC Stat version 4, with a conversion key as described in Directive No. 849/2010/EC. <p>R & D codes:</p> <ul style="list-style-type: none"> • The codes are used as described in Directive 2008/98/EC 					
<p>Documentation on the methodology: Determination of the waste code according to the List of Waste http://www.bhas.ba/metodoloskidokumenti/LoW_2012_001_01_BA.pdf Manual on Waste statistics</p>						

http://www.bhas.ba/metodoloskidokumenti/MWS_2013_001_01-bh.pdf

Determination of waste weight

http://www.bhas.ba/metodoloskidokumenti/KFO_2015_001_01-bh.pdf

MSW recycling rate

$$\text{Municipal Solid Waste Recycling Rate (\%)} = \frac{\text{Total MSW Recycled (t)}}{\text{Total MSW Generated (t)}} \times 100$$

(Total MSW Recycled + Total MSW Disposed Of)

1. Calculate total waste disposed	
A. Calculate MSW Disposed of	
Category:	Amount disposed of
Total MSW	
B. Exclude materials not included in MSW	
Category:	Amount disposed of
Commercial waste	
Other	
Total excluded waste	
C. Total MSW Disposed of (tonnes)	C = A – B
2. Calculate total recycling	
D. Calculate Recyclables (MSW Recycled) from all sources	
Category:	Amount disposed of
Total MSW Recycled	
E. Exclude what not considered recycled	
Category:	Amount disposed of
Residual waste sent to landfill	
Contaminated recyclables sent to landfill	
Total excluded recyclables	
F. Total MSW Recycled	F = D – E
3. Calculate MSW Recycling Rate (%)	[F ÷ (F + C)] x 100

Availability and comprehensibility

Confidentiality - policy and data handling

The confidentiality of statistical data is regulated by law, and the staff conducting the statistical surveys has the same legal obligation to protect confidentiality. The Law on Statistics of BiH (Official Gazette BIH 26/04 and 42/04 - Chapter XI - Article 23-29) establishes the principle of confidentiality as one of the main principles. The Agency for Statistics of BiH disseminates statistics in accordance with the statistical principles of the European Statistics Code of Practice and in particular the principle of statistical confidentiality.

The document "Rules on the Protection of Statistical Data in the Agency for Statistics of BiH " lists procedures for ensuring confidentiality during collection, processing and dissemination - including, protocols for securing individual data

	<p>access, rules for defining confidential cells in the output tables, and procedures for detecting and preventing subsequent exposures as well as access to microdata for survey purposes.</p> <p>Availability Waste treatment statistics are disseminated on an annual basis, access to the latest release: http://www.bhas.gov.ba/data/Publikacije/Saopštenja/2019/ENV_05_2018_Y1_0_B_S.pdf</p> <p>Publication “Sustainable Development Indicators”: http://www.bhas.ba/tematskibilteni/TB_I_odr_razvBiH_BS.pdf</p> <p>Time and geographical comparability Length of comparable time series: waste processing/disinfection statistics are disseminated in the annual dynamics. The length of comparable time series is 5x1 = 5 (years), considering the annual time series. Waste Processing and Disposal Statistics BiH applies international methodological standards for data processing. This allows comparison of data of Bosnia and Herzegovina with other countries.</p>
Dissemination	<p>The indicator is shown in a table or graph as the amount of processed/disposed waste in the year: total (t/yr), by type of processing process-R (t/yr),</p>
Data sets	<p>Data from the Application Sheets, Data on processing from forms according to the rules on special categories of waste, Data from Annual Statistical Surveys.</p>
Reporting obligations	<p>Two-year reporting to Eurostat in accordance with the requirements of Regulation EC 2150/2002</p> <ul style="list-style-type: none"> - produced by BHAS and submitted to Eurostat - Publication in statistical publications and thematic bulletins - produced by BHAS <p>Note: Data are insufficiently reliable (failure to report, insufficient quality control of displayed data), especially those related to certain types of waste and waste from certain activities.</p>
Limitations and Challenges	<p>Current state:</p> <ul style="list-style-type: none"> ✓ Statistical survey OTP-P (Annual survey for Waste Treatment) is carried out with the aim of applying Regulative 2150/2002/EC on waste statistics (in the part of waste treatment reporting). Business entities involved in the collection, recycling, waste treatment or import/export of waste, or all of the above are included. Business subjects of this survey may be registered in any activity of NACE Rev. 2. For this reason, it is difficult to establish the statistical address book of business entities for this survey, therefore the registry of competent ministries that issue waste management licenses is used. The address of commercial chamber is also used in order to establish the statistical address book of active business entities. According to Regulation 2150/2002/EC, the reporting obligation relates to waste management methods in the country according to procedures R1 to R11 (processing operations) and procedures D1 - D7, D10, D12 (disposal operations). ✓ Procedures that are not taken into account in waste statistics in EU countries: <ul style="list-style-type: none"> - Procedures that should not be taken into account when calculating the total quantities of treated waste are pre-treatment methods, certain

	<p>preparatory activities that are followed by the final processing/disposal process, i.e. temporary storage (R12, R13, D8, D9, D13, D14, D15).</p> <ul style="list-style-type: none"> - Furthermore, it is not necessary to follow D11 because it is a procedure that is prohibited by international treaties. Also, no amount of waste that is subject to "internal recycling" at the place of origin is taken into account. ✓ The data are not enough reliable (a small number of company is dealing with waste treatment; mainly a small trade company (after sorting multiple resellers). Regardless of the fact that the statistical form is designed to monitor waste streams, it is very difficult to follow data on processing individual waste streams (handover quantities of waste from other companies/deliver waste to others for management). It is necessary to establish a unique information system for waste, after which it will be possible to monitor waste streams in the right way. ✓ An important factor for the establishment of a separate waste collection system is the availability of the market for collected waste streams such as paper, glass, plastic. In the absence of a demand for raw materials in the recycled material market, it is not possible to maintain a separate waste collection system (companies have difficulty in reselling separate waste streams). ✓ Paper and cardboard have a market price and are often collected outside municipal collection schemes, e.g. by private companies through their own systems or by individuals. Data on collected packaging waste are not always available or reported. Municipal waste data usually include the share of packaging waste collected in the household. This share is quite different from one region to another. ✓ A quality indicator can be quality calculated after setting up material flows accounts - Waste Accounts ✓ For a correct calculation of the "Recycling rate" indicator, clear information is needed: whether relevant data is available for each of the waste collection services? Is data reported in tonnages (recycling rates are calculated by weight, not volume)? Are conversion factors for volume to weight available (conversion factors) ? Programs/data/tools-for-local-government-data are available? Is there any data that should be excluded from municipal solid waste materials? (e.g. contaminated recyclables sent to landfill, residual waste from recyclables collected sent to landfill)
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Interpretation

Assessment of the packaging market in Bosnia and Herzegovina

Estimation of the amount of packaging in BiH has been made , the amount of packaging generated in a country's market depends on the parameters:

- number of inhabitants and
- national income, that is, the purchasing power that buys products in packaging.

In order to obtain the most accurate data on the amount of packaging placed on the market of Bosnia and Herzegovina, it was used Eurostat data, packaging placed on the market (kg /cap.):

Packaging Placed on the Market (kg per capita), EU 28

Packaging Placed on the Market (kg per capita)					
	2012	2013	2014	2015	2016
Austria	149	150	153	152	153
Belgium	154	156	155	155	157
Bulgaria	45	48	52	55	59
Cyprus	87	91	86	86	86
Czechia	92	96	97	103	109
Germany	206	212	220	222	221
Denmark	160	159	161	155	163
Estonia	149	170	173	172	169
Greece	70	68	69	69	70
Spain	144	144	148	154	156
Finland	132	132	134	130	129
France	187	184	189	187	190
Hungary	102	103	103	118	122
Ireland	176	188	208	209	208
Italy	191	190	197	203	210
Liechtenstein	142	152	155	173	166
Lithuania	101	108	118	121	127
Luxembourg	203	206	195	212	219
Latvia	105	114	111	118	118
Malta	125	134	134	141	147
Netherlands	164	167	165	182	184
Norway	139	146	149	153	153
Poland	123	127	127	134	149
Portugal	145	149	151	153	160
Romania	53	53	63	70	69
Sweden	111	109	113	113	132
Slovenia	98	97	102	105	108
Slovakia	83	82	86	91	95
United Kingdom	167	162	177	176	175
AVERAGE	134	138	140	145	148

Source: Eurostat (<http://appsso.eurostat.ec.europa.eu/nui/show.do#>), access 04-01-2019

GDP per capita in purchasing power standards (PPS)

GDP per capita in PPS							
	2012	2013	2014	2015	2016	2017	2018
Austria	133	133	132	131	130	128	128
Belgium	122	121	121	120	119	117	116
Bulgaria	46	46	47	48	49	50	50
Cyprus	92	85	82	83	85	86	87
Czechia	83	85	87	88	88	90	91
Denmark	128	130	129	128	127	129	127
Estonia	74	76	78	77	78	79	82
Finland	116	115	112	110	110	110	111
France	108	110	108	107	106	105	104
Germany	125	125	127	126	125	125	124
Greece	72	72	72	70	68	68	68
Hungary	66	68	69	69	67	68	71
Iceland	120	122	123	128	131	131	134
Ireland	133	133	138	181	178	182	188
Italy	103	100	97	96	98	97	96
Latvia	61	63	64	65	65	67	71
Lithuania	71	74	76	76	76	79	81
Luxembourg	262	264	272	269	263	255	256
Malta	84	86	90	95	96	98	98
Netherlands	136	137	133	132	129	129	130
Norway	188	186	178	158	146	147	151
Poland	68	68	68	69	69	70	71
Portugal	76	77	78	78	78	77	76
Romania	54	55	56	57	60	63	65
Slovakia	76	77	78	78	78	77	78
Slovenia	83	83	83	83	83	86	88
Spain	92	90	91	92	92	93	92
Sweden	128	127	126	127	123	122	122
United Kingdom	109	110	110	110	108	106	105
Bosnia and Herzegovina	30	31	30	31	31	31	31

Source: Eurostat;

(<https://ec.europa.eu/eurostat/tgm/printTable.do?tab=table&plugin=1&language=en&pcode=tec00114&printPreview=true>), access 31.01.2020

Two parameters were used to estimate the packaging market in Bosnia and Herzegovina: the EU average PPS for the countries with the lowest purchasing power and the amount of packaging that those countries placed on the market.

Between 34 and 44 kg per capita of packaging on the market of Bosnia and Herzegovina, annually. However, Eurostat shows data from countries with notified (licensed) packaging. A significant part of the packaging is out of the system in BiH, some of the packaging is incorrectly reported, so a realistic amount of packaging in Bosnia and Herzegovina could be obtained by increasing these average quantities by 25% (packaging left out of the system for the above reasons). The final estimate is that in Bosnia and Herzegovina, between 43 kg and 55 kg per capita of packaging annually on the market.

	Quantity of packaging put on the market
MIN (t)	151.840
MAX (t)	194.214

The average growth rate of the amount of packaging put on the EU market annually is about 4%, for Bosnia and Herzegovina it is estimated a maximum of 3%. The table below shows the estimated quantities of packaging put on the market (estimate based on population figures, OTP-P statistical release data and average 3% increase in quantities).

	2012	2013	2014	2015	2016	2017
<i>BiH, tons</i>	194.214	200.040	206.041	212.223	218.589	225.147

	Composition, %	2017, tons
<i>Glass</i>	21,4	48 217
<i>Metal</i>	6,7	15 179
<i>Paper</i>	31,2	70 162
<i>Plastic</i>	25,0	56 187
<i>Wood</i>	8,3	18 636
<i>Multilayered</i>	7,2	16 155
<i>Hazardus PW</i>	0,1	293
<i>Other</i>	0,1	317
<i>Total</i>	100,0	225 147

Based on the quantities shown above, the amount of packaging was calculated, based on amount reported to the operator's system, the amount of packaging that is out of the system, the amount of packaging waste that the system operators have submitted for recycling. Finally,% of recycled packaging waste was calculated in relation to the total packaging waste placed on the market.

Packaging waste recycling rate, Bosnia and Herzegovina, 2012-2017

	2012	2013	2014	2015	2016	2017
Put on the market (t)	194.214	200.040	206.041	212.223	218.589	225.147
Delivered to recycling operators (t)	3.050	7.053	16.241	19.169	29.889	30.583
Recycling rate (t)	2%	4%	8%	9%	14%	14%

2. Waste treatment - recovered and disposal

Reporting units are business entities and parts of business entities that are registered as waste collectors which are classified by NACE Rev. 2. in the field of activity E – Water supply; sewerage, waste management and remediation activities. Legal entities engaged in processing and removal of waste, show the amount of waste taken from others during the reference period with the intention of further waste management.

Ways of Waste Management, 2014-2018, Bosnia and Herzegovina, tonnes

	TOTAL	Temporary stored, state 31.12.	Recovered waste-R operations	Disposed waste- D operations	Quantities of waste given to others for management
2014	535.016	57.840	246.813	840	229.523
2015	528.006	65.331	227.047	301	235.326
2016	578.252	56.122	252.373	751	269.006
2017	600.777	40.580	269.948	259	289.990
2018	689.730	57.480	277.055	726	354.469

In the period 2014-2018, there was an increase of collected waste for processing/disposal. In 2018, 8,3% of waste was temporarily stored, 40,2% processed and 51,4% delivered to another business entity for further processing and disposal.

7. CIRCULAR ECONOMY AND MATERIAL RESOURCE EFFICIENCY

7.1 EU policy framework

As part of a shift in EU policy towards a circular economy, the European Commission made four legislative proposals introducing new waste-management targets regarding reuse, recycling and landfilling. The proposals also strengthen provisions on waste prevention and extended producer responsibility, and streamline definitions, reporting obligations and calculation methods for targets. On 4th of March 2019, the European Commission adopted a comprehensive report on the implementation of the Circular Economy Action Plan. The report presents the main achievements under the Action Plan and sketches out future challenges to shaping our economy and paving the way towards a climate-neutral, circular economy where pressure on natural and freshwater resources as well as ecosystems is minimised.

Final Circular Economy package - key documents (<https://ec.europa.eu/environment/circular-economy/>):

- Report on the implementation of the Circular Economy Action Plan - press release - questions and answers
- Staff working document with details on the 54 actions included in the action plan
- Staff working document on Sustainable Products in a Circular Economy
- Staff working document on the assessment of the voluntary pledges under Annex III of the Strategy on Plastics
- Guidance and promotion of best practices in the mining waste management plans
- Summary Report of the Public Consultation on the interface between chemicals, product and waste legislation
- Report on improving access to finance for circular economy projects
- Report on Horizon 2020 R&I projects supporting the transition to a Circular Economy
- A circular economy for plastics – Insights from survey and innovation to inform policy and funding decisions
- Eurostat press release: Circular Economy in the EU

[European Circular Economy Stakeholder Platform](#) is a virtual open space which aims at promoting Europe's transition to a circular economy by facilitating policy dialogue among stakeholders and by disseminating activities, information, and good practices on the circular economy. Stakeholders can take part in the Platform by participating in the annual conference and by interacting on the website to look for good practices, to engage with other stakeholders and to share their own good practices and events. The members of the Coordination Group contribute to gather best practices on circular economy, to raise awareness about existing national, regional or local strategies, to identify challenges and opportunities for the transition to a circular economy among policy makers, businesses, trade unions, civil society, etc.

The monitoring framework on the circular economy as set up by the European Commission consists of 10 indicators, some of which are broken down in sub-indicators. These 10 indicators are divided into 4 thematic units: Production and Consumption, Waste Management, Secondary Raw Materials, Competitiveness and Innovation.

Table 5: Circular economy indicators covered by the monitoring framework

No	Name	Relevance	EU tools
Production and consumption			
1	Self-sufficiency of raw materials for production in the EU	Monitoring the production and consumption phase is essential for understanding progress towards the circular economy	Initiative for raw materials; plan for efficient use of resources
2	Green public procurement (as an indicator for financing aspects)*	Public procurement accounts for a large part of consumption; can be the driving force of a circular economy.	Public procurement strategy; EU support programs and optional criteria for green public procurement
3a-c	Waste generation (as an indicator for consumption aspects)	In the circular economy, the waste generation is reduced to the smallest possible extent.	Waste Framework Directive; directives on special waste streams; strategy for plastics
4	Food waste.*	Households and economic sectors should decrease the amount of waste they generate	Regulation on General Food Regulations; Waste Framework Directive; various initiatives (e.g. platform for food scattering)
Waste management			
5a-b	Recycling rates (the share of waste which is recycled)	Increasing recycling is part of the transition to a circular economy	Waste Framework Directive
6a-f	Specific waste streams (packaging waste, biowaste, E-waste, etc.)	Focuses on the share of waste which is recycled and actually returned into the economic cycle to continue creating value	Waste Framework Directive; Landfill Directive; directives on special waste streams
Secondary raw materials			
7a-b	Contribution of recycled materials to raw materials demand	Recycled materials replace newly extracted natural resources; reduce the environmental footprint of production and consumption.	Waste Framework Directive; Ecological design directive; the EU environmental label; REACH Regulation; initiative on the linkages between policies on chemicals, products and waste; strategy for plastics; quality standards for secondary raw materials
8	Trade of recyclable raw materials	Recycled materials increase the security of the future supply of raw materials.	Internal Market Policy; Decree on waste shipments; trade policy
Competitiveness and innovation			
9a-c	Private investments, jobs and gross value added	The circular economy contributes to the creation of jobs and growth	Investment plan for Europe; European Structural and Investment Funds; InnovFin; a platform for financing a circular economy; a strategy for a sustainable financial sector; Green Employment Initiative; a new skills program for Europe; internal market policy

10	Patents related to recycling and secondary raw materials	The development of innovative technologies improves product designs for easier re-use and promotes innovative industrial processes	Horizon 2020
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* Indicators in the development phase

This Monitoring Framework with a precise set of indicators includes the main elements of the circular economy, including the life cycle of products and materials, priority areas and sectors, and the effects on competitiveness, innovation and job creation. The following table shows the list of EU indicators and subindicators:

Table 6: List of circular economy indicators (CEI)

PRODUCTION AND CONSUMPTION

1	Self-sufficiency of raw materials for production in the EU
2	* Green public procurement
3	Waste generation
3A	Municipal waste generation kg/inhabitant
3B	Production of waste without mineral waste per unit of GDP
3C	Production of waste without mineral waste per unit of consumption of domestic materials
4	*Food waste

WASTE MANAGEMENT

5	Recycling rates
5A	Recycling rates of municipal waste
5B	Excluding mineral waste
6	Recycling/Processing for specific waste streams
6A	Recycling rate of total packaging waste
6B	Recycling rate of plastic packaging waste
6C	Recycling rate of wooden packaging
6D	Recycling rate of electrical and electronic waste (e-waste)
6E	Recycling bio-waste per capita
6F	Rate of processing of construction waste and demolition wastes

SECONDARY RAW MATERIALS

7	Contribution of recycled materials to raw materials demand
7A	Input rates for product end-of-life recycling
7B	The rate of use of the circular material
8	Trade of recyclable raw materials

COMPETITIVENESS AND INNOVATION

9	Private investment, jobs and gross value added related to the circular economy sector
9A	Gross investment in material goods
9B	Number of employed persons
9C	Value added at cost factor
10	Number of patents related to recycling and secondary raw materials

* Indicators in the development phase

7.2 Material resource efficiency

The resource-efficient Europe flagship initiative is part of the Europe 2020 Strategy, the EU's growth strategy for a smart, inclusive and sustainable economy. It supports the shift towards sustainable growth via a resource-efficient, low-carbon economy.

The Roadmap to a resource efficient Europe is one of the main building blocks of the resource efficiency flagship initiative. The Roadmap sets out a framework for the design and implementation

of future actions. It also outlines the structural and technological changes needed by 2050, including milestones to be reached by 2020. It proposes ways to increase resource productivity and divide economic growth from resource use and its impact on the environment. It illustrates how politics are interconnected and upgraded to one another.

The Resource Efficiency Roadmap is part of the Resource Efficiency Flagship of the Europe 2020 Strategy. The Europe 2020 Strategy is the European Union's growth strategy for the next decade and aims at establishing a smart, sustainable and inclusive economy with high levels of employment, productivity and social cohesion.

The European Commission uses "*Resource Productivity*" as a leading indicator. Resource Productivity is currently the leading indicator of sustainable consumption and production. Resource productivity is defined as the ratio between gross domestic product (GDP) and domestic material consumption (DMC). DMC measures the total amount of materials directly used by an economy, and is defined as the annual quantity of raw materials extracted from the domestic territory, plus all physical imports minus all physical exports. It is expressed in tons per capita.

Domestic Material Consumption - DMC applies the EW-MFA methodology, in accordance with Regulation (EU) No. 691/2011 of the European Parliament and of the Council on European Economic Accounts for the Environment, in particular Annex III to the Regulation - Module for EW-MFA. The EW-MFA includes the following material categories:

- Biomass and biomass products;
- Metal ores and concentrates, raw and processed;
- Non-metallic minerals, raw and processed;
- Oil resources, raw and processed;
- Other products

The efficiency of material resources, the circular economy and the supply of raw materials is still not a clear priority in Bosnia and Herzegovina, activities are mainly concentrated to some topics that are important factors for environmental issues, such as waste management, energy use and energy efficiency issues.

7.2.1 Domestic Material Consumption (DMC)

Flow of Hazardous Substances

Monitoring of hazardous substances in chemicals and other products has ecological significance, their impact can be understood using EW-MFA statistics (material flow accounts).

Material flows are material flows between the economy and the natural environment, which include extracted raw materials and other primary materials from the natural environment and their release into the natural environment, as well as the flows of materials between the economy and abroad (import and export).

Domestic consumption of materials - DPM is the total amount of material resources used in the national economy. DPM measures the annual quantity of extracted and accumulated raw materials used in the national economy, increased by the difference between physical imports and physical

exports of goods. Given that accumulated materials (supplies) will once be converted into emissions and waste, the value of DMC also indicates potential environmental burdens in the process of exploitation or processing of raw materials.

DMC data are organized into groups of material flows: Biomass and biomass products; Metal ore and concentrates; Non-metallic minerals, primary and refined; Petroleum Resources; Other Products; and Waste. Dangerous substances are included in some of these material streams, but they are not shown separately because statistical data is presented at the aggregated level.

DMC account is available for groups of hazardous chemicals, using available foreign trade statistics. For the calculation of the DMC (domestic consumption of materials) by groups of hazardous substances, data on chemicals in the CN classification are considered. Detailed information on the use of chemicals is not available in most countries, commercial privacy also restricts the use of information. However, the second source of information is the official foreign trade statistics based on the combined nomenclature on 8-digit CN codes for grouping chemicals. Each CN code for chemicals is associated with a specific CAS number (Chemical Abstract Services), which provides a unique identifier for a particular component (ECICS 2007).

The CAS registration number is the unique identification number of a chemical substance (element, compound, DNA sequencing etc.) that has introduced CAS (Chemical Abstract Service) for the purpose of unambiguous classification and sorting of many chemical substances. Each CAS number is unique and indicates only one substance.

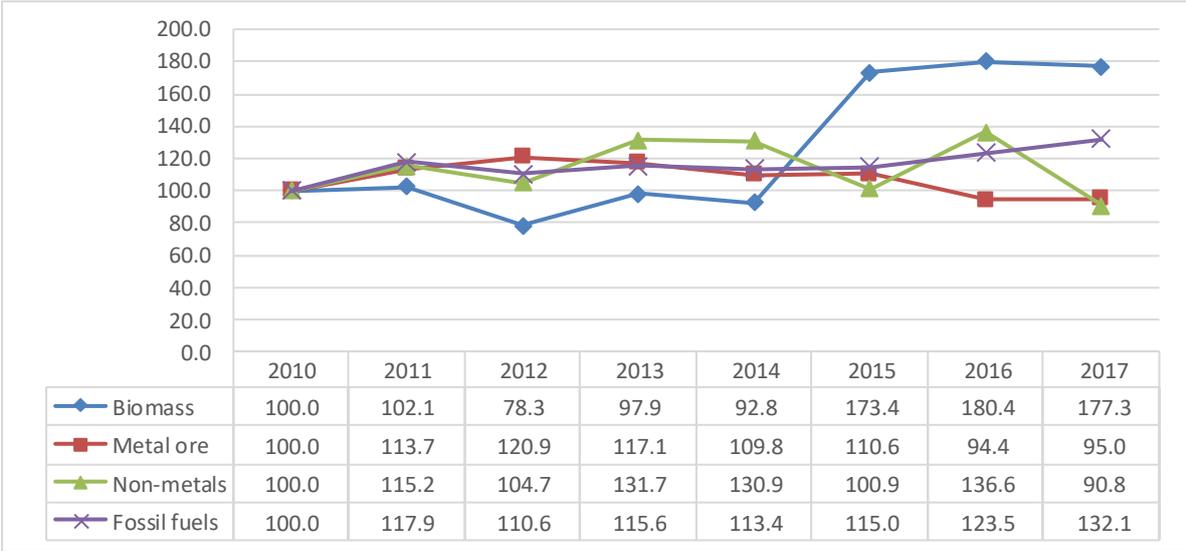
Hazardous substances accounts should include mapping their distribution (production, import, export) and calculation of potential harmful emissions. The survey "*Chemicals in Statistics - Method Development*" -Statistics Sweden SCB (2009), shows an assessment of the use of external trade statistics and the assessment of toxicity for chemical substances monitoring (see Chapter 7.3 of the 100 CAS compounds with the highest TPR rankings).

Interpretation:

Consumption of **Domestic material consumption (DMC)** in Bosnia and Herzegovina recorded a slight increase in the period from 2009 to 2017. It was caused by the increase in the exploitation of local material resources (increase of domestic extraction of non-metallic minerals for construction and industrial use), as well as a slight increase of importing materials in total consumption (import of fossil fuels).

The trend of the DMC indicator for Bosnia and Herzegovina is not the same as the general development at EU level, where there has been a significant decline in domestic consumption of materials, most contributing to the reduction of consumption of mineral raw materials for construction and industrial use.

Domestic material consumption, Bosnia and Herzegovina, 2010-2017



Domestic Extraction of Material (DMC) in 2017 was about 36.0 million of tons, with a slight decrease compared to the previous year. In the category of material resources, the largest share in domestic exploitation have fossil fuels (32.1%) and biomass (77.3%).

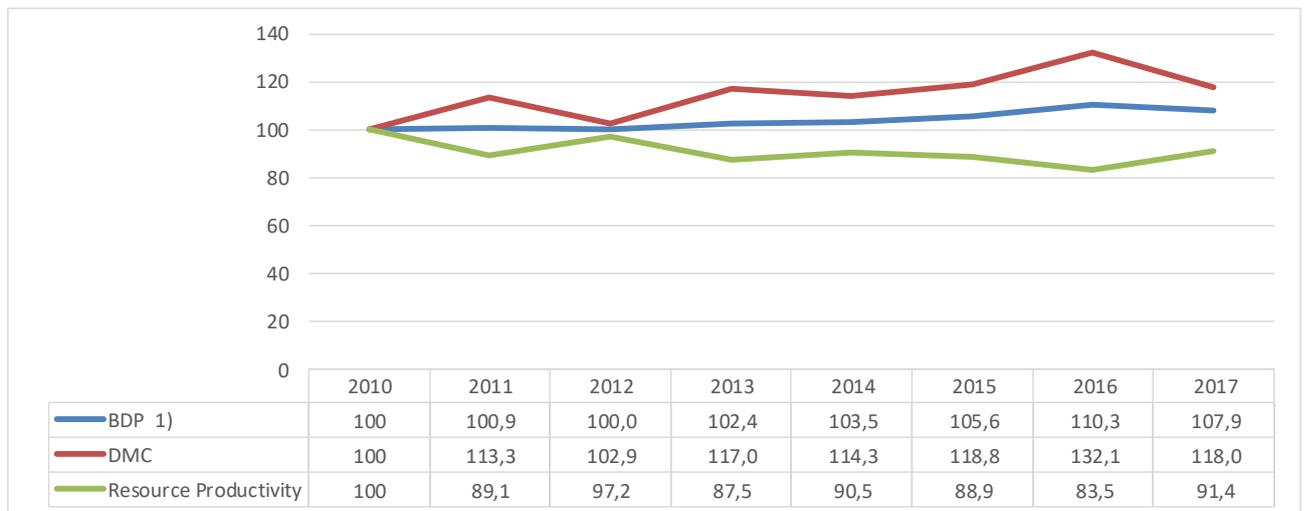
Import of goods has increased by 1.1%. The largest share was recorded in fossil fuels (41.4%), followed by biomass (31.7%), metal ore (11.2%), nonmetals (9.3%) and other (6.4%).

Exports of goods have increased by 2.3% comparing to the previous year. Biomass was the largest share in total exports (30.4%), but significant non-metal exports (26.9%) and metal (16%) were significantly visible.

Resource productivity (RP) as the ratio of gross domestic product and consumption of domestic material, is an indicator of resource efficiency where production is desirable with the least possible consumption of material resources.

Official statistical data show that resource productivity in Bosnia and Herzegovina was decreasing in the reference period over 2009-2017. This is caused by a significant increase in consumption of domestic material, in comparison with the mild growth of gross domestic product. In the reporting period, gross domestic consumption and domestic consumption of materials did not grow in parallel, and there is clear separation of economic and environmental variables. Since Resource productivity value in the reporting period is considerably lower than the GDP value, there is a separation between the relationship between resource utilization and economic growth.

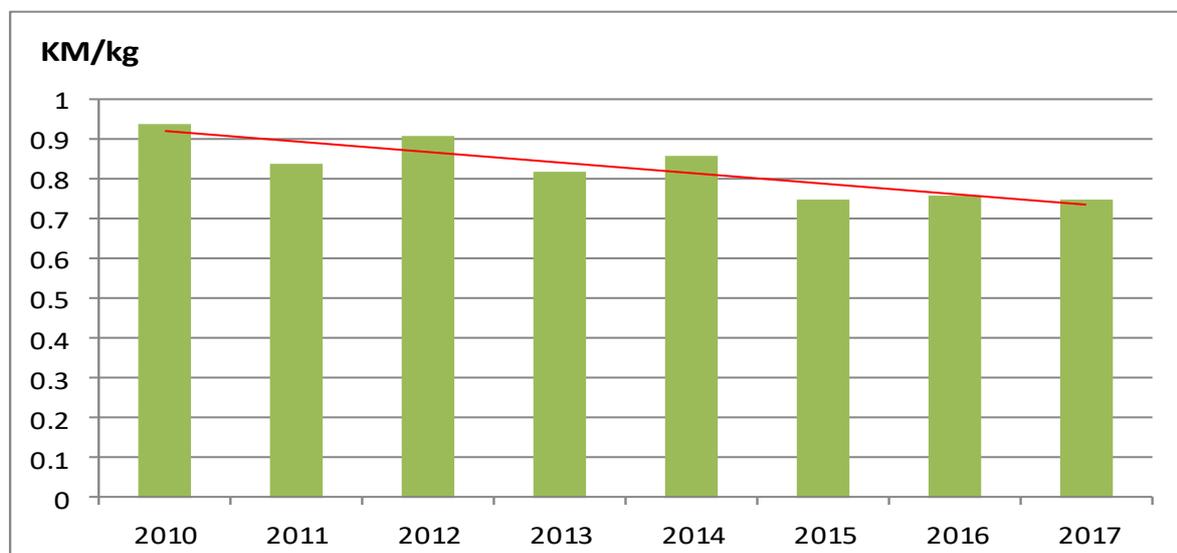
Lead indicator – Resource Productivity, Bosnia and Herzegovina, 2010-2017 (2010=100)



¹⁾GDP in chain-linked volumes, reference year 2010

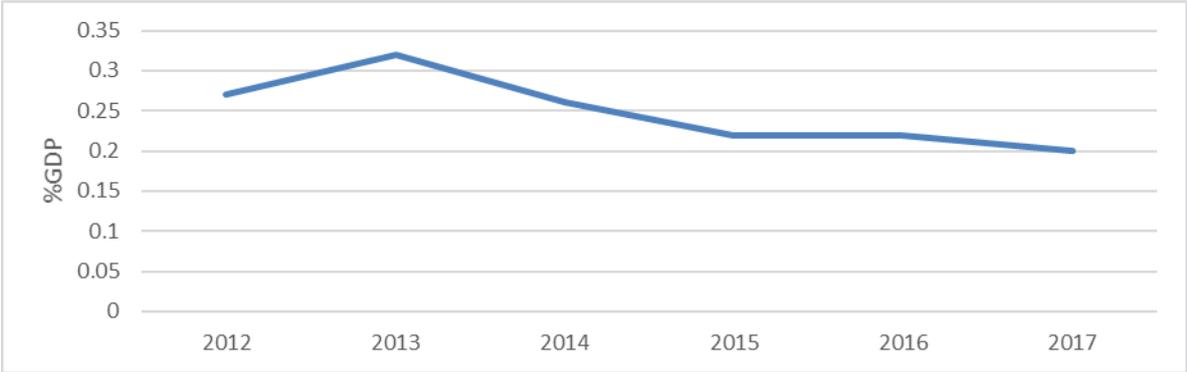
The level of resource productivity depends on the resource potential, the diversity of industrial activities, the role of the service sector and the construction industry, the volume and the structure of consumption and various energy sources.

Resource Productivity, Bosnia and Herzegovina, 2010-2017 (2010=100), KM/kg



Resource Productivity of Bosnia and Herzegovina in the economy is quite low compared to the average of the European Union. It has paid 0.75 KM per kilogram, in the reference 2017 year, which is a 20.2% decrease comparing to 2010.

Expenditures for R & D as a share of GDP, Bosnia and Herzegovina, 2012-2017, %



The level of investment in R & D is low and does not reach 1% of GDP recommended by UNESCO.

8. CHEMICALS

8.1 Mercury

Statistics on import, production and export of chemicals can be an important source of information for monitoring environmental policy and management decisions. This chapter estimates the use of official statistics on trade and production of hazardous chemicals.

Mercury is a silver-white, liquid metal that is obtained by the processing of natural minerals rich with the Mercury. According to the World Health Organization, it is ranked as one of the 10 most dangerous chemicals in public health. Codes considered for Mercury, blends and Mercury compounds are covered by the Regulation on the ban on Mercury exports:

Table 7: Codes for Mercury, mixtures and compounds of Mercury, CN-Prodcom

Substances covered by the Regulation on Export Prohibition	HS code *	Description of HS code	CN code **	Description of CN code **	Prodcom code ***	Description of Prodcom code ***
Metal Mercury and metal fittings with another substances, including alloys of mercury, with the lowest concentration of mercury 95% weight	280540	Mercury	2805 4010	in bottles of net weight of 34.5 kg (standard weight), fob values/bottles, which do not exceed 224 EUR	20.13.23.00*	Alkaline or alkaline earth metals; rare earth metals scandium and itrium; mercury
			2805 4090	Mercury -other		
Red mineral Mercury sulfides (cinnabar ore)	2852	Inorganic or organic Mercury compounds, whether they are or not chemically defined, excluding amalgam.- chemically defined - other	Featured in 2007: 2852	norganic or organic living compounds, whether they are or not chemically defined, excluding amalgam. - chemically defined - other	20.13	Mercury cpmponents, inorganic or organic, (excluding amalgam) chemically defined as Mercury - chemically defined as Mercury
Mercury (II) chloride (Hg₂Cl₂) \ t	2852		Featured in 2012: 2852 1000		20.13.52.70	
Mercury (II) oxide (HgO)	2852 10 2852 90		2852 9000		20.13.52.75	
Amalgam (not addressed) ****	284390	- Other compounds; amalgams	28439010	Amalgams of precious metals	20.13.51.85	Coloid noble metals; compounds and amalgams of precious metals (excluding silver nitrate)

* International Harmonized Codes (HS) used for UN International Trade Statistics (Comtrade)

Combined Nomenclature (CN) used for international trade statistics of the EU (Council Regulation (EEZ) No. 2658/87)

*** Prodcom codes used for EU production statistics (Regulation (EEZ) No. 3924/91)

**** Some dental amalgam capsules can be registered as amalgams

Special waste codes have been addressed by the European List of Waste, the Basel Convention and the Regulations on Cross-Border Waste Transport. After analyzing these waste codes and other relevant Mercury literature (e.g. COWI and Concord East/West, 2008), the codes shown in Table 18. above are considered as relevant for the analysis. All of these codes refer to Mercury, but the Mercury fraction, which is often small, can not be determined. Mercury can also be contained in waste streams that are assigned to other waste codes that do not mention Mercury specifically, but this amount is considered low.

Table 8. Waste containing mercury in the European List of Waste

EU LoW	Opis
01	WASTES RESULTING FROM EXPLORATION, MINING, QUARRYING, AND PHYSICAL AND CHEMICAL TREATMENT OF MINERALS
01 03	wastes from physical and chemical processing of metalliferous minerals
01 03 05*	other tailings containing hazardous substances
01 03 07*	other wastes containing hazardous substances from physical and chemical processing of metalliferous minerals
02	WASTES FROM AGRICULTURE, HORTICULTURE, AQUACULTURE, FORESTRY, HUNTING AND FISHING, FOOD PREPARATION AND PROCESSING
02 01	wastes from agriculture, horticulture, aquaculture, forestry, hunting and fishing
02 01 08*	agrochemical waste containing hazardous substances
05	WASTES FROM PETROLEUM REFINING, NATURAL GAS PURIFICATION AND PYROLYTIC TREATMENT OF COAL
05 07	wastes from natural gas purification and transportation
05 07 01*	wastes containing mercury
06	WASTES FROM INORGANIC CHEMICAL PROCESSES
06 04	metal-containing wastes other than those mentioned in 06 03
06 04 04*	wastes containing mercury
06 05	sludges from on-site effluent treatment
06 05 02*	sludges from on-site effluent treatment containing hazardous substances
06 07	wastes from the MFSU of halogens and halogen chemical processes
06 07 02*	activated carbon from chlorine production
06 07 03*	barium sulphate sludge containing mercury
06 13	wastes from inorganic chemical processes not otherwise specified
06 13 02*	spent activated carbon (except 06 07 02)
07	WASTES FROM ORGANIC CHEMICAL PROCESSES
07 04	wastes from the MFSU of organic plant protection products (except 02 01 08 and 02 01 09), wood preserving agents (except 03 02) and other biocides
07 04 13*	solid wastes containing hazardous substances
07 05	wastes from the MFSU of pharmaceuticals
07 05 13*	solid wastes containing hazardous substances
10	WASTES FROM THERMAL PROCESSES
10 01	wastes from power stations and other combustion plants (except 19)
10 01 18*	wastes from gas cleaning containing hazardous substances
16	WASTES NOT OTHERWISE SPECIFIED IN THE LIST
16 01	end-of-life vehicles from different means of transport (including off-road machinery) and wastes from dismantling of end-of-life vehicles and vehicle maintenance (except 13, 14, 16 06 and 16 08)
16 01 08*	components containing mercury
16 02	wastes from electrical and electronic equipment
16 02 13*	discarded equipment containing hazardous components (1) other than those mentioned in 16 02 09 to 16 02 12

16 04	waste explosives
16 04 03*	other waste explosives
16 05	gases in pressure containers and discarded chemicals
16 05 06*	laboratory chemicals, consisting of or containing hazardous substances, including mixtures of laboratory chemicals
16 05 07*	discarded inorganic chemicals consisting of or containing hazardous substances
16 05 08*	discarded organic chemicals consisting of or containing hazardous substances
17	CONSTRUCTION AND DEMOLITION WASTES (INCLUDING EXCAVATED SOIL FROM CONTAMINATED SITES)
17 09	other construction and demolition wastes
17 09 01*	construction and demolition wastes containing mercury
18	WASTES FROM HUMAN OR ANIMAL HEALTH CARE AND/OR RELATED RESEARCH (except kitchen and restaurant wastes not arising from immediate health care)
18 01	wastes from natal care, diagnosis, treatment or prevention of disease in humans
18 01 10*	amalgam waste from dental care
19	WASTES FROM WASTE MANAGEMENT FACILITIES, OFF-SITE WASTE WATER TREATMENT PLANTS AND THE PREPARATION OF WATER INTENDED FOR HUMAN CONSUMPTION AND WATER FOR INDUSTRIAL USE
19 01	wastes from incineration or pyrolysis of waste
19 01 07*	solid wastes from gas treatment
19 01 10*	spent activated carbon from flue-gas treatment
19 01 13*	fly ash containing hazardous substances
20	MUNICIPAL WASTES (HOUSEHOLD WASTE AND SIMILAR COMMERCIAL, INDUSTRIAL AND INSTITUTIONAL WASTES) INCLUDING SEPARATELY COLLECTED FRACTIONS
20 01	separately collected fractions (except 15 01)
20 01 35*	discarded electrical and electronic equipment other than those mentioned in 20 01 21 and 20 01 23 containing hazardous components ⁽¹⁾

(1) Hazardous components from electrical and electronic equipment may include accumulators and batteries mentioned in 16 06 and marked as hazardous; mercury switches, glass from cathode ray tubes and other activated glass, etc.

Interpretation

There is no production of mercury in Bosnia and Herzegovina, but data on imports of products and chemicals containing Mercury or its compounds and the use of Mercury in various industrial processes have been recorded. Certain deviations of foreign trade statistics can arise due to the following reasons:

- the definition of partner country (origin country or country of import/export),
- incorrect classification of goods,
- confidentiality of data,
- Revision of data
-

It is necessary to evaluate assessment of status of Mercury and/or Mercury compounds, including estimation of storage conditions; livestock supplies; sectors that are used Mercury in production processes, including production processes and products with added Mercury. Import/Export of Mercury and Amalgam, Bosnia and Herzegovina, 2008-2019

CN code	Description CN code	EXPORT (kg)												
		2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	
2805 4010	Mercury - in bottles of net weight of 34.5 kg (standard weight), fob values/bottles, which do not exceed 224 EUR	-	-	-	-	-	-	-	-	-	-	-	-	
2805 4090	Mercury -other	-	-	-	-	-	-	-	-	-	-	-	-	
2852 0000	Inorganic or organic Mercury compounds, excluding amalgam *	-	-	-	-	-	-	-	-	-	-	-	-	
2852 1000	Inorganic or organic Mercury compounds, excluding amalgam - chemically defined	-	-	-	-	-	-	-	-	-	4	4	-	
2852 9000	Inorganic or organic Mercury compounds, excluding amalgam - chemically unspecified	-	-	-	-	-	-	-	-	-	-	-	-	
2843 9010	Amalgams of precious metals	-	-	-	-	-	-	-	-	-	-	-	-	
		IMPORT (kg)												
2805 4010	Mercury - in bottles of net weight of 34.5 kg (standard weight), fob values/bottles, which do not exceed 224 EUR	0	0	0	0	0	0	0	0	0	0	0	-	1.035
2805 4090	Mercury -other	12	1	5	-	-	7	-	345	755	502	-	0,3	
2852 0000	Inorganic or organic Mercury compounds, excluding amalgam *	789	18	5	11	-	-	-	-	-	-	-	-	
2852 1000	Inorganic or organic Mercury compounds, excluding amalgam - chemically defined	-	-	-	-	11	7	579	21	21	4	7	10	
2852 9000	Inorganic or organic Mercury compounds, excluding amalgam - chemically unspecified	-	-	-	-	60	1	1	-	-	1	211	200	
2843 9010	Amalgams of precious metals	3	-	-	-	-	3	-	-	6	21	210	26	

* Until 2007, Mercury compounds were registered in the "other" group with various other unions. CN code 28520000 is since 2012 divided into two codes.

Source: Agency for Statistics of BiH, Foreign Trade Statistics

8.2 Eurostat chemical indicators

A globally harmonized classification and labeling system for chemicals

The globally harmonized classification and labeling system for chemicals is a global agreement that establishes a harmonized classification of chemicals, communication of hazards and explanations for their application. The GHS elements provide a mechanism for meeting basic requirements in the process of communicating danger, i.e. to decide whether the chemical is dangerous, then preparing the label and the security sheet.

The GHS Agreement and its provisions are not applied directly, but it is already necessary for the states to undertake the agreed conditions and criteria by adopting their own regulations and to implement them through their own regulatory procedures. The European Union has implemented the GHS by adopting the CLP Regulation (1272/2008/EC) on Classification, Labeling and Packaging of Substances and Mixtures (EU GHS).

GHS represents a logical and comprehensive approach:

- Definition of physical danger of chemicals, danger to human health and the environment;
- Development of a classification process based on the comparison of available data on chemical properties with defined criteria;
- Providing information on hazards and information on precautionary measures by means of the label and safety sheet;
 - Ensuring the availability of relevant information to improve the health of people and the environment in the handling and use of chemicals;
- Harmonization of the rules and regulations on chemicals at national, regional and world level as an important factor in facilitating trade.

Boundary concentration is the concentration above which the presence of the dangerous substance in the other substance or as a dirt, additive or individual ingredient results with the substance being classified as dangerous in classification.

Limit value is the smallest concentration of any classified impurities, additives or individual constituents in the substance or fractions above which this impurity, additive or individual constituent is taken into account when classifying the substance or smelting.

M factor is the coefficient multiplying the concentration of the substance classified as dangerous for the aquatic environment, acute, category 1 or chronic, category 1, which is used in the aggregate assay classification method containing this substance.

REACH

The Regulation REACH ("Registration, Evaluation, Authorization and Restriction of Chemical") implies procedures for registering, evaluating, approving and restricting the use of the substance. The regulation came into force in 2007.

REACH has been adopted by the European Union in order to improve the protection of human health and the environment with respect to chemicals that may represent chemicals, while at the same time increasing the competitiveness of the chemical industry. REACH refers to all chemical substances; not just those that are used in industrial processes but also those used in everyday life such as cleaning products, paints and products such as clothing, furniture and electrical appliances.

REACH highlights the responsibility for chemical risk assessment and risk management as well as the provision of appropriate safety information related to their use with relevant industry bodies. By the principle "No data - no market", according to REACH, the industry is responsible for managing the risks of chemicals and to provide information on substance safety. Manufacturers and importers are required to obtain information on the properties of the substances they place on the market, which

will enable safe handling, as well as to register substances or to submit information to ECHA's central database of European Chemicals Agency (ECHA).

According to the REACH regulation, all substances (in quantities > 1 ton/year) should be registered and evaluated to be able to continue to produce/import/market/use in the EU. Companies need to register their substances, and to do so, they must also cooperate with other companies that register the same substance. ECHA assesses and evaluates the compliance of individual registrations, and the EU member states evaluate selected substances in order to eliminate any doubts regarding the concern for human health and the environment.

The ECHA database includes information on chemical substances and their dangerous properties, as well as on classifying and safe ways of using them. This information is submitted by ECHA in accordance with its obligations under the Regulations.

- REACH
- Classification, labeling and packaging (CLP)
- Regulation on biocidal products (BPR)
- Regulation on Import/Export of Hazardous Chemicals (PIC).

There are four ECHA databases:

- **REACH** Database on Registered Substances: This database includes information on over 15,000 registered substances, making it one of the largest sources of information on chemicals worldwide. The number of substances in the database is constantly increasing, given that companies continuously submit registration dossiers.
- **CLP** Inventory Classification and Labeling: This inventory contains information on the classification and labeling of substances. In addition, harmonized classifications and information on the categories of hazardous substances under the Seveso Directives are also included. Information for over 120,000 substances are available. The inventory has more information on the basic classification and labeling of registered and registered substances.
- **BPR** database: This database includes information on active substances/types for which the application for authorization is submitted in accordance with the BPR Regulation. Product authorization information is also available.
- **PIC** Export/Import of Hazardous Chemicals: This database includes all hazardous chemicals listed in the Regulative PIC Annexes as well as information on their export and import. Export or import records may be searched, for example, for years, by an EU Member State that is an exporter, country of import, chemical and/or name, and by type of chemical.

The CLP Regulation requires that manufacturers and importers who place chemicals on the market inform the European Chemicals Agency (ECHA) about classification and labeling information. The Agency is, in return, obliged to, under Article 42 Regulative CLP, establish and maintain the Inventory of Classification and Labeling (C & L Inventory) and make this information publicly available. The ECHA inventory is regularly updated, the information in the Inventory of Classification and Labeling are considered as an important source for the indicator methodology and for the audit of the data used in the indicator composition.

The CAS registration number is the unique identification number of a chemical substance for the purpose of unambiguous classification and sorting of chemical substances. Each CAS number is unique and indicates only one substance. The number itself has no chemical significance in terms of

marking the traits. Given that many compounds have few names, the CAS number makes it easier to search databases.

When the new EU REACH policy (registration, evaluation and authorization of chemicals) came into force in 2007, Eurostat has developed a methodology based on indicators to monitor its effectiveness in the protection of human health and the environment. This is described in REACH 2009 study. The European Commission has published a basic REACH survey for 2017 - a 10-year update.

Eurostat chemical indicators

Eurostat has developed indicators for toxic chemicals that are harmful to health and the environment. The calculation for both indicators is based on the same approach and is used by Eurostat's statistics on production of industrial products (PRODCOM). Eurostat has developed the following chemical-toxicity indicators:

- "*Production of Toxic Chemicals*", based on chemicals classified into 5 classes according to toxicity for human health,
- "*Production of chemicals harmful to the environment*", based on chemicals classified as environmentally hazardous,
- *Two related consumption indicators*

The first two indicators are based on the official statistics on the production of industrial chemicals, the production volumes being weighted to the toxicity of the chemical. By adding data from official statistics of foreign trade, production-related indicators are expanded to two additional consumption-indicating indicators. Country level data is not disclosed for reasons of confidentiality. Indicators specify whether toxic chemicals are being replaced by less dangerous substances.

The following categories of PRODCOM are taken into account for the production of indicators, representing the main categories of chemical production:

PRODCOM is the main chemical production category in NACE Rev.2 (2008-)

Coverage	NACE Rev.2
Production of industrial gases	20.11
Production of paints and pigments	20.12
Production of other inorganic basic chemicals	20.13
Production of other organic basic chemicals	20.14
Production of fertilizers and nitrogen compounds	20.15

These five categories are further subdivided and contain individual substances or group entries, detailed at 8-digit level (e.g, PRODCOM code 20.14.11.30 refers to 'Ethylene' and PRODCOM code 20.13.24.60 refers to 'boron oxides; boric acid; inorganic acids (excluding hydrogen fluoride)).

In the first step chemical toxicity was considered in major production categories (20.11-20.15), in the second step hazard information was downloaded for each PRODCOM entry. Until the CLP regulation was adopted, hazard information was based on the R hazard phrases according to the Hazardous Substance Directive, and are now based on H statements in accordance with CLP regulations. Such an evaluation is easy if the PRODCOM code/entry refers to a single substance (e.g. Ethylene) but is more

complicated if the PRODCOM code refers to a group of substances (e.g., oxides of boron, boric acid, inorganic acids, excluding hydrogen fluoride).

This has been solved by selecting a representative substance for the group and taking the information about the hazard for this substance.

With production data and available hazard information for each PRODCOM entry, the tonnage is aggregated for entries that share a specific toxicity. For example, it is possible to sum up the total tonnage for PRODCOM entries that represent substances that are carcinogenic. However, aggregation based on unique toxic properties may be confusing in the case of a large number of different H statements. Therefore, aggregation into five classes of toxicity (Class A-E) (e.g. Class B: "Chronic Toxic Chemicals" and Class C: "Very toxic chemicals") is performed.

Chemicals that can be characterized for more than one H statement are labeled with an H statement that is ranked highest among them as toxic.

"H" statements of labeling dangerous substances

Over the last few years, two major changes have been introduced that have had an impact on the development of the EU methodology of toxic chemical indicators:

- Hazardous and Harmful chemicals according to Hazardous Substances Directive (Directive 67/548/EEC of 27th of June 1967 on the approximation of laws, regulations and administrative provisions in the field of packaging and labeling of dangerous substances) has been changed to a hazard statement (hereinafter referred to as "**H statements**") according to the CLP Regulation (EC) No 1272/2008 of 16th of December 2008 on Classification, Labeling and Packaging substances and mixtures, amending and repealing Directive 67/548/EEC and Directive 1999/45/EC and amending Regulation (EC) No 1907/2006), also taking into account the self-classification according to REACH.

CLP Regulation describes dangerous substance properties by means of a hazard statement ('H statements') that replace R-phrases of risk. As a consequence, the methodology of production and consumption indicators had to be adapted to the new H statement system.

Once the H statements are determined, the A-E toxicity classes are determined. To assign a class of toxicity to the CLP Class A-E Regulatory Regulation, the translation table given in Annex VII CLP Regulation is used.

Classification of chemicals according to class of toxicity

The chemicals are classified into five classes of toxicity according to their specific properties, where the classes represent the degree of chemical danger.

CLASS	DESCRIPTION
A	CMR chemicals (substances or mixtures which are carcinogenic, mutagenic or toxic to reproduction)
B	It is suspected that it is carcinogenic, mutagenic and toxic for reproduction
C	Very toxic chemicals
D	Toxic chemicals
E	Harmful chemicals

The classification uses the R-phrases, as obtained e.g. from safety data sheets, with the aggregation shown in Table 3. Classes A and B primarily describe the chronic toxicity of chemicals. Class A consists

of chemicals with carcinogenic or mutagenic assets as well as toxic reproductive agents (CMR chemicals). Suspicious CMR chemicals form class B, together with susceptible substances Classes C, D and E describe acute toxic effects as "very toxic" (C), "toxic" (D) and "harmful" (E).

Class	Risk phrases								
A	R45	R46	R49	R60	R61				
B	R42	R43	R64	R40	R62	R63			
C	R26	R27	R28	R32	R48/23	R48/24	R48/25	R35	
D	R23	R24	R25	R34	R29	R31			
	R33	R41	R48/20	R48/21	R48/22				
E	R20	R21	R22	R65	R36	R37	R38		

Every chemical produced in the sectors (NACE classes) 20.11. to 20.15., which can be classified by an R-phrase, is aggregated to the corresponding toxicity class. Chemicals, which can be characterised by more than one R-phrase, are characterised by the highest ranked R-phrase starting from class A to E. This system allows building five classes without needing any additional expert ranking. The different classes (A-E) are then shown in mass units.

Compilation approach

Due to several revisions to the PRODCOM classification, the coverage of chemicals (R-phrases and CLP alike) has varied. Although these revisions initially referred to the rearrangement of economic sectors within the PRODCOM classification, where individual product codes were unchanged, internal entries affected the number of chemicals with toxic properties. The number of entries in PRODCOM has declined over time, especially since the 2008 audit. Overall coverage (in terms of economic coverage within PRODCOM) has not been reduced.

Number of chemicals covered by the Eurostat chemical indicator:

years	Number of PRODCOM entries representing chemicals	Number of PRODCOM entries that represent hazardous chemicals
2008	306	110+20*

* Products with 'mixed' classifications

The number of PRODCOM entries related to toxic chemicals and class A-E allocation are shown in the table below.

Class of toxicity	PRODCOM
A	34
B	30
C	30
D	49
E	41
total	184

There are 184 PRODCOM toxicity entries from the indicator 'Production of toxic chemicals'. Because a single PRODCOM entry may relate to different individual chemicals, the total number of substances is higher than the number of PRODCOM entries identified (130).

100 CAS compounds with the highest TPR rankings

Customs Tariff - CN represents a harmonized European customs nomenclature for the purpose of goods exchange. The nomenclature is based on the Harmonized System of Descriptions and Coding of Products (HS) which represents the nomenclature used for the purpose of creating a uniform, harmonized nomenclature in the field of foreign trade in the world, a classification used by all participants in foreign trade. The harmonized system is updated every fifth year. A large number of sub-divisions within the CN have been introduced bearing in mind the specificity of the EU's recommendations regarding customs and foreign trade statistics, the CN Classification is updated every year to meet the needs of technological development and changes in foreign trade flows.

Methodological procedures for systematic comparisons between classifications and one of the most prominent correspondence tables have been developed. Correspondent tables systematically explain where and to what extent, concepts and categories in one classification can be found in other classifications, or in earlier versions of the same classification.

The survey "*Chemicals in Statistics - Method Development*" (Statistical Sweden SCB (2009)) presents an assessment of the use of external trade statistics and toxicity assessment (TPR) for monitoring of chemical substances.

The basic toxicity is the minimal nonspecific toxicity shown by the organic compound- most industrial chemicals, of different sizes, shapes and functional groups, express only basic toxicity. Basic toxicity is the result of chemical accumulation and consequent impairment of normal functions in biological membranes, and is therefore closely related to other forms of bioaccumulation. The basic toxicity is therefore the amount of bioaccumulation.

Exposure to chemical hazards occurs by releasing toxic chemicals into the environment and removing them by physical, chemical and biological processes. Environmental degradation varies significantly, the air is most reactive (reaction with hydroxyl (OH) radicals in the troposphere). The velocity constant for this gas phase reaction can be used as an indicator of environmental stability.

The proposed method uses the ratio of atmospheric stability (half-life (T_{1/2}) to split the half of unstable elemental particles) according to basic toxicity - expressed as mean lethal concentration (in water) (LC₅₀) - to obtain a continuous scale for ranking and summed up environmental impacts from simultaneous exposure to many chemicals. The assessment of toxicity (TPR) is expressed as:

$$\text{TPR} = \text{half-time decomposition in the atmosphere (days)/LC}_{50} \text{ (mg L}^{-1}\text{)}$$

Two validated structurally-active relationships, baseline toxicity and constant rate of hydroxyl radical reaction, form the basis for TPR calculations.

In the survey "*Chemicals in Statistics - Method Development*" (Statistics Sweden SCB (2009), 100 CAS compounds with the highest toxicological rating and their link to the CN nomenclature 2006 are presented.

Clean chemicals are found in Chapters 28 and 29 of CN Classification Structure. The chemicals in Chapters 28 and 29 are mixtures of dangerous and non-toxic substances. Chapter 28 includes inorganic chemicals, Chapter 29 Organic Chemicals. All the chemicals in Chapter 28 CN and CN 29 are aligned with the corresponding CAS number. The largest number of potential environmental impacts were occupied by 100 compounds of Chapter 29 CN.

The table below shows 100 CAS compounds from the "*Chemicals in Statistics - Method Development*" survey and their link to the CN 2016 customs tariff. Systematic comparisons were made between the CN classification using the correspondent tables:

(https://ec.europa.eu/eurostat/ramon/relations/index.cfm?TargetUrl=LST_REL).

Many of these ecologically relevant compounds belong to the same groups of chemicals, where halogenated aromatic hydrocarbon derivatives (29039990) are the largest, with 25 members among the first 100. For 46 compounds in the same group of CN 2903 chemical compounds, further analysis of CN higher-level codes (eight-core CN codes) is needed. These compounds had one code in CN 2006, but they were evaluated over time in several different CN codes in 2016.

In foreign trade statistics, a significant number of chemicals with different properties are often grouped with the same identifier (CN code) and represent two or more specific compounds. The variability of the environmental characteristics between the compounds adds significant uncertainty to the estimates for each CN. This additional uncertainty makes clear trends from external trade statistics with regard to the development of an evaluated environmental indicator (assessment of toxicity) difficult to see. In addition, many different CAS codes are often included in one CN code. This makes it difficult to obtain data for one compound (CAS) in countries that do not have a special register of hazardous substances.

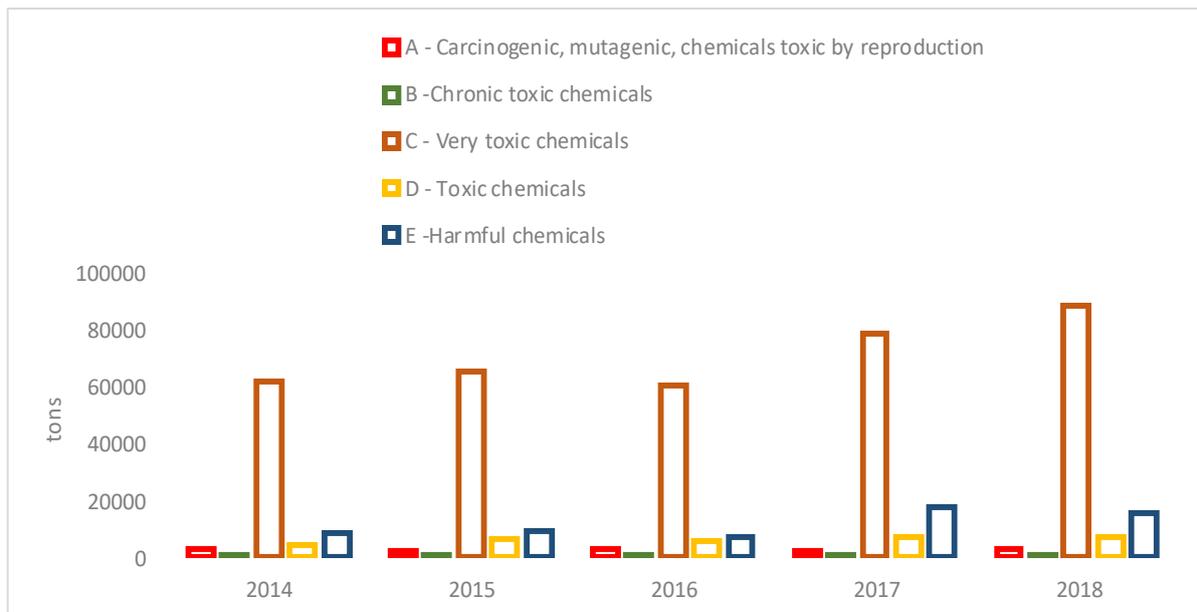
Table 9: 100 CAS compounds with the highest toxicity rating

Chemical name	CAS	CN 2016	t½ (dana)	LC50 (mg/L)	TPR
Dichloro (dichlorophenyl) methyl - methylbenzene	76253-60-6 2437-79-8	2903 99 90 2903 99 90	13.2 28.9	0.0317 0.106	417 273
2,4,2',4'-Tetrahlorbiphenyl	1336-36-3	2903 99 90	28.9	0.106	273
DDE	72-55-9	2903 99 90	15.0	0.0585	257
2,2- (2-Chlorophenyl-4'-) chlorophenyl) -1,1-dichloroethene	3424-82-6 475-26-3	2903 99 90 2903 99 90	11.9 20.8	0.0618 0.152	193 137
DFDT	72-54-8	2903 99 90	11.6	0.0874	132
TDE	53-19-0	2903 99 90	9.29	0.0914	102
mitotane	21824-93-1	2916 19 95	35.9	0.447	80.3
2-Butenoic acid, 2,3,4,4,-	72-56-0	2903 99 90	2.19	0.0298	73.6
pentachloro, butyl ester	422-49-1	2903	405	6.58	61.5
Perthane	728-86-9	2914 70 00	23.5	0.389	60.4
HCFC 222	7012-37-5	2903 99 90	13.2	0.234	56.6
4- (Trifluoromethyl) benzophenone	4101-68-2	2903	6.29	0.143	44.1
PCB 28		2903			
Decanes, 1,10-dibromo-	421-94-3	2903	358	8.41	42.5
Decanes, 1-iodo-	1536-23-8	29147000	30.1	0.776	38.8
	4549-33-1	2903	8.12	0.221	36.7
HCFC 231	877-09-8	2903 99 90	15.4	0.453	33.9
2,3,4,5,6	5216-25-1	2903 99 90	25.3	0.789	32.0
Pentafluorobenzopenon	1928-40-1	2918	8.32	0.264	31.5
Nonane, 1,9-dibromo-	111-19-3	2917	6.44	0.208	31.0
2,4,5,6-tetrachloro-m-xylene	879-39-0	2904 90 95	55.7	1.83	30.4
alpha, alpha, alpha-Trihloro-4- chlorotoluene	634-90-2 773-82-0	2903 99 90 2926 90 95	28.6 695	0.940 22.9	30.4 30.3
Propyl 2,4,5- trihlorofenoksiacetat	634-66-2 139754-75-9	2926 90 95 2903	37.1 662	1.23 22.0	30.3 30.1
Sebacoyl chloride	95-94-3	2903 99 90	30.9	1.08	28.7
2,3,4,5-Tetrakloronitrobenzen	393-75-9	2904 90 95	252	9.04	27.9
1,2,3,5-tetrachloro	877-10-1	2903 99 90	15.1	0.558	27.1
Benzonitrile, 2,3,4,5,6-pentafluoro-	422-52-6	2903	452	17.5	25.8
1,2,3,4-Tetraklorobenzene	422-50-4	2903	381	15.8	24.1
1,2,4,5-Tetrachloro-3- nitrobenzen	117-18-0	2903 99 90	52.7	2.24	23.5
Benzen, 1-hloro-2 (triklorometil) -	2136-89-2	2903	24.9	1.07	23.2
Undecane, 1-bromo-	693-67-4	2903	1.80	0.0814	22.1

Interpretation

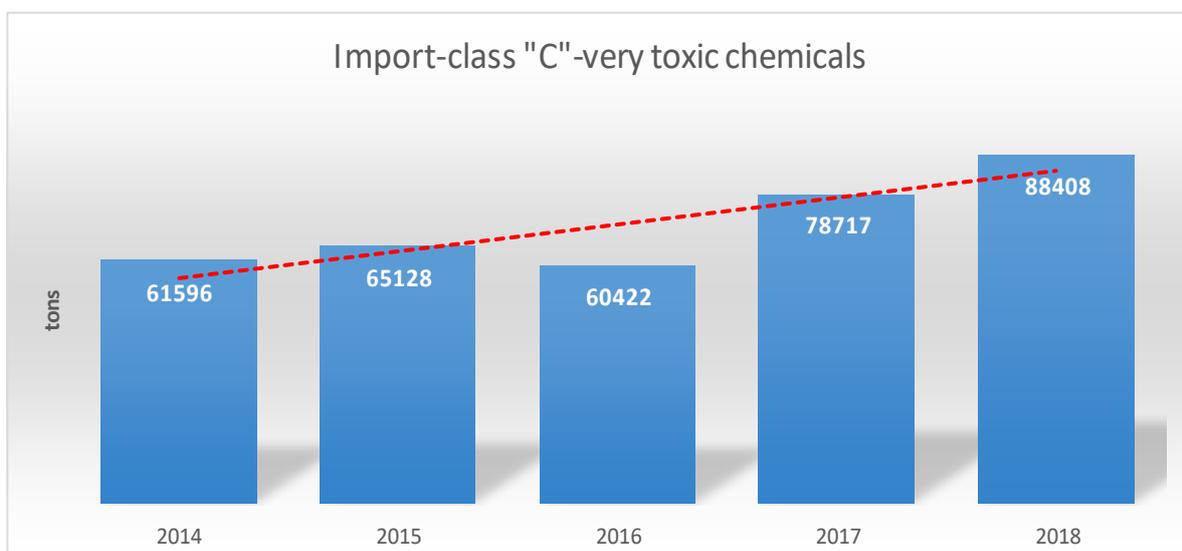
Hazardous chemicals data is required to monitor the long-range transboundary air pollution contagion (CLRTAP), related to the Stockholm Convention on Long-term Organic Pollutants (POPs) bioaccumulative and persistent in the environment.

Imports of hazardous chemicals by toxicity classes, Bosnia and Herzegovina, tons

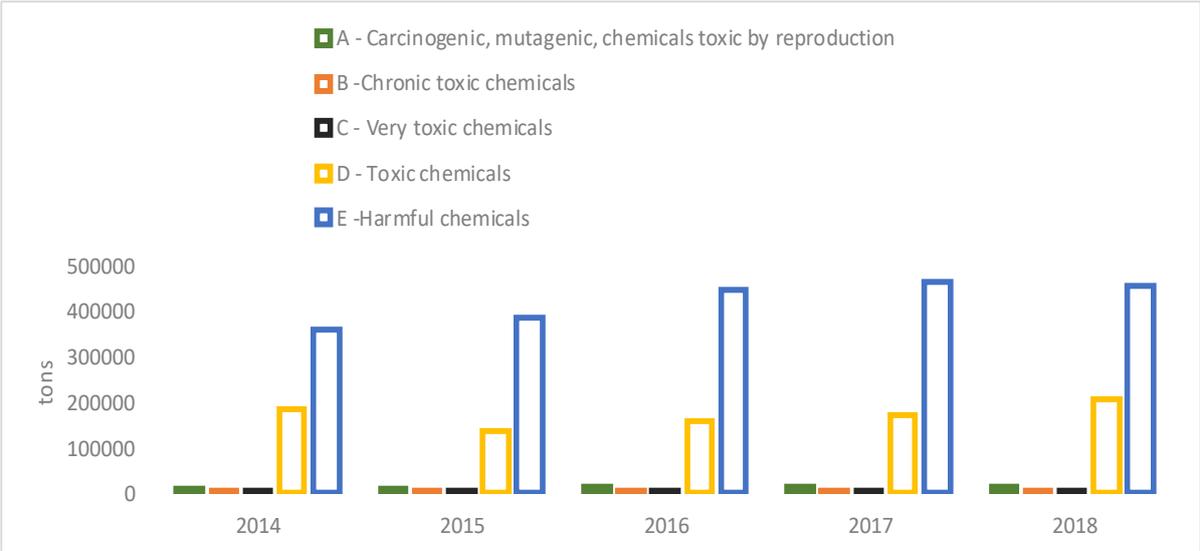


The total imports of hazardous chemicals in 2018 amounted to 114 thousand of tons, which is by 7.8% more than in 2017. Observed according to the class of toxicity, the highest participation in total imports was recorded in Class C of "Very Toxic Chemicals" with 77.8%, followed by the toxicity class E of "Harmful Chemistry" with 13.4%.

Imports of Hazardous Chemicals, Class of Toxicity C - Very Toxic Chemicals, Bosnia and Herzegovina, 2014-2018, tons

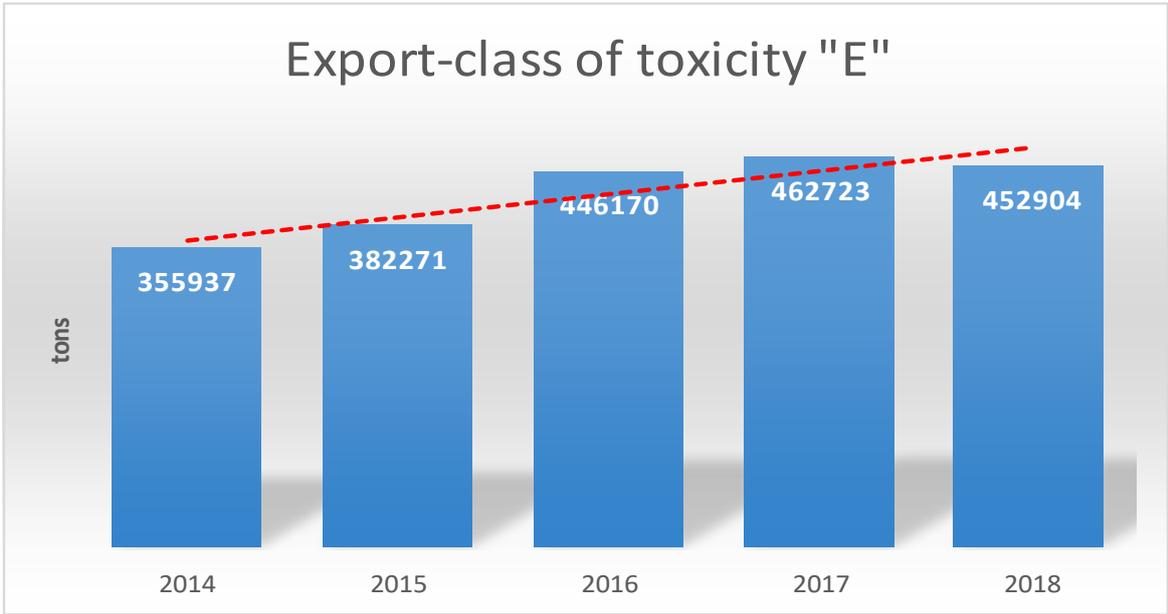


Export of hazardous chemicals by toxicity classes, Bosnia and Herzegovina, tons

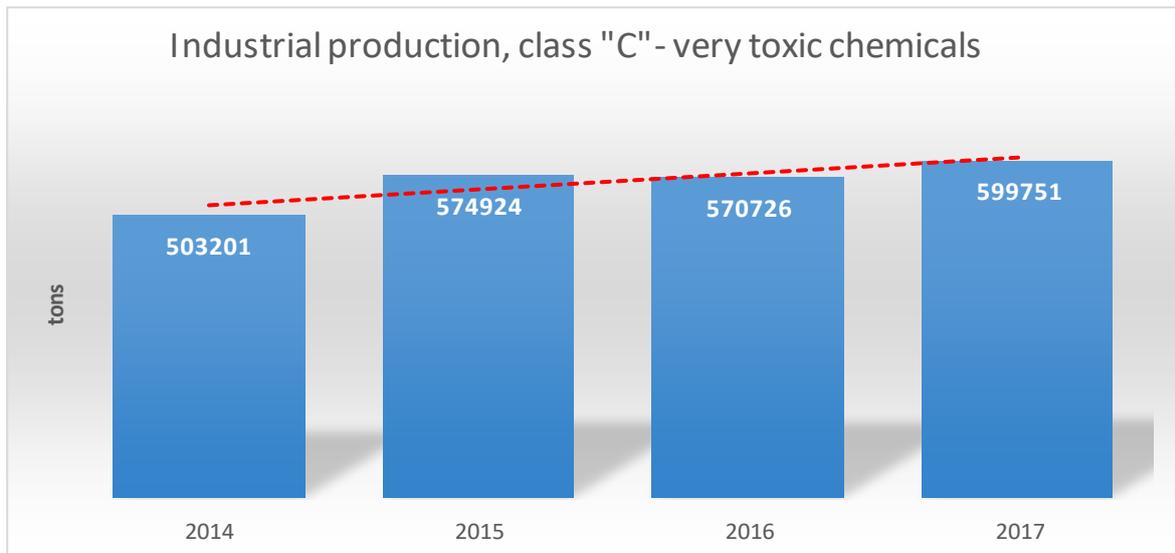


The total exports of hazardous chemicals in 2018 was 666 thousand of tons, which is 3.7% more than in 2017. Observed according to the class of toxicity, the highest participation in total exports was recorded in Class E "Hazardous Chemicals" with 67.9%, followed by toxicity class D "toxic chemical" with 30.5%.

Export of hazardous chemicals, toxicity class E - harmful chemicals, Bosnia and Herzegovina, 2014-2018, tons

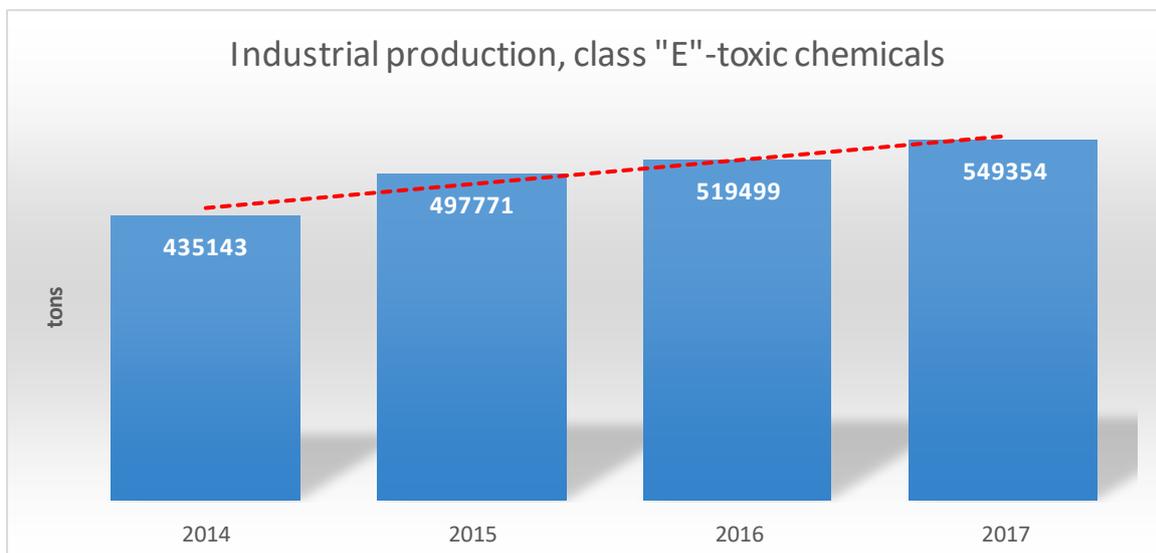


Industrial production, toxicity class C, PRODCOM 20.11-20.15, Bosnia and Herzegovina, tons



The total industrial production of hazardous chemicals in 2017 was 1,335 thousand of tons, which is 5.7% more than in 2016. Observed according to the toxicity class, the highest share in total exports was recorded in Class C "Very Toxic Chemicals" with 44.9%, followed by toxicity class E of "Hazardous Chemicals" with 41.1%.

Industrial production, toxicity class E, PRODCOM 20.11-20.15, Bosnia and Herzegovina, tons



Definitions:

Chemicals is any element, chemical compound or mixture of their elements and/or compounds.

Dangerous chemicals are chemicals that can be classified in at least one of the hazard classes.

Carcinogenic chemicals are chemicals that, when inhaled, ingested or penetrated through the skin, can cause cancer or increase its ability to produce.

Mutagenic chemicals are chemicals that, when inhaled, swallowed or absorbed through the skin, can cause unmatched genetic changes or increases the likelihood of their development.

Toxic chemicals are chemicals that, if it is inhaled, swallowed or absorbed through the skin, can cause unavoidable adverse effects in the offspring and/or weakness of male or female reproductive function, that is to weaken their ability or increase the likelihood of their occurrence.

Sensitive chemicals are chemicals that, when inhaled or penetrated through the skin, may cause a reaction of hypersensitivity, and the longer exposure to that chemical may cause the characteristic adverse effects.

Very toxic chemical is a chemical that in very small quantities, when inhaled, ingested or absorbed through the skin, causes death, acute or chronic health damage.

Harmful chemical is a chemical that, when inhaled, swallowed or absorbed through the skin, causes the death, acute or chronic health impairment.

PCBs - Polychlorinated biphenyls (PCBs) are a group of synthetic organic chemicals, consisting of Carbon, Hydrogen and Chlorine. There are 209 different PCB compounds. The number and arrangement of chlorine atoms in the PCB molecule determines their physical and chemical properties. These are liquid oils or waxes, colorless or slightly yellow in color, with no smell and taste. Due to their high toxicity, environmental stability (very stable compounds), bioaccumulation and biomedication capabilities, they are recognized as persistent organic pollutants and are prohibited by the Stockholm Convention on Persistent Organic Pollutants in 2001.

8.3 Persistent organic pollutants

The persistent organic pollutants are regulated globally by the Stockholm Convention and the Aarhus Protocol. These legislative acts are implemented in the European Union by the Regulation on Persistent Organic Pollutants. Chemical substances identified as persistent organic pollutants are:

- pesticides (for example DDT);
- industrial chemicals (for example polychlorinated biphenyls, which have been widely used in electrical equipment); or
- unintended by-products of industrial processes, decomposition or incineration (eg dioxins and furans).

In line with the Persistent Organic Pollutants Regulation, ECHA helps identify new persistent organic pollutants in the EU and proposes their inclusion in the Stockholm Convention. The Agency collects and processes information from Member States implementing the Regulation and draws up an EU-wide review based on it. ECHA also supports the identification of the necessary future EU measures for the Union's implementation plan for the persistent organic pollutant regulations.

Bosnia and Herzegovina has signed the Stockholm Convention on Persistent Pollutant Organs / Stockholm Convention on Permanent Pollutant Organs (Official Gazette of Bosnia and Herzegovina - MU No. 01/10). The mechanisms that have decided to implement the international agreements / conventions that have ratified Bosnia and Herzegovina are:

- National Implementation Plan for the Implementation of the Stockholm Convention on Persistent Organic Pollutants Adopted by the Council of Ministers of Bosnia and Herzegovina 10.03.2016. which includes a structure for the implementation of the Stockholm Convention.
- Decision of the Council of Ministers of Bosnia and Herzegovina on the conditions and manner of implementation of the Montreal Protocol and the gradual exclusion from the use of ozone depleting substances in Bosnia and Herzegovina (Official Gazette of Bosnia and Herzegovina Nos. 36/07 and 67/15)
- Decision on the conditions of transboundary movement of hazardous wastes in accordance with the Convention on the Control of Transboundary Movements of Hazardous Wastes and their Disposal (Official Gazette of Bosnia and Herzegovina - No. 83/16).

Initially, twelve POPs have been recognized as causing adverse effects on humans and the ecosystem and these can be placed in 3 categories:

Pesticides: aldrin, chlordane, DDT, dieldrin, endrin, heptachlor, hexachlorobenzene, mirex, toxaphene;

Industrial chemicals: hexachlorobenzene, polychlorinated biphenyls (PCBs); and

By-products: hexachlorobenzene; polychlorinated dibenzo-*p*-dioxins and polychlorinated dibenzofurans (PCDD/PCDF), and PCBs.

Currently there are over 30 chemicals on the List of Persistent Organic Pollutants (POPs) in the Convention (up to Jul 2019). The List consists of three annexes:

- **Annex A (Elimination):** The production and use of chemicals on annex A must be eliminated unless there are specific exemptions;
- **Annex B (Restriction):** The production and use of chemicals on annex B must be restricted;
- **Annex C (Unintentional Production):** Measures must be taken to reduce the unintentional releases of chemicals on Annex C.

It shall be noted that:

- 3 chemicals are listed in both Annex A and Annex C: Hexachlorobenzene (HCB), Pentachlorobenzene and Polychlorinated biphenyls (PCB);
- Even for chemicals listed on Annex A, there may be some specific exemptions. For example, Hexabromocyclododecane(HBCD) can be used in expanded polystyrene and extruded polystyrene in buildings;

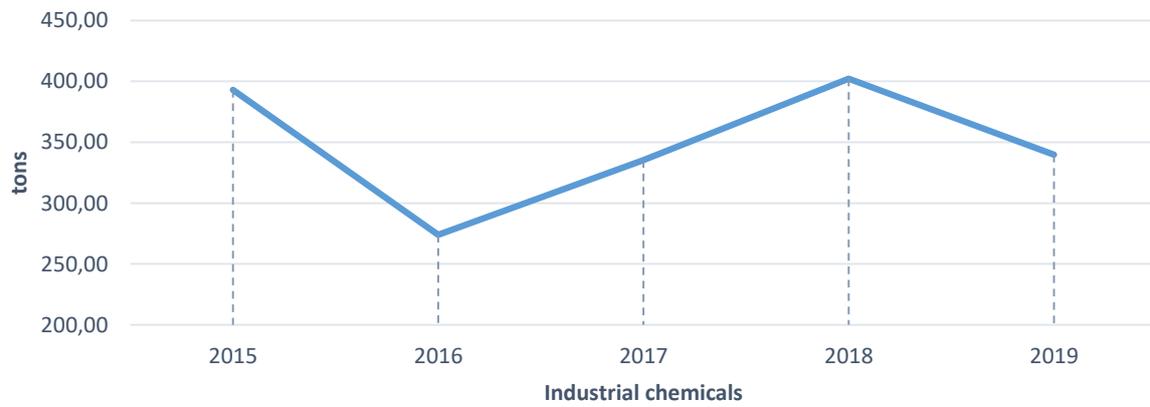
Many chemicals have multiple CAS numbers. For example, there are 2 CAS numbers for Hexabromocyclododecane(HBCD): CAS25637-99-4 and CAS3194-55-6.

Table 10: Wastes to which Article 7(4)(b) applies Regulation (EU) 2019/1021 on persistent organic pollutants

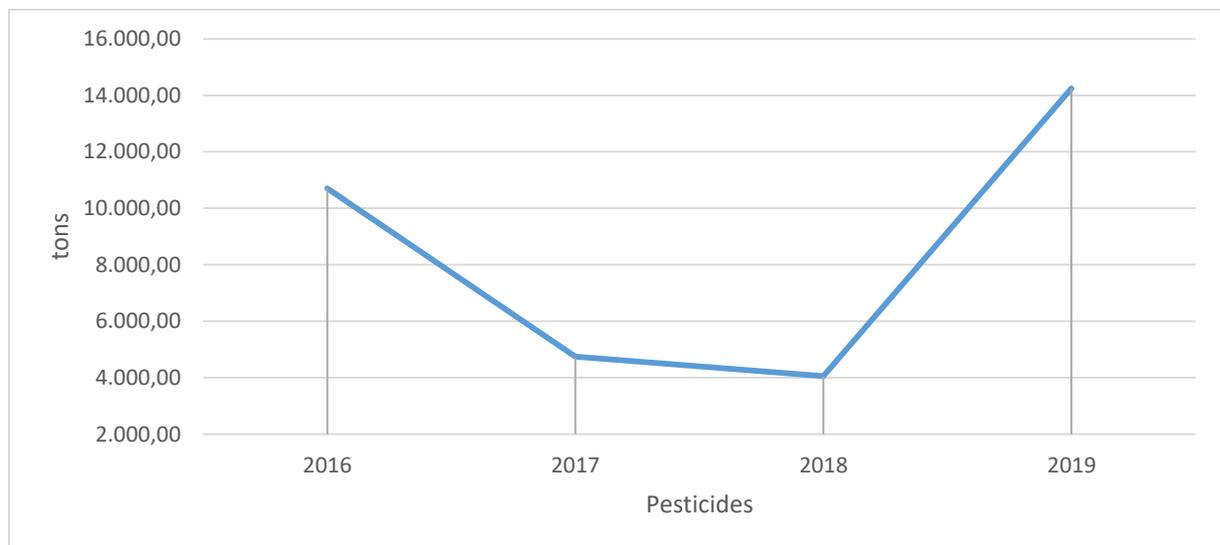
Wastes as classified in Decision 2000/532/EC		Maximum concentration limits of substances listed in Annex IV
10	WASTES FROM THERMAL PROCESSES	
10 01	Wastes from power stations and other combustion plants (except 19)	Alkanes C10-C13, chloro (short-chain chlorinated paraffins) (SCCPs):
10 01 14 *	Bottom ash, slag and boiler dust from co-incineration containing hazardous substances	
100116*	Fly ash from co-incineration containing hazardous substances	10 000 mg/kg; Aldrin: 5 000 mg/kg; Chlordane: 5 000 mg/kg; Chlordecone: 5 000 mg/kg;
10 02	Wastes from the iron and steel industry	
100207*	Solid wastes from gas treatment containing hazardous substances	DDT (1,1,1-trichloro-2,2-bis (4-chlorophenyl) ethane): 5 000 mg/kg;
10 03	Wastes from aluminium thermal metallurgy	
100304*	Primary production slags	Dieldrin: 5 000 mg/kg
100308*	Salt slags from secondary production	
100309*	Black drosses from secondary production	Endosulfan: 5 000 mg/kg;
100319*	Flue-gas dust containing hazardous substances	
100321*	Other particulates and dust (including ball-mill dust) containing hazardous substances	Endrin: 5 000 mg/kg;
100329*	Wastes from treatment of salt slags and black drosses containing hazardous substances	
10 04	Wastes from lead thermal metallurgy	Heptachlor: 5 000 mg/kg;
100401*	Slags from primary and secondary production	
100402*	Dross and skimmings from primary and secondary production	Hexabromobiphenyl: 5 000 mg/kg;
100404*	Flue-gas dust	Hexabromocyclododecane: 1 000 mg/kg;
10 04 05 *	Other particulates and dust	
10 04 06 *	Solid wastes from gas treatment	Hexachlorobenzene: 5 000 mg/kg;
10 05	Wastes from zinc thermal metallurgy	
10 05 03 *	Flue-gas dust	Hexachlorobutadiene: 1 000 mg/kg;
10 05 05 *	Solid waste from gas treatment	
10 06	Wastes from copper thermal metallurgy	Hexachlorocyclohexanes, including lindane: 5 000 mg/kg;
10 06 03 *	Flue-gas dust	Mirex: 5 000 mg/kg;
10 06 06 *	Solid wastes from gas treatment	
10 08	Wastes from other non-ferrous thermal metallurgy	Pentachlorobenzene: 5 000 mg/kg;
10 08 08 *	Salt slag from primary and secondary production	
10 08 15 *	Flue-gas dust containing hazardous substances	
10 09	Wastes from casting of ferrous pieces	
10 09 09 *	Flue-gas dust containing hazardous substances	Perfluorooctane sulfonic acid and its derivatives (PFOS) (C8F17SO2X) (X = OH, metal salt (O-M+), halide, amide and other derivatives including polymers):
16	WASTES NOT OTHERWISE SPECIFIED IN THE LIST	
16 11	Waste linings and refractories	
161101*	Carbon-based linings and refractories from metallurgical processes containing hazardous substances	
161103*	Other linings and refractories from metallurgical processes containing hazardous substances	50 mg/kg;
17	CONSTRUCTION AND DEMOLITION WASTES (INCLUDING EXCAVATED SOIL FROM CONTAMINATED SITES)	Polychlorinated Biphenyls (PCB): 50 mg/kg;
17 01	Concrete, bricks, tiles and ceramics	Polychlorinated dibenzo-p-dioxins and dibenzofurans: 5 mg/kg;
170106*	Mixtures of, or separate fractions of concrete, bricks, tiles and ceramics containing hazardous substances	
17 05	Soil (including excavated soil from contaminated sites), stones and dredging spoil	Polychlorinated naphthalenes (*): 1 000 mg/kg;
170503*	Soil and stones containing hazardous substances	
17 09	Other construction and demolition wastes	Sum of the concentrations of tetrabromodiphenyl ether (C12H5Br5O), pentabromodiphenyl ether (C12H5Br6O), hexabromodiphenyl ether (C12H5Br7O), and heptabromodiphenyl ether (C12H5Br8O):
170902*	Construction and dem. wastes containing PCB, excluding PCB containing equipment	
170903*	Other construction and demolition wastes (including mixed wastes) containing hazardous substances	
19	WASTES FROM WASTE MANAGEMENT FACILITIES, OFF-SITE WASTE WATER TREATMENT PLANTS AND THE PREPARATION OF WATER INTENDED FOR HUMAN CONSUMPTION AND WATER FROM INDUSTRIAL USE	
19 01	Wastes from incineration or pyrolysis of waste	diphenyl ether (C12H4Br6O) and heptabromodiphenyl ether (C12H3Br7O):
190107*	Solid wastes from gas treatment	10 000 mg/kg;
190111*	Bottom ash and slag containing hazardous substances	
190113*	Fly ash containing hazardous substances	Toxaphene: 5 000 mg/kg.
190115*	Boiler dust containing hazardous substances	
19 04	Vitrified waste and waste from vitrification	
190402*	Fly ash and other flue-gas treatment wastes	
190403*	Non-vitrified solid phase	

Interpretation

Import of persistent organic pollutants - Industrial chemicals, BiH, tonnes



Import of persistent organic pollutants - Pesticides, BiH, tonnes



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11. ANNEXES

Annex I - Annual survey on municipal waste collectors (KOM-6aS)

Annex II - Annual survey on waste brought to landfill sites (KOM-6aD)

Annex III - Annual survey on collected waste from production and service activities (OTP)

Annex IV- Annual survey on waste recycling/disposal (OTP-P)

Annex V - Explanatory symbols and abbreviations

ANNEX I Annual survey on municipal waste collectors (KOM-6aS)

The table is filled in by companies that have been granted the municipality the right to collect municipal waste, regardless of whether they only collect waste or at the same time manage and land the waste.

Table 1 Collected municipal waste¹⁾ by type of waste, source of origin and method of waste treatment, in tonnes

WASTE TYPE ²⁾		ANNUAL QUANTITY OF COLLECTED WASTE 2 = 3 + 4 + 5 2 = 6 + 7 + 8 + 9 + 10	SOURCE OF COLLECTED WASTE Collected by public transport, in tonnes			WAYS OF MANAGEMENT OF COLLECTED WASTES					Waste exported to other countries ton	
						Disposal of waste to landfills		Waste taken care on other ways (describe the procedure applied in the Note on the first page of the form)	The amount of waste is handed over to another firm for further processing (collecting, removing or processing)	Be sure to enter the name of the company to which the waste is handed over for further treatment.		
						Landfill 1	Landfill 2					ton
Classification number of waste	Name of waste ¹⁾	ton	From households	From manufacturing, service activities and other activities ¹⁾	From public utility services (park maintenance, street and market cleaning)	Municipal Settlement You manage the landfill yourself ³⁾ 1 - Yes 2 - No	Municipal Settlement You manage the landfill yourself ³⁾ 1 - Yes 2 - No	ton	ton	ton	b	
1	a	2	3	4	5	6	7	8	9	b	10	
99	TOTAL QUANTITY (rows 1 +15 +19 +27), in tonnes											
1	20 01 Separately collected waste (excluding packaging waste - 15 01)											
2	20 01 01 paper and cardboard											
3	20 01 Glass											
4	20 01 biodegradable waste (from kitchen and canteen)											
5	20 01 textile											
6	20 01 31* cytotoxics and cytostatics											
7	20 01 medicines other than those mentioned in 20 01 31											
8	20 01 35* discarded electrical and electronic equipment containing hazardous components											
9	20 01 discarded electrical and electronic equipment that does not contain mercury and hydrofluorocarbons											
10	20 01 wood											
11	20 01 Plastic											
12	20 01 metals											
13	20 01 other types of separately collected non-hazardous waste ⁴⁾											
14	20 01 other types of separately collected hazardous waste ⁵⁾											

¹⁾ Municipal waste - from households, including bulk and similar waste from shops, industrial plants, business buildings, institutions and small enterprises, gardens, from street cleaning, market (excluding construction and demolition waste).

²⁾ Rulebook on waste categories with lists ("Official Gazette of the Federation of BiH" no. 9/05).

³⁾ Circle option 1 or 2 (if you have circled the option "1" you need to fill in **Report on waste deposited at landfills, KOM-6aD**

⁴⁾ Other types of separately collected non-hazardous waste include edible oils and fats, non-greasy paints, inks, adhesives, laundry detergents, batteries and accumulators that do not contain hazardous components, waste from cleaning the chimney ...

WASTE TYPE ²⁾		ANNUAL QUANTITY OF COLLECTED WASTE 2 = 3 +4 +5 2 = 6 +7 +8 +9 +10	SOURCE OF COLLECTED WASTE			Waste management methods						
			Collected by public transport, in tonnes			Disposal of waste to landfills		Waste taken care on other ways (describe the procedure applied in the Note on the first page of the form)	The amount of waste is handed over to another firm for further processing (collecting, removing or processing)	Be sure to enter the name of the company to which the waste is handed over for further treatment.	Waste exported to other countries	
Classification number of waste	Name of waste ¹⁾	ton	From households	From manufacturing, service and other activities	From public utility services (park maintenance, street and market cleaning)	Municipality	Municipality					ton
						Settlement	Settlement	You manage the landfill yourself ³⁾ 1 - Yes 2 - No	You manage the landfill yourself ³⁾ 1 - Yes 2 - No			
1	a	2	3	4	5	6	7	8	9	b	10	
15	20 01	waste from gardens and parks (including waste from the cemetery)										
16	20 01	biodegradable waste										
17	20 01	soil and rocks										
18	20 01	other non-biodegradable waste										
19	20 03	other municipal waste										
20	20 03 01	mixed municipal waste										
21	20 03	waste from the market										
22	20 03	waste from street cleaning										
23	20 03	sludges from septic tanks										
24	20 03	waste generated by sewage cleaning										
25	20 03	bulk waste										
26	20 03	municipal waste which is not specified otherwise										
27	15 01	packaging (including separately collected municipal waste packaging)										
28	15 01	Paper and cardboard packaging										
29	15 01	plastic packaging										
30	15 01	wooden packaging										
31	15 01	metal packaging										
32	15 01	multilayer (composite) packaging										
33	15 01	mixed packaging										
34	15 01	glass packaging										
35	15 01	textile packaging										
36	15 01 10 *	packaging containing residues or contaminated with dangerous substances										
37	15 01 11 *	metal packaging containing hazardous substances (e.g. asbestos), including empty spray doses										

Table 2: Communal waste collected by a utility company, by municipalities

d i n a l n u m b e r	SOURCE OF WASTE					
	The name of the municipality in whose territory the waste is collected	ID number of the municipality ¹⁾	Number of settlements using the public waste disposal service ^{1) 2)}	Number of households covered by the public waste disposal service	Percentage of residents of the municipality that use the public waste disposal service	Total annual amount of collected waste ³⁾
					%	ton
1	a	b	1	2	3	4
1						
2						
3						
4						
5						
6						
7						
8						
9						
10						
11	TOTAL (1 to 10)					

¹ The register of municipalities / settlements of F BiH
http://fzs.ba/wp-content/uploads/2016/06/sif_naselja.pdf
<http://fzs.ba/index.php/2017/01/16/7192/>

² The number includes those populated places where waste is partially collected

³⁾ Only show those quantities of waste that were collected during the performance of the public utility waste management service
 Display volumes in tonnes, round to one decimal place

ANNEX IV Table 1: WASTE TREATMENT

The table is filled in by the companies that perform the activity of collecting / processing / disposing of waste. →

Own waste as a result of the company's activities will not be shown in this questionnaire, but the results should be filled in the Questionnaire on waste production in production activities - OTP

Regular number	TYPE OF WASTE		QUANTITY OF TAKEN / COLLECTED AND WASTE FROM STOCKS							HANDLING WITH TAKEN / COLLECTED AND WASTE FROM STOCKS								
	Classificati on No. of waste ¹⁾	Name of waste ¹⁾	TOTAL QUANTITY OF WASTE (3=4+5+6+7) (3=8+9+10+11)	Quantities of waste TAKEN of others			Code of import 1- from EU countries 2 - outside EU countries	Quantities of COLLECTED waste	The amount of waste from last year (STOCKS) by the day 01.01.	TEMPORARY STORAGE - state by the day 31.12.	Processed quantities of waste ²⁾		REMOVED waste quantities ²⁾		Quantities of waste DELIVERED to others for further treatment		If the column "e" indicated the code "1", write the name of the company which was handed over to the waste for further treatment	
				in the territory of the state	Name of company /person from which waste was taken	imported from other countries					quantity	code "R"	quantity	code "D"	in country1	exported in EU2		exported in countries wh are not in EU....3
1	2	a	3	4	5	b	6	7	8	9	c	10	d	11	e	f		
01																		
02																		
03																		
04																		
05																		
06																		
07																		
08																		
09																		
10																		
11																		
12																		

¹⁾For the classification number and waste name, see the Regulations on waste categories with lists ("Official Gazette of the Federation BiH", No. 9/05).

http://bhas.ba/Arhiva/Klasifikacije/WST_CLA_2009_005_01-BH.pdf

²⁾Processes of processing ("R") and disposal ("D") of waste are listed on the back of the questionnaire.

Removal procedures "D" (incineration, other methods of disposal) and "R" processing operations (recycling, composting, other processing methods) should be described in detail in the Notes on the first page

Annex V

Explanatory symbols and abbreviations

Abbreviations	Clarification
BHAS	Agency for Statistics of BiH
BiH	Bosnia and Herzegovina
BDP	Bruto Domestic Product
CAS	Unique identification number of a chemical substance
CN	Combined Nomenclature
DMC	Domestic Material Consumption
Ekopak	System operator of packaging waste management
EW-MFA	Economy-wide Material Flow. Accounts
EWC-Stat	Substance oriented waste statistical nomenclature
Eurostat	European Statistical Office
EEE	Electrical and electronic equipment
E&E waste	Electrical and electronic waste
EU	European Union
GDP	Gross Domestic Product
GHG	Greenhouse gases
HHW	Household Hazardous waste
HS	Harmonized System of tariff nomenclature
IED	Industrial Emissions Directive (Integrated Pollution Prevention and Control
KOM-6aD	Statistical survey "Disposal of municipal waste"
KOM-6aS	Statistical survey "Public Utility Waste Disposal"
LoW	List of Waste
KD BiH	Classification of economic activities in BiH
KM	Convertible mark
MSW	Municipal solid waste
NACE Rev.2	Statistical classification of economic activities in the European Community
OTP	Statistical survey "Waste from production and service activities"
OTP-P	Statistical survey "Waste treatment and disposal"
PCB	Polychlorinated biphenyls
PRODCOM	Nomenclature of industrial products
REI	Resource efficiency indicator
REACH	European Regulation on Registration, Evaluation, Authorisation and Restriction of Chemical
RP	Resource Productivity
SDG	The Sustainable Development Goals
TPR	The toxic persistence rating
WStatR	Waste Statistics Regulation
WEEE Directive	Directive on waste electrical and electronic equipment
WFD	Waste Framework Directive
UNECE	The United Nations Economic Commission
UNEP	The United Nations Environment Programme
ZEOS	System operator of waste electrical and electronic equipment

