

# Review 02

EN

## EU actions to address the increasing amount of hazardous waste



EUROPEAN  
COURT  
OF AUDITORS

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## Executive summary

I Hazardous waste has the potential to harm human health and the environment. It has therefore been subject to restrictive regulation in the EU. These rules aim at ensuring a common definition of hazardous waste and that such waste is managed properly, through a stricter control regime than applied to other waste.

II The increase in hazardous waste poses several challenges and it is thus timely to review the EU's management of it. This review provides an overview of the EU's role and actions to tackle hazardous waste, and of the challenges and opportunities arising from its prevention and treatment. The Commission and EU co-legislators could consider it in their ongoing updates of relevant legislation. This is not an audit report; it is a review mainly based on publicly available information or material specifically collected for this purpose.

III The EU **defines** hazardous waste as waste displaying one or more specific dangerous properties. This classification process is essential to limit the potential harmful impact of hazardous waste, but is affected by the inconsistent classification of hazardous waste amongst Member States.

IV **Preventing** hazardous waste from being produced in the first place is the best way to address such waste. Since 1991, hazardous waste prevention has been an EU priority. EU action has focused on influencing the way economic operators design and manufacture products, on making polluters responsible for their waste, and on providing consumers with better information on the presence of hazardous substances. Despite all these initiatives, the amount of hazardous waste generated in the EU has continuously increased since 2004.

V When generation cannot be avoided, hazardous waste has to be **treated** by dedicated treatment facilities respecting strict rules and safety requirements. However, the safe treatment of hazardous waste is still hampered by difficulties, such as in ensuring that hazardous waste is not mixed with other types of waste and in registering and tracing hazardous waste reliably. EU data on how hazardous waste is treated only accounts for 79 % of the hazardous waste generated, leaving a gap of 21 %.

**VI** When treated, hazardous waste should preferably be prepared for reuse, followed by recycling, energy recovery, and – as a last resort – its disposal. Available data indicates that more than half of the hazardous waste we generate in the EU is disposed of, and reuse and recycling account for 34 %. Some hazardous wastes streams are technically difficult to recycle on a large scale or in an economically viable way. When this is possible, recycling facilities encounter difficulties to decontaminate waste or to find market opportunities for the recycled outcome.

**VII** The stricter management and safety rules applied to hazardous waste impose extra administrative burden and higher treatment costs on economic operators. This creates the risk of **hazardous waste trafficking**, whereby operators do not declare the waste generated as hazardous, and **dump it illegally** in the EU or **ship it illegally** in and outside the EU – this is what is usually referred to as “illegal trafficking of hazardous waste”.

**VIII** We highlight several challenges in the management of hazardous waste in the EU. The EU has to address the problems of:

- the increasing amount of hazardous waste, and the low level of prevention of the generation of hazardous waste;
- the inconsistent classification of hazardous waste;
- the 21 % gap between the reported amounts of hazardous waste generated and treated, and the traceability from generation to final treatment not being fully ensured;
- the disposal of more than half of hazardous waste, while the recycling rate remains unchanged;
- the risk of illegal trafficking of hazardous waste.

# Introduction

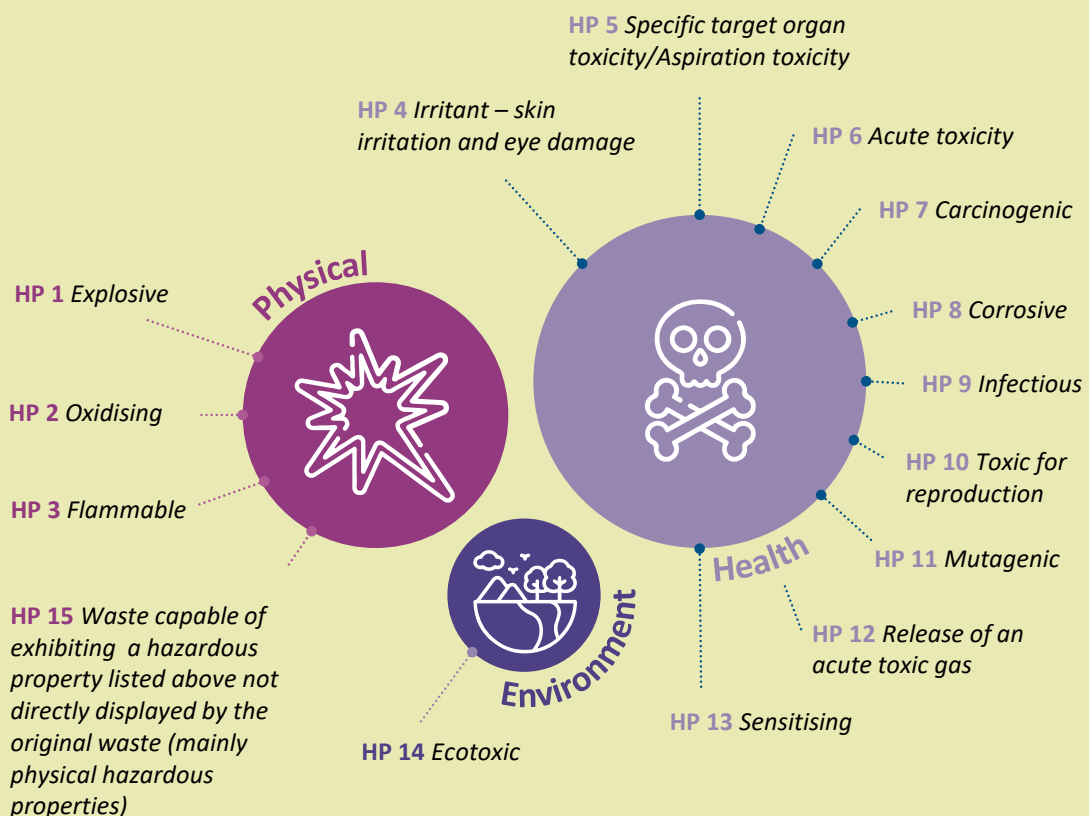
## Hazardous waste

**01** EU legislation defines hazardous waste as waste displaying one or more hazardous properties, for example explosive, irritant or toxic (see [Box 1](#)).

### Box 1

#### Definition of hazardous waste

The [Waste Framework Directive](#) (Article 3(2)) defines hazardous waste as waste that displays one or more of the 15 hazardous properties listed in Annex III of the Directive:

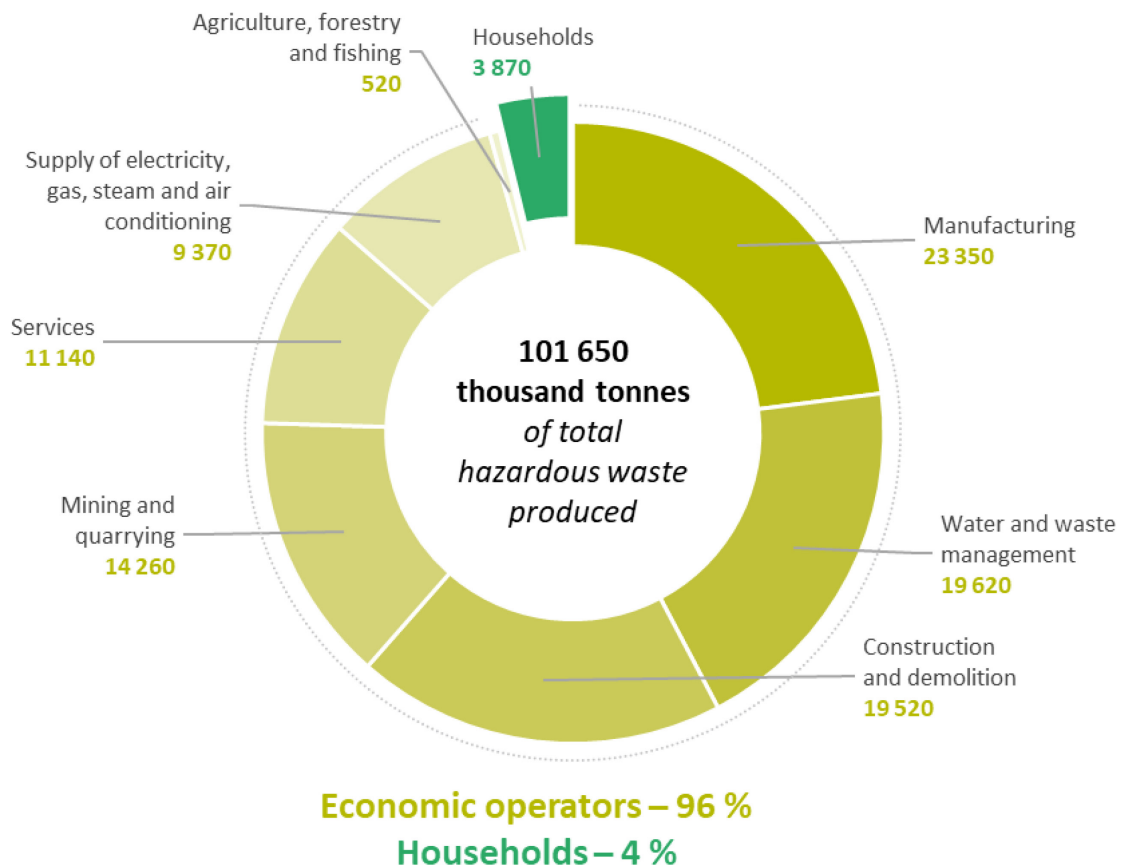


Source: ECA, based on the [Waste Framework Directive](#).

**02** Hazardous waste can affect human health when inhaled, touched or ingested. It can cause severe illness, birth defects, sterility, cancer or even death. Hazardous waste can also contaminate the environment by causing soil, air and water pollution and a degradation of ecosystems. Such waste can cause physical reactions such as explosions, form toxic vapours or present immediate fire hazards.

**03** Hazardous waste can take various forms: solid, liquid, pasty and gaseous. A wide range of activities generates hazardous waste, with most hazardous waste being generated by economic operators (see [Figure 1](#)).

**Figure 1 – Main activities generating hazardous waste in the EU in 2018, thousand tonnes**



Source: ECA, based on Eurostat data.

**04** The main sectors contributing to the generation of hazardous waste are manufacturing (especially metals), water and waste treatment, construction, and mining – together representing 75 % of the hazardous waste generated in the EU. For example, both the mining and metal industries generate toxic heavy metals as waste<sup>1</sup>. Similarly, wastewater treatment generates sewage sludge, which may contain heavy metals and pathogens<sup>2</sup>.

**05** As regards households, typical examples of hazardous wastes they generate are certain medicines, used batteries, nail polish, garden pesticides, cleaning products, paints, solvents, fluorescent lamps or electronic appliances<sup>3</sup>.

**06** In 2018, mineral and solidified waste (mainly soils, construction and demolition waste) accounted for over half of the total hazardous waste generated in the EU, followed by chemical and medical wastes (26 %), as shown in *Figure 2*.

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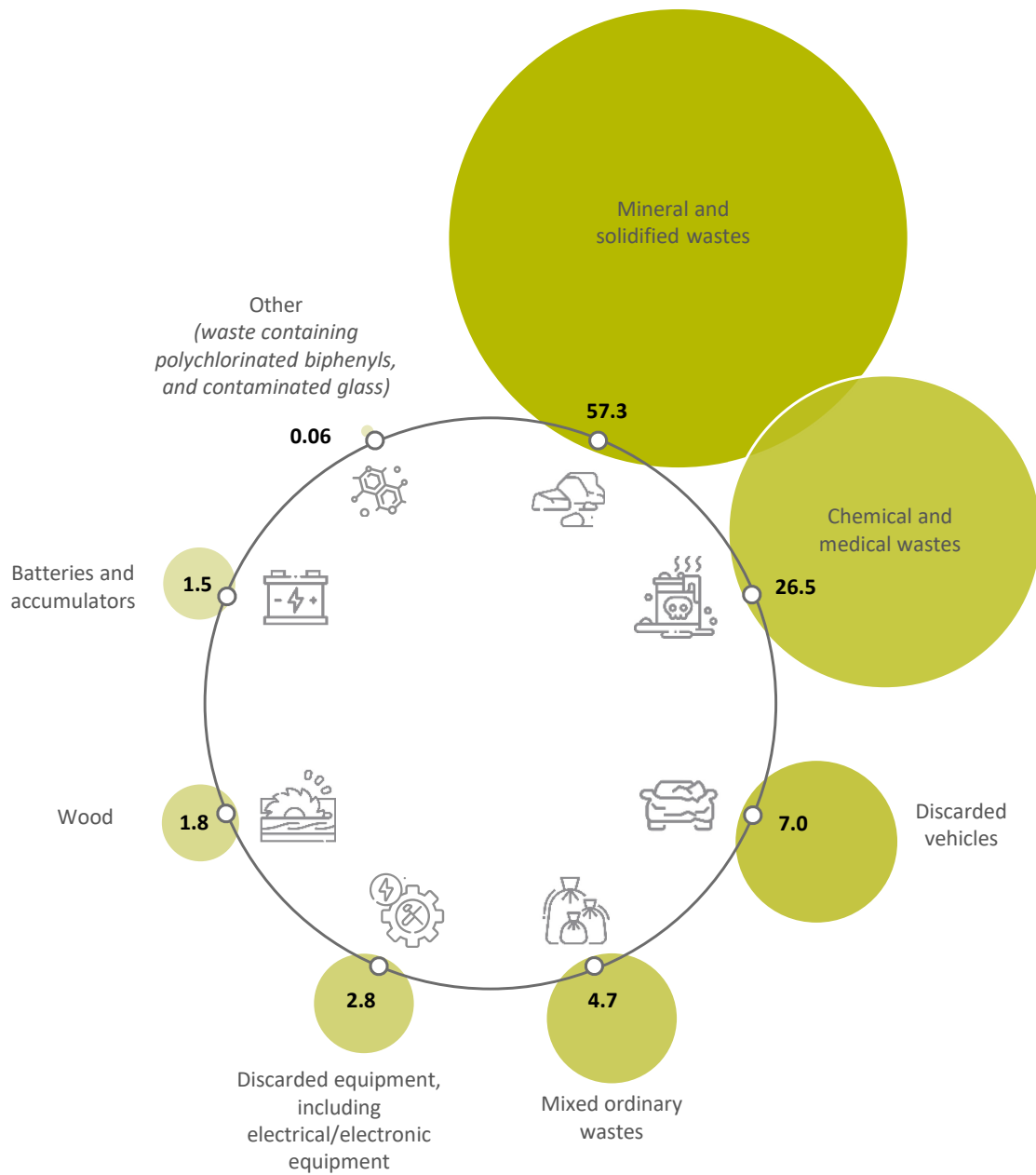
<sup>1</sup> [United Nations Environment Programme webpage on heavy metals.](#)

<sup>2</sup> [Commission webpage on sewage sludge.](#)

<sup>3</sup> [Commission notice on separate collection of household hazardous waste, 2020/C 375/01.](#)



**Figure 2 – Main hazardous waste streams generated in the EU in 2018  
(in million tonnes)**

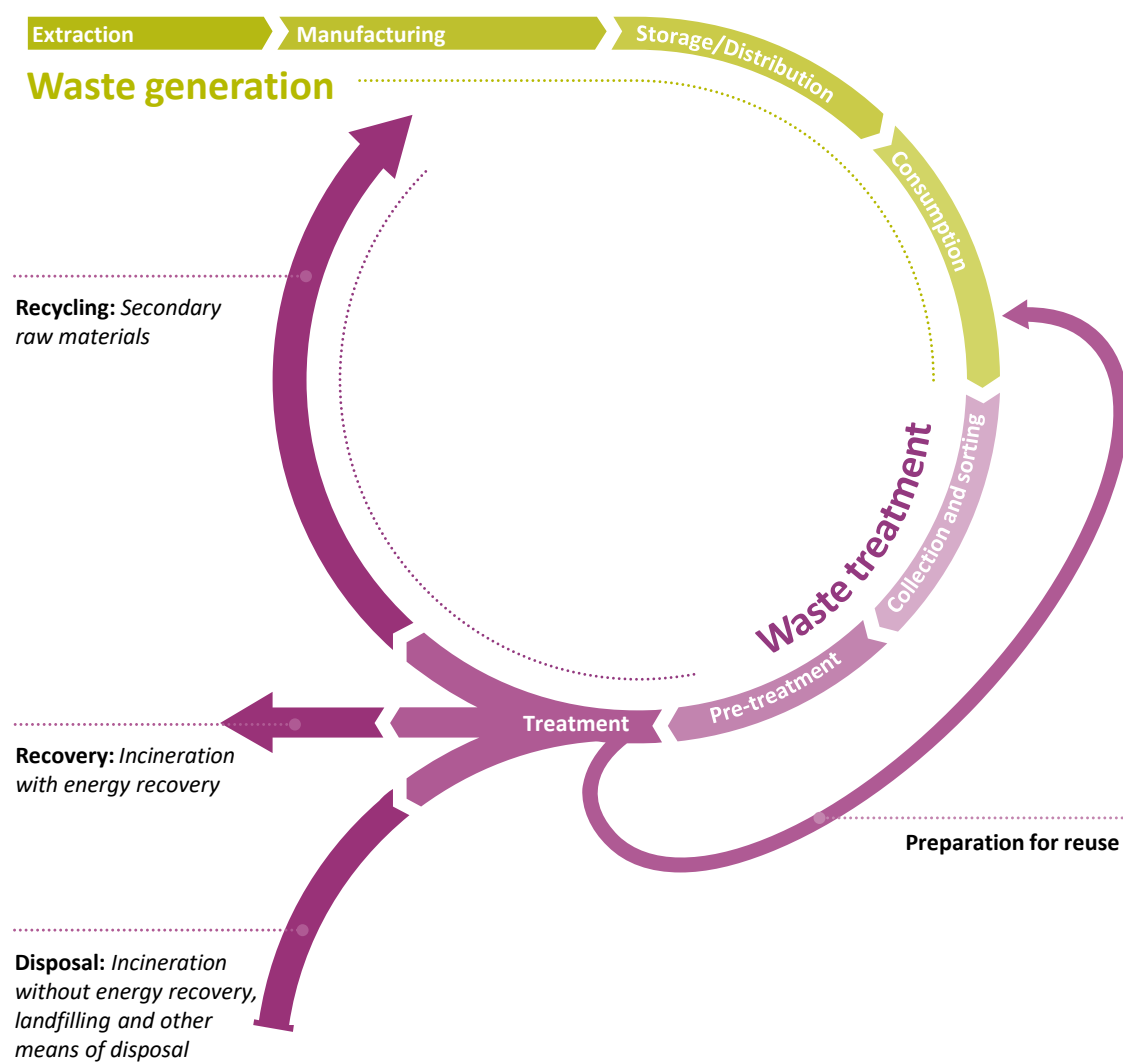


Source: ECA, based on Eurostat data.

## Lifecycle of hazardous waste

**07** All steps in a product's lifecycle can generate hazardous waste, which must then be treated (see [Figure 3](#)).

**Figure 3 – The hazardous waste process**



Source: ECA, based on the [European Environment Agency report](#) and the [Waste Framework Directive](#).

**08** Economic operators can prevent the production of hazardous waste by limiting the presence of dangerous substances in products<sup>4</sup> and by replacing hazardous substances with safer alternatives<sup>5</sup>. Initiatives to promote product longevity, safer use of chemicals, and penalising polluters can also contribute to limiting the generation of hazardous waste.

**09** Once generated, hazardous waste can be prepared for reuse, recycled, recovered in energy, or, as a last resort, disposed of (e.g. incineration without energy recovery, landfilling). For example<sup>6</sup>, up to 70 % of used solvents can be recycled into ready-to-use solvents. Some pharmaceuticals, e.g. chemotherapy medicines, or chemical weapons must be destroyed through high-temperature incineration. Residue from hazardous waste incineration is systematically landfilled. The choice of treatment depends on the nature of the hazardous waste, availability of treatment facilities, but also on economic considerations.

**10** Hazardous waste can be treated in the country of origin, sent to another Member State or shipped outside the EU. Member States can ship hazardous waste outside the EU only to OECD countries, for recycling or recovery<sup>7</sup>. For disposal, extra-EU shipments are limited to the European Free Trade Association countries<sup>8</sup>. The EU also imports hazardous waste from the rest of the world.

## Hazardous waste is increasing

**11** Reducing the generation of waste, including hazardous waste, and “decoupling” waste generation from economic growth, is a primary objective of EU waste and circular economy policies<sup>9</sup>.

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<sup>4</sup> Article 9(1 i) of [Waste Framework Directive](#).

<sup>5</sup> [European Chemicals Agency webpage on substitution to safer chemicals](#).

<sup>6</sup> [Hazardous Waste Europe and EURITS](#).

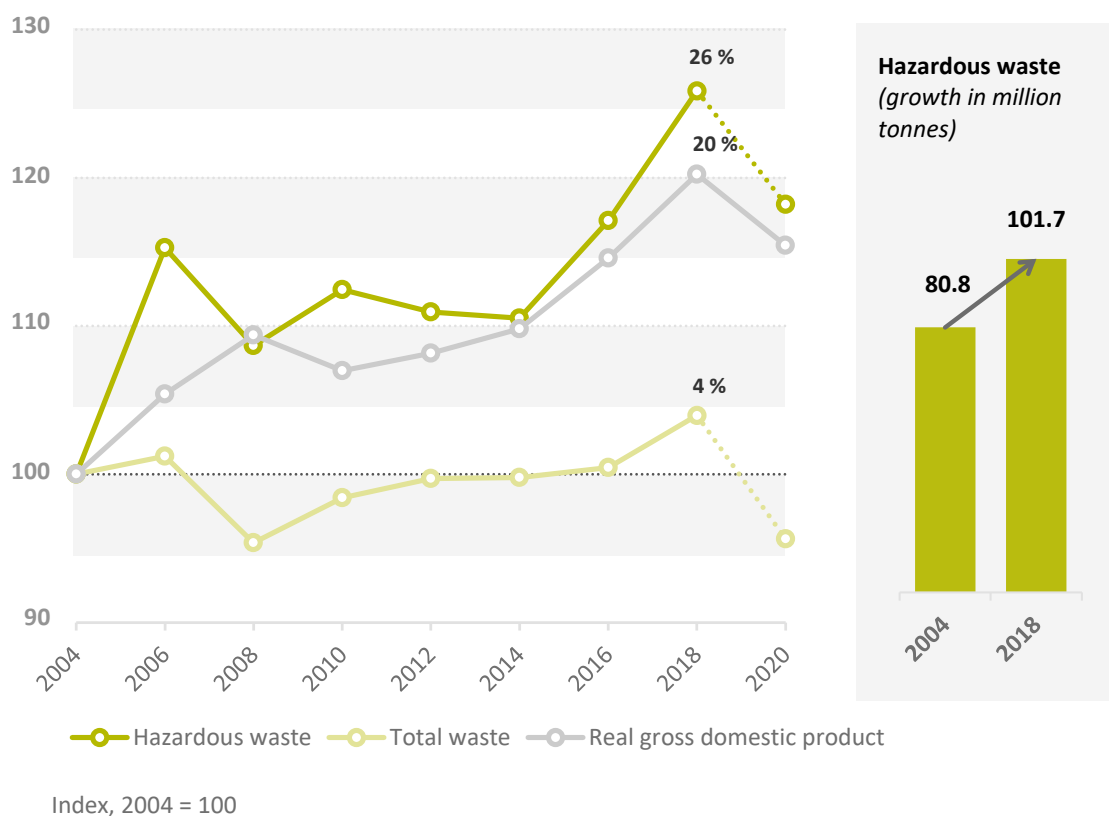
<sup>7</sup> [Basel Convention](#), ratified by the EU in 1998.

<sup>8</sup> Article 34 of [Regulation \(EC\) No 1013/2006](#) on shipments of waste.

<sup>9</sup> European Environment Agency, [Waste generation and decoupling in Europe](#), 2021.

**12** In 2018, around 102 million tonnes of hazardous waste were generated in the EU, representing 4 % of all waste generated. **Figure 4** shows that hazardous waste in the EU increased by 26 % from 2004 to 2018, from 80.8 million tonnes to 101.7 million tonnes. However, according to the Commission, this increase is mostly due to better reporting on hazardous waste generation.

**Figure 4 – Generation of hazardous waste in the EU since 2004**



*Note:* Only provisional data available for waste in 2020.

*Source:* ECA, calculated based on Eurostat data on generation of [hazardous waste](#), of [waste](#) and [gross domestic product](#).

**13** Provisional statistics for hazardous waste generated in the EU in 2020, published by Eurostat in September 2022, show a decrease of hazardous waste, due to the effect of the COVID-19 pandemic. As this data is incomplete and will be subject to further updates, we have decided to exclude it for the analysis of the next sections.

**14** As shown in [Figure 4](#), the gross domestic product in the EU increased by around 20 % from 2004 to 2018. This could be expected to lead to an increase in waste production, including hazardous waste. While overall waste increased by 4 %, indicating a decoupling from economic growth, hazardous waste increased by 26 %. Driven by global megatrends such as continuing urbanisation, the rise in consumption and accelerating technological change, the chemical-intensive industrial sectors (e.g. construction or electronics) are expected to grow<sup>10</sup>, which could lead to more hazardous waste.

## Roles and responsibilities

**15** In the area of waste management, the Commission (mainly the Directorate-General for Environment), together with the EU legislative authorities, is responsible for setting EU priorities. The Commission proposes policies, including new legislation. The European Environment Agency supports the Commission in the policy-making process. The Commission does not have an implementing role, but supervises how Member States implement EU requirements for hazardous waste.

**16** Eurostat is responsible for collecting statistics from Member States on waste, and for performing quality checks on the data. It publishes data on the generation and treatment of hazardous waste every two years, and on intra and extra-EU shipments every year.

**17** Member States are responsible for the enforcement of legal requirements regarding waste management at national level. They must transpose EU legislation into national rules, and set up and implement waste management plans and waste prevention programmes. These plans must include provisions for hazardous waste.

**18** The Commission may launch infringement procedures against Member States in cases of absence of or incorrect transposition of EU legislation covering hazardous waste, or systemic non-compliance with EU requirements.

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<sup>10</sup> United Nations Environment Programme, [Global Chemical Outlook II: Summary for policy makers](#), 2019.

## Review scope and approach

**19** The increase in hazardous waste poses multiple threats to human health and the environment. It is therefore timely to review the EU's management of such waste. This review provides an overview of the EU's role and actions to tackle hazardous waste, and of the challenges and opportunities arising from its prevention and treatment. We covered the period from 2004, when data on hazardous waste became available at EU level, until September 2022. We identified key future challenges for the EU in dealing with hazardous waste.

**20** This is not an audit report; it is a review mainly based on publicly available information or material specifically collected for this purpose, such as public documents of the Commission (Directorate-General Environment and Eurostat), the European Environment Agency, and the European Parliament Research Service. We used the reports published by ECA on the polluter pays principle<sup>11</sup>, electrical and electronic waste<sup>12</sup>, and plastic waste<sup>13</sup>. We interviewed Commission staff and consulted experts in the field (e.g. Europol, stakeholders from industry and civil society). We also visited two facilities in France specialised in hazardous waste to get a practical understanding of different treatment methods.

**21** The publication of this review at the beginning of 2023 provides an opportunity for the European Parliament and the Council to include it in their current debate on the update of relevant legislation, such as the [Waste Shipment Regulation](#) and the [Directive on the protection of the environment through criminal law](#). The Commission could also take it into account in its future reviews of the [Waste Framework Directive](#).

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<sup>11</sup> [Special report 12/2021](#): The Polluter Pays Principle – Inconsistent application across EU environmental policies and actions.

<sup>12</sup> [Review 04/2021](#): EU actions and existing challenges on electronic waste.

<sup>13</sup> [Review 04/2020](#): EU action to tackle the issue of plastic waste.

# EU initiatives to manage hazardous waste

## EU legal and policy framework on hazardous waste

**22** The [Waste Framework Directive](#) is the overarching legislation regulating hazardous waste in the EU. Its main aim is to prevent and reduce the negative impacts caused by waste. To this end, Member States have to manage hazardous waste in accordance with three key principles:

- the **principle of the waste hierarchy**, with waste prevention and preparation for reuse being the most preferred options, followed by recycling, energy recovery and waste disposal as a last resort;
- the **precautionary principle**, through the reduction of hazardous substances in waste as a precautionary measure; and
- the **principles of polluter pays and producer responsibility**, to ensure that those who generate waste or contaminate the environment should bear the full costs of their actions.

**23** The [Waste Framework Directive](#) also defines stricter rules for managing hazardous waste compared to non-hazardous, such as:

- the obligation for Member States to ensure traceability via electronic registries of hazardous waste from its generation to final destination;
- a mixing ban, meaning that hazardous waste cannot be mixed, either with other categories of hazardous waste or with other waste;
- specific labelling and packaging obligations for the collection, transport and temporary storage of hazardous waste;
- treatment of hazardous waste allowed only in specially designated treatment facilities that have obtained a permit; and
- compulsory separate collection for hazardous waste produced by households from 2025.

**24** The EU legal framework for hazardous waste is completed by directives and regulations dealing with specific waste management operations (e.g. the shipment of waste or its landfilling), and with specific waste streams (e.g. end-of-life vehicles or batteries). This framework does not prescribe targets to reduce the generation of hazardous waste or influence its treatment. *Annex I* provides an overview of the applicable legislation.

**25** The Commission can enforce EU legislation in the Member States by launching infringement procedures. The Commission launched 216 such procedures over the last three decades (see *Annex II*). Most of the procedures concern the need to reduce the use of hazardous substances in electrical and electronic equipment. An example is shown in *Box 2*.

## Box 2

### Example of enforcement of hazardous waste rules through legal measures

In 2003, the Commission launched an infringement procedure against Greece for not planning and managing hazardous waste as required by several EU Directives. The procedure concerned a lack of adequate planning for the management of hazardous waste, the absence of a network of installations to deal with such waste and the failure to adopt the necessary measures to ensure a proper management of hazardous waste.

In 2009, the European Court of Justice issued a [judgement](#) requesting Greece to take immediate action on these matters.

By 2016, Greece had not taken action. The Court of Justice therefore imposed €30 000 per day of penalty until all necessary measures were implemented, and fined the Member State €10 million<sup>14</sup>.

Greece started to take action in 2017. According to the Commission, in June 2021, Greece had not fully addressed the shortcomings identified almost two decades ago.

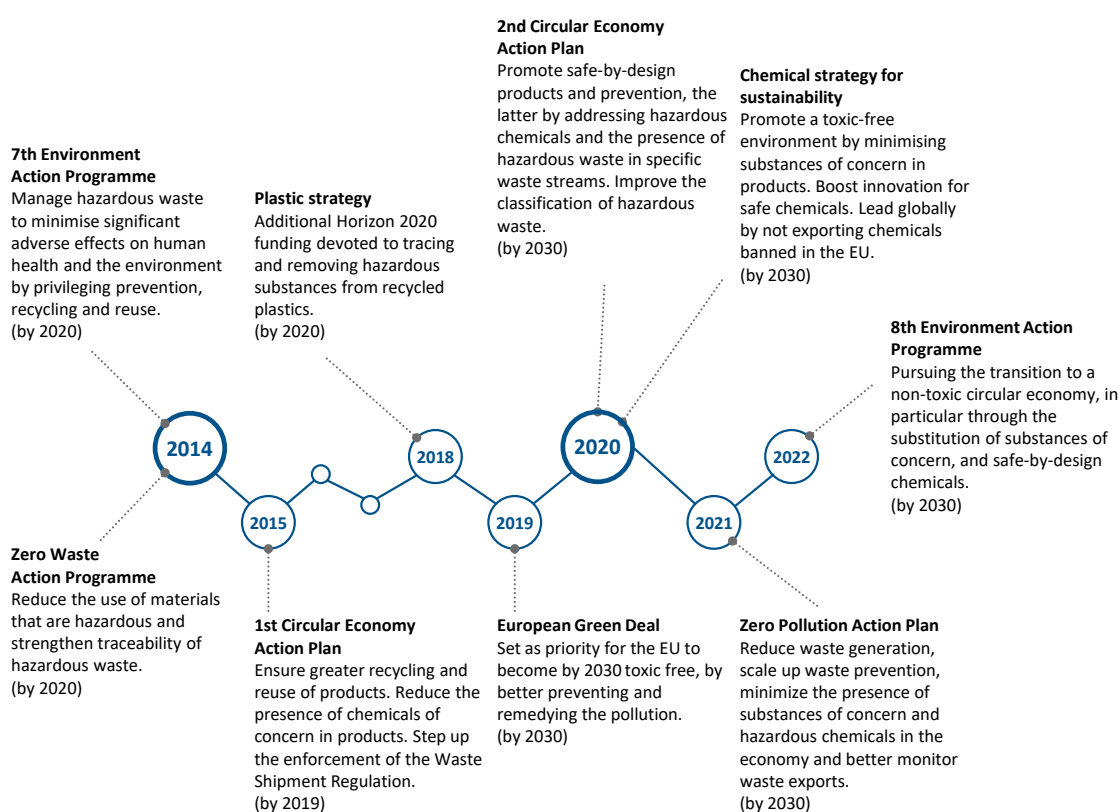
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<sup>14</sup> Judgment of the European Court of Justice, [Case C-584/14](#).



**26** In the wider policy framework, hazardous waste is not singled out in the EU's political agenda, but is covered by a series of strategies and policies (see [Figure 5](#)). These documents overall point to the need to protect human health and the environment from hazardous substances and therefore the need to prevent the generation of hazardous waste or ensure its proper treatment.

**Figure 5 – EU strategies and policies covering hazardous waste**



Source: ECA, based on European Commission documents.

## EU funding related to hazardous waste

**27** The Commission has an overview of the EU funding for waste management in general, with €4.3 billion of EU funds allocated for the 2014-2020 programming period<sup>15</sup>, but not for hazardous waste specifically. Available data indicates that such funding is mainly provided through [Horizon 2020](#) for research and capacity building. We could link 163 projects financed under [Horizon 2020](#) to hazardous waste for the

<sup>15</sup> Cohesion policy data on EU support to waste management.

period 2014-2020, which amount to €1.2 billion of EU contribution (1.6 % of the overall Horizon 2020 budget).

**28** The second largest contributor to the financing of hazardous waste management are the [Cohesion](#) and [European Regional Development](#) Funds. For the 2014-2020 programming period the Commission allocated around €370 million<sup>16</sup>, or 8.6 % of these funds, to infrastructure projects for the treatment of commercial, industrial and hazardous waste.

**29** The EU also finances environmental and climate action in the area of hazardous waste through [LIFE](#). Data for 2014-2020 lists 14 projects on hazardous waste, with a total funding of €17.9 million (6 % of the [LIFE](#) funds spent on waste projects). **Box 3** shows examples of EU projects funding hazardous waste management.

### Box 3

#### Examples of EU projects funding hazardous waste management

##### Recycling and reusing hazardous fly ash, a LIFE funded project

A [project in Sweden and Denmark](#) co-financed the development of a facility to recycle and reuse fly ash resulting from a waste incineration plant in Denmark.

Fly ash are particles found in gases released when waste is incinerated. They often contain chlorides and heavy metals, and are classified as hazardous waste. Hazardous fly ash is landfilled. In Sweden alone, around 150 000 tonnes per year of this ash are transported to be disposed of in a disused limestone quarry in Norway.

##### Treating highly toxic waste in the oil and petrochemical industry, a Horizon 2020 funded project

A [project in Spain](#) funds the development of a plant using an innovative process for the low-cost treatment of spent caustic. Spent caustic is a highly toxic waste resulting from the oil and petrochemical refining industries, classified as hazardous waste. Treating used caustic through existing processes is difficult and expensive, resulting in large stockpiles of this hazardous waste accumulating at refineries.

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<sup>16</sup> Cohesion policy data on commercial, industrial or hazardous waste management.

**30** As a complement to the EU budget, both the [Recovery and Resilience Facility](#) and the [European Investment Bank](#) provide funding for waste management, including hazardous waste.

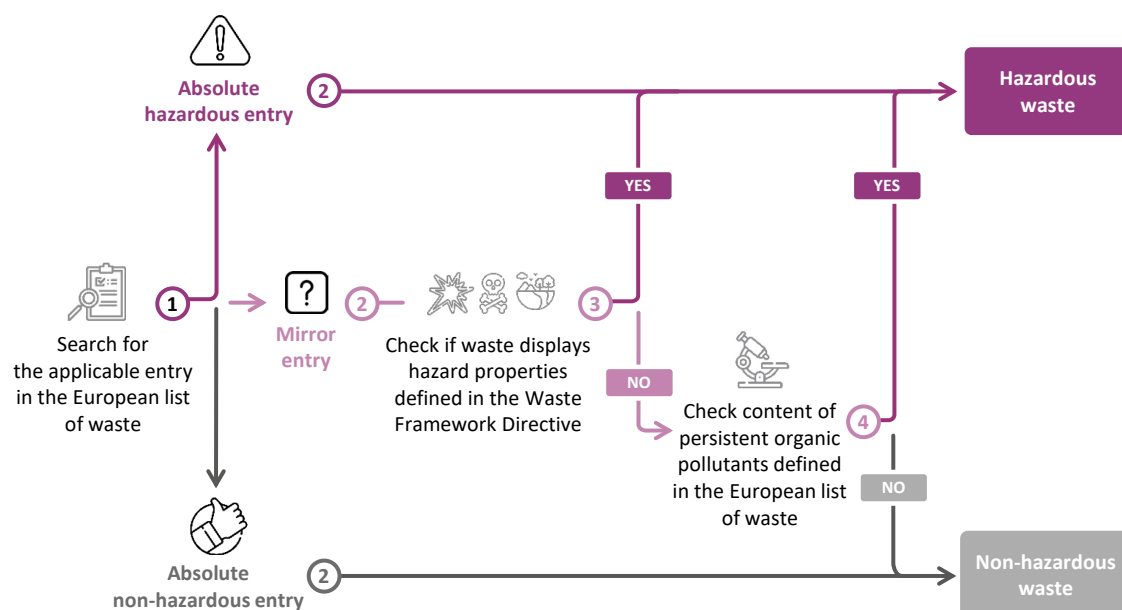
**31** The [Taxonomy Regulation](#), adopted in 2020, defines those economic activities the EU considers environmentally sustainable to provide transparency in the financial markets. Consequently, in the period 2021-2027, the EU decided to stop funding the landfilling of hazardous waste and the incineration of recyclable hazardous waste. The EU funds all alternatives that are higher in the waste hierarchy, such as prevention and recycling.

## Classification of hazardous waste

**32** Economic operators (waste generators, collection and sorting centres, transporters, brokers and waste treatment facilities) must classify their waste into hazardous or non-hazardous (see [Figure 6](#)). This step is essential in seeking to ensure that hazardous waste is correctly identified and treated according to strict standards, and that accurate and comparable data on hazardous waste is available at EU level. Economic operators classify their waste by using the [European list of waste](#), a Commission Decision that lists waste categories as:

- absolute non-hazardous entries: waste considered non-hazardous without any further assessment needed;
- absolute hazardous entries: waste considered hazardous without any further assessment needed; and
- mirror entries: waste that can be hazardous or not, which needs to be further assessed. For this purpose, waste holders must determine if the waste displays one or more of the hazardous properties defined in the [Waste Framework Directive](#) or if the waste contains certain persistent organic pollutants above thresholds set in the Decision.

Figure 6 – Classifying waste into hazardous or non-hazardous



Source: ECA, based on [Commission Guideline for the Classification of Waste](#).

**33** A 2017 Commission funded report on the management of hazardous waste in Member States indicated that the classification of hazardous waste constituted one of the main challenges Member States face when managing such waste. This is mainly due to challenges for Member States and waste holders to apply the [European list of waste](#)<sup>17</sup>, but also from a misalignment between the EU chemicals and waste legislations affecting the definition of hazardous waste<sup>18</sup>.

**34** Almost half of the entries in the [European list of waste](#) are mirror entries<sup>19</sup>. Waste holders often have difficulties to assess whether their waste is hazardous or not, as they need to know its chemical composition. Such information is not always available. This causes the same waste to be interpreted differently by Member States and waste holders<sup>20</sup>. As an example, while some Member States classify and treat funnel glass – used in cathode ray tubes – as hazardous waste, others treat it as non-

<sup>17</sup> BiPRO, [Support to selected Member States in improving hazardous waste management based on assessment of Member States' performance](#), 2017.

<sup>18</sup> Communication on the implementation of the circular economy package: options to address the interface between chemical, product and waste legislation, [COM/2018/032](#).

<sup>19</sup> Commission notice on technical guidance on the classification of waste, [2018/C 124/01](#).

<sup>20</sup> BiPRO, [Support to selected Member States in improving hazardous waste management based on assessment of Member States' performance](#), 2017.

hazardous<sup>21</sup>. In 2018, the Commission addressed this issue by publishing [technical guidance on the classification of waste](#).

**35** Lithium-ion batteries are used in many products such as toys, laptops, mobile phones and electric vehicles. A recent study estimated that, in the EU, the volume of end-of-life lithium-ion batteries could reach about 0.2 million tonnes per year from 2030<sup>22</sup>. In the US, these batteries are classified as hazardous waste<sup>23</sup>. In the [European list of waste](#), there is no specific code for lithium-ion batteries and the only available code that waste holders can use is a general code for “other batteries and accumulators”, which is absolute non-hazardous.

**36** EU chemicals legislation plays an important role in the classification of waste. The properties that define hazardous waste, listed in the [Waste Framework Directive](#), are mostly aligned with the hazard classes used to identify hazardous substances in the EU, defined in the [classification, labelling and packaging regulation](#) (CLP Regulation).

**37** Chemical substances of very high concern in the EU are identified and restricted through the [regulation on the registration, evaluation, authorisation and restriction of chemicals](#) (REACH Regulation). This Regulation defines these substances based on three hazard properties, as shown in [Box 4](#). Because not all these properties are included in the [CLP Regulation](#), they are not taken into consideration when classifying waste as hazardous. Therefore, waste containing toxic substances that accumulate and stay in the environment and in the human body for a long time or that disrupt the human hormones is not classified as hazardous waste. The Commission is considering to propose adding these hazard properties to the [CLP Regulation](#)<sup>24</sup>. Following this, the Commission would further need to update the [Waste Framework Directive](#) to make them applicable to the classification of waste.

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<sup>21</sup> WEEE Forum, [Impact of glass from cathode ray tubes in achieving the WEEE recycling and recovery targets](#), 2018.

<sup>22</sup> Fraunhofer-Institut für System- und Innovationsforschung ISI, [Recycling of Lithium-Ion Batteries: Opportunities and Challenges for Mechanical and Plant Engineering](#), 2021.

<sup>23</sup> [United States Environmental Protection Agency webpage on used lithium-ion batteries](#).

<sup>24</sup> Chemical strategy for sustainability: Towards a toxic-free environment, [COM\(2020\) 667](#).

## Box 4

### Substances of very high concern

EU chemicals legislation identifies substances that may have serious and often irreversible effects on human health and the environment as substances of very high concern. There are 224 such substances so far<sup>25</sup>. Substances of very high concern have the following hazards<sup>26</sup>:

- carcinogenic, mutagenic or toxic to reproduction: such as some phthalates used as plasticisers in flooring, roofing, wires or in artificial leather for bags;
- persistent, bio-accumulative and toxic and very persistent and very bio-accumulative: such as some brominated flame retardants used in polystyrene products for thermal insulation in buildings, packaging, electronic equipment, mattresses, car seats or curtains;
- other substances causing an equivalent concern as the above: such as endocrine disrupting chemicals (e.g. some bisphenols – bisphenol A is an industrial chemical used to make polycarbonate, a hard, clear plastic, which is used in many consumer products).

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<sup>25</sup> [European Chemicals Agency webpage on the candidate list of substances of very high concern for authorisation.](#)

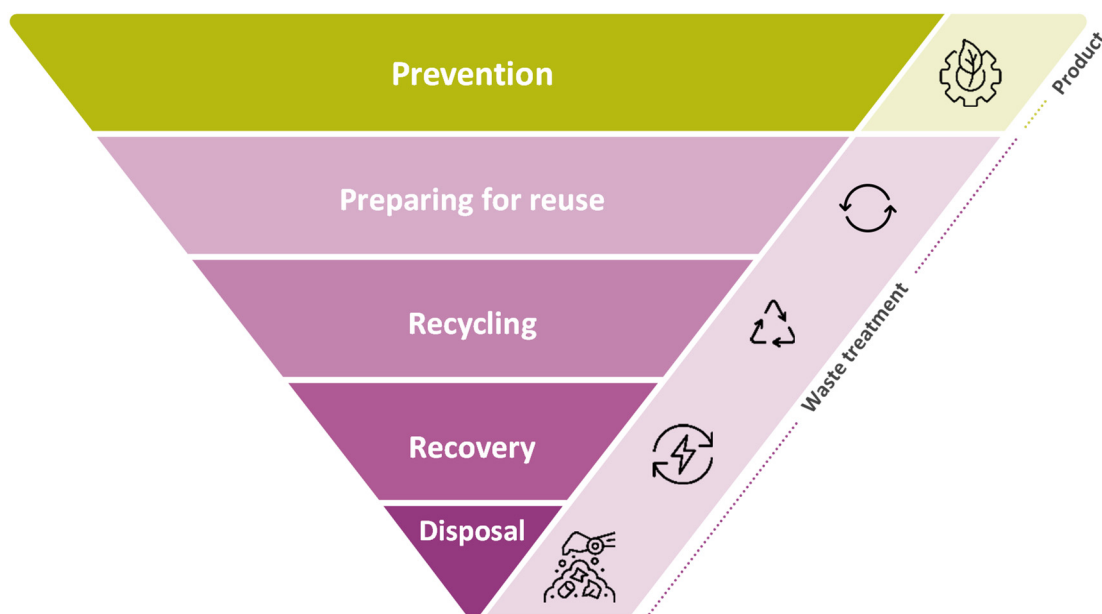
<sup>26</sup> [European Chemicals Agency webpage on substance of very high concern.](#)

## Prevention of hazardous waste in the EU

### Despite EU efforts, the generation of hazardous waste has increased

**38** Preventing hazardous waste from being generated in the first place is the best way to address such waste. Giving priority to prevention over the treatment of hazardous waste has been the objective of the EU waste legislation since the early 1990s<sup>27</sup>. In 2008, the [Waste Framework Directive](#) enshrined this objective in EU legislation through the waste hierarchy principle (see [Figure 7](#)).

**Figure 7 – The waste hierarchy principle**

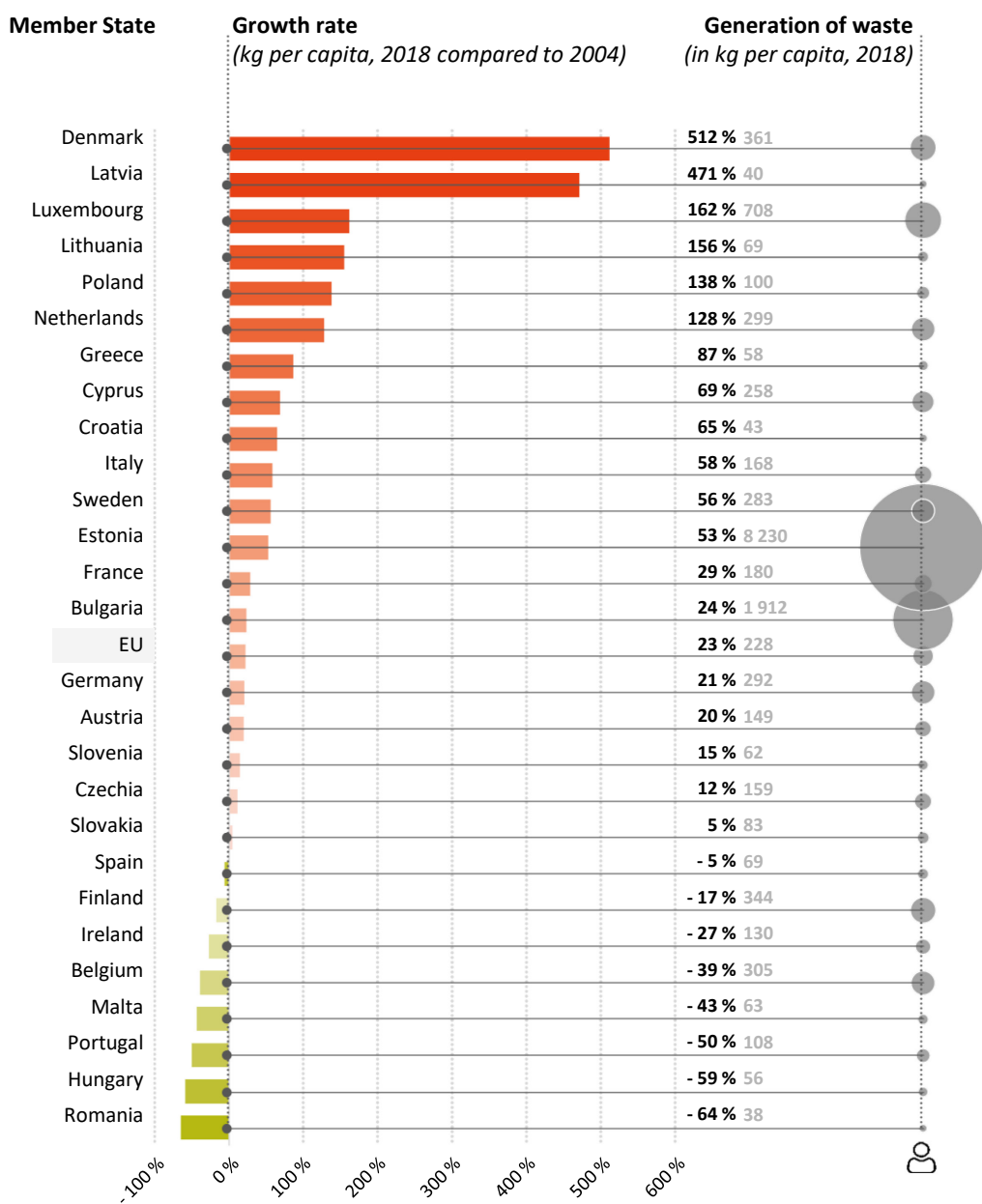


Source: ECA, based on the [Waste Framework Directive](#).

**39** In the last decade, hazardous waste prevention has gained importance, reflected in the various policy and legislative initiatives that the Commission has put in place, as shown in [Figure 5](#). Despite these initiatives, the amount of hazardous waste generated in the EU has continuously increased (see [Figure 8](#)).

<sup>27</sup> Article 1 of [Council Directive 91/689/EEC](#) on hazardous waste.

**Figure 8 – Hazardous waste generated by Member States in 2018 compared to 2004**



Source: ECA, based on Eurostat data.



**40** Since 2013, Member States are required to establish waste prevention programmes<sup>28</sup>, including measures to reduce hazardous substances in materials and products. In 2016, the European Environment Agency analysed these programmes and concluded that most did not include such measures, nor specific targets to reduce the generation of hazardous waste<sup>29</sup>. The agency noted that “prevention of hazardous waste appears to have lower priority than management aspects, and limited financial support”<sup>30</sup>.

### **Economic operators can prevent the production of hazardous waste by changing the way they design and manufacture products**

**41** Economic operators generate 96 % of the hazardous waste in the EU (see [Figure 1](#)). They can prevent the production of hazardous waste by developing products that are sustainable, with the lowest possible environmental impact – so called “Eco-design”. According to the Commission, more than 80 % of the environmental impact of a product is determined at the design stage<sup>31</sup>.

**42** In March 2022, the Commission proposed<sup>32</sup> to amend its [directive on eco-design](#). Economic operators would have to provide treatment facilities with information on the presence of substances of concern in their products, and on how they could be recycled or disposed of. This information would be included in “digital product passports”, applicable as from 2024 (see [Figure 9](#)). The Commission believes that this will create an incentive for consumers to make more sustainable choices, to which economic operators will align when designing products.

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<sup>28</sup> Article 29 of [Waste Framework Directive](#).

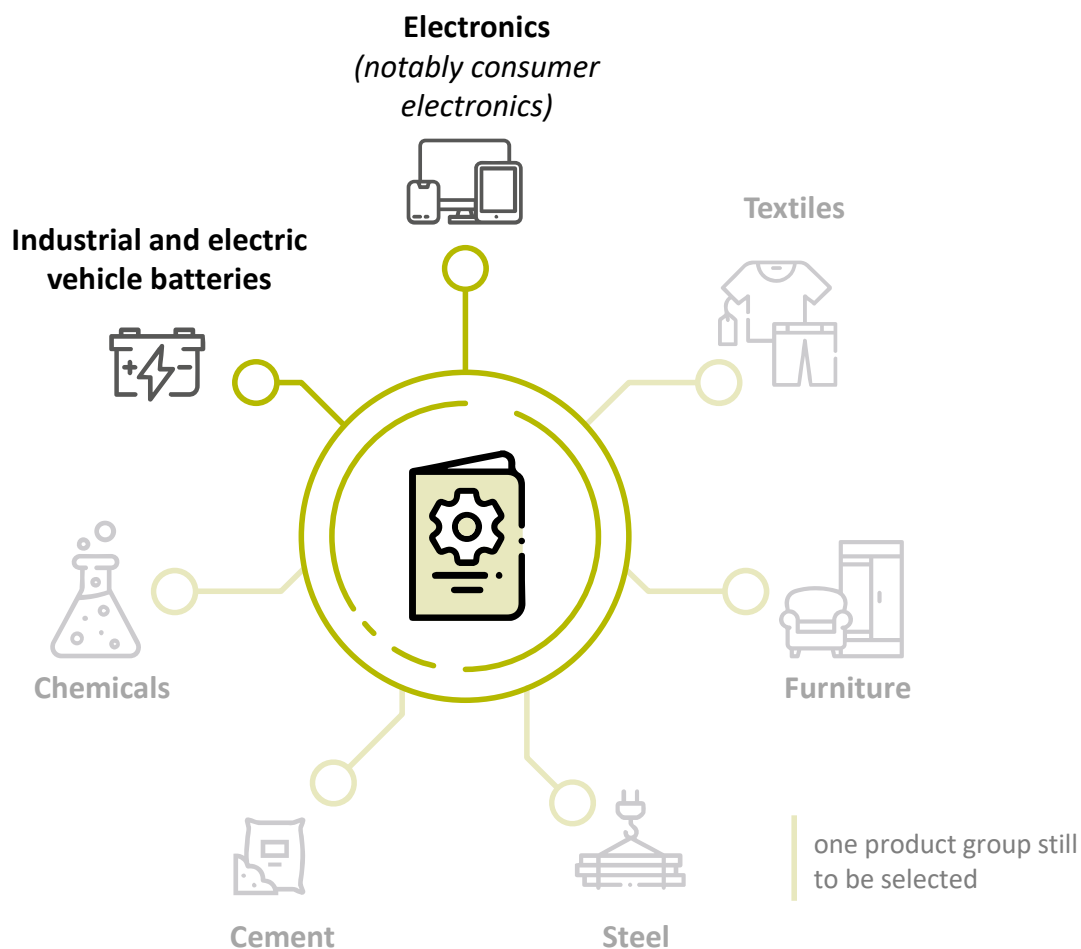
<sup>29</sup> European Environment Agency, [Prevention of hazardous waste in Europe – the status in 2015, 2016](#).

<sup>30</sup> European Environment Agency, News release: [European hazardous waste management improving, but its prevention needs attention](#), 2016.

<sup>31</sup> Communication on making sustainable products the norm, [COM/2022/140](#).

<sup>32</sup> Proposal for a Regulation on ecodesign requirements for sustainable products, [COM/2022/142](#).

**Figure 9 – Product groups for which digital passports are proposed**



Source: ECA, based on [Digital Product Passport: sustainable and circular systems](#).

**43** Economic operators can also prevent the generation of hazardous waste by limiting the presence of hazardous substances in products. In 2020, the Commission proposed to reduce the presence of substances of very high concern in products<sup>33</sup>, by restricting the use of some of the most harmful substances in the EU<sup>34</sup>.

**44** Economic operators can generate less hazardous waste by reviewing their manufacturing processes. In March 2022, the Commission proposed to amend the [Industrial Emissions Directive](#). The [proposal](#) would require industrial installations (including the mining and battery production sectors) to set up actions to enhance the substitution of hazardous substances in the production process and prevent the generation of waste.

<sup>33</sup> Chemicals strategy for sustainability: Towards a toxic-free environment, [COM/2020/667](#).

<sup>34</sup> Restrictions Roadmap under the Chemicals Strategy for Sustainability, [COM/2022/128](#).

**45** All these measures take time to show their full effects. Some products generating hazardous waste can have a long lifetime (e.g. vehicles, buildings, furniture, electrical equipment), which means that the effects of measures taken now, such as the restriction of the use of certain hazardous substances, would only be visible in a medium to long term when they finally become waste. For example, the Commission estimates that only around 25 % of buildings built before 2005<sup>35</sup>, which may contain asbestos, will have been phased out by 2050<sup>36</sup>.

### **Making polluters responsible for their waste helps prevent the generation of hazardous waste**

**46** The polluter pays principle means that polluters bear the costs of their pollution, including the cost of measures taken to prevent, control and remedy pollution and the costs it imposes on society. The EU requires that the costs of waste management have to be borne by the waste producer or waste holders. Member States decide whether the costs of waste management are to be borne by the waste holder or partly/wholly by the producer of the product that has become waste. The latter is termed “Extended Producer Responsibility”. At EU level, some hazardous waste streams are subject to Extended Producer Responsibility under EU legislation (e.g. electrical and electronic equipment waste or end-of-life vehicles) or through national legislation and agreements with industry (e.g. waste oils or pesticides)<sup>37</sup>.

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<sup>35</sup> Commission, [News Release on the ban of asbestos as of 1 January 2005](#).

<sup>36</sup> ECA calculation based on A Renovation Wave for Europe – greening our buildings, creating jobs, improving lives, [COM/2020/662](#).

<sup>37</sup> Deloitte, [Development of Guidance on Extended Producer Responsibility](#), 2014.

**47** We recently reported<sup>38</sup> that Extended Producer Responsibility incentivises producers to develop greener products that avoid unnecessary waste. Academic studies<sup>39</sup> and policy reviews<sup>40</sup> mention the positive contribution of the Extended Producer Responsibility in reducing waste. Our report, however, highlighted that while the charges levied on citizens/businesses should be proportional to the waste generated and take full account of environmental damage caused, evidence suggests that environmental externalities are internalised in these charges only to a limited extent. In the context of its 2021 EU [Action Plan on zero pollution](#), the Commission intends to address shortcomings in the application of the polluter pays principle in 2024.

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<sup>38</sup> [Special report 12/2021: The Polluter Pays Principle – Inconsistent application across EU environmental policies and actions.](#)

<sup>39</sup> [Pouikli K., Concretising the role of extended producer responsibility in European Union waste law and policy through the lens of the circular economy, 2020.](#)

<sup>40</sup> [OECD, Extended Producer Responsibility Updated Guidance for Efficient Waste Management, 2016.](#)

# Treatment of hazardous waste in the EU

## Applying the waste hierarchy to the treatment of hazardous waste

**48** Since 2008, Member States must ensure that hazardous waste is treated in line with the waste hierarchy (see [Figure 7](#)). Hazardous waste should preferably be prepared for reuse, followed by recycling. Fractions of waste that cannot be recycled should be recovered through incineration with energy production. As a last resort, hazardous waste should be disposed of<sup>41</sup>.

**49** A full overview of how the hazardous waste generated in the EU is treated could support the Commission and Member States in assessing how well the waste hierarchy is applied. However, such overview cannot be obtained due to a gap in the amounts of hazardous waste reported as generated and treated in the EU. In 2018, the EU generated around 102 million tonnes of hazardous waste (see paragraph [12](#)), while the total amount of hazardous waste treated was 82 million tonnes<sup>42</sup>, a discrepancy of 20 million tonnes (19 %). In the same year, 3.6 million tonnes of hazardous waste were imported into the EU, and 0.7 million tonnes were exported for treatment outside the EU<sup>43</sup>. When considering these imports and exports, the reporting gap increases to 22 million tonnes (21 %). The gap varies from around 1 % for some Member States such as Bulgaria, Estonia and Greece to more than 50 % for others, such as Czechia, Slovakia, Austria and Lithuania (see [Figure 10](#)).

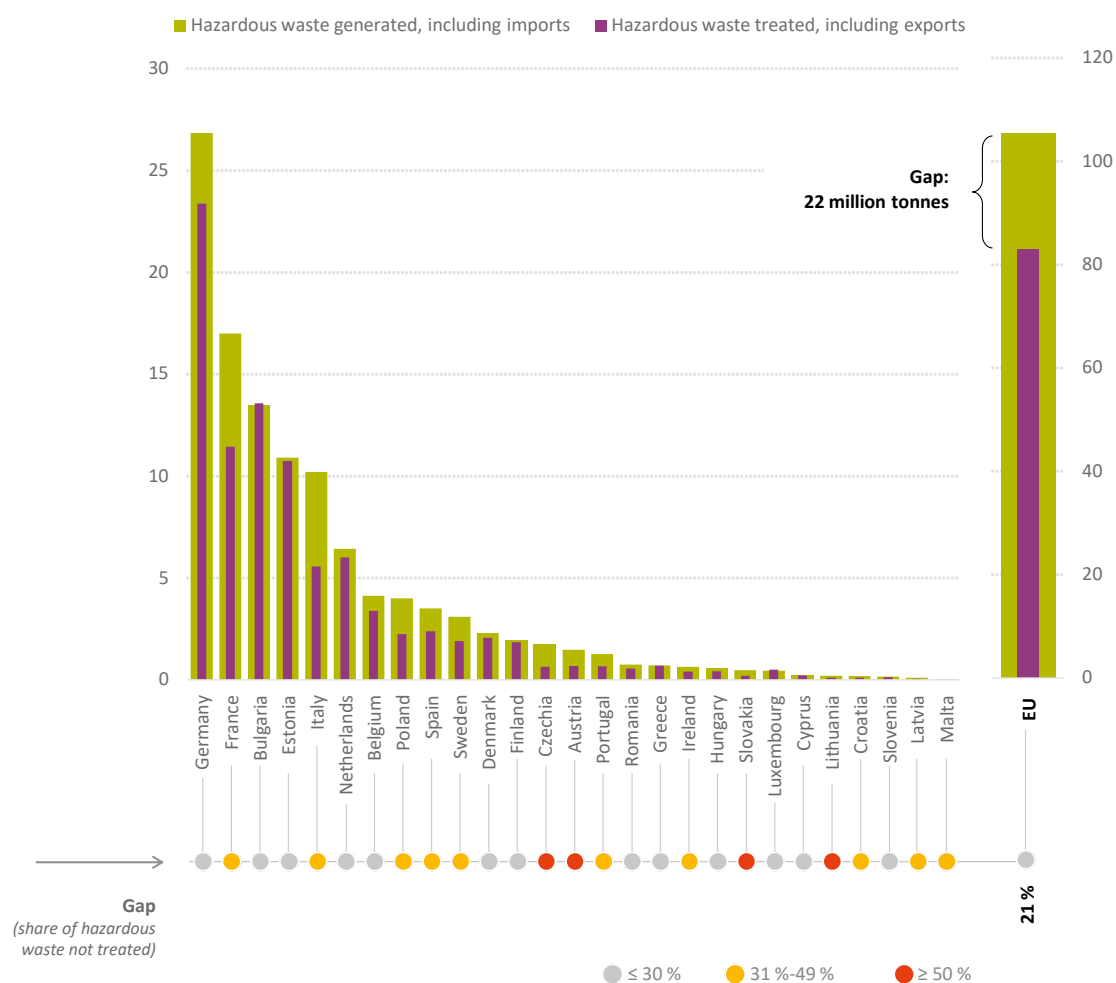
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<sup>41</sup> Article 4 of [Waste Framework Directive](#).

<sup>42</sup> [Eurostat data on treatment of waste](#).

<sup>43</sup> [Eurostat data on shipment of waste](#).

**Figure 10 – Reporting gap between generation and treatment of hazardous waste in 2018**



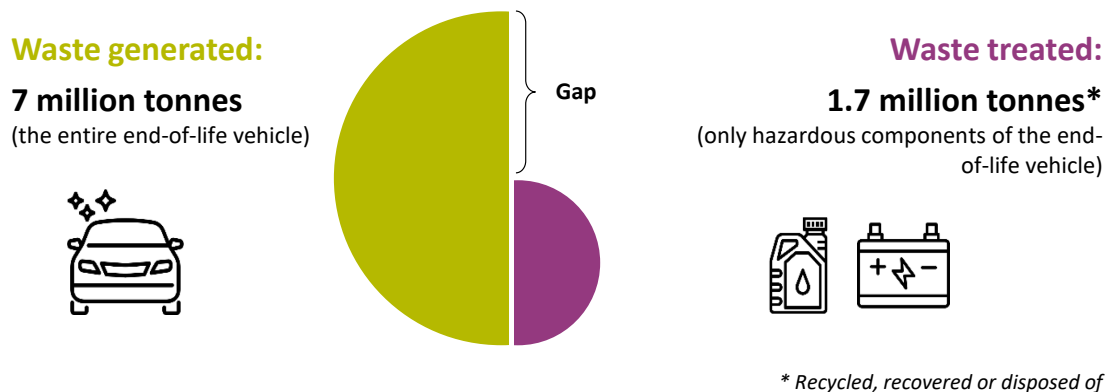
Source: ECA based on Eurostat data on [generation](#), [treatment](#) and [movements](#) of waste.

**50** The gap between the generation and treatment of hazardous waste can be due to various reasons<sup>44</sup>: waste generated in a given period may be counted as treated in another period, lack of information on imports and exports, or hazardous waste may be illegally disposed of. It could also be due to different reporting methods between the generation and treatment of hazardous waste. For example, waste that contains both hazardous and non-hazardous components might be recorded as 100 % hazardous waste generated. However, the corresponding waste that is actually treated would only include the hazardous components (see an example in [Figure 11](#)). The Commission intends to clarify the gap between the generation and treatment of

<sup>44</sup> BiPRO, [Support to Member States in improving hazardous waste management based on assessment of Member States' performance](#), 2015.

hazardous waste by developing experimental waste accounts based on estimated data<sup>45</sup>.

**Figure 11 – Example of gap for end-of-life vehicles due to different reporting methods**



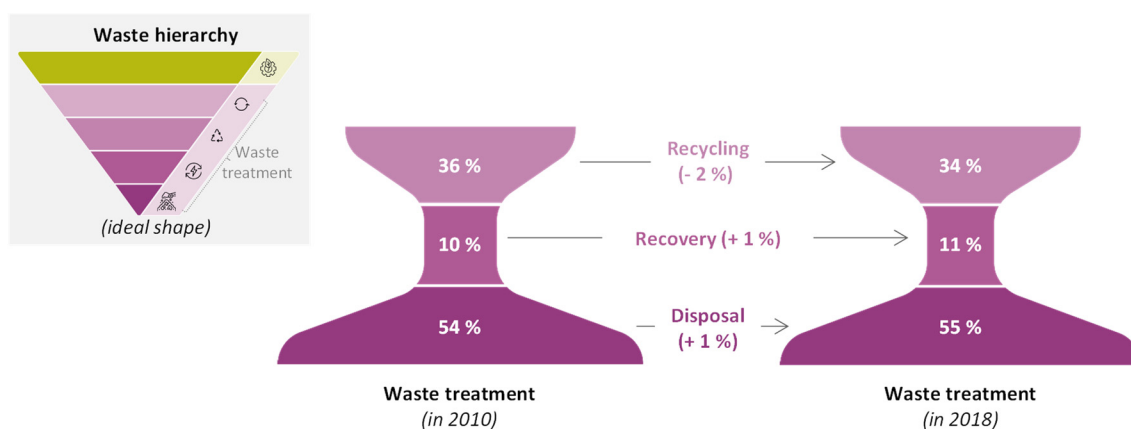
Source: ECA based on 2018 Eurostat data on [generation](#) and [treatment](#) of hazardous waste from end-of-life vehicles.

**51** As regards the application of the waste hierarchy, available data indicates that in 2018, similarly to 2010 – when data for recycling of waste became available, more than half of the hazardous waste treated in the EU is still disposed of, with almost none being reused (see paragraph [52](#)) and only 45 % recycled and recovered (see [Figure 12](#)). This is despite the numerous actions taken by the EU to push hazardous waste up the waste hierarchy (see paragraph [39](#)). In 2009, the Commission estimated that 97 % of hazardous waste generated in the EU could either be recycled or recovered<sup>46</sup>.

<sup>45</sup> Commission, Presentation at the UNECE/OECD seminar implementation of System of Environmental-Economic Accounting: [Introduction to waste accounts and possible integration with other SEEA](#), 2021.

<sup>46</sup> Villanueva A. *et al.*, [Study on the selection of waste streams for end-of-waste assessment](#), 2010.

**Figure 12 – No visible change in applying the waste hierarchy to hazardous waste in the EU between 2010 and 2018**



Note: No data for preparing for reuse.

Source: ECA, based on Eurostat data on the [treatment of hazardous waste](#).

## Most hazardous waste is not suitable to be prepared for reuse

**52** The preferred option to treat hazardous waste is to prepare it for reuse. This means “checking, cleaning or repairing” discarded products so that they can be reused without any other pre-processing<sup>47</sup>. There is no systematic data available at EU level on how much hazardous waste is being prepared for reuse. According to the Commission, this concerns a very limited amount, as there are no clear reuse options for most hazardous waste streams, mainly because they are the residual output of industrial processes.

## The EU faces challenges to increase recycling of hazardous waste

**53** Recycling is the second preferred option to treat hazardous waste. *Figure 12* shows that in 2018, 34 % of the hazardous waste treated in the EU was recycled. This was slightly less than in 2010, when 36 % was recycled.

**54** The Member States’ performance on recycling can, with the available data, only be partially assessed. The data shows how much of their hazardous waste Member States recycle on their territory, but does not specify how much is recycled abroad. In 2018, countries that recycled most of the generated or imported hazardous waste on their territory are Greece (91 %) and Croatia (84 %), followed by Denmark and

<sup>47</sup> Article 3 of [Waste Framework Directive](#).



Poland (79 %), as shown in [Annex III](#). Other countries such as Bulgaria and Ireland only recycle 2 % of the hazardous waste on their territory or even none, for Malta. Malta exports most of its hazardous waste, of which 75 % is recycled or recovered through incineration with energy production.

**55** The EU can influence how much hazardous waste is recycled by setting recycling targets. So far, the EU has set targets for three waste streams that are partially hazardous (electrical and electronic equipment waste, batteries and end-of-life vehicles), as shown in [Box 5](#). These were the three most recycled hazardous waste streams in the EU, with recycling rates of above 90 % in 2018 for their hazardous components<sup>48</sup>.

### Box 5

#### EU recycling targets for specific waste streams that are partially hazardous

For **electrical and electronic equipment waste**<sup>49</sup>, Member States must:

- since 2018, respect a minimum target for recycling ranging from 55 % to 80 % depending on the type of equipment.

For **batteries and accumulators**<sup>50</sup>, Member States must:

- since 2011, achieve recycling rates of 65 % by average weight of lead-acid batteries/accumulators, 75 % by average weight of nickel-cadmium batteries/accumulators and 50 % by average weight of other waste batteries/accumulators. In 2020, the Commission proposed to increase these targets<sup>51</sup>.

For **end-of-life vehicles**<sup>52</sup>, since 2015, Member States are required to meet annual minimum targets for recycling of 85 %, by an average weight per vehicle.

<sup>48</sup> Eurostat 2018 data on the [recycling of hazardous waste streams](#), at EU level.

<sup>49</sup> [Directive 2012/19/EU](#) on waste electrical and electronic equipment.

<sup>50</sup> [Directive 2006/66/EC](#) on batteries and accumulators and waste batteries and accumulators.

<sup>51</sup> Proposal for a regulation concerning batteries and waste batteries, [COM/2020/798](#).

<sup>52</sup> [Directive 2000/53/EC](#) on end-of life vehicles.

**56** In 2009, the Commission identified additional hazardous waste streams for which more recycling would be possible: mineral wastes from construction and demolition, combustion waste, and two types of chemical wastes (waste oils and waste solvents)<sup>53</sup>. The EU has not yet introduced recycling targets for these streams. Recycling these waste streams is also hampered by the absence of clear rules to consider the recycled outcome a marketable product and no longer waste<sup>54</sup>. This limits market opportunities for waste operators in the EU<sup>55</sup>.

**57** There are also hazardous waste streams that are currently technically impossible to recycle on a large scale or in an economically viable way (e.g. glass contaminated with hazardous substances, such as fluorescent lamps<sup>56</sup>). The EU has invested in developing such technologies, in particular through Horizon 2020 and LIFE, but these technologies are not yet used at industrial scale.

**58** To recycle other hazardous waste streams such as waste plastics and textiles containing persistent organic pollutants and heavy metals, waste operators must decontaminate them, i.e. remove their hazardous substances. Recent studies have shown that, despite decontamination, a wide range of hazardous substances (including some phased-out by EU legislation) have been found in recycled materials, including paper, plastics, rubber and textiles<sup>57</sup>. This is mainly because recyclers lack information on the chemical composition of the waste they treat<sup>58</sup> and can therefore not carry out a proper decontamination. According to the Commission, it can also be explained by improper waste management practices, limitations in available sorting and decontamination technologies or by imported materials recycled outside the EU at lower standards.

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<sup>53</sup> Delgado L. *et al.*, [End-of-waste criteria](#), 2009.

<sup>54</sup> Communication on the implementation of the circular economy package: options to address the interface between chemical, product and waste legislation, [COM/2018/032](#).

<sup>55</sup> [Opinion of Hazardous Waste Europe on the Environmental impact of waste management – revision of EU waste framework](#), 2022.

<sup>56</sup> Meng W. *et al.*, [The recycling of leaded glass in cathode ray tubes \(CRT\)](#), 2016.

<sup>57</sup> Chemsec, [What goes around – Enabling the circular economy by removing chemical roadblocks](#), 2021; Arnika, [Toxic Loophole: Recycling Hazardous Waste into New Products](#), 2018.

<sup>58</sup> BiPRO, [Support to selected Member States in improving hazardous waste management based on assessment of Member States' performance](#), 2018.

**59** These issues reduce trust in recycled materials, and constitute an important barrier to the recycling of hazardous waste<sup>59</sup>. The Commission took action<sup>60</sup> and, since 2021, companies supplying articles on the EU market that contain substances of very high concern in a concentration above 0.1 % must notify information on these articles in a public EU register<sup>61</sup>. In April 2022, industry leaders indicated that they still face a lack of information on the chemical content and hazardous properties in their supply chains and asked the Commission to require this information for all chemical substances<sup>62</sup>.

**60** As of 2025, Member States will have to ensure the separate collection of hazardous waste produced by households<sup>63</sup>. This is an opportunity to increase the share of hazardous waste recycled stemming from consumer products (such as electrical and electronic equipment or portable batteries).

### **Around half of the incinerated hazardous waste is not used to produce energy**

**61** In 2018, the main types of waste incinerated with energy recovery in the EU were contaminated wood, chemical wastes (mainly chemicals and spent solvents) and residues generated when sorting waste. The latter two categories were also the main hazardous wastes incinerated without energy recovery<sup>64</sup>.

**62** *Annex III* shows that in 2018, 8 % of the hazardous waste treated in the EU was burnt with energy production and 6 % was incinerated without energy recovery, almost the same figures as in 2008. Similarly to recycling, due to issues of data availability, the Member States' performance for recovery with energy production can only be assessed on their territory.

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<sup>59</sup> BiPRO, [Support to selected Member States in improving hazardous waste management based on assessment of Member States' performance](#), 2018.

<sup>60</sup> Chemical strategy for sustainability – Towards a toxic-free environment, [COM/2020/667](#).

<sup>61</sup> [SCIP Database](#).

<sup>62</sup> [Open letter to the Commission regarding transparency](#), 2022.

<sup>63</sup> Article 20 of [Waste Framework Directive](#).

<sup>64</sup> Eurostat data on [incineration of hazardous waste with and without energy recovery](#).

**63** NGOs highlight the negative impact of waste incineration as carbon-intensive source of energy causing toxic air pollution and potentially diverting waste from recycling<sup>65</sup>. At the same time, waste management operators consider incineration with energy recovery as an alternative source of energy in the current context of energy crisis in the EU<sup>66</sup>. In 2020, 4 % of the energy produced in the EU used waste, while renewable energy represented around 41 %, nuclear energy 31 %, solid fossil fuels 15 %, natural gas 7 % and crude oil 3 %<sup>67</sup>.

**64** The [Taxonomy Regulation](#) could offer an opportunity to further develop incineration capacity as it defines the incineration of all “non-recyclable” hazardous waste as a green investment (see paragraph [31](#)).

**65** New technologies (e.g. artificial intelligence) could also help in better sorting hazardous waste<sup>68</sup> and improving its recycling by reducing contamination between hazardous and non-hazardous waste. It could also enhance the recovery of critical raw materials, such as the copper and nickel found in electrical and electronic equipment<sup>69</sup>. These technologies could also bring new solutions to treat hazardous components<sup>70</sup>.

### **Around half of hazardous waste is still being disposed of**

**66** In 2018, around half of the hazardous waste treated in the EU was disposed of, which is the least preferable waste treatment option. A small part of this waste, around 10 %<sup>71</sup>, was incinerated without energy recovery (see paragraph [62](#)), while the remaining 90 %<sup>72</sup> was landfilled or deposited into natural cavities, in the seabed or in artificially created lakes and ponds.

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<sup>65</sup> ClientEarth, [The environmental impacts of waste incineration](#), 2021.

<sup>66</sup> FEAD – European Waste Management Association.

<sup>67</sup> Eurostat data on [production of primary energy in 2020](#).

<sup>68</sup> European Environment Agency, [Digital waste management](#), 2020.

<sup>69</sup> Sipka S., [Towards circular e-waste management: How can digitalisation help?](#), 2021

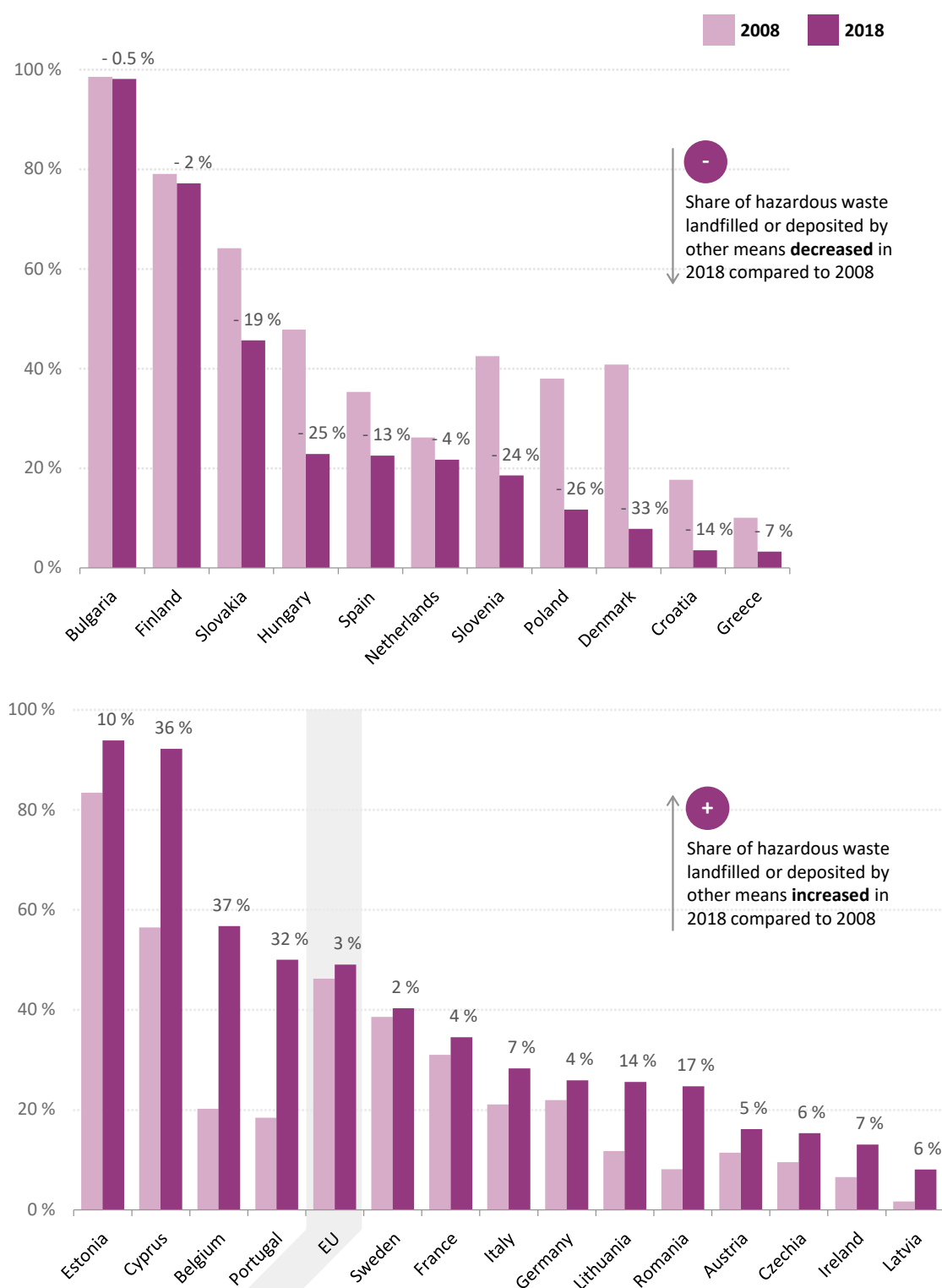
<sup>70</sup> Example of an EU funded project on the recycling of polyvinyl chloride contaminated with hazardous substances: [REMADYL](#).

<sup>71</sup> Eurostat data on [disposal of hazardous waste – Incineration without energy recovery](#).

<sup>72</sup> Eurostat data on [disposal of hazardous waste – Landfill and other](#).

**67** In line with the waste hierarchy principle, disposal of hazardous waste should be reserved for hazardous waste streams that cannot be recycled or recovered in energy, such as combustion waste resulting from incinerating hazardous waste. *Figure 13* shows that in 14 Member States, the share of hazardous waste landfilled or deposited by other means has increased since 2008.

**Figure 13 – Share of hazardous waste landfilled or deposited by other means**



Note: No waste landfilled or deposited by other means in Malta and Luxembourg.

Source: ECA, based on Eurostat data on [landfilling and other means of disposal of hazardous waste](#).

**68** Many Member States export their hazardous waste for disposal in another Member State or outside the EU, in European Free Trade Association countries (see [Annex III](#)). In 2018, 22 % of the 7.6 million tonnes of hazardous waste exported by Member States were disposed of. In 2021, the Commission proposed<sup>73</sup> to ban all intra and extra-EU shipments of waste for disposal, except in cases where Member States can demonstrate that it is not technically and economically viable to dispose of the waste on their territory. This proposal is being discussed by the Parliament and Council (see paragraph [82](#)).

**69** From 2030, Member States will have to limit the landfilling of all waste, including hazardous waste, suitable for recycling<sup>74</sup>.

### Applying stricter rules for managing hazardous waste

**70** Hazardous waste management is subject to stricter rules than the management of other types of waste (see paragraph [23](#)). Studies show that, although Member States transposed these stricter requirements into national legislation, they encountered challenges in applying them, in particular on the traceability of hazardous waste and on the mixing ban<sup>75</sup>. The co-legislators have strengthened these rules in 2018 in the last amendment of the [Waste Framework Directive](#).

**71** Member States are required to trace hazardous waste from generation to final treatment. In theory, such tracing could be performed using data on the generation, treatment and movements of hazardous waste. Available data however does not allow such traceability (see paragraphs [49-50](#)).

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<sup>73</sup> Article 11 of Proposal to amend the waste shipment regulation, [COM/2021/709](#).

<sup>74</sup> [Commission webpage on landfilling of waste](#).

<sup>75</sup> BiPRO, [Support to selected Member States in improving hazardous waste management based on assessment of Member States' performance, 2017](#); BiPRO, [Support to Member States in improving hazardous waste management based on assessment of Member States' performance, 2015](#).

**72** The [Waste Framework Directive](#) does not set how the traceability from generation to final treatment of hazardous waste should take place. A 2017 report<sup>76</sup> indicated that traceability of hazardous waste across EU regions was hampered by inconsistent and incompatible information on hazardous waste declared by different economic operators involved in the management of such waste.

**73** To address issues relating to the traceability of hazardous waste (see paragraphs [71-72](#)), Member States have had to set up electronic registries of the hazardous waste generated and treated on their territory since 2020. The EU also intends to set up an EU-wide electronic register of shipments of waste, including hazardous waste<sup>77</sup>. At this stage, there are no plans to ensure that the national registers of hazardous waste can exchange information with the EU system for waste shipments.

**74** Mixing different streams of hazardous waste may generate additional hazardous substances not initially present. Mixing hazardous with non-hazardous waste can contaminate the latter and make it unfit for recycling. It can also dilute hazardous waste. The EU has banned the mixing of hazardous waste since 1991<sup>78</sup>. In 2017<sup>79</sup>, an EU study found Member States perform a limited number of inspections on the mixing or dilution of hazardous waste.

## Hazardous waste trafficking in the EU

**75** The stricter management and safety rules applied to hazardous waste impose extra administrative burdens and higher treatment costs on economic operators. A study based on a survey of refineries in 2013<sup>80</sup> estimated that the median cost of all hazardous waste management in Europe was €238/tonne, compared to €63/tonne for non-hazardous waste<sup>81</sup>. This creates the risk of hazardous waste trafficking, whereby operators do not declare the waste generated as hazardous, and dump it illegally in

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<sup>76</sup> BiPRO, [Support to selected Member States in improving hazardous waste management based on assessment of Member States' performance](#), 2017.

<sup>77</sup> Proposal to amend the Waste Shipment Regulation, [COM/2021/709](#).

<sup>78</sup> [Directive 91/689/EEC](#) on hazardous waste.

<sup>79</sup> BiPRO, [Support to selected Member States in improving hazardous waste management based on assessment of Member States' performance](#), 2017.

<sup>80</sup> [2013 survey of waste production and management at European refineries](#).

<sup>81</sup> Estimated costs converted from USD to EUR using [Eurostat exchange rate](#) for 2013.



the EU or ship it illegally in or outside the EU. A [report](#) in 2016 estimated that companies using illegal hazardous waste disposal could save up to 400 % in costs.

### Waste not declared as hazardous

**76** In 2021, declaring hazardous waste as non-hazardous was the main method for trafficking dangerous substances in the EU<sup>82</sup>. This can be done, for example, through false documentation on the chemical composition of the waste, false analysis provided by laboratories, the forgery of loading/unloading records and by intentionally classifying hazardous waste as non-hazardous<sup>83</sup>.

**77** Other practices used by operators to avoid declaring waste as hazardous include mixing it with non-hazardous waste – diluting the concentration of hazardous substances in the waste so that the hazardous properties can no longer be verified (see paragraph [74](#)), or classifying hazardous waste as second-hand goods. For example, waste from electrical and electronic equipment and used car parts can be declared as second-hand goods, and end up being recycled in an unsafe manner or illegally dumped<sup>84</sup>. A Commission report<sup>85</sup> indicated that in 2017, 3.8 million used vehicles disappeared from the legal market (see [Figure 14](#)).

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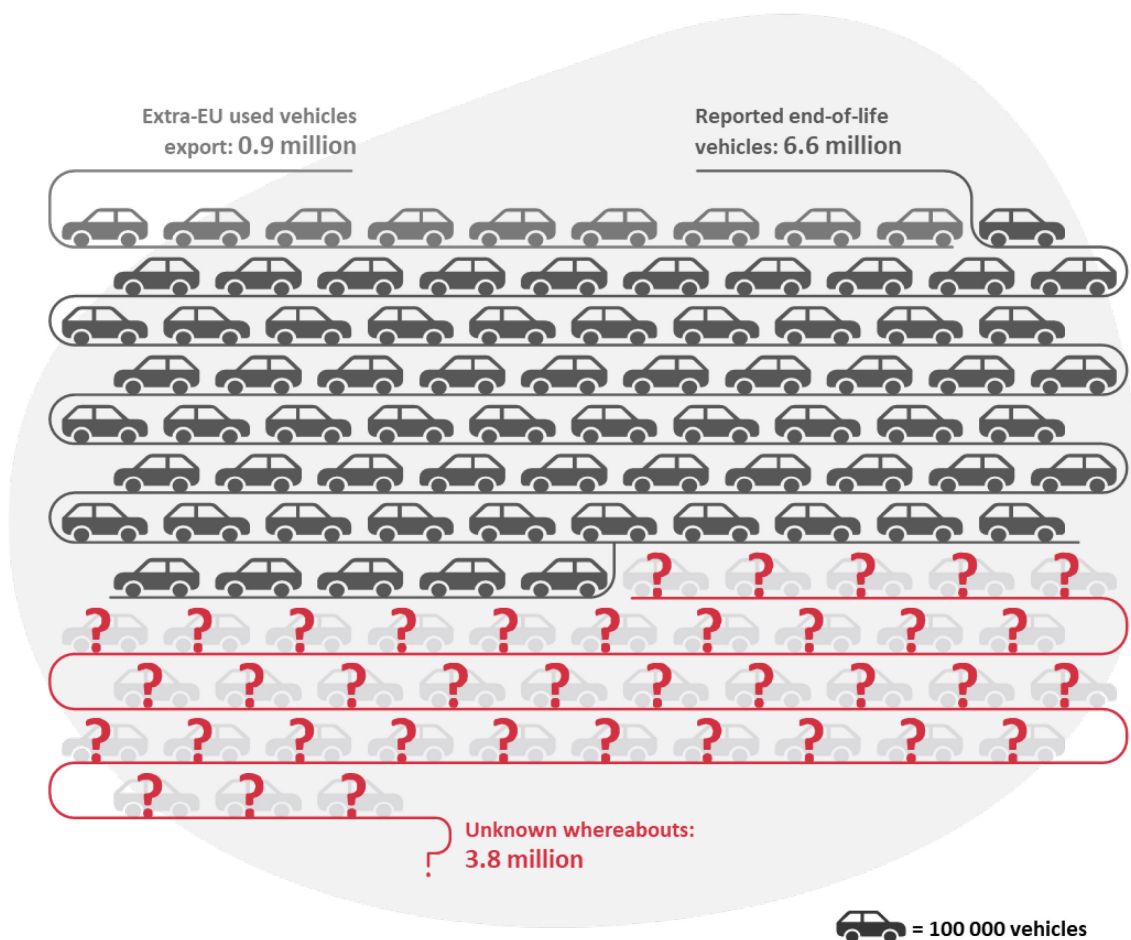
<sup>82</sup> Europol, [Environmental crime in the age of climate change, Threat assessment 2022](#).

<sup>83</sup> De Rosa S., [Ending illegal trafficking and disposal of hazardous waste in Italy: knowledge and solutions from impacted local communities](#), 2016.

<sup>84</sup> World Custom Organisation, [Article Illegal waste trafficking: more data is key to getting a better grip on this trade](#), 2019; United Nations Environment Programme, [Used vehicles and the environment](#), 2020.

<sup>85</sup> Evaluation of the directive on end-of-life vehicles, [Commission SWD\(2021\) 60](#).

Figure 14 – Unknown whereabouts of vehicles in the EU in 2017



Source: ECA, based on the [2021 Commission evaluation of the Directive on end-of-life vehicles](#).

## Illegal dumping

**78** Illegal dumping of hazardous waste is a widespread illegal waste trafficking practice<sup>86</sup>. Hazardous waste can be dumped in authorized sites outside legal norms, abandoned in construction sites or agricultural fields or dumped in unauthorised sites or in quarries<sup>87</sup>. A 2017 [Interpol operation](#) focusing on hazardous waste found that the most common types of hazardous waste illegally disposed of in Europe were construction and demolition waste, waste from the car industry (end-of-life vehicles, vehicle oil and car batteries), and chemical wastes (expired medicines, sludge, paint, pesticides and tanned leather). A case of illegal dumping is described in [Box 6](#).

<sup>86</sup> Suvantola L. *et al.*, [Blocking the loopholes for illicit waste trafficking \(Blockwaste\)](#), 2017.

<sup>87</sup> De Rosa S., [Ending illegal trafficking and disposal of hazardous waste in Italy: knowledge and solutions from impacted local communities](#), 2016.

## Box 6

### Illegal dumping of hazardous waste in Italy

Toxic waste has been illegally burnt and buried since the late 1980s in the region of Campania. A study on illegal disposal of hazardous waste in Italy indicated that between January 2012 and August 2013, 6 034 toxic fires were reported in the region<sup>88</sup>.

Following citizens' protests raised by increasing health issues registered in the nearby population, the Italian government decided in 2014 to strengthen the sanctions for such practices. In 2021 there were still 1 406 waste fires reported<sup>89</sup>.

### Illegal shipment in or outside the EU

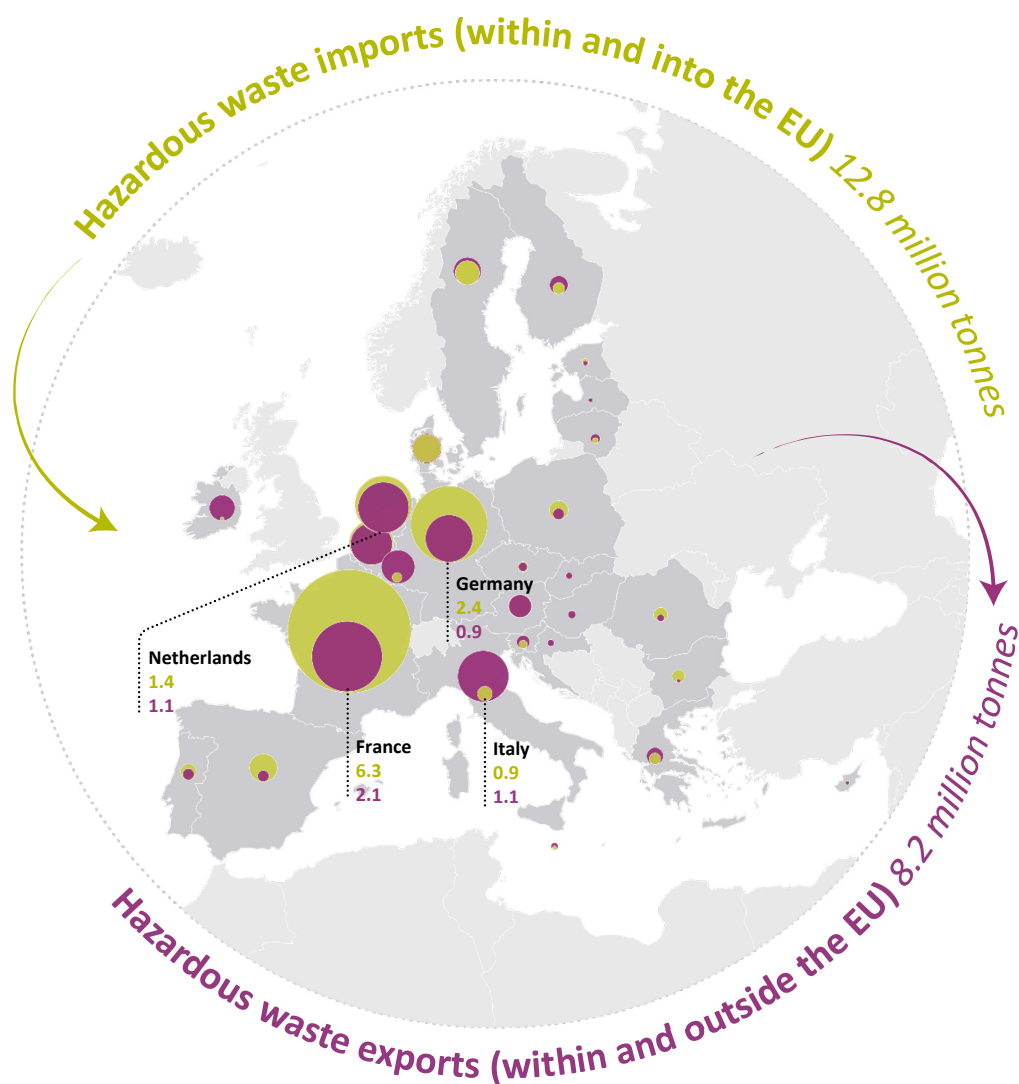
**79** As shown in [Figure 15](#), a small part of the EU's hazardous waste (8.2 million tonnes in 2020) is legally shipped between Member States (7.3 million tonnes), and outside the EU to OECD and European Free Trade Association countries (0.9 million tonnes). Treating hazardous waste safely requires specialised treatment facilities, which may not be available in the country of origin. There may also be more economical treatment options in other Member States or outside the EU.

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<sup>88</sup> De Rosa S., [Ending illegal trafficking and disposal of hazardous waste in Italy: knowledge and solutions from impacted local communities](#), 2016.

<sup>89</sup> Italian Government – Ministry for Internal Affairs, [Terra dei fuochi: diminuiti i roghi di rifiuti grazie all'incremento dei controlli](#), 2022.

Figure 15 – Legal intra- and extra-EU movements of hazardous waste in 2020



Source: ECA, based on Eurostat data on [movements of hazardous waste](#).

**80** The hazardous waste streams most affected by illegal shipping in 2020 were electrical and electronic equipment, end-of-life vehicles and plastics containing hazardous components<sup>90</sup>. OLAF estimates that 30 % of all waste shipments in and from the EU are illicit<sup>91</sup>. An example of illegal shipment is provided in [Box 7](#).

<sup>90</sup> ECA analysis of the [2020 Basel Convention National Reports](#).

<sup>91</sup> [2021 OLAF Activity report](#).

**Box 7****Audit showed how hazardous waste is transported on the black market**

The [Waste Shipment Regulation](#) classifies waste either as “green listed”, with less stringent requirements for shipment, or as “amber listed”, with stricter requirements.

A 2012 joint audit on the enforcement of the [Waste Shipment Regulation](#) conducted by Supreme Audit Institutions from seven Member States plus Norway<sup>92</sup> found that hazardous waste was often imported or exported as “goods” or as “green listed” waste in order to avoid the more stringent procedures applied to “amber listed” waste.

**81** Waste trafficking is lucrative. Annual revenues are estimated between €1.5 billion and €1.8 billion<sup>93</sup> for hazardous waste trafficking alone, with a low risk of sanctions<sup>94</sup>. Detection, investigations and prosecutions are rare, and penalties are low<sup>95</sup>.

**82** Illegal trafficking has increased over the last decade and is expected to increase further<sup>96</sup>, as the amount of hazardous waste generated increases, stricter rules on managing hazardous waste come into force and exporting hazardous waste becomes more difficult<sup>97</sup>. The Commission has taken action to tackle this issue. In 2021, it proposed to ban the shipment of hazardous waste for disposal, improve the controls on shipments within the EU, and increase sanctions and penalties. It also proposed to make the unlawful collection, transport, recovery or disposal of hazardous waste a criminal offence by amending the [Directive on the protection of the environment through criminal law](#). As of September 2022, both legislative proposals are being discussed by the Parliament and the Council.

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<sup>92</sup> Joint report based on eight national audits, [Coordinated audit on the enforcement of the European Waste Shipment Regulation](#), 2012.

<sup>93</sup> European Environmental Bureau, [Implement for Life – Crime and Punishment](#), 2020.

<sup>94</sup> [Review 04/2021](#): EU actions and existing challenges on electronic waste.

<sup>95</sup> Basel Governance, Webinar presentation: [Illegal waste trade: what’s driving this multi-billion dollar transnational crime and what could stop it?](#), 2021.

<sup>96</sup> [United Nations Office on Drugs and Crime webpage on plastic and hazardous waste](#).

<sup>97</sup> Obradović M. *et al.*, [Dumping and illegal transport of hazardous waste, danger of modern society](#), 2014.

## Challenges and opportunities

**83** Hazardous waste poses multiple threats to human health and the environment. Its management has been subject to restrictive regulation in the EU, with stricter rules applied compared to other waste. The EU has taken initiatives to improve the management of hazardous waste, reinforcing the legislation, developing strategies and providing funding to support waste management projects. The Commission has undertaken numerous infringement procedures against Member States failing to transpose EU requirements into national rules (see paragraphs [22-31](#)).

**84** The generation of hazardous waste has continuously increased and is expected to further increase in the future. Several challenges in hazardous waste management in the EU remain in:

- tackling the increasing amount of hazardous waste by preventing its generation wherever possible;
- improving the classification of hazardous waste;
- clarifying the gap between the reported amounts of hazardous waste generated and treated, and ensuring traceability from generation to final treatment;
- limiting the disposal of hazardous waste and encouraging, where possible, recycling;
- tackling the illegal trafficking of hazardous waste.

**85** The Commission has taken action to improve the classification of hazardous waste, which is essential for its proper identification and treatment. However, Member States and waste holders are still facing challenges to ensure a consistent classification of hazardous waste. To address this, the Commission could, for example, further align the various applicable EU legislations (see paragraphs [32-37](#)).

**86** Prevention of the generation of hazardous waste is most important and already prioritised in EU legislation. Economic operators can limit their hazardous waste by adopting eco-design practices and reducing the use of hazardous substances in production processes. Providing more information to consumers on the presence of hazardous substances in products would allow them to make more sustainable choices. This would in turn influence how economic operators design their products, and prevent the generation of hazardous waste. The Commission could, for example, consider extending the use of digital passports to more products that generate

hazardous waste at their end-of-life. Addressing shortcomings in the application of the polluter pays principle, which the Commission intends to do in 2024 in the context of the [2021 EU Action Plan on zero pollution](#), is an opportunity to ensure that polluters are better held responsible for their waste (see paragraphs [38-47](#)).

**87** There is a gap of 21 % in the data between the hazardous waste generated and treated in the EU, and current data is insufficient to ensure the traceability of hazardous waste. This shows the need to improve relevant data on hazardous waste. The Commission could, for example, consider setting minimum operating conditions for the Member States' electronic registers of hazardous waste, and align them with the European register for the shipping of waste. This could constitute an opportunity to better trace hazardous waste from generation to final treatment (see paragraphs [48-50](#), and [70-73](#)).

**88** Hazardous waste has to be treated by dedicated treatment facilities respecting safety requirements. This is still hampered by different difficulties, such as operators mixing hazardous waste with other types of waste when treating it. Despite the EU initiatives, most hazardous waste continues to be disposed of, rather than prepared for reuse, recycled or recovered. In particular recycling of hazardous waste could benefit from the development of new technologies. The need to improve technologies and capacities to recover critical raw materials from waste would also support the EU's strategic autonomy. The Taxonomy Regulation provides the opportunity to channel more private investment into recycling activities. This could address hazardous waste currently still impossible to recycle in a viable way. Furthermore, better decontamination and better waste management practices at the level of Member States and waste holders could open up new market opportunities for the recycled outcome (see paragraphs [51-69](#), and [74](#)).

**89** Finally, the trafficking and illegal dumping of hazardous waste remains a lucrative business, with low rates of detection and sanctions. The use of digitalisation, which is an opportunity to better trace hazardous waste, and a more dissuasive sanctions mechanism, could limit possibilities of illegal trafficking. The ban on all intra and extra-EU shipments of waste for disposal, which the Commission proposed in 2021, could further contribute to limiting illegal trafficking of hazardous waste (see paragraphs [75-82](#)).

This review was adopted by Chamber I, headed by Mrs Joëlle Elvinger, Member of the Court of Auditors, in Luxembourg at its meeting of 14 December 2022.

*For the Court of Auditors*

Tony Murphy  
*President*



# Annexes

## Annex I – EU Legislation applicable to hazardous waste

### Waste management

- Waste Framework Directive – [Directive 2008/98/EC](#)
- European list of waste – [Commission Decision 2000/532/EC](#)

### Waste operations

- Landfill of waste – [Directive 1999/31/EC](#)
- Waste shipment Regulation – [Regulation \(EC\) No 1013/2006](#)
- Protection of the environment through criminal law – [Directive 2008/99/EC](#)
- Industrial emissions (waste incineration and waste treatment) – [Directive 2010/75/EU](#)
- Control of major accident hazards involving dangerous substances – [Directive 2012/18/EU](#)
- *Proposal for a revision of the Industrial Emissions Directive (2022)*
- *Proposal for a new Regulation on waste shipments (2021)*
- *Proposal for a revision of the Directive on the protection of the environment through criminal law (2021)*

### Specific waste streams

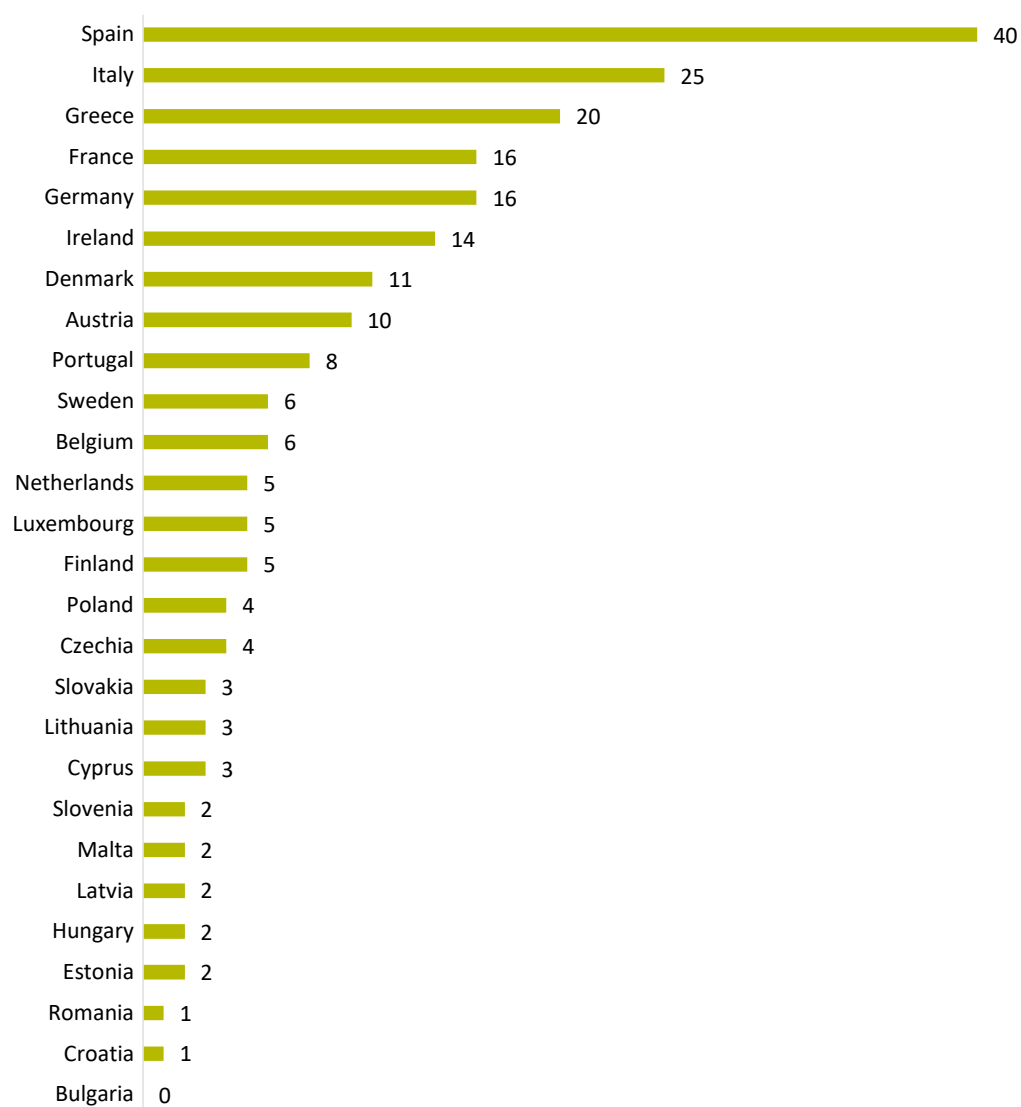
- Packaging and packaging waste – [Directive 94/62/EC](#)
- Disposal of PCBs/PCTs – [Directive 96/59/EC](#)
- End-of-life vehicles – [Directive 2000/53/EC](#)
- Batteries and accumulators – [Directive 2006/66/EC](#)
- Waste from extractive industry – [Directive 2006/21/EC](#)

- Restrictions of hazardous substances in electrical and electronic equipment (RoHS) – [Directive 2011/65/EU](#)
- Waste electric and electronic equipment (WEEE) – [Directive 2012/19/EU](#)
- Ship recycling – [Regulation \(EU\) No 1257/2013](#)
- Persistent organic pollutants – [Regulation \(EU\) 2019/1021](#)
- *[Proposal for a new Regulation on batteries and accumulators \(2020\)](#)*

## Annex II – Infringement procedures on hazardous waste

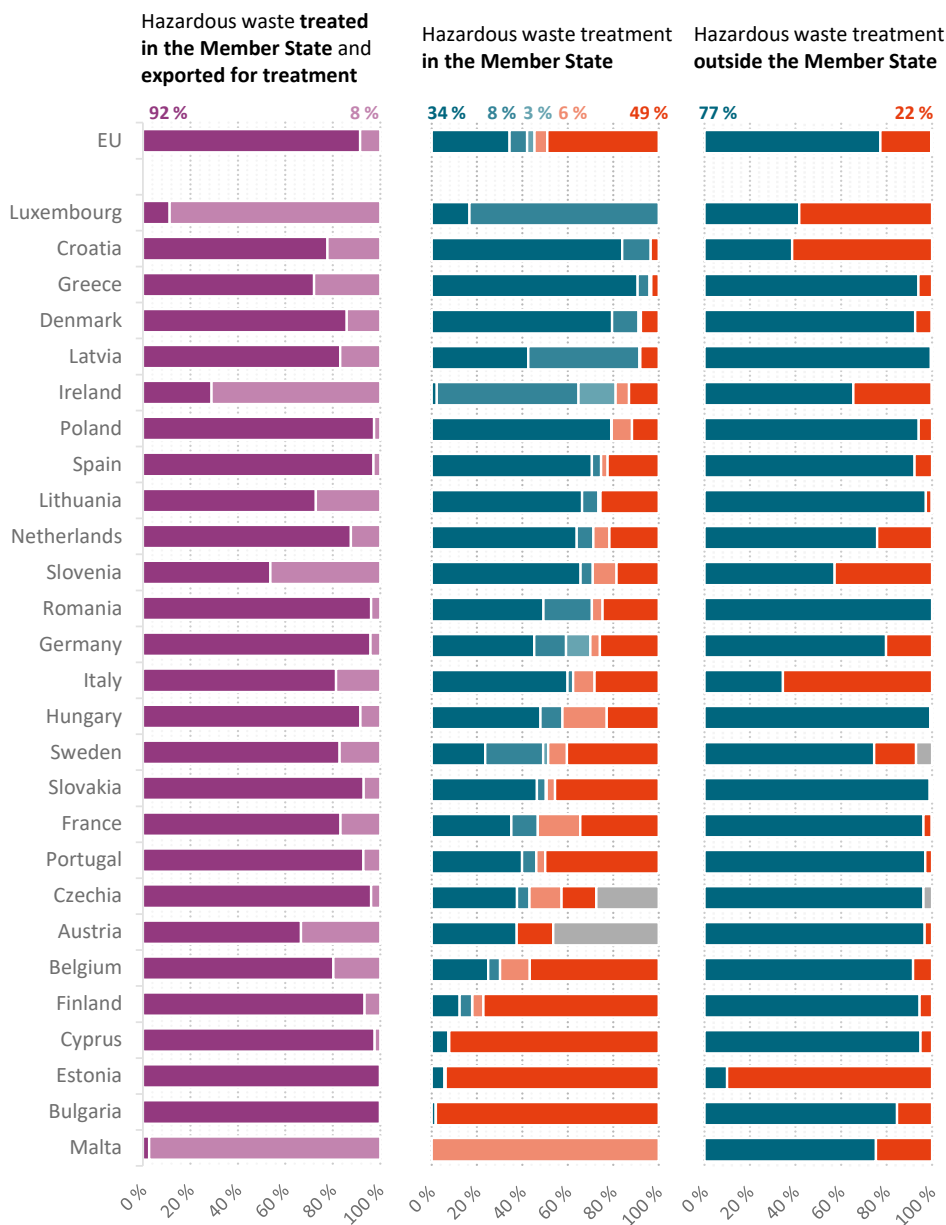
In the period 1990-2022, the Commission launched 216 infringement procedures against Member States, as presented in the table below. The table does not include infringement cases launched against the United Kingdom in the same period.

These infringement procedures specifically addressed the topic of hazardous waste, and polychlorinated biphenyls (PCBs) and polychlorinated terphenyls (PCTs). PCBs and PCTs are a group of synthetic chemical substances, used mainly in electrical equipment. Extensively used in the past, these substances have been restricted in the EU since 1985 because of the environmental concerns they raised.



## Annex III – Treatment of hazardous waste in 2018

The following graph shows how hazardous waste was treated in the EU, and in each Member States, in 2018. Treatment is also shown for hazardous waste exported by each Member State, and the EU, but with less detail due to available data.



# Glossary

**Amber listed waste:** Waste that cannot be imported or exported for recovery without prior written notification or consent from the authorities of the countries concerned; includes hazardous waste.

**Bio-accumulative:** Term used to describe chemicals that accumulate in the tissues of plants and animals because they are absorbed faster than the metabolic rate of breakdown.

**Disposal:** Waste treatment operation in which waste is left in an open-air tip, buried underground, deposited in a water body, pond or lagoon, or injected into a well, salt dome or naturally occurring repository.

**Eco-design:** Approach to design that minimises environmental impact at all stages of a product's life cycle.

**(Energy) recovery:** Use of combustible waste to generate energy through incineration, with recovery of the heat thus generated.

**European Regional Development Fund:** EU fund that strengthens economic and social cohesion in the EU by financing investments that reduce imbalances between regions.

**Extended producer responsibility:** Approach which adds the post-consumer stage of a product's life cycle, including recycling and disposal, to the producer's environmental responsibilities.

**Green listed waste:** Waste that can be imported or exported for recovery without prior written notification or consent from the authorities of the countries concerned.

**Horizon 2020:** The EU's research and innovation funding programme for the 2014-2020 period.

**Landfilling:** Disposal of hazardous waste by means of managed superficial burial.

**LIFE:** Financial instrument supporting the implementation of the EU's environmental and climate policy through co-financing of projects in Member States.

**Persistent organic pollutants:** Chemical substance that resists breakdown and can travel long distances and remain intact in the environment for long periods of time.

**Polluter pays principle:** Principle requiring those causing, or likely to cause, pollution to bear the cost of measures to prevent, control or remedy it.

## ECA team

This ECA's review on EU action to address the increasing amount of hazardous waste was adopted by Chamber I Sustainable use of natural resources, headed by ECA Member Joëlle Elvinger. The task was led by ECA Member Eva Lindström, supported by Katharina Bryan, Head of Private Office, Johan Stalhammar, Private Office Attaché, and Andrzej Robaszewski, Economist in the Private Office; Florence Fornaroli, Principal Manager; Mihaela Văcărașu, Head of Task; Xavier Ignasi Farrero Gonzalez, Lucia Rosca, Malgorzata Frydel and Vasileia Kalafati, Auditors. Marika Meisenzahl provided graphical support. Laura McMillan provided linguistic support.



*From left to right:* Xavier Ignasi Farrero Gonzalez, Vasileia Kalafati, Malgorzata Frydel, Eva Lindström, Andrzej Robaszewski, Mihaela Văcărașu, Florence Fornaroli, Katharina Bryan, Laura McMillan, and Marika Meisenzahl.

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This review addresses the EU's actions for tackling hazardous waste. Hazardous waste can harm human health and the environment. EU initiatives have focused on its prevention, but hazardous waste has continued to increase since 2004. Its safe treatment is hampered by difficulties, e.g. reliably tracing hazardous waste. Still over 50 % of the EU's hazardous waste is disposed of. Recycling is constrained by technical difficulties and the lack of market opportunities for the recycled output. Moreover, illegal trafficking remains a lucrative business. Future challenges lie in dealing with the increasing amount of hazardous waste, improving its classification, ensuring traceability from generation to final treatment, limiting its disposal through more recycling, and addressing its illegal trafficking.

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