

# JRC SCIENCE FOR POLICY REPORT

## WASTE DISPOSAL – Interim Report: Main Report

*Assessment of the disposal  
operations listed in Annex I to  
Directive 2008/98/EC in the  
light of the duty of care  
obligation set out in Article 13  
of the same Directive*

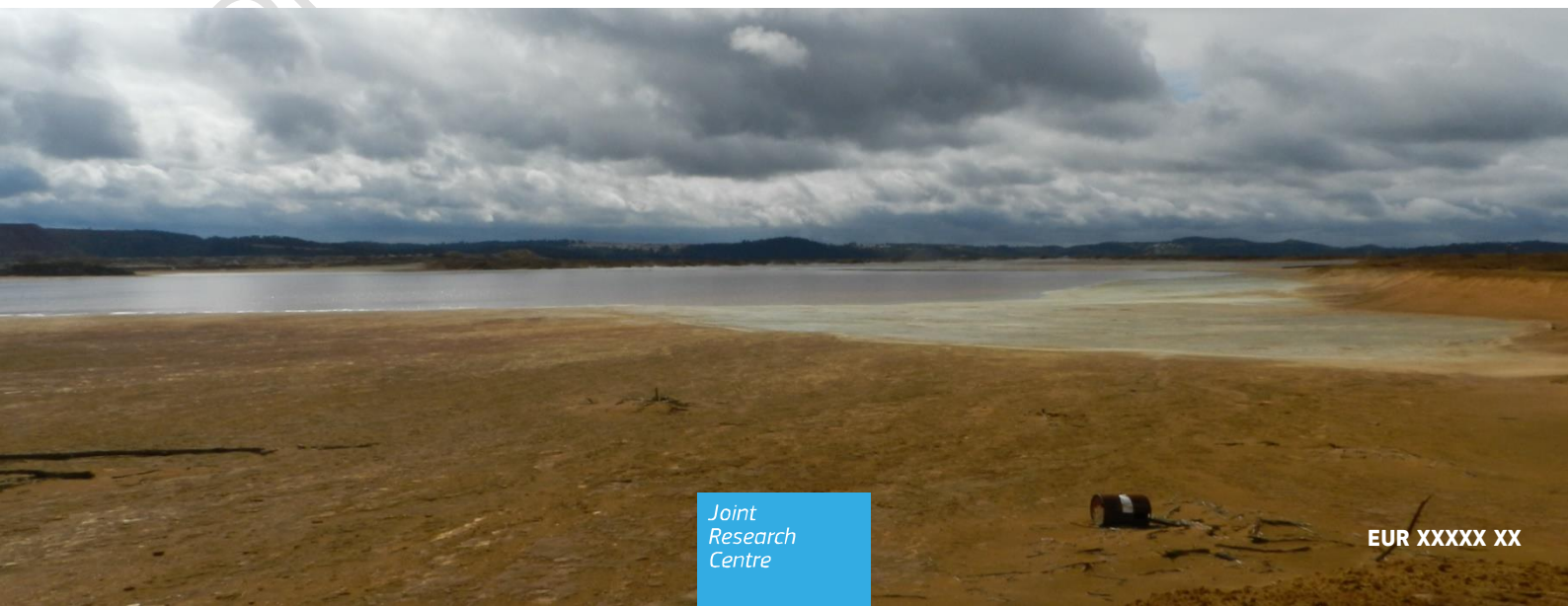
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1 **Abstract**

2 To be included after the workshop.

3

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DRAFT - WORK IN PROGRESS

1    **Acknowledgements**

2    **To be included after the workshop.**

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DRAFT - WORK IN PROGRESS

## **Executive summary**

To be included after the workshop.

### **Policy context**

This work is carried out in line with the provisions of Article 12 of the revised Waste Framework Directive (WFD), Directive 2008/98/EC as last amended by Directive (EU) 2018/851, adopted by the EU Council on 22 May 2018: *'the Commission shall carry out an assessment of the disposal operations listed in Annex I, in particular in the light of Article 13 and shall submit a proposal, if appropriate, to the European Parliament and the Council with a view to regulating disposal operations, including through possible restrictions, and to consider a disposal reduction target, to ensure environmentally sound waste management'*.

Further information on the policy context is provided in Section 1.1.

### **Key conclusions**

To be included after the workshop.

# 1 Introduction

## 1.1 Policy context

Article 12 of the revised Waste Framework Directive (WFD), Directive 2008/98/EC as last amended by Directive (EU) 2018/851, adopted by the EU Council on 22 May 2018 stipulates that: *'the Commission shall carry out an assessment of the disposal operations listed in Annex I, in particular in the light of Article 13 and shall submit a proposal, if appropriate, to the European Parliament and the Council with a view to regulating disposal operations, including through possible restrictions, and to consider a disposal reduction target, to ensure environmentally sound waste management'*.

Article 13 of the WFD refers to *'Protection of human health and the environment'*. It refers particularly to measures to ensure that waste is managed without:

*'(a) without risk to water, air, soil, plants or animals;*

*(b) without causing a nuisance through noise or odours; and*

*(c) without adversely affecting the countryside or places of special interest'*.

Article 3(19) of the WFD provides the definition of *'disposal'*: *'it means any operation, which is not recovery even where the operation has as a secondary consequence the reclamation of substances or energy. Annex I sets out a non-exhaustive list of disposal operations'*.

The list of disposal operations set out in Annex I of the WFD mirrors the current Annex IV of the Basel Convention (see Annexes Section 11.3.1). It features the most common operations to dispose of waste.

The incineration of waste and the disposal of waste in landfills are regulated by EU legislation (see Section 2.1). In the case of landfills, specific obligations such as permit conditions, risk assessment, waste acceptance criteria, costs, financial security, control and monitoring in the operational phase and closure and after-care are set out.

Under certain circumstances a number of treatment operations prior to disposal are also covered by EU legislation (see Section 2.1), setting specific requirements for the permitting of such operations and for the protection of the human health and environment.

Nevertheless, for other disposal operations such as land treatment or release into water bodies, the situation is not as clear as for the landfilling and the incineration of waste when it comes to the minimum requirements to ensure the protection of the human health and the environment.

Furthermore, based on the data and information reported by MS, primarily on the statistics on disposal of municipal waste in landfills, the situation differs significantly between MS. The available data indicates preferential use of certain types of waste disposal operations in some MS, while these are barely used, or not used at all in other MS.

However, currently no disaggregated data or information, on the quantities, the safe conditions in which the waste is disposed in each MS and the potential impacts that these may have on human health and the environment, is available for each of the listed disposal operations or unlisted disposal operations (i.e. other than those listed in Annex I).

Finally, it is noteworthy to point out that currently the review of Annexes I, III, IV and related aspects of Annex IX to the Basel Convention is on-going (see Annexes Section 11.3.1). The lists of disposal operations and recovery operations in Annexes I and II of the WFD are based on the current Annex IV of the Convention. This means that each modification of Annex IV may lead to the necessity to amend the WFD. For the purpose of this review, MS are already compiling information and data and holding discussions that have been considered under the development of this project.

In addition to the WFD, it is also important to recall Article 5(9) of the Landfill Directive (LFD) in the policy context of this study. Indeed, Article 5(9) of the LFD foresees that *'by 31 December 2024, the Commission shall review the target laid down in paragraph 5 with a view to maintaining or, if appropriate, reducing it, to considering quantitative target per capita on landfilling and to introducing restrictions to the landfilling of non-hazardous waste other than municipal waste. To that end, the Commission shall submit a report to the European Parliament and to the Council, accompanied, if appropriate, by a legislative proposal'*.

## 1.2 Objectives

The information gathered through this project should allow the Commission services to attain the following objectives:

- objective 1: to understand the situation in each Member State for each of the waste disposal operations listed in Annex I and for any other existing unlisted waste disposal operation;



- objective 2: to understand the relevance of the impacts on the circular economy as well as on human health and the environment that can be associated to each of the identified waste disposal operations;
- objective 3: to ascertain the feasibility and relevance for (further) EU regulation of waste disposal operations. In particular, in the case of the LfD and the WAC Decision to detect and propose areas for legal and/or technical improvement; and
- objective 4: to analyse the relevant information in view of proposing (an) overall and/or operation-specific waste disposal restriction(s) and reduction target(s), in particular for landfilling of waste.

In order to achieve these objectives, the following work plan was developed and is presented in this report:

- Overview of applicable legislation and guidance documents (see Section 2):
  - EU legislation such as the Waste Framework, the Landfill, the Extractive waste, and the Industrial Emissions Directives;
  - other EU relevant documents such as BREFs; and
  - other United Nations Conventions and Protocols.
- Collection of data and information on waste disposal operations in the EU (see Section 3):
  - data analysis from Eurostat waste statistics; and
  - data and information collection from stakeholders via:
    - MS consultation (survey);
    - other stakeholders consultation (complementary data and information); and
    - written the consultation and the workshop.
- Analysis of differences in waste disposal operations between MS (see Section 4):
  - analysis of the current situation for each disposal operation (D code) based on data and information collected;
  - analysis of differences between MS;
  - analysis of the impact on circular economy, environment and human health;
  - identification of policy options for waste disposal operations, e.g.:
    - revised waste disposal operations;
    - specific guidance to ensure harmonised interpretations; and
    - possible restrictions and reduction targets.

## 2 Overview of applicable EU legislation and guidance on waste disposal operations

### 2.1 EU legislation relevant to waste treatment prior to disposal or disposal operations

#### 2.1.1 Analysis of EU legislation with regard to waste disposal

The first step of this study was to analyse a selected number of waste and environmental EU laws with reference to waste treatment prior to disposal or waste disposal operations in order to first identify the relevant EU legislation, and then to extract key information on possible bans or restrictions affecting disposal operations, waste recovery and recycling, waste disposal reduction targets and measures to protect the environment and human health.

To be assessed as relevant for this study, the EU legislation analysed had to at least include a provision on either waste treatment prior to disposal or waste disposal. Legal texts not containing neither were considered as not relevant for this study.

The result of the assessment of the relevant Legal texts is presented in **Table 1**.

The EU Legal texts considered for the this exercise included EU waste framework legislation, legislation relative to specific waste treatment/management operations and legislation relative to specific waste streams:

— Framework legislation:

- Waste Framework Directive (WFD); and
- Waste Shipments Regulation.

— Legislation relative to waste treatment/management operations:

- Industrial Emissions Directive (IED); and
- Landfill Directive (LFD) including the Waste Acceptance Criteria (WAC) Council Decision and the Guidance on landfill gas control.

— Legislation relative to specific waste-streams, mainly the following Directives:

- Batteries and Accumulators and Waste Batteries and Accumulators (Batteries Directive);
- Waste Electrical and Electronic Equipment (WEEE) including the Restriction of the use of certain Hazardous Substances (RoHS) in electrical and electronic equipment;
- End-of Life Vehicles (ELV Directive);
- Packaging and Packaging Waste;
- PolyChlorinated Biphenyls and PolyChlorinated Terphenyls (PCB Directive);
- Urban Waste Water Treatment;
- Sewage Sludge; and
- Extractive Waste Directive (EWD).

In addition, a number of other Legal texts relative to specific streams, which may include specific waste streams, were considered:

- Ship Recycling Regulation;
- Animal By-Products Regulation (ABP Regulation);
- Nitrates Directive; and
- Persistent Organic Pollutants Regulation (POP Regulation).

Supplementary to waste legislation, a number of additional EU environmental Legal texts that aim for the protection of the environmental and human health were also considered:

- Water Framework Directive;
- Groundwater Directive;
- Drinking Water Directive;
- Bathing Water Directive;
- Marine Strategy Framework Directive;
- Habitat and Birds Directives;
- Environmental Impact Assessment Directive (EIA Directive);
- Seveso III Directive; and
- Environmental Liability Directive.

Finally, a number of EU Legal texts, Reference and Guidance documents that may be relevant for the classification and reporting of waste, were also considered:

- List of Waste Decision;
- Commission notice on technical guidance on the classification of waste;
- Waste Statistics Regulation;
- Rules and calculation methods for verifying compliance with the targets Decision; and
- Registration, Evaluation, Authorisation and Restriction of Chemicals (REACH) Regulation.

A detailed analysis of the objectives and the scope of the selected EU legal texts and documents is provided in the Annexes (Section 11.1).

**Table 1:** Summary of waste and environmental EU legislation relevant community containing provisions on waste treatment prior to disposal or waste disposal operations

EU legislation	Contains provisions on waste treatment prior to disposal?	Contains provisions on waste disposal?	Relevant for this study?
<b>Waste Framework Directive</b>	YES	YES	YES
<b>Waste Shipments Regulation</b>	YES	YES	YES
<b>Industrial Emission Directive</b>	YES	YES	YES
<b>Landfill Directive</b>	YES	YES	YES
<b>Waste Acceptance Criteria Decision</b>	YES	YES	YES
<b>Batteries Directive</b>	YES	YES	YES

EU legislation	Contains provisions on waste treatment prior to disposal?	Contains provisions on waste disposal?	Relevant for this study?
<b>Waste Electrical and Electronic Equipment Directive</b>	YES	YES	YES
<b>Restriction of the use of certain Hazardous Substances Directive</b>	NO	NO	NO
<b>End-of Life Vehicles Directive</b>	YES	NO	YES
<b>Packaging and Packaging Waste Directive</b>	NO	NO (apart from a reference to the objective of 'reducing the final disposal of such waste')	NO
<b>PolyChlorinated Biphenyls and PolyChlorinated Terphenyls Directive</b>	YES	YES	YES
<b>Urban Waste Water Treatment</b>	YES	YES	YES
<b>Sewage Sludge Directive</b>	NO (defines treatment prior to Recovery, use for agriculture, not Disposal)	NO	NO
<b>Extractive Waste Directive</b>	YES	YES	YES
<b>Animal By-Products Regulation</b>	YES	YES	YES
<b>Nitrates Directive</b>	NO	NO	NO
<b>Ship Recycling Regulation</b>	NO	NO	NO
<b>Persistent Organic Pollutants Regulation</b>	YES	YES	YES
<b>Water Framework Directive</b>	NO	NO	NO (but the first and second indents of Article 11(3)(j) set condition for injection of water and re-injection of pumped groundwater into aquifers)
<b>Groundwater Directive</b>	NO	NO	NO
<b>Drinking Water Directive</b>	NO	NO	NO

EU legislation	Contains provisions on waste treatment prior to disposal?	Contains provisions on waste disposal?	Relevant for this study?
<b>Bathing Water Directive</b>	NO	NO (refers only to visual inspection of water for pollution, which includes waste)	NO
<b>Marine Strategy Framework Directive</b>	NO	NO (refers only to the consideration of waste disposal activities for the initial assessment, establishment of environmental targets and programmes of measures)	NO
<b>Habitat Directive</b>	NO	NO	NO
<b>Birds Directive</b>	NO	NO	NO
<b>Environmental Impact Assessment Directive</b>	YES	YES	YES
<b>Seveso III Directive</b>	YES	YES	YES
<b>Environmental Liability Directive</b>	YES	YES	YES
<b>List of Waste Decision</b>	NO	NO	NO
<b>Commission notice on technical guidance on the classification of waste</b>	NO	NO	NO*
<b>Waste Statistics Regulation</b>	NO (provisions on reporting only)	NO (provisions on reporting only)	NO
<b>Rules and calculation methods for verifying compliance with the targets Decision</b>	NO	NO	NO
<b>Registration, Evaluation, Authorisation and Restriction of Chemicals Regulation</b>	YES**	YES**	YES**

\* Classification of waste 'has important consequences on future waste management choices, such as feasibility and economic viability of collection, recycling method or the choice between recycling and disposal', however the document does not provide specific provision neither on waste treatment prior to disposal nor on waste disposal.

\*\* The REACH Regulation lays down provisions on substances and mixtures and on the articles that contain them, rather than on waste (see REACH Articles 1-3). However, since substances, mixtures and articles often end up being waste, the REACH legal text does contain waste-related provisions (e.g., in Annex I on Chemical Safety Reports, in Annex II, on safety data sheets, in Annex VI on information requirements and in Annex XVII on restrictions). Also certain Implementing Decisions based on REACH refer to waste treatment or waste disposal (e.g., some authorisations for the use of a substance of very high concern impose use conditions on waste management). Nevertheless, the Waste Framework Directive (2008/98/EC) remains the reference point. For example, the disposal considerations for substances and mixtures in section 13 of the safety data sheets (described in REACH Annex II) have to

be consistent with what the Waste Framework Directive requires. Only where a risk assessment of the waste phase for a given substance (and substance use) has been done as part of the Chemical Safety Report (see REACH Annex I – 5.2.2; for related guidance: see R18 – Exposure scenario building and release estimation for the waste stage), this would be relevant in the context of this report.

## **2.1.2 Bans, restrictions, targets and protection measures relative to waste disposal operations**

Following a detailed analysis of the provisions of the different EU legal texts identified in Section 2.1.1 (detailed analysis provided in the Annexes, Section 11.1), and the assessment of relevant legislation (highlighted in green in **Table 1**), a summary is provided in **Table 2**.

This summary table includes the disposal operations included in the scope of each legal text. The disposal operations indicated in the texts are provided in the *scope* column. When the text provides a reference to a disposal operation listed in Annex I to the WFD (D codes), this is also indicated. Otherwise, when possible, an assessment of the possible D code operations included/covered is indicated as *possible*.

When applicable, any ban or prohibition that may affect the disposal of waste is reported in the *bans* column.

The *restrictions* column reports any requirement that may affect directly or indirectly the amount or the properties of the waste sent to a disposal operation without banning or prohibiting it totally. This includes existing targets on collecting, recycling, recovery or preparing for re-use rates in place (not future targets), or treatment of certain waste streams when required by the legislation.

Any future targets affecting the disposal of waste and set in the EU legislation is reported in the (*future*) *targets* column.

Finally, when applicable, references to specific protection measures of the environment and human health are provided in the last column.

**Table 2** shows that all the disposal operations are covered by one or more EU legal texts.

In some cases, such as for the IED or the EIA Directive, different thresholds may apply, which leads to a possible inclusion or exclusion of the disposal operation in one or the other legal texts depending on the threshold (e.g. a waste disposal capacity).

Bans or prohibitions cover the abandonment or dumping of waste (illegal operation without permit), the incineration at sea (D11 incineration at sea), and certain imports or exports of wastes, especially the export to non-EFTA countries for disposal. In addition, certain types of management practice may be banned such as the mixing of waste during shipment. Certain types of waste streams are also targeted by specific requirements such as WEEE or wastes containing POP. Finally, certain disposal operation prohibit specific wastes such as the LfD.

In order to promote a circular economy, a number of collection, recycling, recovery or preparing for re-use targets are set to avoid disposal of valuable materials including critical raw materials that may be contained in specific streams.

In some cases, for waste presenting a specific risk for the environment and human health, a specific treatment prior to disposal may be required in certain EU legal texts, e.g. treatment of non-inert waste prior to disposal in landfill or detoxification of tailings containing cyanides prior to deposition in tailing ponds.

Protection measures refer to a number of different concepts: from specific requirements laid down in the legislation itself, to the best available techniques or the best environmental management practices defined in the BREFs or the BEMP Sectorial Reference Documents, including unspecified environmentally sound management or environmentally acceptable manner.

1 **Table 2:** Summary of the relevant EU legislation with respect to the covered disposal operations, the bans, the restrictions, the targets and the protection measures

EU legislation	Covered operations	disposal	Bans	Restrictions (direct and indirect)	(Future) Targets	Protection measures (of the environment and human health)
<b>Waste Framework Directive 2008/98/EC</b>	D1 (deposit into or on to land) to D15 (storage).		Incineration at sea (D11), Abandonment, Dumping.	<p>Preparing for re-use or recycling paper, metal, plastic and glass from households: <math>\geq 50\%</math> w./w by 2020.</p> <p>Preparing for re-use, recycling and other material recovery, to substitute other materials, of non-hazardous construction and demolition waste: <math>\geq 70\%</math> w./w. by 2020.</p>	<p>Preparing for re-use and recycling of municipal waste: <math>\geq 55\%</math> w./w. by 2025 (<math>\geq 50\%</math> by 2030 if postponed by MS).</p> <p><math>\geq 60\%</math> w./w. by 2025 (<math>\geq 55\%</math> by 2030 if postponed by MS).</p> <p><math>\geq 65\%</math> w./w. by 2035 (<math>\geq 60\%</math> by 2030 if postponed by MS).</p>	'Minimum standards taking into consideration BAT'.

EU legislation	Covered operations	disposal Bans	Restrictions (direct and indirect)	(Future) Targets	Protection measures (of the environment and human health)
<b>Landfill Directive 1999/31/EC</b>	<p>Deposit onto or into land (i.e. underground).</p> <p>Possibly: D1 (deposit into or on to land), D5 (specially engineered landfill), D12 (permanent storage).</p>	<p>Landfill of liquid, explosive, corrosive, oxidising, flammable, highly flammable wastes, certain types of infectious wastes, separately collected wastes for preparing for re-use or recycling, certain types of tyres and any other waste not meeting WAC.</p>	<p>Treatment prior to landfilling (possible exemption for certain inert wastes)</p> <p>Landfill class use depends on waste properties and WAC.</p>	<p>Landfill of municipal waste ≤10 % w/w. by 2035 (≤25 % w/w. by 2035 and ≤10 % w/w. by 2040 if postponed by MS).</p> <p>By 2030, landfill of all waste suitable for recycling or other recovery, in particular in municipal waste, shall not be accepted in a landfill with the exception of waste for which landfilling delivers the best environmental outcome in accordance with Article 4 of Directive 2008/98/EC.</p> <p>By 31 December 2024, the Commission shall review the target laid down in paragraph 5 with a view to maintaining or, if appropriate, reducing it, to considering quantitative target per capita on landfilling and to introducing restrictions to the landfilling of non-hazardous waste other than municipal waste</p>	<p>Technical requirements in Annexes I, II, and III on landfill classes, waste acceptance procedures and control and monitoring.</p> <p>'Best practices'.</p>



EU legislation	Covered operations	disposal	Bans	Restrictions (direct and indirect)	(Future) Targets	Protection measures (of the environment and human health)
<b>Industrial Emissions Directive 2010/75/EU</b>	<p>Disposal of hazardous waste (&gt;10 t/day) and non-hazardous waste (&gt;50 t/day), involving a number of pre-treatment activities but excluding urban waste water treatment activities.</p> <p>Disposal of hazardous waste (&gt;10 t/day) and non-hazardous waste (&gt;3 t/h) by incineration.</p> <p>Landfills as defined in the Landfill Directive but excluding landfills of inert waste. (&gt;10 t/day or 25 kt capacity).</p> <p>Temporary storage pending disposal (&gt;50 t).</p> <p>Underground storage of hazardous waste (&gt;50 t).</p> <p>Possibly all D1 (deposit into or on to land) to D15 (storage), except D6 (release into water body except seas/oceans), D7 (release to seas/oceans including seabed insertion) and D11 (incineration at sea), if treatment capacity threshold met.</p>					'Best Available Techniques'

EU legislation	Covered operations	disposal	Bans	Restrictions (direct and indirect)	(Future) Targets	Protection measures (of the environment and human health)
<b>Waste Regulation 1013/2006</b>	<b>Shipments (EC)</b>	D1 (deposit into or on to land) to D15 (storage), with D13 (blending or mixing), D14 (re-packaging) and D15 (storage) defined as interim operations by the Regulation.	<p>Mixing of waste during shipment (absolute ban, no exception).</p> <p>Export of waste to the Antarctic.</p> <p>Import of waste for disposal from non-Basel-Convention countries or for recovery from non-OCDE-Decision or non-Basel-Convention countries (possible exceptions).</p> <p>Export of waste for disposal to non-EFTA (possible exceptions if Basel-Convention party) and overseas countries and territories.</p> <p>Export of hazardous waste and import of waste destined for recovery to non-OCDE-Decision countries (possible exceptions).</p>			'Environmentally sound management'.
<b>Batteries 2006/66/EC</b>	<b>Directive</b>	D1 (deposit into or on to land) to D15 (storage) as defined in the WFD.		<p>Collection rate <math>\geq 40</math> % w/w. (collected/sold) and</p> <p>Minimum recycling efficiencies 50-75 % w/w.</p>	To minimise the disposal of batteries and accumulators as mixed municipal waste.	<p>'Best Available Techniques'.</p> <p>Detailed requirements in Annex III, Part A on treatment and storage.</p>

EU legislation	Covered operations	disposal Bans	Restrictions (direct and indirect)	(Future) Targets	Protection measures (of the environment and human health)
<b>Waste Electrical and Electronic Equipment Directive 2012/19/EU</b>	D1 (deposit into or on to land) to D15 (storage) as defined in the WFD.	Disposal of separately collected and untreated WEEE is prohibited.	Collection rate of WEEE shall be 65 % of the average weight of EEE placed on the market in the three preceding years in the MS, or alternatively 85 % of WEEE generated (40% if derogation) and  Recovery rate 55-85% w./w. (depending on the category of WEEE).		Proper treatment as defined in Annex VII.  Technical requirements as specified in Annex VIII (e.g. impermeable surfaces, waterproof covering).  'Best Environmental Management Practices'.
<b>End-of Life Vehicles Directive 2000/53/EC</b>	D1 (deposit into or on to land) to D15 (storage) as defined in the WFD.		The reuse and recovery rate ≥95 % by an average weight per vehicle and year.  The re-use and recycling ≥85 % by an average weight per vehicle and year		'Minimum treatment' defined in Annex I.
<b>PolyChlorinated Biphenyls and PolyChlorinated Terphenyls Directive 96/59/EC</b>	D8 (biological treatment), D9 (physico-chemical treatment), D10 (incineration on land), D12 (only in safe, deep, underground storage in dry rock formations and only for equipment containing PCBs and used PCBs which cannot be decontaminated) and D15 (storage).	D11 (incineration at sea)	Decontamination		'Best Available Techniques'

EU legislation	Covered operations	disposal Bans	Restrictions (direct and indirect)	(Future) Targets	Protection measures (of the environment and human health)
<b>Urban Waste Water Treatment Directive 91/271/EEC</b>	Not defined. Disposal included in the definition of appropriate treatment.	Dumping to surface water.			'Environmentally acceptable manner'.
<b>Extractive Waste Directive 2006/21/EC</b>	Waste facilities, e.g. heaps, ponds, including Category A waste facilities.  Possibly D1 (deposit into or on to land), D3 (deep injection), D4 (surface impoundment), D5 (specially engineered landfill), D6 (release into water body except seas/oceans), D7 (release to seas/oceans including seabed insertion) and D15 (storage).	Dumping or abandonment of extractive waste.	Weak acid dissociable concentration ≤10 ppm.	To prevent or reduce waste production and its harmfulness.	'Based on, inter alia, Best Available Techniques'
<b>Animal By-Products Regulation 1069/2009</b>	Incineration and landfilling.  Possibly D10 (incineration on land) and D1 (deposit into or on to land), D5 (specially engineered landfill), D12 (permanent storage).		In some cases sterilisation prior to disposal.		

EU legislation	Covered operations	disposal	Bans	Restrictions (direct and indirect)	(Future) Targets	Protection measures (of the environment and human health)
<b>Persistent Pollutants 2019/1021</b>	<b>Organic Regulation</b>	D9 (physico-chemical treatment) and D10 (incineration on land).	Disposal or recovery operations that may lead to recovery, recycling, reclamation or re-use on their own of the substances listed in Annex IV shall be prohibited.	Permanent storage shall be allowed only when all the conditions set in Annex V are met:	Phase out POPs.	'Best environmental practice or best available techniques if 'exceptional cases' derogation'.
<b>Environmental Assessment 2011/92/EU</b>	<b>Impact Directive</b>	D9 (physico-chemical treatment), D10 (incineration on land) or landfill of hazardous waste.  D9 (physico-chemical treatment), D10 (incineration on land) of non-hazardous waste with a capacity exceeding 100 tonnes per day.  In addition to D9 (physico-chemical treatment) and D10 (incineration on land), landfill of hazardous waste may possibly include D5 (specially engineered landfill) or D12 (permanent storage).				"Developers' measures envisaged in order to avoid, prevent or reduce and, if possible, offset likely significant adverse effects on the environment'.

EU legislation	Covered operations	disposal Bans	Restrictions (direct and indirect)	(Future) Targets	Protection measures (of the environment and human health)
<b>Seveso III Directive 2012/18/EC</b>	<p>Included: tailing ponds containing dangerous substances.</p> <p>Excluded: waste landfills, including underground waste storage.</p>	Any establishment, installation or storage facility, or any part thereof where the measures taken by the operator for the prevention and mitigation of major accidents are seriously deficient.			<p>'Major Accident Policy Prevention'.</p> <p>'Emergency plans'.</p>
<b>Environmental liability Directive 2004/35/EC</b>	<p>Disposal of waste and hazardous waste.</p> <p>Management of extractive waste.</p> <p>Possibly D1 (deposit into or on to land) to D15 (storage).</p>				<p>'Preventive measures'.</p> <p>'Remedial measures' (evaluated using 'best available technologies').</p>
<b>Registration, Evaluation, Authorisation and Restriction of Chemicals Regulation 1907/2006</b>	<p>The REACH Regulation lays down provisions on substances and mixtures and on the articles that contain them, rather than on waste (see REACH Articles 1-3). However, since substances, mixtures and articles often end up being waste, the REACH legal text does contain waste-related provisions (e.g., in Annex I on Chemical Safety Reports, in Annex II, on safety data sheets, in Annex VI on information requirements and in Annex XVII on restrictions). Also certain Implementing Decisions based on REACH refer to waste treatment or waste disposal (e.g., some authorisations for the use of a substance of very high concern impose use conditions on waste management). Nevertheless, the Waste Framework Directive (2008/98/EC) remains the reference point. For example, the disposal considerations for substances and mixtures in section 13 of the safety data sheets (described in REACH Annex II) have to be consistent with what the Waste Framework Directive requires. Only where a risk assessment of the waste phase for a given substance (and substance use) has been done as part of the Chemical Safety Report (see REACH Annex I – 5.2.2; for related guidance: see R18 – Exposure scenario building and release estimation for the waste stage), this would be relevant in the context of this report.</p>				

## 2.2 Other EU relevant documents

Other documents such as the best available techniques (BAT) reference documents (BREFs) provide information and data on waste incineration or waste treatment, pollution control and prevention techniques, and the BAT and the associated environmental performance levels (including associated emission levels) (see Annexes Section 11.2.1).

In addition, the best environmental management practice for the waste management sector 'describes a set of best practices with high potential for broad uptake' and constitutes 'the technical basis for the development of an EU Eco-Management and Audit Scheme (EMAS)' (see Annexes Section 11.2.2).

Finally, two Communications from the Commission: 'The European Green Deal' (COM(2019) 640 final), <https://eur-lex.europa.eu/legal-content/EN/TXT/?qid=1588580774040&uri=CELEX:52019DC0640> and 'A new Circular Economy Action Plan – For a cleaner and more competitive Europe' (COM(2020) 98 final), <https://eur-lex.europa.eu/legal-content/EN/TXT/?qid=1583933814386&uri=COM:2020:98:FIN>, are also important documents that present the EU waste management ambitions.

The first one, the European green deal, provides an insight to the Commission's commitment and strategy to tackle climate and environmental-related challenges, including the waste management. It stresses the plan to 'propose an EU model for separate waste collection', and to 'stop exporting its waste outside of the EU'.

The second one, the circular economy action plan, provides 'a future-oriented agenda for achieving a cleaner and more competitive Europe' with a focus on product policy but also waste, and in particular on further measures 'to reduce waste and ensure that the EU has a well-functioning internal market for high quality secondary raw materials'.

With that aim, the document highlights the Commission plan to 'put forward waste reduction targets for specific streams as part of a broader set of measures on waste prevention in the context of a review of Directive 2008/98/EC'.

A particular focus is given to a number of streams:

- electronics and ICT;
- batteries and vehicles;
- packaging;
- plastics;
- textiles;
- construction and buildings; and
- food, water and nutrients.

## 2.3 United Nations Conventions

A number of United Nations (UN) Conventions may also be relevant for waste disposal operations.

One of the most relevant, when it comes to the list of waste disposal operations, is the Basel Convention (see Annexes Section 11.3.1) transposed into EU law as the Waste Shipments Regulation (see Annexes Section 11.1.1.2).

The Basel Convention is also of particular interest for this project as the review of the Basel Convention's Annex IV (Section A final disposal operations – Section B recovery operations) and Annex IX (List B of wastes) is on-going. During the biennium 2020-2021, an Expert Working Group (EWG) is undertaking specific activities on Annex IV review. The way forward foresees that amendment proposals are presented/discussed in 2020 and negotiated/possibly adopted during the Conference of the Parties, at its fifteenth meeting (COP15) in 2021. Different options for the final disposal operations are proposed and selected by Parties and observers. The options under discussion, at the time of writing, for the possible amendments to Annex IV section A are reported in **Table 9** in Section 11.1.1. Furthermore, the options proposed by the EU and its MS are summarised in **Table 10** in Section 11.1.1.





### **3 Data and information collection**

#### **3.1 Eurostat**

Eurostat includes a number of databases on waste statistics reported by Member States to Eurostat following the requirements of the Waste Statistics Regulation (see Annexes Section 11.1.5.3) and the Waste Framework Directive (see Annexes Section 11.1.1.1).

In general, the most comprehensive databases are the ones on waste generation (env\_wasgen) and waste treatment (env\_wastrt), including recovery and disposal operations.

In addition, material flow account databases are available for the management of waste (env\_wassd) and for the material flows for circular economy (env\_ac\_sd), including waste materials.

Other databases are available (<https://ec.europa.eu/eurostat/data/database>) but they are more specific to certain waste streams such as packaging waste, WEEE waste, ELVs, batteries and accumulators waste, municipal waste or transboundary shipped wastes, with a focus on recovery/recycling operations.

The dataset of both databases on waste treatment and generation was downloaded for the EU-27 for years 2010, 2012, 2014 and 2016; 2018 was not available at the time of writing.

#### **3.2 Survey and Member States consultation**

Specific data and information on waste disposal operations have been collected in the EU-27 via a survey designed for this purpose (see Section 11.5 in the Annexes).

The survey was designed taking into consideration preliminary input from some Member States (MS) in February–March 2019.

The survey was then distributed to MS on 25 July 2019 by DG Environment, and feedback was collected until January 2020.

#### **3.3 Complementary data and information collection with other stakeholders**

From March to April 2020, the JRC launched an additional call to collect data and information on unlisted waste disposal operations, bans or restrictions, specific measures to protect the environment and human health and waste disposal data (as in Section 3.2) from industry associations and environmental organisations. The survey designed for MS was distributed for information purpose.

In addition, data and information on possible differences across MS on the interpretation of the disposal operations from Annex I to the WFD was requested.

#### **3.4 Written consultation and workshop**

Finally, a written consultation was organised from DD MONTH 2020 to DD MONTH 2020, to collect a written feedback from stakeholders on the preliminary results from the interim report.

In addition to the written consultation, a workshop/webinar was organised to present, discuss and exchange on the preliminary results presented in the draft report.



## 4 Results

### 4.1 General results

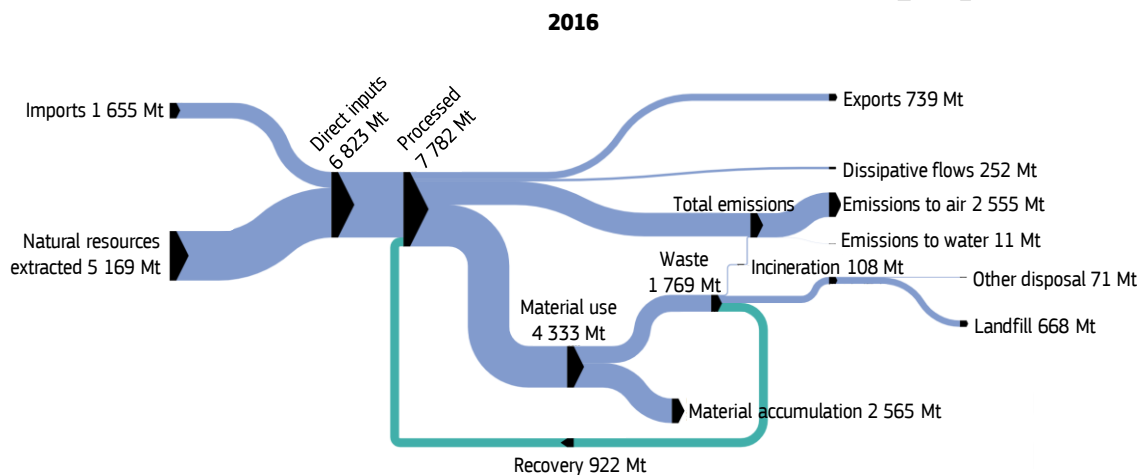
#### 4.1.1 The EU situation (based on Eurostat data)

##### 4.1.1.1 General overview of different streams

Recently, Eurostat developed a new visualisation tool to help visualising different material flows in the EU-27 ([https://ec.europa.eu/eurostat/cache/sankey/circular\\_economy/sankey.html](https://ec.europa.eu/eurostat/cache/sankey/circular_economy/sankey.html)). In practice, different flows are presented in a Sankey diagram with different nodes representing different phases in the economy, e.g. imports, extraction, processing, use, exports, and including waste treatment and waste disposal.

The Sankey diagram (**Figure 1**) is based on an analysis of the different databases at Eurostat including the ones presented in Section 3.1.

**Figure 1:** Material and waste flows in the EU-27 in 2016



Source: Eurostat (<https://ec.europa.eu/eurostat/web/circular-economy/material-flow-diagram>)

Based on data in **Figure 1**, the disposal of waste represented about ~12% of the total mass of material inputs in the EU-27 economy in 2016:

$$\frac{108 \text{ Mt sent to incineration} + 668 \text{ Mt sent to landfills} + 71 \text{ Mt other disposal}}{6 823 \text{ Mt direct material input}} \approx 12\%$$

Over the 2010-2016 period, this ratio ranged from ~12% in 2016 to ~14% in 2012 and 2013.

The Sankey diagram shows also that about half of the waste sent for treatment is recovered either by recycling or backfilling: ~52%. This percentage has been regularly increasing since 2012 when it was ~49%.

##### 4.1.1.2 From generation to treatment and waste disposal

As stated in Section 3.1, different databases on waste are available in Eurostat, among which the waste generation and treatment databases, env\_wasgen and env\_wasttr respectively.

Waste data are reported to Eurostat by Member States following requirements of the Waste Statistics Regulation (see also Annexes Section 11.1.5.3).

The definitions used by Eurostat for waste and by-products are the definitions of the Waste Framework Directive (WFD). In addition the waste stream, as in the WFD, excludes the following streams:

- 'gaseous effluent emitted into the atmosphere;
- land (in situ) including unexcavated contaminated soil and buildings permanently connected with land;
- uncontaminated soil and other naturally occurring material excavated in the course of construction activities where it is certain that the material will be used for the purposes of construction in its natural state on the site from which it was excavated;
- radioactive waste;
- decommissioned explosives; and
- faecal matter, straw and other natural non-hazardous agricultural or forestry material used in farming, forestry or for the production of energy from such biomass through processes or methods which do not harm the environment or endanger human health'.

(see also Annexes Section 11.1.1.1)

On the one hand, in Eurostat, the generation of waste is reported based on the origin of the waste based on different economic activities, similar to the European List of Waste classification (see also Annexes Section 11.1.5.1). In total, 19 distinct economic activities: 18 codes for industry activities and 1 code for households; are provided. These 19 distinct economic activities include waste treatment and therefore the waste generated by this economic activity. At this stage it is important to differentiate between the 'primary' and the 'secondary' waste.

The 'primary' waste is defined as: 'any substance or object which the holder discards or intends or is required to discard' (WFD and Eurostat definition of 'waste').

The 'secondary' waste is defined as: 'wastes generated by waste treatment facilities during the process of waste treatment' (Eurostat definition).

This means that certain waste streams may be double counted in the generation database whereas this should not be the case in the waste treatment database which refers to the final treatment and therefore should be counted only once. The only exception to this is '*the double counting of combustion residues from waste incineration and energy recovery*'<sup>2</sup>.

In addition, a distinction is made between 'production residues' and 'production wastes' in Eurostat: 'Production residues' are defined according to the definition of 'by-products' of Article 5 of the WFD. However, 'consumption residues' are defined as 'primary wastes that arise from consumption in private households and businesses'; and 'waste treatment residues' as 'secondary wastes generated by waste treatment facilities during the processing of waste'<sup>2</sup>.

Finally, waste is classified in 51 waste categories ('substance oriented waste statistical nomenclature') linked to the European List of Waste (see Table of Equivalence in the Waste Statistics Regulation, Regulation (EU) No 849/2010<sup>3</sup>). These categories include:

- 33 waste type categories (Spent solvents, Acid, alkaline or saline wastes, Used oils, Chemical wastes, Industrial effluent sludges, Sludges and liquid wastes from waste treatment, Health care and biological wastes, Metal wastes ferrous, Metal wastes non-ferrous, Metal wastes mixed ferrous and non-ferrous, Glass wastes, Paper and cardboard wastes, Rubber wastes, Plastic wastes, Wood wastes, Textile wastes, Waste containing PCB, Discarded vehicles, Batteries and accumulators wastes, Discarded equipment except discarded vehicles and batteries and accumulators waste, Animal and mixed food waste, Vegetal wastes, Animal faeces, urine and manure, Household and similar wastes, Mixed and undifferentiated materials, Sorting residues, Common sludges, Mineral waste from construction and demolition, Combustion wastes, Soils, Dredging spoils, Mineral wastes from waste treatment and stabilised wastes, and Other mineral wastes); and
- 2 hazard categories (Hazardous, Non-Hazardous).

Therefore, since 2010, the database on waste generation contains the total waste generated by each Member State disaggregated into:

<sup>2</sup> See manual on waste statistics – A handbook for data collection on waste generation and treatment – 2013 edition, Section 2.1, pp.15-19 (<https://ec.europa.eu/eurostat/web/products-manuals-and-guidelines/-/KS-RA-13-015>)

<sup>3</sup> Regulation (EU) No 849/2010 <https://eur-lex.europa.eu/eli/reg/2010/849/oj>

- primary and secondary waste;
- 19 waste producing activities (NACE codes); and
- 51 waste categories

On the other hand, the treatment of waste reported in Eurostat is broken-down into:

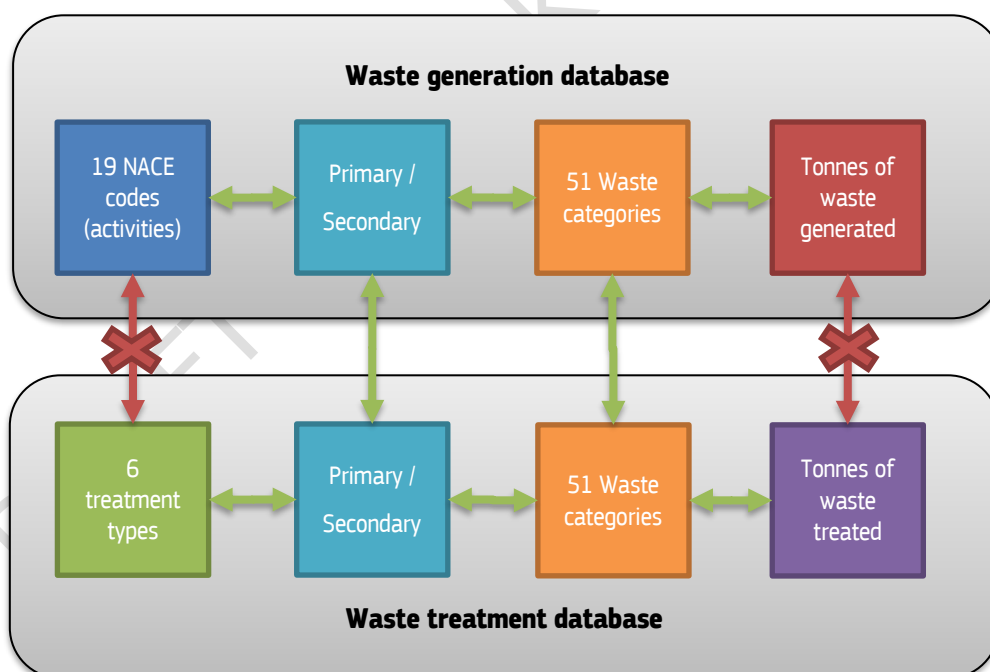
- 6 treatment types: energy recovery (R1), waste incineration (D10 incineration on land), recycling (R2 to R11 but excluding backfilling), backfilling<sup>4</sup> (part of R3 and R5), landfilling (D1 deposit into or on to land, D5 specially engineered landfill and D12 permanent storage), and other forms of disposal (D2 land treatment, D3 deep injection, D4 surface impoundment, D6 release into water body except seas/oceans and D7 release to seas/oceans including seabed insertion); and
- 51 waste categories.

Unfortunately, there is no database linking the generated waste flows and the treated waste flows.

Figure 1 provides a schematic overview of the level of disaggregation of the two databases on waste generation and treatment, along with the existent (green arrows) and non-existent links (red arrows) between the different blocks, i.e. the disaggregation levels.

It is also important to highlight that the treatment of waste includes imported wastes, whereas generated waste includes exported waste. This may lead to differences within a country between the total amounts of generated waste and the total amount of treated waste.

**Figure 2:** Schematic overview of waste generation and waste treatment Eurostat databases



Green arrows indicate a link  
Red arrows indicate no link

<sup>4</sup> backfilling was included as a recovery operation in the Waste Statistics in 2013, however the legal definition was provided in the revised WFD in 2018.

Nonetheless, it is possible to retrieve both statistics on waste generation and treatment in order to have an idea of the different waste streams in a similar way as presented in the Sankey diagram in **Figure 1**.

In that sense, **Figure 3** presents the reported waste generation in the EU-27 in 2010-2016 for both primary alone and total wastes (primary plus secondary) in million tonnes (mega-tonnes – Mt). In addition to absolute tonnage, relative values in kilogram of waste per capita are provided (kg/hab – based on the annual average of the population).

About 2.1 Gt (giga-tonnes or billion tonnes) of primary waste on average were generated every year in the EU-27 from 2010 to 2016, with a ~5% increase over the 6 years. Secondary wastes represented some extra 0.5 to 0.9 Gt of waste in 2010 and 2016 respectively. A similar trend is visible when considering the relative generation of waste per capita. Primary waste represented some 4 800 kg/hab of primary waste on average from 2010 to 2016, and secondary waste counted for an extra ~110 to ~200 kg/hab in 2010 and 2016 respectively.

In addition, the waste treatment is plotted on **Figure 3** based on the type of operation:

— recovery operations:

- recycling of waste
- material recovery of waste for backfilling; and
- energy recovery

— disposal operations:

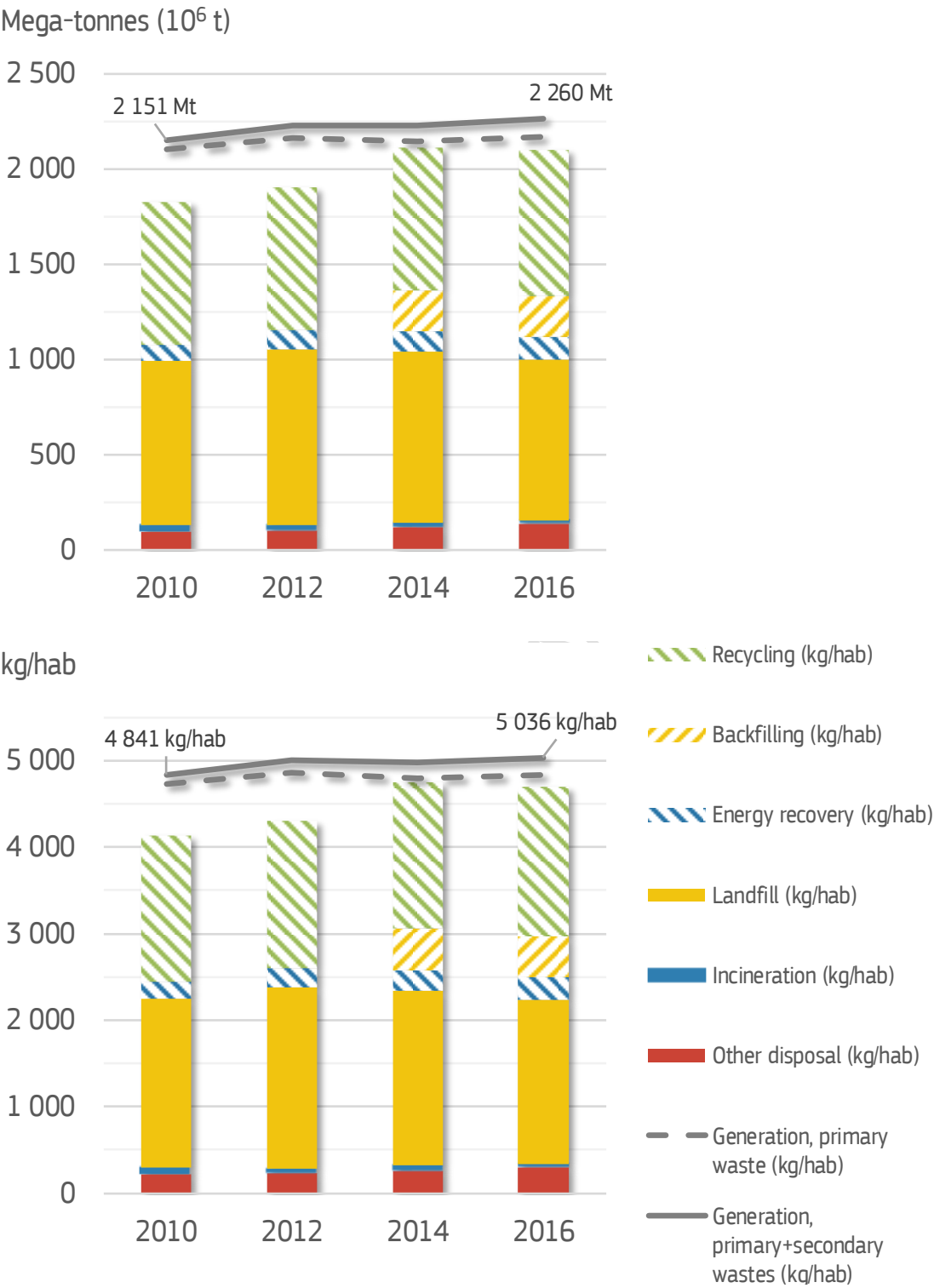
- landfilling of waste,
- incineration of waste without energy recovery; and
- other waste disposal operations but excluding treatment operations prior to disposal, i.e. D8 (biological treatment), D9 (physico-chemical treatment) and D13 (blending or mixing) to D15 (storage) operations.

Waste recovery represented on average 40 to 50% of the total treatment: about 825 Mt or ~2 t/hab before 2012 (no backfilling reported); and about 1.1 Gt or 2.4 t/hab after 2012 (backfilling reported).

Waste disposal represented about 1 Gt or ~2.3 t/hab of primary and secondary waste on average, without a significant variation over years.

These general figures are consistent but slightly different from the data on material flows account (Sankey diagram Figure 1) due to different methodologies. Indeed, the material flow account (MFA) uses a mix of information including the databases on waste generation and waste treatment but not only. The most important from an MFA perspective is to respect the law of conservation of mass and avoid the double counting. Therefore, some streams such as secondary waste or soils or dredging spoils are not counted in the MFA.

**Figure 3:** Absolute and population relative waste generation (grey lines), recovery (bars with diagonal pattern) and disposal trends (bars with full colours) in the EU-27 in 2010-2016



Source: based on Eurostat waste generation and waste treatment databases

**4.1.1.3 General overview**

Data on waste disposal are provided in the waste treatment database.

As previously stated in Section 4.1.1.2, disposal operations are reported into 3 categories:

- 1 — waste incineration (D10 incineration on land);
- 2 — landfilling (D1 deposit into or on to land, D5 specially engineered landfill and D12 permanent storage);
- 3 and
- 4 — other forms of disposal (D2 land treatment, D3 deep injection, D4 surface impoundment, D6 release into
- 5 water body except seas/oceans and D7 release to seas/oceans including seabed insertion).
- 6 Preparatory operations such as treatment prior to disposal operations D8 (biological treatment), D9 (physico-chemical
- 7 treatment) and D13 (blending or mixing), re-packaging D14 or storage D15 are not reported.

8

9 As visible in **Figure 4**, about 1 Gt ( $10^9$  t) of waste on average is sent to disposal operations D1 (deposit into or on to land)

10 to D11 (incineration at sea) every year in the EU-27. The average has been calculated taking into consideration the last 4

11 biennial reporting years available (2010, 2012, 2014 and 2016).

12

13 Disposal to landfill represented on average about 880 Mt or 86% of the waste disposal operations, whereas incineration and

14 other disposal operations represented 22 Mt or 2% and 111 Mt or 11% respectively.

15

16 A further analysis of different waste types and waste disposal operations is possible using the disaggregated dataset of

17 Eurostat's waste treatment database.

18

19 The Sankey diagram presented in **Figure 4** shows the major waste streams sent to waste disposal operations. The flow is

20 divided into two categories: non-hazardous wastes (light grey) and hazardous wastes (light red).

21

22 Mineral and solidified wastes constituted most of the waste disposed of (614 Mt or 61%), followed by Combustion wastes

23 (110 Mt or 11%) and Household and similar wastes (67 Mt or 7%).

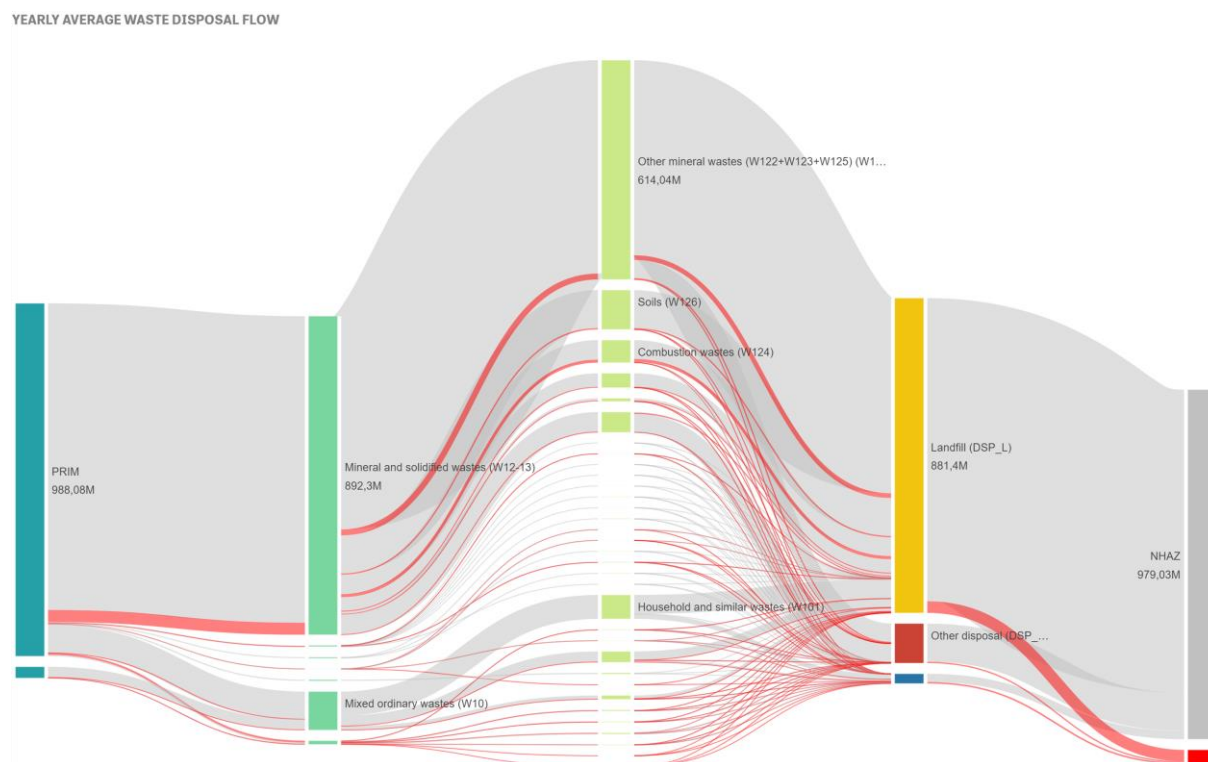
24

25 Most of the waste disposed of was non-hazardous (in light grey in the Sankey) – 96% – whereas hazardous waste streams (in

26 light red) represented about 4%.



**Figure 4:** Yearly average waste tonnages disposed of in waste disposal operations in the EU-27 in 2010-2016



Source: based on Eurostat waste treatment database

#### 4.1.1.4 Hazardous waste

Further details on hazardous waste are presented in **Table 3** showing the type (category) and yearly averages of hazardous waste sent to disposal, calculated with the biennial MS reporting from 2010 to 2016.

Disposal of hazardous waste represented on average about 40.2 Mt. Mineral and solidified wastes constituted most of the hazardous waste: 33.6 Mt on average in 2010-2016. Major contributions to hazardous waste made the other mineral wastes and the combustion wastes categories, with 16.5 Mt and 8.5 Mt on average in 2010-2016, respectively. Hazardous chemical and medical wastes represented 5.5 Mt on average in 2010-2016 with 2.8 Mt for chemical wastes alone. Hazardous sorting residues from mixed and ordinary wastes represented on average 0.9 Mt, while hazardous equipment wastes and hazardous recyclable wastes accounted for an extra 0.1 Mt each.

**Table 3:** Yearly average amount of hazardous waste disposed of per waste categories in the EU-27 in 2010-2016

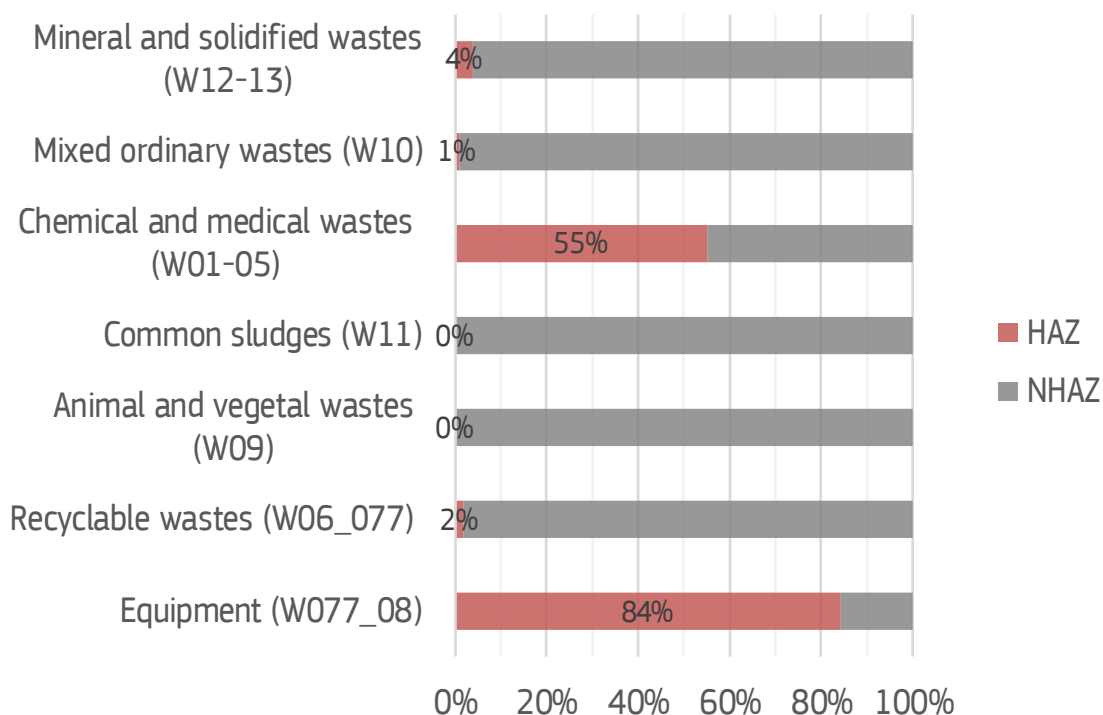
Waste category/subcategory	Yearly average (Mt)	Relative share (%)
<b>Mineral and solidified wastes (W12-13)</b>	33.6	84
<b>Other mineral wastes (W122+W123+W125) (W12B)</b>	16.5	41
<b>Combustion wastes (W124)</b>	8.5	21
<b>Soils (W126)</b>	3.6	9
<b>Mineral wastes from waste treatment and stabilised wastes (W128_13)</b>	2.6	6

Waste category/subcategory	Yearly average (Mt)	Relative share (%)
Mineral waste from construction and demolition (W121)	1.7	4
Dredging spoils (W127)	0.7	2
Chemical and medical wastes (W01-05)	5.5	14
Chemical wastes (W02A)	2.8	7
Industrial effluent sludges (W032)	0.9	2
Health care and biological wastes (W05)	0.6	1
Sludges and liquid wastes from waste treatment (W033)	0.5	1
Spent solvents (W011)	0.4	1
Acid, alkaline or saline wastes (W012)	0.3	1
Used oils (W013)	0.1	0
Mixed ordinary wastes (W10)	0.9	2
Sorting residues (W103)	0.9	2
Mixed and undifferentiated materials (W102)	0.1	<0.5
Equipment (W077_08)	0.1	<0.5
Discarded equipment (except discarded vehicles and batteries and accumulators waste) (W08A)	0.1	<0.5
Batteries and accumulators wastes (W0841)	0.0	<0.5
Waste containing PCB (W077)	0.0	<0.5
Discarded vehicles (W081)	0.0	<0.5
Recyclable wastes (W06_077)	0.1	<0.5
Wood wastes (W075)	0.0	<0.5
Glass wastes (W071)	0.0	<0.5
<b>TOTAL HAZARDOUS WASTES</b>	<b>40.2</b>	<b>100</b>

Source: based on Eurostat waste treatment database

A relative breakdown of hazardous waste share per waste category is presented in **Figure 5**. It shows that most of the equipment waste (84%) and most of the chemical and medical waste (55%) was classified as hazardous in 2010-2016, but these represented ~5.5 Mt and 0.1 Mt respectively on average.

**Figure 5:** Average share of hazardous waste disposed of per waste categories in the EU-27 in 2010-2016

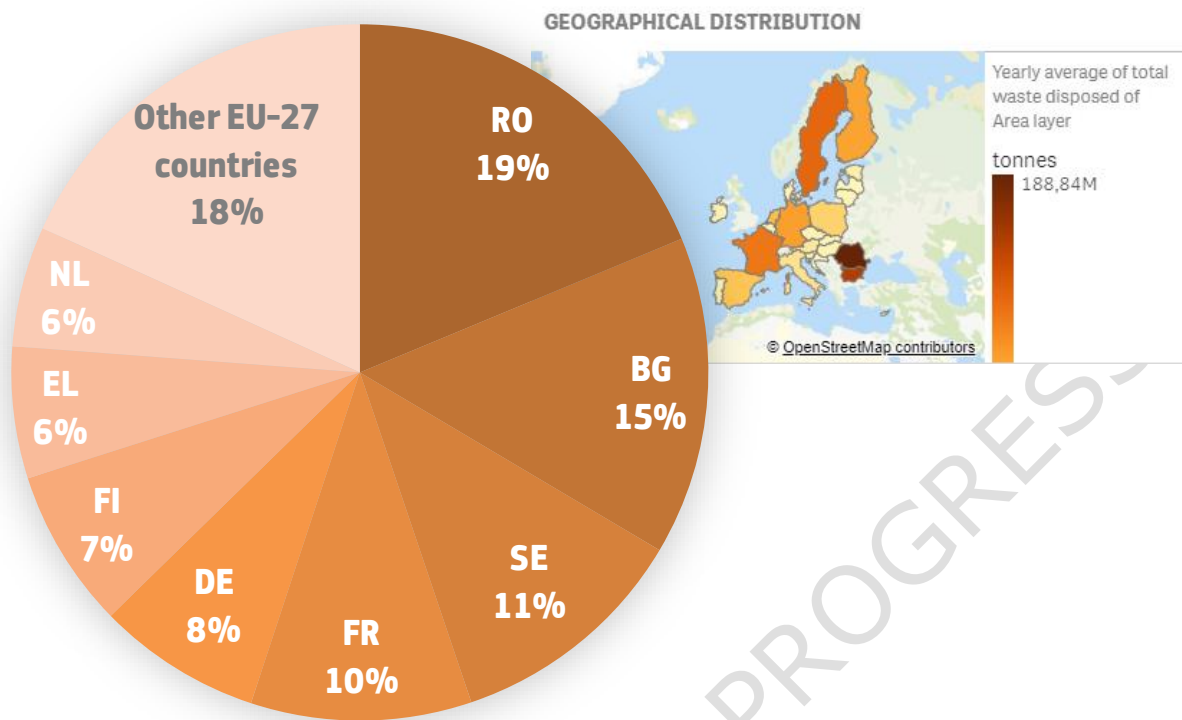


Source: based on Eurostat waste treatment database

#### 4.1.1.5 Geographical distribution

**Figure 6** shows that over the 2010-2016 time period, mainly eight countries disposed of 81% of the EU-27 waste. Obviously, countries known for their mining activities and in particular metal mining activities, which generated important amounts of extractive waste (e.g. tailings), constitute this top 8.

**Figure 6:** Geographical distribution of waste disposal in the EU-27 (2010-2016 average figures)



Source: based on Eurostat waste treatment database

Further details either on the waste streams or on the disposal operations are not available in the database, this is why a request was made to MS to provide more disaggregated data on waste disposal in the survey designed for this project (see Section 3.2).

**BOX 1: General figures derived from Eurostat, in the EU-27, in 2010-2016:**

- 2.1 Gt/year of waste was generated in the EU-27
- 12% w./w. is the share of waste in the total material flow in the EU-27 economy
- Generation and disposal trends were stable over the 2010-2016 period
- 50% of the treated waste was sent to disposal (1 Gt/year or 2.3 t/hab)
- 61% of the total waste disposed of was mineral and solidified waste
- 96% of the total waste disposed was non-hazardous
- 86% of the total waste disposed was landfilled
- 45% of the total waste disposed was disposed of in Romania, Bulgaria and Sweden

**4.1.2 Stakeholders' response rate**

**4.1.2.1 Member States survey response rates**

In total, 12/27 Member States (MS) answered to the survey, namely Romania, Finland, the Netherlands, Spain, Austria, Estonia, Hungary, Portugal, Denmark, Lithuania, Croatia and Latvia.

The response rate of each MS was calculated as:

$$\text{Response rate (\%)} = \frac{\text{Number of questions answered (even partially)}}{\text{Total number of questions (=36)}} \times 100$$

The response rate per MS is plotted in **Figure 7** along with the respective yearly average of waste generation and disposal (calculated as the average of the four biennial amounts reported to Eurostat for 2010-2016).

MS that answered the survey are indicated with blue dots and their respective response rate is indicated. Response rates ranged from 8% for Hungary to 92% for Lithuania, with an average response rate of 65%.

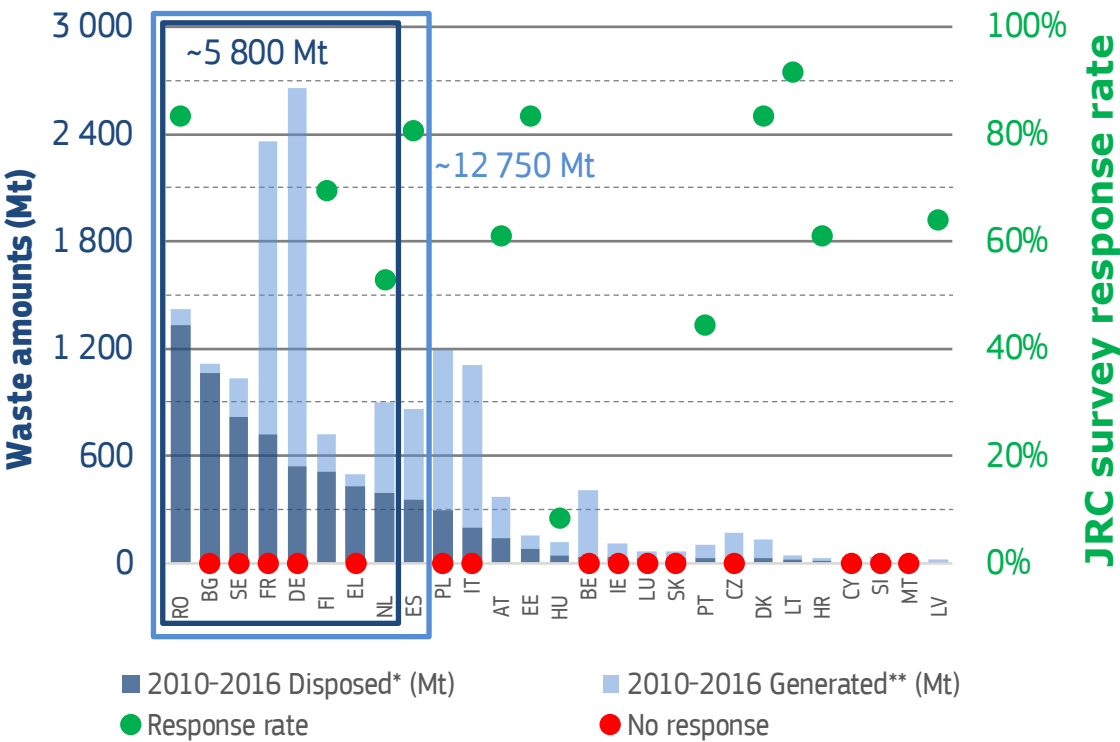
MS that did not answer the survey are indicated with red dots, their respective response rate being 0%.

In addition to response rates, **Figure 7** shows the total amount of waste disposed and waste generated in 2010-2016 based on Eurostat databases on waste treatment and waste generation. This helps to visualise which MS are either among the top 80% waste disposers (red box in the graph) or 80% top waste producers in the EU-27 in 2010-2016 (orange box in the graph).

Hence, **Figure 7** highlights that 3 out of 8 MS among the top 80% waste disposers in the EU-27 participated in the survey and provided data and information on waste disposal operations in their country.

Besides, 4 out of 10 MS among the top 80% waste producers in the EU-27 answered the survey.

**Figure 7:** Response rates to the survey per Member State along with the national total amounts of waste generated and disposed of in the EU-27 in 2010-2016



\* 2010-2016 yearly average based on Eurostat waste treatment database  
\*\* 2010-2016 yearly average based on Eurostat waste generation database  
The red box includes the MS disposing of 80% of the EU-27 waste whereas the orange box includes the MS generating 80% of the EU-27 waste in 2010-2016

Findings presented in this study are based on the data and information provided by MS and other stakeholders, i.e. those that answered the survey or information call.

#### 4.1.2.2 Industry organisations and environmental associations call response rate

When it comes to the call for complementary data and information from Industry organisations and environmental associations, six out of 52 organisations answered the call and five provided supplementary information and data (the list of the contacted organisation is provided in Annexes, see Section 11.6):

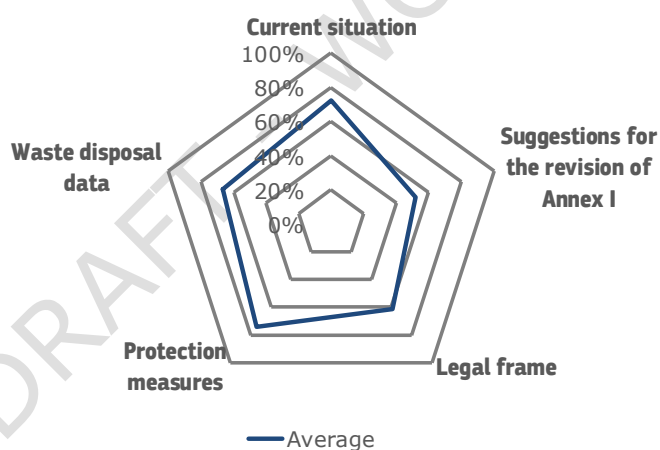
- the European Federation of Waste Management and Environmental Services (FEAD);
- the European Tyre and Rubber Manufacturers' Association (ETRMA);
- a division of the European Petroleum Refiners Association (CONCAWE);
- Hazardous Waste Europe (HWE);
- the Confederation of European Waste-to-Energy Plants (CEWEP); and
- the European Aluminium Association, but no complementary information or data provided as no waste disposal operators among the association's members.

#### 4.1.3 Collected data and information

The questions on protection measures were on average the most answered, followed by the questions on the current situation in MS. The questions on suggestions for the revision of Annex I were the less answered on average.

**Figure 8** shows the average response rates per category of questions (see Section 3.2 on the different question categories).

**Figure 8:** Median response rates to the survey per type of question



Source: based on the answers provided by MS in the Survey.

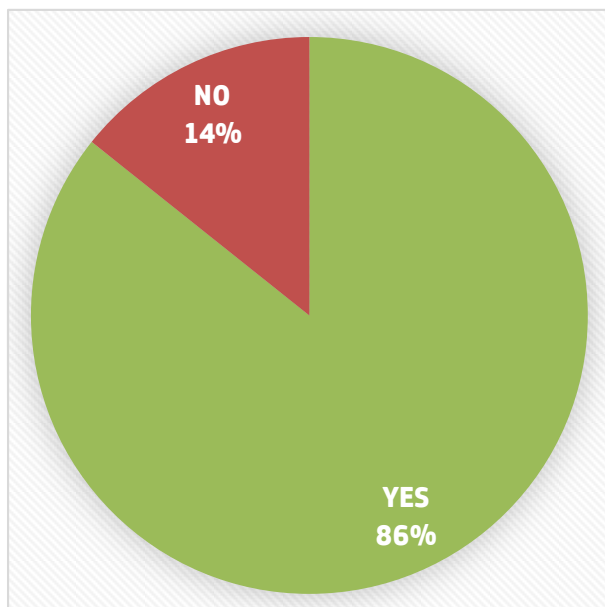
Industry organisations mainly provided valuable information for the revision of Annex I.

A summary of the data and information collected via the survey is presented in this report per waste disposal operation (following the list of waste disposal operations provided in Annex I to the WFD).

More details on the reported current situation, legal regimes, waste flows, protection measure and suggestion for revision are provided in Annexes (see Annexes Section 11.6).

## 4.2 Annex I title: Disposal operations

Most of the MS that answered the survey were in favour of changing the title: 86% of them. Nevertheless, no specific suggestions were provided.



Based on the answers provided by MS in the Survey (Q08) and the comments collected during written the consultation and the workshop.

Figure 9: Share of MS that considered necessary to change the title of Annex I: Disposal operations, in the case of a review of that Annex I.

In the Basel Convention, the last suggestion from EU for the revision of the title is: '*Final disposal operations*'.

## 4.3 D1 Deposit into or on to land (e.g. landfill, etc.)

This section provides a summary of the data and information provided by Members States (MS) and other stakeholders on D1 (deposit into or on to land) disposal operations. Detailed answers provided by MS to the survey are provided in Annexes, see Section 11.6.1.

What is meant by D1 (deposit into or on to land)?

Based on the answers provided, D1 operations are mostly either non-hazardous landfills (in Austria, Finland, Hungary and Lithuania) or extractive waste facilities, i.e. waste heaps (in Spain and Romania). In Denmark and the Netherlands this is limited to open air operations not meeting the LfD requirements, including the illegal dumping of waste in the case of Denmark; whereas in Estonia, D1 encompasses surface and underground sites. In Portugal D1 is a landfill site without further details provided.

What type of waste is mostly disposed of in D1 (deposit into or on to land)?

D1 is mostly used for the disposal of other industrial non-hazardous waste (almost entirely made up of mineral and solidified wastes such as extractive waste), and it is mostly used in Romania. The disposal rates of the mineral and solidified fraction of

1 other non-hazardous waste ranged from 6% to 93%. The mineral and solidified fraction of other waste streams and  
2 construction and demolition wastes is also deposited in D1, with disposal rates ranging from 2% to 91% and 2% to 11%,  
3 respectively.

4 According to industry, D1 is either limited to deposition on to land of inert waste not covered by D5 (specially engineered  
5 landfill) (FEAD) or is not limited to a specific stream and includes all types of deposition into and on to land, being  
6 environmentally sound or not, or illegal (HWE).

7 ETRMA reported that most of the waste from tyre and rubber manufacturers (~80%) is landfilled in D1.

8 CONCAWE reported aggregated data for the landfilling of waste in D1, D4 (surface impoundment), D12 (permanent storage)  
9 and D15 (storage), D15 was classified as landfill operation. Petroleum refiners mostly use landfills for the disposal of non-  
10 hazardous wastes (e.g. soil/stones/aggregates/concrete).

11  
12 How is D1 (deposit into or on to land) permitted?

13 The main findings on the legal regimes are the following:

- 14 — D1 are permitted pursuant the requirements of the WFD, no permit exemption was reported;
- 15 — the permit does not always contain an EIA or an Environmental Screening, the situation differs from MS  
16 to MS;
- 17 — the permit does not always contain adequate financial security or other equivalent provisions, the  
18 situation differs from MS to MS;
- 19 — the sites for waste disposal operations are not always inspected prior to commencement of disposal  
20 operations;
- 21 — the costs of disposal operations are not always covered by the price charged;
- 22 — waste acceptance procedures are not always in place; and
- 23 — D1 waste disposal operations were not associated to a single IED waste management activity.

24  
25 What are the measures in place for the protection of the environment and human health?

26 The reported measures in place for the protection of the environment and human health are similar to the measures laid down  
27 in the LfD/WAC Decision requirements. However, not all MS reported specific measures in place. In addition, the site selection  
28 seems significantly less covered by specific measures.

29  
30 What are the suggestions for the revision?

- 31 — to clarify differences between 'into' and 'on to', 'underground' and 'surface', 'engineered' and 'not  
32 engineered', 'emplacement' and 'deposition';
- 33 — to rephrase D1 to avoid possible overlapping with D2 (land treatment), D4 (surface impoundment), D5  
34 (specially engineered landfill) or D12 (permanent storage) codes; and
- 35 — to limit D1 to inert waste (FEAD), and/or construction and demolition, extractive wastes and temporary  
36 deposition of end-of life vehicles (HWE), i.e. to not used D1 for the disposal of other waste streams.

37  
38 What is the suggestion from EU and its MS in the on-going Basel Convention review?

39 In the Basel Convention, D1 (deposit into or on to land) would correspond to code A5, and the last suggestion from EU for the  
40 revision of this code is: 'Deposit into or onto land other than covered by A1 to A4 (e.g. placement into wells, salt domes of  
41 naturally occurring repositories'. In A5, D1 and D3 (deep injection) are proposed to be merged.



**BOX 2: Summary conclusions on D1 (deposit into or on to land)**

1) → D1 is mostly used for the deposition of the mineral and solidified fraction of other non-hazardous waste on to land, e.g. extractive waste heaps, with a disposal rate ranging from 6% to 93% (in the case of deposition of high amounts of extractive waste).

2) → When provided, the reported measures in place to protect the environment and human health are mostly in line with the measures laid down in the LfD/WAC Decision requirements. Specific measures for site-selection were less reported than other specific measures.

Extractive waste or other non-hazardous solidified mineral waste may be re-used or recycled, e.g. waste-rock for construction, landscaping and reclamation purposes.

3) → The description of D1 could be improved by including a clarification of the terms 'into', 'on to' and 'deposit' and by including the specific landfill classes included in D1, to avoid possible overlapping and/or confusion with other codes, e.g. D2 (land treatment), D4 (surface impoundment), D5 (specially engineered landfill) and D12 (permanent storage).

The clarification of the waste facilities included in D1 could help ensure a better implementation of the existing measures for the protection of the environment and human health, e.g.:

D1 – category A extractive waste facility falling under the EWD; or

D1 – class A landfill falling under the LfD;

4) → To introduce restrictions for D1 to progressively limit D1 to the deposition of the inert mineral and solidified fraction of other non-hazardous not suitable for recycling or recovery such as inert extractive waste and inert dredging spoils not suitable for recycling or recovery.

**4.4 D2 Land treatment (e.g. biodegradation of liquid or sludgy discards in soils, etc.)**

This section provides a summary of the data and information provided by Members States (MS) and other stakeholders on D2 (land treatment) disposal operations. Detailed answers provided by MS to the survey are provided in Annexes, see Section 11.6.2.

What is meant by D2 (land treatment)?

Based on the answers provided, D2 operations are land sites used for the biodegradation of liquid waste and sludge, either on land or incorporated into the soil, without any agricultural benefit or soil improvement purpose. According to industry stakeholders (FEAD, CONCAWE, HWE), D2 is an in-situ treatment method used for the treatment of biodegradable wastes.

What type of waste is mostly disposed of in D2 (land treatment)?

D2 was mostly used in Latvia and Lithuania for the disposal of other industrial non-hazardous waste (mixed ordinary and animal and vegetal wastes) and in Denmark for the disposal of construction and demolition wastes (mineral and solidified wastes). The disposal rates of these waste streams ranged from <0.5% to 6%.

CONCAWE reported aggregated data for the treatment of waste in D2, D8 (biological treatment), D9 (physico-chemical treatment) and D13 (blending or mixing). Petroleum refiners mostly use this option for the treatment of hazardous wastes (e.g. sludge, spent chemical/acids/bases, contaminated soil/stones/aggregates/concrete).

How is D2 (land treatment) permitted?

D2 does not occur in the Netherlands, Portugal and Romania.

In Austria, D2 is banned.

The main findings on the legal regimes are the following:

- D2 are permitted pursuant the requirements of the WFD, no permit exemption was reported;
- the permit does not always contain an EIA or an Environmental Screening, the situation differs from MS to MS;
- the permit always contains adequate financial security or other equivalent provisions;
- the sites for waste disposal operations are not always inspected prior to commencement of disposal operations;
- the costs of disposal operations are not always covered by the price charged;
- waste acceptance procedures are not always in place; and
- D2 waste operations were associated to the IED waste management activity '5.4 Landfills, as defined in Article 2(g) of the LfD, receiving >10 t/day or with a total capacity exceeding 25 000 t excluding landfills of inert waste'.

What are the measures in place for the protection of the environment and human health?

The measures reported are scarce.

What are the suggestions for the revision?

Suggestions for the revision include the following:

- to rephrase D2 as '*Land treatment in-situ*' (also supported by FEAD).

What is the suggestion from EU and its MS in the on-going Basel Convention review?

In the Basel Convention, D2 (land treatment) would correspond to code A6, and the last suggestion from EU for the revision of this code is: 'Treatment of land or through interaction with land other than covered by B5 in Section B (e.g. biological or chemical treatment)'. In A6, 'land treatment' is proposed to be replaced by '*treatment of land*', the treatment '*through interaction with land*' other than recycling operations is included.

#### **BOX 3: Summary conclusions on D2 (land treatment)**

- 1) → D2 is mostly used for the spreading on land and incorporation in the soil of the mixed ordinary and animal and vegetal fraction of the other industrial non-hazardous waste and the mineral and solidified fraction of the construction and demolition waste, with a low disposal rate ranging from <0.5% to 6%. D2 is used as a waste disposal operation with no agricultural benefits or soil improvement.
- 2) → The reported measures in place to protect the environment and human health are scarce.
- 3) → The description of D2 could be improved by adding '*in-situ*' to avoid possible overlapping and/or confusion with other codes, such as D1 (deposit into or on to land) or D4 (surface impoundment).
- 4) → To introduce restrictions for D2 to progressively limit D2 to very specific cases.  
To introduce reduction targets for a progressive phasing out of this method.

## **4.5 D3 Deep injection (e.g. injection of pumpable discards into wells, salt domes or naturally occurring repositories, etc.)**

This section provides a summary of the data and information provided by Members States (MS) and other stakeholders on D3 (deep injection) disposal operations. Detailed answers provided by MS to the survey are provided in Annexes, see Section 11.6.3.

What is meant by D3 (deep injection)?

Based on the answers provided, D3 operations are deep injections of e.g. pumpable discards into wells, salt domes or naturally occurring repositories, as defined in Annex I to the WFD. In addition, in Denmark, Spain and Finland, the formation into which the waste is injected may be porous (this practice is also confirmed by HWE). The consequence of this is that the injection may include injections of wastes into groundwater aquifers.

What type of waste is mostly disposed of in D3 (deep injection)?

D3 is used in Finland for the deep injection of unspecified waste (no disaggregated data provided). No disposal rate was calculated.

How is D3 (deep injection) permitted?

D3 does not occur in Austria, Latvia and Romania.

In Estonia, Portugal and Romania, D3 is prohibited.

The main findings on the legal regimes are the following:

- D3 are permitted pursuant the requirements of the WFD, no permit exemption was reported;
- the permit does not always contain an EIA or an Environmental Screening, the situation differs from MS to MS;
- the permit does not always contain adequate financial security or other equivalent provisions, the situation differs from MS to MS;
- the sites for waste disposal operations are not always inspected prior to commencement of disposal operations;
- the costs of disposal operations are not always covered by the price charged;
- waste acceptance procedures are not always in place; and
- D3 waste operations were associated to the IED waste management activity '5.6 Underground storage of hazardous waste'.

What are the measures in place for the protection of the environment and human health?

The measures reported are scarce.

What are the suggestions for the revision?

Suggestions for the revision include the following:

- to define 'pumpable waste'; and
- to clarify the difference between D3 and D12 (permanent storage) (also supported by FEAD).

What is the suggestion from EU and its MS in the on-going Basel Convention review?

In the Basel Convention, D3 (deep injection) would correspond to code A5, and the last suggestion from EU for the revision of this code is: 'Deposit into or onto land other than covered by A1 to A4 (e.g. placement into wells, salt domes or naturally occurring repositories'. In A5, D3 and D1 (deposit into or on to land) are proposed to be merged.

#### **BOX 4: Summary conclusions on D3 (deep injection)**

1) → D3 is used for the deep injection of liquid waste (both hazardous and non-hazardous), including injection in porous formations, i.e. possibly groundwater aquifers.

2) → The reported measures in place to protect the environment and human health are scarce.

In some cases, the treatment of waste prior to injection, with e.g. recycling/recovery of water could help reduce the amount of waste sent for disposal.

3) → The description of D3 could be improved by clarifying the difference between '*deep injection*' and '*underground emplacement*', and by defining '*pumpable*' to avoid possible overlapping and/or confusion with other codes, such as D12 (permanent storage).

The clarification of the waste facilities included in D3 could help ensure a better implementation of the existing measures for the protection of the environment and human health, e.g.:

D3 – extractive waste facility falling under the EWD.

For D3 disposal operations not covered by the existing measures, a new document on the specific measures for the protection of the environment and human health, and waste acceptance criteria for D3 would help ensure a harmonised implementation of the WFD objectives.

4) → To introduce restrictions for D3 to progressively limit D3 to very specific cases, e.g. the deep injection of extractive waste such as inert drilling muds.

#### **4.6 D4 Surface impoundment (e.g. placement of liquid or sludgy discards into pits, ponds or lagoons, etc.)**

This section provides a summary of the data and information provided by Member States (MS) and other stakeholders on D4 (surface impoundment) disposal operations. Detailed answers provided by MS to the survey are provided in Annexes, see Section 11.6.4.

What is meant by D4 (surface impoundment)?

Based on the answers provided, D4 operations are natural or engineered impoundments used for the disposal of liquid or slurry waste. This may include ponds with dams (i.e. '*engineered structure designed to retain or confine water and/or waste within a pond*').

What type of waste is mostly disposed of in D4 (surface impoundment)?

D4 is mostly used in Romania for the disposal of other industrial non-hazardous waste (mineral and solidified wastes and chemical and medical wastes fractions). The disposal rates of the mineral and solidified fraction of other non-hazardous waste was 2%, whereas for the chemical and medical wastes fraction it ranged from <0.5% to 83%.

CONCAWE reported aggregated data for the landfilling of waste in D1 (deposit into or on to land), D4, D12 (permanent storage) and D15 (storage), D15 was classified as landfill operation. Petroleum refiners mostly use landfills for the disposal of non-hazardous wastes (e.g. soil/stones/aggregates/concrete).

How is D4 (surface impoundment) permitted?

D4 does not occur in Austria, Denmark, Estonia, Hungary, the Netherlands, and Portugal (in some MS, tailing ponds were possibly not taken into consideration when reporting D4 operations).

The main findings on the legal regimes are the following:

— D4 are permitted pursuant the requirements of the WFD, no permit exemption was reported;

— the permit does not always contain an EIA or an Environmental Screening, the situation differs from MS to MS;

- the permit does not always contain adequate financial security or other equivalent provisions, the situation differs from MS to MS;
- the sites for waste disposal operations are not always inspected prior to commencement of disposal operations;
- the costs of disposal operations are not always covered by the price charged;
- waste acceptance procedures are not always in place; and
- D4 waste disposal operations were associated to the IED waste management activity '5.1 (k) surface impoundments of hazardous waste exceeding 10 t/day capacity or 5.3(a)(iv) disposal of non-hazardous waste with a capacity exceeding 50 t/day involving treatment of slags and ashes'.

What are the measures in place for the protection of the environment and human health?

The measures reported are scarce.

What are the suggestions for the revision?

Suggestions for the revision include the following:

- to define 'surface impoundments'; and
- to clarify the difference between D4 and D12 (permanent storage), and D4 and D6 (release into water body except seas/oceans).

What is the last suggestion from EU and its MS in the on-going Basel Convention review?

In the Basel Convention, D4 (surface impoundment) would correspond to code A2, and the last suggestion from EU for the revision of this code is: '*Surface impoundment (e.g. placement of liquids or sludge into pits, tailings ponds, tailings dams or tailings lagoons)*'. The proposed A2 provides more specific examples of tailings storage facilities.

#### **BOX 5: Summary conclusions on D4 (surface impoundment)**

- 1) → D4 is mostly used for the deposition into ponds of liquid or slurry extractive waste resulting from mineral processing and mineral and solidified fraction of other industrial non-hazardous waste with a disposal rate of 2%.
- 2) → The reported measures in place to protect the environment and human health are scarce.  
The possibility to avoid disposal of waste in D4 is limited by the possibility of re-using or recycling extractive waste (e.g. tailings for construction purpose). Nevertheless, due to the high volumes of extractive waste generated, this may lead to important losses of possibly valuable materials such as critical raw materials.
- 3) → The description of D4 could be improved by clarifying the definition of '*surface impoundment*' to avoid possible overlapping and/or confusion with other codes, such as D12 (permanent storage) or D6 (release into water body except seas/oceans).  
The clarification of the waste facilities included in D4 could help ensure a better implementation of the existing measures for the protection of the environment and human health, e.g.:  
D4 – Category A extractive waste facility falling under the EWD.  
For D4 disposal operations not covered by the existing measures, a new document on the specific measures for the protection of the environment and human health, and waste acceptance criteria for D4 would help ensure a harmonised implementation of the WFD objectives.
- 4) → To introduce restrictions for D4 to progressively limit D4 to the deposition of extractive waste, such as tailings, or sludges.

#### **4.7 D5 Specially engineered landfill (e.g. placement into lined discrete cells which are capped and isolated from one another and the environment, etc.)**

This section provides a summary of the data and information provided by Members States (MS) and other stakeholders on D5 (specially engineered landfill) disposal operations. Detailed answers provided by MS to the survey are provided in Annexes, see Section 11.6.5.

What is meant by D5 (specially engineered landfill)?

Based on the answers provided, D5 operations are specially engineered landfills, as defined in Annex I to the WFD. In Denmark, Estonia, Spain and Romania, D5 is limited to landfills meeting the LfD requirements (position shared by FEAD and HWE). In Austria and Denmark, D5 is a surface/aboveground disposal site.

What type of waste is mostly disposed of in D5 (specially engineered landfill)?

D5 is mostly used for the disposal of various waste streams, including municipal wastes but excluding liquid wastes. Mineral and solidified fraction of other industrial non-hazardous waste is the most disposed of waste stream with a disposal rate ranging from <0.5% to 4%; followed by the mixed ordinary fraction of the other municipal wastes with a disposal rate ranging from <0.5% to 58%; then the mineral and solidified fraction of the construction and demolition waste with a disposal rate ranging from <0.5% to 19%; and finally the mineral and solidified fraction of other waste streams with a disposal rate ranging from 2% to 70%.

How is D5 (specially engineered landfill) permitted?

D5 does not occur in Austria and Portugal.

The main findings on the legal regimes are the following:

- D5 are permitted pursuant the requirements of the WFD, no permit exemption was reported;
- in most of the MS, D5 waste disposal operations fall under the LfD and WAC Decision requirements;
- the permit does not always contain an EIA or an Environmental Screening, the situation differs from MS to MS;
- the permit does not always contain adequate financial security or other equivalent provisions, the situation differs from MS to MS;
- the sites for waste disposal operations are not always inspected prior to commencement of disposal operations;
- the costs of disposal operations are not always covered by the price charged;
- waste acceptance procedures are not always in place; and
- D5 waste operations were mostly associated to the IED waste management activity '5.4 Landfills, as defined in Article 2(g) of the LfD, receiving >10 t/day or with a total capacity exceeding 25 000 t excluding landfills of inert waste'.

What are the measures in place for the protection of the environment and human health?

The reported measures in place for the protection of the environment and human health are similar to the measures laid down in the LfD/WAC Decision requirements. However, not all MS reported specific measures in place.

What are the suggestions for the revision?

Suggestions for the revision include the following:

- to include in the description of D5 the terms '*deposit*', '*aboveground*' and '*isolated from the environment*' in order to avoid possible overlapping and/or confusion with other D codes (position shared by industry stakeholders); and

— to include in the description of D5 a reference to the LfD: 'e.g. covered by Directive 1999/31/CE'.

What is the last suggestion from EU and its MS in the on-going Basel Convention review?

In the Basel Convention, D5 (specially engineered landfill) would correspond to code A1, and the last suggestion from EU for the revision of this code is: 'Deposit in an aboveground landfill isolated from the environment'. The proposed A1 specifies both 'aboveground' and 'isolated from the environment', whereas 'specially engineered' is not included.

#### **BOX 6: Summary conclusions on D5 (specially engineered landfill)**

1) → D5 is used for the disposal of a wide range of waste streams into specially engineered landfills isolated from the environment with an engineered basal structure and a capping/cover structure. The disposal rates were ranging: from <0.5% to 4% for the mineral and solidified fraction of the other industrial non-hazardous waste; from <0.5% to 76% for the mixed ordinary wastes fraction of the other municipal wastes; from <0.5% to 19% for the mineral and solidified fraction of the construction and demolition waste; and from 2% to 70% for the mineral and solidified fraction of other waste streams.

2) → When provided, the reported measures in place to protect the environment and human health are mostly in line with the measures laid down in the LfD/WAC Decision requirements.

Mineral and solidified fractions of other non-hazardous industrial waste and construction and demolition wastes may potentially include valuable fractions that could be recovered, and therefore a disposal restriction target might be considered.

3) → The description of D5 could be improved by clarifying the term 'specially engineered' and by including the specific landfill classes included in D5, to avoid possible overlapping and/or confusion with other codes, such as D1 (deposit into or on to land), D4 (surface impoundment) and D12 (permanent storage).

The clarification of the waste facilities included in D5 could also help ensure a better implementation of the existing measures for the protection of the environment and human health, e.g.:

D5 – class C landfill falling under the LfD; or

D5 – category A extractive waste facility falling under the EWD.

4) → An existing disposal reduction target on municipal waste (≤10 % w/w by 2035) is in place.

A ban on landfill of liquid, explosive, corrosive, oxidising, flammable, highly flammable wastes, certain types of infectious wastes, separately collected wastes for preparing for re-use or recycling, certain types of tyres and any other waste not meeting WAC is also in place.

By 2030, landfill of all waste suitable for recycling or other recovery, in particular in municipal waste, shall not be accepted in a landfill (except if it delivers the best environmental outcome). This may include municipal bio-waste for example.

To introduce additional reduction targets for the landfilling of the mineral and solidified fractions of construction and demolition waste, other industrial non-hazardous wastes and other waste streams. Note that according to Article 5(9) of the LfD 'By 31 December 2024, the Commission shall review the target laid down in paragraph 5 with a view to maintaining or, if appropriate, reducing it, to considering quantitative target per capita on landfilling and to introducing restrictions to the landfilling of non-hazardous waste other than municipal waste'.

## **4.8 D6 Release into a water body except seas/oceans**

This section provides a summary of the data and information provided by Members States (MS) and other stakeholders on D6 (release into water body except seas/oceans) disposal operations. Detailed answers provided by MS to the survey are provided in Annexes, see Section 11.6.6.

What is meant by D6 (release into water body except seas/oceans)?

Based on the answers provided, D6 operations are releases of waste into water bodies (excluding sea and oceans), as defined in Annex I to the WFD. In Denmark, D6 operations include deposition of waste on to the water body bed and insertion in the subsoil, i.e. deposition on to the surface below water or insertion into the subsoil of non-hazardous wastes.

What type of waste is mostly disposed of in D6 (release into water body except seas/oceans)?

Based on the data collected, D6 is mostly used by the Netherlands for the release of unspecified waste (no disaggregated data provided). However, the Netherlands also reported that this disposal operation does not occur in the Netherlands. No disposal rate was calculated.

How is D6 (release into water body except seas/oceans) permitted?

D6 does not occur in Estonia, Spain, Hungary, Lithuania, Latvia, the Netherlands, Portugal and Romania.

In Austria and Finland, D6 is prohibited.

The main findings on the legal regimes are the following:

- D6 are permitted pursuant the requirements of the WFD, no permit exemption was reported;
- the permit does not always contain an EIA or an Environmental Screening, the situation differs from MS to MS;
- the permit does not always contain adequate financial security or other equivalent provisions, the situation differs from MS to MS;
- the sites for waste disposal operations are not always inspected prior to commencement of disposal operations;
- the costs of disposal operations are not always covered by the price charged;
- waste acceptance procedures are not always in place; and
- D6 waste operations were not associated to any IED waste management activity.

What are the measures in place for the protection of the environment and human health?

The measures reported are scarce.

What are the suggestions for the revision?

Suggestions for the revision include the following:

- to delete the waste code;
- to detail the list of possible surface water bodies;
- to include subcategories for different types of wastes and waste disposal method; and
- to limit D6 to very specific cases with no risk of water contamination (HWE).

What is the last suggestion from EU and its MS in the on-going Basel Convention review?

In the Basel Convention, D6 (release into water body except seas/oceans) would correspond to code A7, and the last suggestion from EU for the revision of this code is: '*Release into a water body except seas/oceans*', i.e. maintaining the *status quo*.



**BOX 7: Summary conclusions on D6 (release into water body except seas/oceans)**

- 1) → D6 is used for the release of waste into surface water bodies and the deposition of waste on the water body bed, including insertion into the subsoil.
- 2) → Where provided, the reported measures in place to protect the environment and human health are scarce.
- 3) → The description of D6 could be improved by clarifying the type of water bodies included in D6, e.g. natural water or artificial water bodies (using for example the existing definitions of the Water Framework Directive).
- 4) → To introduce restrictions for D6 to progressively limit D6 to very specific cases.  
To introduce reduction targets for a progressive phasing out of this method.

#### **4.9 D7 Release to seas/oceans including seabed insertion**

This section provides a summary of the data and information provided by Members States (MS) and other stakeholders on D7 (release to seas/oceans including seabed insertion) disposal operations. Detailed answers provided by MS to the survey are provided in Annexes, see Section 11.6.7.

What is meant by D7 (release to seas/oceans including seabed insertion)?

Based on the answers provided, D7 operations are releases of waste to seas/oceans, including seabed insertion, as defined in Annex I to the WFD. In Finland, D7 operations include deposition of waste on to the seabed; in Spain, D7 operations include the discharge of fish processing waste and inert materials of natural origin.

What type of waste is mostly disposed of in D7 (release to seas/oceans including seabed insertion)?

Based on the data collected, D7 is mostly used by the Netherlands for the release of unspecified waste (no disaggregated data provided). However, the Netherlands also reported that this disposal operation does not occur in the Netherlands. No disposal rate was calculated.

How is D7 (release to seas/oceans including seabed insertion) permitted?

D7 does not occur in the Netherlands, Portugal and Romania.

In Austria and Finland, D7 is prohibited.

The main findings on the legal regimes are the following:

- D7 are permitted pursuant the requirements of the WFD, no permit exemption was reported;
- the permit does not always contain an EIA or an Environmental Screening, the situation differs from MS to MS;
- the permit does not always contain adequate financial security or other equivalent provisions, the situation differs from MS to MS;
- the sites for waste disposal operations are not always inspected prior to commencement of disposal operations;
- the costs of disposal operations are not always covered by the price charged;
- waste acceptance procedures are not always in place; and
- D7 waste operations were not associated to any IED waste management activity.

What are the measures in place for the protection of the environment and human health?

The measures reported are scarce.

What are the suggestions for the revision?

Suggestions for the revision include the following:

- to include subcategories for different types of wastes and waste disposal method; and
- to ban/prohibit the waste disposal method (HWE).

What is the last suggestion from EU and its MS in the on-going Basel Convention review?

In the Basel Convention, D7 (release to seas/oceans including seabed insertion) would correspond to code A8, and the last suggestion from EU for the revision of this code is: '*Release into seas/oceans including sea-bed insertion*', i.e. maintaining the *status quo*.

**BOX 8: Summary conclusions on D7 (release to seas/oceans including seabed insertion)**

- 1) → D7 is used for the release of waste to sea/oceans and the deposition/inclusion of waste on to/into the seabed.
  - 2) → Where provided, the reported measures in place to protect the environment and human health are scarce.
  - 3) → The description of D7 could be improved by clarifying the inclusion, or not, of '*emplacement*' of waste in closed/sealed containers to avoid confusion and/or overlapping with other waste codes, such as D12 (permanent storage).
  - 4) → To introduce restrictions for D7 to progressively limit D7 to very specific cases, e.g. the release of dredging spoils.
- Disposal reduction targets could be planned for a progressive phasing out of this method.

**4.10 D8 Biological treatment not specified elsewhere in this Annex which results in final compounds or mixtures which are discarded by means of any of the operations numbered D1 to D12**

This section provides a summary of the data and information provided by Members States (MS) and other stakeholders on D8 (biological treatment) disposal operations. Detailed answers provided by MS to the survey are provided in Annexes, see Section 11.6.8.

What is meant by D8 (biological treatment)?

Based on the answers provided, D8 operations are mechanical biological treatment (MBT) installations used for the removal of mostly organic pollutants (biodegradable) prior to further treatment and/or disposal of waste, as defined in Annex I to the WFD. In Austria, however, it corresponds to a phyto-treatment/biodegradation (possible method also reported by HWE). D8 may include treatment installations covered by the IED (FEAD).

What type of waste is mostly disposed of in D8 (biological treatment)?

D8 is mostly used in the Netherlands for the treatment of unspecified waste (no disaggregated data provided). In Denmark it is mostly used for the treatment prior to disposal of construction and demolition waste (the mineral and solidified fraction) and the chemical and medical wastes fraction of the other waste streams, whereas in Latvia for animal and vegetal wastes and common sludge.

CONCAWE reported aggregated data for the treatment of waste in D2 (land treatment), D8, D9 (physico-chemical treatment) and D13 (blending or mixing). Petroleum refiners mostly use this option for the treatment of hazardous wastes (e.g. sludge, spent chemical/acids/bases, contaminated soil/stones/aggregates/concrete).

1  
2 How is D8 (biological treatment) permitted?

3 The main findings on the legal regimes are the following:

- 4 — D8 are permitted pursuant the requirements of the WFD, no permit exemption was reported;
- 5 — the permit does not always contain an EIA or an Environmental Screening, the situation differs from MS  
6 to MS;
- 7 — the permit does not always contain adequate financial security or other equivalent provisions, the  
8 situation differs from MS to MS;
- 9 — the sites for waste disposal operations are not always inspected prior to commencement of disposal  
10 operations;
- 11 — the costs of disposal operations are not always covered by the price charged;
- 12 — waste acceptance procedures are not always in place; and
- 13 — D8 waste operations were mostly associated to the IED waste management activity involving '*biological*  
14 *treatment*' – 5.1 (a) or 5.3 (a)(i).

15  
16 What are the measures in place for the protection of the environment and human health?

17 The measures reported by MS are scarce. However, FEAD reported the implementation of the BAT for the waste treatment by  
18 operators.

19  
20 What are the suggestions for the revision?

21 Suggestions for the revision include the following:

- 22 — to include a more detailed list of the treatment methods covered by the code; and
- 23 — to include two subcategories (i) D8 as final disposal operation – non-interim, and (ii) D8 as treatment  
24 prior to submission to any D1 to D12 – interim (HWE). However, a definition or an example of an interim  
25 D8 operation was not provided.

26  
27 What is the last suggestion from EU and its MS in the on-going Basel Convention review?

28 In the Basel Convention, D8 (biological treatment) corresponds to code A12, and the last suggestion from EU for the revision  
29 of this code is: '*Biological treatment prior to submission to any of the operations in section A*'.

**BOX 9: Summary conclusions on D8 (biological treatment not specified elsewhere in this Annex which results in final compounds or mixtures which are discarded by means of any of the operations numbered D1 to D12)**

1) → D8 is used for the biological treatment (degradation) of mostly organic pollutants prior to the disposal of waste, such as chemical and medical, animal and vegetal wastes or common sludge.

2) → Where provided, the reported measures in place to protect the environment and human health are scarce.

3) → On the one hand, some stakeholders suggested to include in D8 subcategories for treatment methods. However, in the case of a combination of treatments using several techniques, this suggestion may not help to improve the usability of the list.

A more detailed description of the methods included may help improve the description of D8, e.g. composting, anaerobic digestion, and avoid possible overlapping and/or confusion with other codes, e.g. D2 (land treatment).

In addition, the clarification of the 'non-interim' nature of D8 (in line with the definition of the Waste Shipments Regulation) would also help avoid confusion with other codes such as D13 (blending or mixing).

On the other hand, the clarification of the type of waste facilities included in D8 could help ensure a better implementation of the existing measures for the protection of the environment and human health, e.g.:

D8 – IED installation for the biological treatment of waste falling under the IED.

4) → No overall or operation-specific waste disposal restriction or reduction target for D8.

**4.11 D9 Physico-chemical treatment not specified elsewhere in this Annex which results in final compounds or mixtures which are discarded by means of any of the operations numbered D1 to D12 (e.g. evaporation, drying, calcination, etc.)**

This section provides a summary of the data and information provided by Members States (MS) and other stakeholders on D9 (physico-chemical treatment) disposal operations. Detailed answers provided by MS to the survey are provided in Annexes, see Section 11.6.9.

What is meant by D9 (physico-chemical treatment)?

Based on the answers provided, D9 waste disposal operations are physico-chemical treatment installations, including thermal and mechanical treatment installations, used for the removal of mostly inorganic pollutants prior to further treatment and/or disposal of waste, as defined in Annex I to the WFD. In Denmark, Estonia and Portugal D9 operations include low and high temperature treatments. In Austria, D9 is divided in 5 subcategories of physical and/or chemical treatment, including separation and mixing, which may overlap with D13 (blending or mixing), and solidification and stabilisation (or immobilisation), which were also suggested to be included by FEAD and HWE. D9 may include treatment installations covered by the IED according to FEAD.

What type of waste is mostly disposed of in D9 (physico-chemical treatment)?

D9 is mostly used in Portugal, Finland and Hungary for the treatment and disposal of unspecified waste (no disaggregated data provided). D9 is usually used for the treatment and disposal of waste that cannot be landfilled or incinerated. In Lithuania it is mostly used for the treatment and disposal of the animal and vegetal fraction of the other industrial non-hazardous waste, whereas in Denmark it is used for the treatment and disposal of the mineral and solidified fraction of construction and demolition waste, both hazardous and non-hazardous.

CONCAWE reported aggregated data for the treatment of waste in D2 (land treatment), D8 (biological treatment), D9 and D13 (blending or mixing). Petroleum refiners mostly use this option for the treatment of hazardous wastes (e.g. sludge, spent chemical/acids/bases, contaminated soil/stones/aggregates/concrete).

1 How is D9 (physico-chemical treatment) permitted?

2 The main findings on the legal regimes are the following:

- 3 — D9 are permitted pursuant the requirements of the WFD, no permit exemption was reported;
- 4 — the permit does not always contain an EIA or an Environmental Screening, the situation differs from MS
- 5 to MS;
- 6 — the permit does not always contain adequate financial security or other equivalent provisions, the
- 7 situation differs from MS to MS;
- 8 — the sites for waste disposal operations are not always inspected prior to commencement of disposal
- 9 operations;
- 10 — the costs of disposal operations are not always covered by the price charged;
- 11 — waste acceptance procedures are not always in place; and
- 12 — D9 waste operations were mostly associated to the IED waste management activity involving '*physico-*
- 13 *chemical treatment*' – 5.1 (b) or 5.3 (a)(ii).

14  
15 What are the measures in place for the protection of the environment and human health?

16 The measures reported by MS are scarce. However, FEAD reported the implementation of the BAT for the waste treatment by

17 operators.

18  
19 What are the suggestions for the revision?

20 Suggestions for the revision include the following:

- 21 — to include of a more detailed list of the treatment methods covered by the code; and
- 22 — to include two subcategories (i) D9 as a final disposal operation – non-interim, and (ii) D9 as treatment
- 23 prior to submission to any D1 to D12 – interim (HWE). However, a definition or an example of an interim
- 24 D9 operation was not provided.

25  
26 What is the last suggestion from EU and its MS in the on-going Basel Convention review?

27 In the Basel Convention, D9 (physico-chemical treatment) would correspond to code A13, and the last suggestion from EU for

28 the revision of this code is: 'Manual treatment (e.g. separation), physical/mechanical treatment (e.g. separation, size reduction,

29 evaporation, drying, autoclaving), physical/chemical treatment (e.g. solvent extraction), chemical treatment (e.g. neutralization,

30 precipitation) or immobilization (e.g. stabilization, solidification) prior to submission to any of the operations in Section A'. The

31 suggestion provides a more detailed list of included treatment methods.

**BOX 10: Summary conclusions on D9 (physico-chemical treatment not specified elsewhere in this Annex which results in final compounds or mixtures which are discarded by means of any of the operations numbered D1 to D12)**

1) → D9 is used for the physico-chemical treatment (removal or immobilisation) of mostly inorganic pollutants prior to the disposal of waste.

2) → Where provided, the reported measures in place to protect the environment and human health are scarce.

3) → On the one hand, some stakeholders suggested to include in D9 subcategories for the different treatment methods included in D9. However, in the case of a combination of treatments using several techniques, this suggestion may not help to improve the usability of the list.

A more detailed description of the methods included may help improve the description of D9, e.g. a list of the physico-mechanical, chemical, physico-chemical and immobilisation treatments included in D9, and avoid possible overlapping and/or confusion with other codes, e.g. D13 (blending or mixing).

In addition, the clarification of the 'non-interim' nature of D9 (in line with the definition of the Waste Shipments Regulation) would also help avoid confusion with other codes such as D13 (blending or mixing).

On the other hand, the inclusion or clarification of the disposal facilities included in D9 could help ensure a better implementation of the existing measures for the protection of the environment and human health, e.g.:

D9 – IED installation for the physico-chemical treatment of waste falling under the IED.

4) → No overall or operation-specific waste disposal restriction or reduction target for D9.

#### **4.12 D10 Incineration on land**

This section provides a summary of the data and information provided by Member States (MS) and other stakeholders on D10 (incineration on land) disposal operations. Detailed answers provided by MS to the survey are provided in Annexes, see Section 11.6.10.

What is meant by D10 (incineration on land)?

Based on the answers provided, D10 operations are land (onshore) waste incineration or co-incineration plants, used for the purpose of reducing the volume and hazardousness of waste and without energy recovery or below the threshold required to classify as R1 (energy recovery). D10 may also include pyrolysis, gasification or plasma processes if the substances resulting from the treatment are subsequently incinerated, as defined in the IED (HWE). D10 is also used in the specific cases of isolated islands to avoid other waste disposal operations that would not be suitable or appropriate.

The difference between R1 (energy recovery) and D10 is mostly based on energy efficiency requirements laid down in Annex II to the WFD (in the footnote of recovery code R1). However, the use of R1 may be limited to municipal waste incineration in some MS based on the information provided by industry (CEWEP). Stakeholders stressed the importance of defining the difference between R1 and D10 for other waste streams, i.e. other than municipal waste.

What type of waste is mostly disposed of in D10 (incineration on land)?

D10 is mostly used for the incineration of municipal waste, sorting residues, chemical wastes and animal carcasses. D10 is commonly used for the treatment of hazardous waste (e.g. hazardous chemical wastes).

The incineration of biodegradable including food wastes may be restricted or banned in some MS (CEWEP).

CONCAWE also reported the use of D10 mostly for the treatment of hazardous wastes (e.g. sludge, spent chemical/acids/bases, contaminated soil/stones/aggregates/concrete) in petroleum refining industry.

How is D10 (incineration on land) permitted?

The main findings on the legal regimes are the following:

- D10 are permitted pursuant the requirements of the WFD, no permit exemption was reported;
- the permit does not always contain an EIA or an Environmental Screening, the situation differs from MS to MS;
- the permit does not always contain adequate financial security or other equivalent provisions, the situation differs from MS to MS;
- the sites for waste disposal operations are not always inspected prior to commencement of disposal operations;
- the costs of disposal operations are not always covered by the price charged;
- waste acceptance procedures are not always in place; and
- D9 (physico-chemical treatment) waste operations were mostly associated to the IED waste management activity '5.2 Disposal of waste in waste incineration plants or in waste co-incineration plants'.

What are the measures in place for the protection of the environment and human health?

The measures reported by MS are scarce. However, CEWEP reported the implementation of a more comprehensive list of specific measures by operators, including BAT for waste incineration and other specific measures for major accident prevention.

What are the suggestions for the revision?

Suggestions for the revision include the following:

- to rephrase D10 description as '*thermal treatment*' instead of '*incineration on land*' (also supported by HWE).

What is the last suggestion from EU and its MS in the on-going Basel Convention review?

In the Basel Convention, D10 (incineration on land) would correspond to code A10, and the last suggestion from EU for the revision of this code is: '*Thermal treatment other than covered by B6 in Section B (e.g. incineration)*'. The suggestion emphasises the difference with recovery operations (B6).

#### **BOX 11: Summary conclusions on D10 (incineration on land)**

- 1) → D10 is used for the reduction of waste volume or hazardousness by incineration or co-incineration in onshore plants.
- 2) → Where provided, the reported measures in place to protect the environment and human health are scarce. However, industry stakeholders reported the implementation of the BAT for the incineration of waste.
- 3) → A more detailed description of the incineration methods included in D10 may help improve the description of D10, i.e. a list of the thermal treatments (using for example the existing definitions of '*waste incineration*' or '*co-incineration*' in the IED).  
  
The clarification of the waste facilities included in D10 could help ensure a better implementation of the existing measures for the protection of the environment and human health, e.g.:  
  
D10 – IED installation for the disposal of waste in waste incineration plants or in waste co-incineration plants falling under the IED.
- 4) → To introduce restrictions for D10 to progressively ban the incineration of bio-waste (especially municipal bio-waste).

#### 4.13 D11 Incineration at sea

This section provides a summary of the data and information provided by Members States (MS) and other stakeholders on D11 (incineration at sea) disposal operations. Detailed answers provided by MS to the survey are provided in Annexes, see Section 11.6.11.

This operation is prohibited by EU legislation and international conventions. It is currently included in the Basel Convention list of disposal operation, however the last suggestion from EU and its MS for the revision is to delete and merge it with D10 (incineration on land) '*Thermal treatment other than covered by B6 in Section B (e.g. incineration)*' for simplification and broadening.

Industry stakeholders were also in favour of either deletion or clear indication of the prohibition.

##### **BOX 12: Summary conclusions on D11 (incineration at sea)**

1) → D11 is defined as an incineration at sea for the reduction of waste volume or hazardousness by incineration or co-incineration at sea (offshore incineration plants).

2) → D11 disposal operation is prohibited.

3) → D11 may be deleted.

4) → D11 disposal operation is prohibited.

#### 4.14 D12 Permanent storage (e.g. emplacement of containers in a mine, etc.)

This section provides a summary of the data and information provided by Members States (MS) and other stakeholders on D12 (permanent storage) disposal operations. Detailed answers provided by MS to the survey are provided in Annexes, see Section 11.6.12.

What is meant by D12 (permanent storage)?

Based on the answers provided, D12 operations are installations used to permanently store waste, mostly under the ground in for example excavation voids (also supported by HWE and FEAD inputs). D12 includes underground landfills in Austria and Denmark. This code may also include the permanent storage of waste aboveground, even though no MS reported such an example for D12.

What type of waste is mostly disposed of in D12 (permanent storage)?

D12 is mostly used in Finland for the disposal of unspecified waste (no disaggregated data provided). In Denmark, D12 is mostly used for the permanent storage of construction and demolition waste.

CONCAWE reported aggregated data for the landfilling of waste in D1 (deposit into or on to land), D4 (surface impoundment), D12 and D15 (storage), D15 was classified as landfill operation. Petroleum refiners mostly use landfills for the disposal of non-hazardous wastes (e.g. soil/stones/aggregates/concrete).

How is D12 (permanent storage) permitted?

The main findings on the legal regimes are the following:

- D12 are permitted pursuant the requirements of the WFD, no permit exemption was reported;
- the permit does not always contain an EIA or an Environmental Screening, the situation differs from MS to MS;
- the permit does not always contain adequate financial security or other equivalent provisions, the situation differs from MS to MS;



- the sites for waste disposal operations are not always inspected prior to commencement of disposal operations;
- the costs of disposal operations are not always covered by the price charged;
- waste acceptance procedures are not always in place; and
- D12 waste operations were mostly associated to the IED waste management activity '5.6 Underground storage of hazardous waste with a total capacity >50 t'.

What are the measures in place for the protection of the environment and human health?

The measures reported by MS are scarce.

What are the suggestions for the revision?

Suggestions for the revision include the following:

- to limit D12 to underground storage and rephrase as '*permanent underground storage*';
- to include two subcategories: (i) '*permanent underground storage*' and '*permanent aboveground storage*'; instead of '*incineration on land*' (HWE);
- to clarify the difference between D3 (deep injection) and D12;
- to define '*permanent*', '*storage*' and '*emplacement*'

What is the last suggestion from EU and its MS in the on-going Basel Convention review?

In the Basel Convention, D12 (permanent storage) would correspond to codes A3 and A4, and the last suggestions from EU for the revision of these codes are: '*A3: Permanent underground storage (e.g. emplacement of containers in a mine)*' and '*A4: Permanent aboveground storage (e.g. emplacement of containers in a warehouse)*'. The suggestions emphasise the difference between aboveground and underground storage. In both cases the example of '*emplacement of containers*' is provided.

#### **BOX 13: Summary conclusions on D12 (permanent storage)**

- 1) → D12 is used for the underground permanent storage of waste, usually in containers that are placed in excavation voids (e.g. underground mines).
- 2) → Where provided, the reported measures in place to protect the environment and human health are scarce.
- 3) → The description of D12 could be improved by including a clarification of the terms '*storage*' and '*emplacement*', a more detailed description of the methods included, i.e. aboveground and/or underground, and by including the specific landfill classes included in D12, to avoid possible overlapping and/or confusion with other codes, e.g. D1 (deposit into or on to land), D2 (land treatment), D4 (surface impoundment) and D5 (specially engineered landfill).  
  
The clarification of the waste facilities included in D12 could help ensure a better implementation of the existing measures for the protection of the environment and human health, e.g.:  
  
D12 – class D<sub>HAZ</sub> landfill falling under the LfD.
- 4) → To introduce restrictions for D12 to progressively limit D12 to the disposal of hazardous wastes.

#### 4.15 D13 Blending or mixing prior to submission to any of the operations numbered D1 to D12

This section provides a summary of the data and information provided by Members States (MS) and other stakeholders on D13 (blending or mixing) disposal operations. Detailed answers provided by MS to the survey are provided in Annexes, see Section 11.6.13.

What is meant by D13 (blending or mixing)?

Based on the answers provided, D13 operations are installations used for the blending or mixing of waste prior to further treatment and/or disposal. D13 includes *'pre-processing such as, inter alia, sorting, crushing, compacting, pelletising, drying, shredding, conditioning or separating prior to submission to any of the operations numbered D1 to D12'*, as defined in Annex I to the WFD (also supported by FEAD input). In Denmark, Spain, Finland and Romania D13 includes conditioning and packaging of waste, which may overlap with D14 (re-packaging). In addition, in Denmark, Spain Portugal and Romania, D13 includes solidification, which may overlap with D8 (biological treatment).

What type of waste is mostly disposed of in D13 (blending or mixing)?

D13 is mostly used in Finland for the blending and mixing and disposal of unspecified waste (no disaggregated data provided). In Denmark, D13 is mostly used for the blending or mixing of construction and demolition waste (the mineral and solidified fraction mostly).

CONCAWE reported aggregated data for the treatment of waste in D2 (land treatment), D8 (biological treatment), D9 and D13. Petroleum refiners mostly use this option for the treatments of hazardous wastes (e.g. sludge, spent chemical/acids/bases, contaminated soil/stones/aggregates/concrete).

How is D13 (blending or mixing) permitted?

The main findings on the legal regimes are the following:

- D13 are permitted pursuant the requirements of the WFD, no permit exemption was reported;
- the permit does not always contain an EIA or an Environmental Screening, the situation differs from MS to MS;
- the permit does not always contain adequate financial security or other equivalent provisions, the situation differs from MS to MS;
- the sites for waste disposal operations are not always inspected prior to commencement of disposal operations;
- the costs of disposal operations are not always covered by the price charged;
- waste acceptance procedures are not always in place; and
- D13 waste operations were mostly associated to the IED waste management activity involving *'blending or mixing'* – 5.1 (c), and *'pre-treatment of waste for incineration or co-incineration'* – 5.3 (a)(iii) or 5.3 (b)(ii).

What are the measures in place for the protection of the environment and human health?

The measures reported by MS are scarce.

What are the suggestions for the revision?

Suggestions for the revision include the following:

- to rephrase D13 description in order to include other mechanical treatments listed in the footnote of Annex I;
- to merge with D14 (re-packaging);

- to clarify the difference between D13 and R codes in order to avoid possible overlapping, e.g. in the case of mechanical treatment, a fraction of waste may be sent to R12 (exchange of waste prior to recovery), nevertheless the rule to apply for the classification of the waste operation is not clear in that case; and
- to include in the description of D13 that D13 is an interim operation according to the Waste Shipments Regulation, i.e. operation without chemical reaction or change in the physical or chemical properties of the waste, in order to avoid possible overlapping with D8 (biological treatment) and D9 (physico-chemical treatment).

What is the last suggestion from EU and its MS in the on-going Basel Convention review?

In the Basel Convention, D13 (blending or mixing) would correspond to code A13, and the last suggestions from EU for the revision of this code is: '*Blending or mixing prior to submission to any of the operations in Section A*'. This suggestion keeps separated blending or mixing from re-packaging operations (D13 and D14).

**BOX 14: Summary conclusions on D13 (blending or mixing prior to submission to any of the operations numbered D1 to D12)**

- 1) → D13 are mechanical pre-treatment installations, used to prepare the waste for any of the subsequent operations D1 to D12.
- 2) → Where provided, the reported measures in place to protect the environment and human health are scarce.
- 3) → The description of D13 could be improved by rephrasing the description of D13 '*blending or mixing including mechanical pre-treatment*', by including a clarification of the '*interim*' nature of this operation, e.g. any mechanical pre-treatment that does not change the physical or chemical properties of the waste, to avoid possible overlapping and/or confusion with other codes, e.g. D8 (biological treatment), D9 (physico-chemical treatment), and D13.  
  
The description could also be improved by defining and including a disposal/recovery threshold to clarify the difference between D13 and R12 (exchange of waste prior to recovery).  
  
The clarification of the waste facilities included in D13 could help ensure a better implementation of the existing measures for the protection of the environment and human health, e.g.:  
  
D13 – IED installation for the blending or mixing prior to subsequent disposal operation D1 to D12 or pre-treatment of waste for incineration or co-incineration of waste falling under the IED.
- 4) → No overall or operation-specific waste disposal restriction or reduction target for D13.

#### **4.16 D14 Repackaging prior to submission to any of the operations numbered D1 to D13**

This section provides a summary of the data and information provided by Members States (MS) and other stakeholders on D14 (re-packaging) disposal operations. Detailed answers provided by MS to the survey are provided in Annexes, see Section 11.6.14.

What is meant by D14 (re-packaging)?

Based on the answers provided, D14 operations are transfer stations used for the repackaging of waste '*prior to submission to any of the operations numbered D1 to D13*', as defined in Annex I to the WFD (also supported by FEAD and HWE inputs). In Austria, Denmark, Spain and Romania, waste conditioning and/or compaction are also included in D14, which may overlap with D13 (blending or mixing).

What type of waste is mostly disposed of in D14 (re-packaging)?

D14 is mostly used for the repackaging of other industrial non-hazardous wastes (mostly the following fractions: animal and vegetal waste, mineral and solidified waste and chemical and medical wastes) and construction and demolition waste (the mineral and solidified fraction).

CONCAWE reported the use of D14 as a treatment option in combination with recycling or energy recovery. Petroleum refiners mostly use D14 for the treatment of hazardous wastes (e.g. sludge, spent chemical/acids/bases, contaminated soil/stones/aggregates/concrete).

How is D14 (re-packaging) permitted?

The main findings on the legal regimes are the following:

- D14 are permitted pursuant the requirements of the WFD, no permit exemption was reported;
- the permit does not always contain an EIA or an Environmental Screening, the situation differs from MS to MS;
- the permit does not always contain adequate financial security or other equivalent provisions, the situation differs from MS to MS;
- the sites for waste disposal operations are not always inspected prior to commencement of disposal operations;
- the costs of disposal operations are not always covered by the price charged;
- waste acceptance procedures are not always in place; and
- D14 waste operations were mostly associated to the IED waste management activity involving *'repackaging prior to submission to any of the other activities listed in points 5.1 and 5.2' – 5.1 (d)*.

What are the measures in place for the protection of the environment and human health?

The measures reported by MS are scarce.

What are the suggestions for the revision?

Suggestions for the revision include the following:

- to merge D14 with D13 (blending or mixing).

What is the last suggestion from EU and its MS in the on-going Basel Convention review?

In the Basel Convention, D14 (re-packaging) would correspond to code A15, and the last suggestions from EU for the revision of this code is: *'Repackaging prior to submission to any of the operations in Section A'*. This suggestion keeps separated re-packaging from blending or mixing operations (D13 and D14).

**BOX 15: Summary conclusions on D14 (re-packaging prior to submission to any of the operations numbered D1 to D13)**

- 1) → D14 are transfer stations used for the re-packaging of waste and transfer to any of the subsequent operations D1 to D13.
- 2) → Where provided, the reported measures in place to protect the environment and human health are scarce.
- 3) → The description of D14 could be improved by adding in the description examples of 'repackaging' operations, e.g. baling.  
The clarification of the waste facilities included in D14 could help ensure a better implementation of the existing measures for the protection of the environment and human health, e.g.:  
D14 – IED installation for the repackaging prior to subsequent disposal operation D1 to D14 or pre-treatment of waste for incineration or co-incineration of waste falling under the IED.
- 4) → No overall or operation-specific waste disposal restriction or reduction target for D14.

**4.17 D15 Storage pending any of the operations numbered D1 to D14 (excluding temporary storage, pending collection, on the site where the waste is produced)**

This section provides a summary of the data and information provided by Members States (MS) and other stakeholders on D15 (storage) disposal operations. Detailed answers provided by MS to the survey are provided in Annexes, see Section 11.6.15.

What is meant by D15 (storage)?

Based on the answers provided, D15 operations are storage installations used to store the waste '*pending any of the operations numbered D1 to D14*', as defined in Annex I to the WFD. In practice, these may be part of a repackaging installation. According to FEAD and HWE, D15 is used for the temporary storage of waste pending treatment and/or disposal and is limited to a period of 1 year. In Denmark and Portugal the limit of 1 year is applied, whereas in Spain the limit of 1 year is applied only for non-hazardous waste, while hazardous waste is limited to 6 months.

What type of waste is mostly disposed of in D15 (storage)?

D15 is mostly used for storage of other industrial non-hazardous wastes (the mineral and solidified wastes fraction and the chemical and medical wastes fraction).

CONCAWE reported aggregated data for the landfilling of waste in D1 (deposit into or on to land), D4 (surface impoundment), D12 (permanent storage) and D15 (D15 was classified as landfill operation). Petroleum refiners mostly use landfills for the disposal of non-hazardous wastes (e.g. soil/stones/aggregates/concrete).

How is D15 (storage) permitted?

The main findings on the legal regimes are the following:

- D15 is permitted pursuant the requirements of the WFD, no permit exemption was reported;
- the permit does not always contain an EIA or an Environmental Screening, the situation differs from MS to MS;
- the permit does not always contain adequate financial security or other equivalent provisions, the situation differs from MS to MS;
- the sites for waste disposal operations are not always inspected prior to commencement of disposal operations;
- the costs of disposal operations are not always covered by the price charged;

- waste acceptance procedures are not always in place; and
- D15 waste operations were mostly associated to the IED waste management activity ‘5.5 Temporary storage of hazardous waste not covered under point 5.4 pending any of the activities listed in points 5.1, 5.2, 5.4 and 5.6 with a total capacity >50 t excluding temporary storage, pending collection, on the site where the waste is generated’.

What are the measures in place for the protection of the environment and human health?

The reported measures in place for the protection of the environment and human health are similar to the measures laid down in the LfD/WAC Decision requirements. However, not all MS reported specific measures in place. In addition, waste acceptance criteria and procedures seem significantly less covered by specific measures.

What are the suggestions for the revision?

Suggestions for the revision include the following:

- to merge D15 with D12 (permanent storage) and D13 (blending or mixing);
- to clarify the ‘temporary’ nature of the storage by including a time limit; and
- to clarify the difference between D15 and R codes, e.g. R13 (storage of waste pending recovery) in order to avoid possible overlapping.

What is the last suggestion from EU and its MS in the on-going Basel Convention review?

In the Basel Convention, D15 (storage) would correspond to code A16, and the last suggestions from EU for the revision of this code is: ‘Temporary storage prior to submission to any of the operations in Section A’. This suggestion keeps separated temporary storage from re-packaging.

#### **BOX 16: Summary conclusions on D15 (storage pending any of the operations numbered D1 to D14)**

- 1) → D15 are storage installations used for the temporary storage of waste pending any operations D1 to D14.
- 2) → Where provided, the reported measures in place to protect the environment and human health are mostly in line with the measures laid down in the LfD/WAC Decision requirements. Possible additional guidance for waste acceptance criteria and procedures.
- 3) → The description of D15 could be improved by rephrasing D15 as ‘temporary storage’, by defining and including a maximum storage period for hazardous, non-hazardous and inert waste.  
  
The description could also be improved by defining and including a disposal/recovery threshold to clarify the difference between D15 and R13 (storage of waste pending recovery).  
  
The clarification of the waste facilities included in D15 could help ensure a better implementation of the existing measures for the protection of the environment and human health, e.g.:  
  
D15 – IED installation for the temporary storage of hazardous waste.
- 4) → No overall or operation-specific waste disposal restriction or reduction target for D15.

### **4.18 Unlisted codes or suggestions for new codes**

No unlisted D code was reported by MS.

The JRC provided examples of possible new codes taken from the on-going review of the Basel Convention Annex IV in the survey. These examples were supported by Austria and Denmark, whereas Estonia, Spain, Lithuania, Portugal, and Romania considered it not necessary to include new codes in the revised Annex I (see Annexes Section 11.3.1).

1 In particular the following suggestions were supported by Austria and/or Denmark:

- 2 • release to the atmosphere (e.g. venting of compressed or liquefied gases), which corresponds to the  
3 proposal for A9A9 from EU and its MS in the on-going review of the Basel Convention Annex IV  
4 (supported by Denmark);
- 5 • final disposal operations other than covered by D1 (deposit into or on to land), D2 (land treatment),  
6 D3 (deep injection), D5 (specially engineered landfill), D6 (release into water body except  
7 seas/oceans), D7 (release to seas/oceans including seabed insertion), D10 (incineration on land), D12  
8 (permanent storage) and release to the atmosphere, which corresponds to the proposal for A11 from  
9 EU and its MS of the on-going review of the Basel Convention Annex IV (supported by Austria and  
10 Denmark, with a remark from Denmark that D8 (biological treatment) and D9 (physico-chemical  
11 treatment) – A12 and A13 respectively in the Basel Convention – are non-interim operations also  
12 considered as final disposal operations); and
- 13 • immobilization (e.g. stabilization, solidification) prior to submission to any of the operations in this  
14 Annex (if not include in D9); which corresponded to a proposal from EU and its MS in the on-going  
15 review of the Basel Convention Annex IV, but has been replaced by a new proposal to include it in  
16 A13 – i.e. D9 in Annex I to the WFD (supported by Austria).

17  
18 The addition of new codes was not supported, neither by FEAD nor by HWE.

19 In general, industry stakeholders were not in favour of either adding new or merging existing codes. They rather suggested to  
20 clarify existing ones in order to mostly avoid possible overlaps between different codes.

21  
22 In the currently on-going review of the Basel Convention Annex IV, the following new codes, not covered by any D code, are  
23 proposed for inclusion by EU and its MS:

- 24 — A9 Release to the atmosphere (e.g. venting of compressed or liquefied gases);
- 25 — A11 Other treatment than covered by A1 to A10; this corresponds to a catch-all code; and
- 26 — A17 Other treatment than covered by A12 to A16 above prior to submission to any of the operations in  
27 Section A; this corresponds to a catch-all.

28  
29 In addition, the suggestion from EU is to split D12 (permanent storage) into:

- 30 — A3 Permanent underground storage (e.g. emplacement of containers in a mine); and
- 31 — A4 Permanent aboveground storage (e.g. emplacement of containers in a warehouse).

32  
33 Other new codes have been proposed by different EWG members within the framework of the Basel Convention Annex IV  
34 review, but they have not been supported by EU and its MS (see **Table 9** in Section 11.3.1).

35 The proposal to include a new code for releases to the atmosphere (A9) may require a clarification/definition on the type of  
36 waste disposal operation targeted. '*Gaseous effluents emitted into atmosphere*' are currently excluded from the scope of the  
37 WFD. In addition, it may create confusion or overlapping with thermal treatment installations (e.g. incineration).

38  
39 The proposal to include a new catch-all code (A11) that would include any operation not covered by codes A1 to A10, i.e.  
40 deposition on to or into land, underground or aboveground permanent storage, release to water bodies and sea/oceans,  
41 thermal treatment or release into atmosphere, may also require a clarification/definition on the type of operations. On the one  
42 hand, it is not clear if this code would include prohibited operations such as illegal dumping of waste, or other operations. On  
43 the other hand, it may also create confusion with the second catch-all code suggested for treatment operations prior to  
44 disposal (A17), which would cover any treatment operation prior to disposal or further treatment that is biological treatment,  
45 manual, physical/mechanical, physical/chemical, chemical treatment, immobilisation, blending or mixing, repackaging or  
46 temporary storage.

1 The proposal to include a new catch-all treatment code (A17) may also require further clarifications as it is not clear which  
2 type of treatment would be covered by this code. In practice, if not clarified, this code may be used by default by any  
3 operators performing a mix of treatment operations.

4  
5 Finally, the proposal to split permanent storage into underground (A3) and aboveground storage (A4) provides a more precise  
6 description of the operations currently included in D12 (permanent storage).

#### 8 **4.19 Re-ordering or re-grouping of D codes**

9 In general, stakeholders were in favour of re-grouping together on the one hand non-interim operations, and on the other hand  
10 interim operations, to clearly differentiate between the two types of operations. This was also suggested by the EU and its MS  
11 in the on-going Basel Convention review and included in the last suggestions from EU for the revision.



## 5 Summary overview with respect to the project's objectives

This section provides a summary overview of the lessons learned from the data and information collected.

The summary overview is divided into the 4 objectives of this project presented in Section 1.2 and recalled here:

- objective 1: to understand the situation in each Member State for each of the waste disposal operations listed in Annex I and for any other existing unlisted waste disposal operation;
- objective 2: to understand the relevance of the impacts on the circular economy as well as on human health and the environment that can be associated to each of the identified waste disposal operations;
- objective 3: to ascertain the feasibility and relevance for (further) EU regulation of waste disposal operations. In particular, in the case of the LfD and the WAC Decision to detect and propose areas for legal and/or technical improvement; and
- objective 4: to analyse the relevant information in view of proposing (an) overall and/or operation-specific waste disposal restriction(s) and reduction target(s).

### 5.1 Objective 1: current situation

Based on the data and information collected, **Table 4** summarises the differences between the waste disposal code descriptions provided in Annex I to the WFD and the descriptions provided by MS in the survey.

The green cell in the table indicates that the MS provided the same or a similar description to the code description provided in Annex I to the WFD. A similar description may include additional clarifications or subcategories in the description but is not different from the initial description provided in the Annex. The red cell indicates a different description that may either overlap with other D codes or not be in line with the description provided in Annex I to the WFD. An example of this is the case of D12 (permanent storage) description provided by Hungary where D12 is defined as temporary or not-permanent storage, whereas it is defined as '*permanent storage*' in the Annex.

The table points out that mostly the same definitions were provided by MS. However, in the case of D12 (permanent storage), D13 (blending or mixing) and D14 (re-packaging), not all the descriptions provided were the same or similar as a number of provided definition included potential confusions and/or overlaps with other codes.

**Table 4:** Summary table of the reported implementation of the waste disposal operation codes

D code	AT	DK	EE	ES	FI	HR	HU	LT	LV	NL	PT	RO
D1												
D2	P										NU	NU
D3	NU		P						NU		P	P
D4	NU*	NU*	NU*				NU*			NU*	NU*	
D5											NU	
D6	P		NU	NU	P		NU	NU	NU	NU	NU	NU
D7											NU	NU
D8												
D9												
D10												
D11		P	NU	P	NU	NU	NU	NU	NU	NU	P	NU
D12	NU		NU						NU		NU	NU
D13												
D14												
D15												

\* possibly not all the MS counted tailing ponds under code D4 (surface impoundment)

Green indicates that the same or a similar description was provided, i.e. including clarifications or more detailed but not different, red indicates a different description provided, and white or blue indicate that no answer was provided

P stands for prohibited and NU stands for not used

No unlisted waste disposal operation was reported.

Finally, it should be stressed that not all the MS have the same interpretation of a landfill operation. For example, in Austria any disposal of waste on to land is defined as landfilling, and therefore D4 (surface impoundment) may fall under the LfD.

## 5.2 Objective 2: protection measures and impact on circular economy

Based on the data and information collected, **Table 5** summarises the reported information on:

- the EIA/Screening inclusion in the permit;
- the reported possible link with the IED waste management activities listed in Annex I to the IED (Categories of activities referred to in Article 10);
- the possible definition of the waste disposal operation as a landfill operation; and
- the type of specific measures reported.

For the latter, the assessment is based on the reporting of specific technical information on the measures implemented and the coverage of the different categories of measures, as laid down in the LfD and the WAC Decision.

Where the specific measures included a technical description, they were counted as specific measures.

Where general references to legislation or general statements were provided without further details, the measures were assessed as not specific.

The LfD requirements were used as a check list to collect data and information on protection measures. Where the specific measures were assessed as specific and where the different categories of requirements laid down in the LfD were covered by the specific measures reported, the type of specific measures was assessed as 'similar to the LfD requirements' and is reported in the last column.

1 The level of details in the information that was provided by MS and stakeholder organisations on protection measures does  
2 not allow to assess the uptake of the latest technological developments such as the use of artificial barriers, geotextiles or  
3 any specific basal structure or capping structure.

4  
5 In addition, where specific BAT were reported as protection measures, the type of specific measures reported is indicated as  
6 'BAT'.

7  
8 Finally, **Table 5** highlights (in red) the waste disposal operations for which the protection measures to ensure the objectives of  
9 Article 13 in the WFD (Protection of human health and the environment) were assessed as not appropriate.

10 These are D6 (release into water body except seas/oceans) and D7 (release to seas/oceans including seabed insertion) waste  
11 disposal operations for which:

- 12 — the EIA/Screening is not always included in the permit;
- 13 — the waste disposal operations are not linked to any IED waste management activity;
- 14 — no BREF was assessed to cover the waste disposal operation;
- 15 — the LfD requirements do not apply; and
- 16 — the specific measures reported were not assessed as 'similar to the LfD' or 'BAT'.

1 **Table 5:** Summary table of the reported protection measures and applicable BREFs

D code	Permit always contains an EIA/ Screening?*	Waste installation may be linked to an IED activity?*	Waste facility or installation possibly covered by a BREF**?	Waste operation reported to be possibly defined as a landfill?*	Type of specific measures reported***
D1	NO	YES	YES – MWEI	YES	Similar to the LfD requirements <sup>4*</sup>
D2	NO	YES	NO	YES	
D3	NO	YES	YES – MWEI	YES	
D4	NO	YES	YES – MWEI	YES	
D5	NO	YES	YES – MWEI	YES	Similar to the LfD requirements
D6	NO	NO	NO	NO	
D7	NO	NO	NO	NO	
D8	NO	YES	YES – WT	NO	BAT
D9	NO	YES	YES – WT	NO	BAT
D10	NO	YES	YES – WI	NO	BAT
D11	NO	NO	NO	NO	Prohibited
D12	NO	YES	NO	YES	
D13	NO	YES	YES – WT	NO	
D14	NO	YES	YES – WT	NO	
D15	NO	YES	YES – WT	NO	Similar to the LfD requirements <sup>5*</sup>

\* Based on data and information reported by stakeholders

\*\* Authors' assessment of possible BREFs applicable based on their scope and the description of the D operation.

MWEI stands for Management of Waste from Extractive Industries

WT stands for Waste Treatment

WI stands for Waste Incineration

\*\*\* Based on data and information reported by stakeholders and authors' assessment

<sup>4\*</sup> site selection was less covered by specific measures

<sup>5\*</sup> waste acceptance criteria and procedures less covered by specific measures

In addition to the assessment of the protection measures, the other objective was to understand the relevance of the impacts on the circular economy.

For that purpose and in relation with point 6 of Article 11 in the WFD, which refers to '*the setting of preparing for re-use and recycling targets for construction and demolition waste and its material-specific fractions, textile waste, commercial waste, non-hazardous industrial waste and other waste streams, as well as preparing for re-use targets for municipal waste and recycling targets for municipal bio-waste*', the following waste streams were defined and used to assess the impact on circular economy:

- construction and demolition wastes<sup>5</sup> (coloured in blue): defined as all the wastes classified in Chapter 17 of the list of waste (all waste codes 17 XX XX);
- textile wastes (coloured in orange): defined as all wastes classified in Eurostat waste category as W076;
- municipal bio-waste (coloured in green): defined for the purpose of this study as all wastes classified as W09, according to Eurostat classification, but limited to those classified as municipal wastes, according to the list of waste (i.e. wastes classified as 20 XX XX within the W09 waste category);

<sup>5</sup> The table of equivalence provides the link between the codes provided in the list of waste and Eurostat classification (see Annexes Section 11.4). Chapter 17 waste codes are included in a number of W codes (Eurostat classification).

- other municipal wastes (coloured in dark grey): defined for the purpose of this study as all the municipal wastes excluding bio-wastes (20 XX XX – municipal bio-wastes); and
- other industrial non-hazardous wastes (coloured in pink): defined for the purpose of this study as all the non-hazardous wastes excluding wastes from Chapters 15, 16, 17, 18 and 20 in the list of waste (i.e. packaging, unspecified, construction and demolition because already stand-alone category, human and health care, and municipal wastes) similarly to the Eurostat industrial waste indicator<sup>6</sup>.
- it was not possible to differentiate between commercial wastes and household wastes. The lack of a definition of commercial wastes and the current classifications of waste streams do not allow to differentiate between these two waste streams considered of similar nature.

Based on the data provided, it is important to report that:

- construction and demolition waste accounted for 2% and was mostly classified as mineral and solidified wastes (99%);
- textile waste accounted for less than 0.1% and consisted of only (100%) of recyclable waste;
- other industrial non-hazardous wastes accounted for 95% of the total wastes reported; and the reported other industrial non-hazardous wastes consisted mostly (98%) of mineral and solidified wastes;
- municipal bio-wastes also accounted for less than 0.1% and consisted only (100%) of animal and vegetal wastes; and
- other municipal wastes accounted for 3% of the total wastes reported and consisted mostly of mixed ordinary wastes (94%).

**Table 6** aims at underlining the waste disposal operation codes that may have a relevant impact on the circular economy, i.e. those waste disposal operation codes that are used for the disposal of one of the five specific waste streams defined above.

In order to focus on the main codes, the disposal share of each disposal operation was calculated for each of the specified waste streams as the amount of the specific waste stream disposed of in a disposal operation (one D code) divided by the total amount of the specific waste stream disposed of in all the disposal operations (all D codes).

The three most used D codes for each waste stream were considered as they accounted for more than 80% of the specific waste stream disposal.

For example, based on the reported data, 54% of the total of the mineral and solidified fraction of the construction and demolition waste is disposed of in D1 (deposit into or on to land), 23% in D5 (specially engineered landfill) and 14% in D15 (storage), and therefore 91% of the mineral and solidified fraction of the construction and demolition waste is sent to D1+D5+D15. The disposal of the remaining 9% of the mineral and solidified fraction of the construction and demolition waste is not reported in the table.

For textile wastes, 59% of the total textile wastes disposed of is deposited in D1 (deposit into or on to land), 20% is landfilled in D5 (specially engineered landfill) and 8% is sent to D14 (re-packaging).

The mineral and solidified fraction of the other industrial non-hazardous wastes are deposited in D1 (90%), D5 (4%) and D15 (4%).

Municipal bio-waste is sent to D15 (61%), D1 (20%) and D8 biological treatment (9%).

Finally, the mixed ordinary waste fraction of the other municipal wastes are mostly sent to D5 (44%), D1 (36%) and D10 incineration on land (17%). In addition, the disposal rates (calculated as the total amount of waste disposed of / total amount of waste generated) are also reported.

Finally, in addition to the disposal share, the minimum and maximum disposal rates are also reported in **Table 6** per waste streams and waste disposal operation. For each specific waste stream and disposal operation, the disposal rate was calculated as the amount of waste disposed of in a specific D code, divided by the total amount of waste generated. The total

<sup>6</sup> <https://www.eea.europa.eu/data-and-maps/indicators/industrial-waste-indicator>

- 1 disposal rate was calculated as the total amount of waste disposed of in all D codes, divided by the total amount of waste
- 2 generated.

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1 **Table 6:** Summary overview of the impact on circular economy, i.e. disposal share and disposal rates of a number of specific waste streams

D code	Mineral and solidified fraction of the construction and demolition waste	Textile waste	Mineral and solidified fraction of the other industrial non-hazardous	Municipal bio-waste	Mixed ordinary fraction of the other municipal
<b>D1</b>	Disposal share*: 54% Disposal rate**: 2-11%	59%* 20-41%**	90%* 6-93%**	20%* <0.5-68%**	36%* 6-100%** <sup>3*</sup>
<b>D2</b>					
<b>D3</b>					
<b>D4</b>					
<b>D5</b>	Disposal share*: 23% Disposal rate**: <0.5-19%	20%* 4-17%**	4%* <0.5-4%**		44%* 9-58%**
<b>D6</b>					
<b>D7</b>					
<b>D8</b>				9%* <0.5%**	
<b>D9</b>					
<b>D10</b>					17%* <0.5%**
<b>D11</b>					
<b>D12</b>					

D code	Mineral and solidified fraction of the construction and demolition waste	Textile waste	Mineral and solidified fraction of the other industrial non-hazardous	Municipal bio-waste	Mixed ordinary fraction of the other municipal
D13					
D14		8%* <0.5-8%**			
D15	Disposal share*: 14% Disposal rate**: <0.5-34%		4%* <0.5-25%**	61%* <0.5%-100%**	
<b>Total disposal rates**</b>	<b>12-36%**</b>	<b>22-77%**</b>	<b>6-99%**</b>	<b>15-100%**<sup>3*</sup></b>	<b>48-100%**<sup>3*</sup></b>

\* Based on data reported by Denmark, Estonia, Croatia, Latvia, Lithuania and Romania, the disposal share calculated as the amount of waste disposed of in a specific D code divided by the total amount of waste disposed of.

\*\* Based on data provided by Estonia, Latvia, Lithuania and Romania, the minimum and maximum waste disposal rates calculated as the amount of waste disposed of divided by amount of waste generated.

<sup>3\*</sup> The actual maximum calculated value exceeds 100% as MS reported amounts of waste disposed of superior to amounts of waste generated.



### 5.3 Objective 3: suggestions for legal and/or technical improvements

**Table 7** provides an overview of the identified technical improvements that may help a more harmonised implementation, along with the possible legal improvements based on both the information reported by stakeholders and the analysis of EU legislation provided in Section 2.1.1 (see **Table 2**).

The column on technical improvements lists a number of terms identified in Section 4 and for which providing a definition would help improve a harmonised implementation of the list of codes.

In addition to the definitions, a number of suggestions to be included in the description of each D code is also provided.

The column on legal improvements provides a number of references to existing EU legal texts and documents for which the D code may apply but the link (existing or not) is not clear in the text and therefore could be improved by either clarifying the list of codes or the legal texts and documents. In addition to the existing EU legal texts, the last column provides an overview of possible new guidance or requirements to help ensure better implementation of the requirements and objectives of Article 13 in the WFD: Protection of human health and the environment. This is mainly the case for the LfD which defines landfill but does not provide any link with existing D codes. As a result, MS may have different interpretations of which D code is covered or not by the LfD and WAC Decision. As a consequence, the same confusion may apply to any EU legal text that makes reference to the landfill operation but not explicitly to the codes such as in the case of the IED (and the Waste Treatment BREF/BAT), the EIA Directive or the Animal By-Products Regulation. For the Waste Incineration BREF/BAT, only D10 (incineration on land) is possible and therefore no confusion with other codes is possible. In the case of the Extractive Waste Directive (EWD), the improvement could be to clarify whether or not extractive waste facilities categories are to be included in the list of D codes, which seems the case for D4 (surface impoundment) for example. If extractive waste facilities (Category A or not) are to be considered as D codes, a clarification either in the list itself or in the EWD could be considered as a legal improvement.

Finally, the last column highlights D codes for which a new guidance or additional legal requirements may help improve the implementation of the requirements set in Article 13 of the WFD. This includes a suggestion for a progressive phasing out of the waste disposal operation, as well as the development of new guidance or requirements where a possible gap has been identified in Section 4.

**Table 7:** Summary table of the suggestions for legal and/or technical improvements

D code	Technical improvement: Definitions	Description of the code	Legal improvements: Existing legislation	New guidance requirements /
<b>D1</b>	into, on to, deposit		LfD/WAC, IED, EWD, MWEI BREF, EIA, ABP	
<b>D2</b>		in-situ land treatment	LfD/WAC, IED, EIA	NEW
<b>D3</b>	pumpable, deep injection, underground emplacement		LfD/WAC, IED, EWD, MWEI BREF, Water Framework Directive*, EIA	NEW
<b>D4</b>	surface impoundment		LfD/WAC, IED, EWD, MWEI BREF, EIA	NEW
<b>D5</b>	specially engineered		LfD/WAC, IED, EWD, MWEI BREF, EIA, ABP	
<b>D6</b>	water body	Natural and/or artificial lake	EWD, EIA	
<b>D7</b>		emplacement (or not) of	EWD**, EIA	NEW

D code	Technical improvement: Definitions	Description of the code	Legal improvements: Existing legislation	New guidance requirements /
		containers		
D8		non-interim operation, list of treatments	IED, WT BREF, EIA	NEW
D9		non-interim operation, list of treatments	IED, WT BREF	
D10		list of treatments	IED, ABP	
D11	-	-	Prohibited	-
D12	storage, emplacement	underground, aboveground	LfD/WAC, IED, EIA, ABP	
D13	a disposal/recovery threshold to differentiate with R12 (exchange of waste prior to recovery)	interim operation, list of treatments	IED, WT BREF, EIA	
D14		list of treatments	IED, WT BREF, EIA	
D15	temporary, a disposal/recovery threshold to differentiate with R13 (storage of waste pending recovery)	temporary storage	IED, WT BREF, EWD, EIA	

\* MS reported to include deep injections in porous formations, therefore this may include injection of water and re-injection of pumped groundwater as defined in the first and second indents of Article 11(3)(j) of Directive 2000/60/EC

\*\* Extractive waste facilities are possible in theory but either not used or in the phasing out phase in practice in the EU-27

LfD is for Landfill Directive, WAC Waste Acceptance Criteria Decision, IED Industrial Emissions Directive, WT BREF Best available techniques REference document for Waste Treatment, EWD Extractive Waste Directive, MWEI BREF Best available techniques REference document for the Management of Waste from Extractive Industries, EIA Environmental Impact Assessment Directive, ABP Animal By-Products Regulation

#### 5.4 Objective 4: overall and/or operation-specific waste disposal restriction(s) and reduction target(s)

Based on the analysis of the EU legislation provided in Section 2.1, a number of specific streams were already identified to be covered by a waste disposal restriction or a waste disposal reduction target. Often these restrictions or reductions are formulated in an indirect way, e.g. through minimum requirements on preparing for re-use, recycling or recovery:

- Paper, metal, plastic and glass household waste → preparing for re-use and recycling ≥50 %
- Non-hazardous construction and demolition waste → preparing for re-use, recycling and material recovery ≥70 %
- Municipal waste → preparing for re-use and recycling ≥65 % (2035 or 2040) + landfill ≤10 % (2035 or 2040)
- Waste batteries and accumulators → collection rate ≥40 % + recycling efficiencies ≥50-75%
- WEEE → collection rate ≥65 % + recovery rate ≥55-85%
- ELV → reuse and recovery rate ≥95 % + reuse and recycling ≥85%
- Waste suitable for recycling or other recovery → shall not be accepted in landfills by 2030

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In addition to these existing restrictions and targets, a number of new operation-specific waste disposal reduction targets and restrictions are provided in **Table 8** based on the assessment of the data and information collected in this study, including the current situation, the protection measures in place and the impact on circular economy (considering in particular the existing restrictions and targets, as well as the calculated disposal shares and rates based on the reported amounts of disposed and generated wastes).

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**Table 8:** Summary table of the reported prohibitions and non-use of specific waste disposal operations and overview of the possible new restriction/reduction targets

D code	Operation prohibited in:	Operation not used in:	Possible new restriction/reduction targets**
<b>D1</b>			To introduce restrictions to progressively limit to inert mineral and solidified fraction of other industrial non-hazardous waste, e.g. extractive waste and dredging spoils.
<b>D2</b>	AT	PT, RO	To introduce restrictions to progressively limit to very specific cases and to progressively phase out.
<b>D3</b>	PT, RO	AT, LV	To introduce restrictions to progressively limit to extractive waste, e.g. drilling muds.
<b>D4**</b>		AT, DK, EE, HU, NL, PT	To introduce restrictions to progressively limit to extractive waste, e.g. tailings.
<b>D5</b>		PT	To ban the landfilling of all waste suitable for recycling, including municipal bio-waste (bio-waste mostly disposed of in D15, D1). To introduce additional reduction targets for the landfilling of the mineral and solidified fraction of construction and demolition wastes and other industrial non-hazardous wastes (best performing MS disposed of <0.5% of these fractions in D5).
<b>D6</b>	AT, FI	EE, ES, HU, LT, LV, NL, PT, RO	To introduce restrictions to progressively limit to very specific cases and to progressively phase out.
<b>D7</b>		PT, RO	To introduce restrictions to progressively limit to very specific cases and to progressively phase out.
<b>D8</b>			
<b>D9</b>			
<b>D10</b>			
<b>D11</b>	Prohibited	Prohibited	Prohibited.
<b>D12</b>		AT, EE, LV, PT, RO	
<b>D13</b>			
<b>D14</b>			
<b>D15</b>			

\* Based on data and information reported by stakeholders and authors' assessment

\*\* Possibly not all MS included tailing ponds in D4 (surface impoundment) operations when reporting data and information on D4.

## 6 Conclusion

Following collection and analysis of the data and information provided by stakeholders, and following the analysis of the current situation (objective 1), the protection measures and the impact on circular economy, the suggestions for legal and/or technical improvement and the possible overall and/or operation-specific waste disposal restriction(s) and reduction target(s), the following can be concluded:

1) The existing EU legislation and documents cover in principle most of the waste disposal operations, providing specific requirements and technical information on protection measures to help ensure that waste disposal operations (including treatment prior to disposal) are carried out without endangering human health and without harming the environment. Either the LfD and the WAC Decision or the IED and the EWD cover in principle most of the operations. However, a number of possible gaps have been identified: D2 (land treatment), D3 (deep injection), D4 (surface impoundment), D6 (release into water body except seas/oceans) and D7 (release to seas/oceans including seabed insertion) may not be covered by the LfD/WAC, IED or EWD in which case additional guidance may be necessary to ensure the objectives of Article 13 in the WFD.

2) a) The situation in MS regarding bans and restrictions is not harmonised, neither the permitting and registration requirements.

However, no MS reported permit exemptions. Other legal regimes were not reported, even though the EWD may apply in a number of cases reported by MS. In addition, for the disposal operations not covered by the LfD, MS reported little information on protection measures.

The requirements of the EWD and the measures provided in the BAT for the Management of Waste from Extractive Industries were not reported by MS. Certain operations such as D6 (release into water body except seas/oceans) or D7 (release to seas/oceans including seabed insertion) may clearly need further guidance/requirements to achieve the objectives of Article 13 in the WFD. Nevertheless, treatment operations prior to disposal or other treatment and incineration on land (i.e. D8 biological treatment, D9 physico-chemical treatment, D10 incineration on land, D13 blending or mixing, D14 repackaging and D15 storage) are usually covered by the IED and the BAT for Waste Treatment or Waste Incineration.

b) In most of the cases, MS have the same interpretation of the operations that fall under each D code. However, the classification of the specific D code as a landfill falling under the LfD or an extractive waste facility falling under the EWD may differ from MS to MS. In addition, for D12 (permanent storage), D13 (blending or mixing) and D14 (repackaging), the national interpretation may include a significant difference, including a contradiction with the description provided within Annex I to the WFD.

No unlisted waste disposal operation was reported by MS.

From the data on waste flows and disposal operations, it appears that the EWD and the reporting of extractive waste is not consistent in all the MS. This is of particular importance for D1 (deposit into or on to land), D3 (deep injection), D4 (surface impoundment) and D5 (specially engineered landfill) operations.

3) Further detailed analysis to explain the differences among MS disposal figures was not possible based on the provided information (only six MS reported disaggregated data).

4) Similarly to the BREFs under the IED or EWD, which are revised, the LfD and the WAC Decision may be revised to reflect the latest technological changes.

In addition, a guidance document such as a handbook may be developed to ensure a harmonised interpretation of waste disposal operations in the EU.

Finally, a number of disposal operations may be progressively limited to specific waste streams or phased out e.g. D2 (land treatment), D3 (deep injection), D6 (release into water body except seas/oceans) or D7 (release to seas/oceans including seabed insertion) (see **Table 8**).

## 1 7 List of abbreviations and definitions

ABP	Animal By-Products
AT	Austria
B	Banned
BAT	Best Available Techniques
BE	Belgium
BEMP	Best Environmental Management Practices
BG	Bulgaria
BREF	Best available techniques REference document
CEWEP	the Confederation of European Waste-to-Energy Plants
CONCAWE	a division of the European Petroleum Refiners Association
COP	Conference Of the Parties (UN)
CY	Cyprus
CZ	the Czech Republic
DE	Germany
DG	Directorate General
DK	Denmark
EC	European Commission
EE	Estonia
EEC	European Economic Community
EFTA	European Free Trade Association
EIA	Environmental Impact Assessment
EL	Greece
ELV	End-of Life Vehicles
EP	European Parliament
ETRMA	the European Tyre and Rubber Manufacturers' Association
EU	European Union
EWD	Extractive Waste Directive
EWG	Expert Working Group
FEAD	the European Federation of Waste Management and Environmental Services
FI	Finland
FR	France
Gt	Giga-tonne or billion tonnes
HAZ	Hazardous (waste)
HR	Croatia
HU	Hungary
HWE	Hazardous Waste Europe
ICT	Information and Communications Technology
IE	Ireland
IED	Industrial Emissions Directive
IT	Italy
JRC	Joint Research Centre
kt	kilo-tonne or thousand tonnes
LfD	Landfill Directive
LT	Lithuania
LU	Luxembourg
LV	Latvia

MS	Member State
Mt	Mega-tonne or million tonnes
MT	Malta
MWEI	Management of Waste from Extractive Industries
NA	Not Applicable
NHAZ	Non-Hazardous (waste)
NL	the Netherlands
NU	Not Used
OSPAR	Oslo-Paris Convention (UN)
P	Prohibited
PCB	PolyChlorinated Biphenyls (and PolyChlorinated Terphenyls)
PL	Poland
POP	Persistent Organic Pollutants
PT	Portugal
R	Restriction
RO	Romania
RoHS	Restriction of the use of certain Hazardous Substances
SE	Sweden
SI	Slovenia
SK	Slovakia
SRD	Sectorial Reference Document
TAC	Technical Adaptation Committee
UN	United Nations
WAC	Waste Acceptance Criteria
WEEE	Waste Electrical and Electronic Equipment
WFD	Waste Framework Directive
WI	Waste Incineration
WT	Waste Treatment

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